PROCEEDINGS OF

TASSA ANNUAL CONFERENCE

25-26 MARCH, 2006

DREXEL UNIVERSITY, PHILADELPHIA, PA

TURKISH AMERICAN SCIENTISTS AND SCHOLARS ASSOCIATION

Conference Theme:

Knowledge and Innovation to Benefit Society

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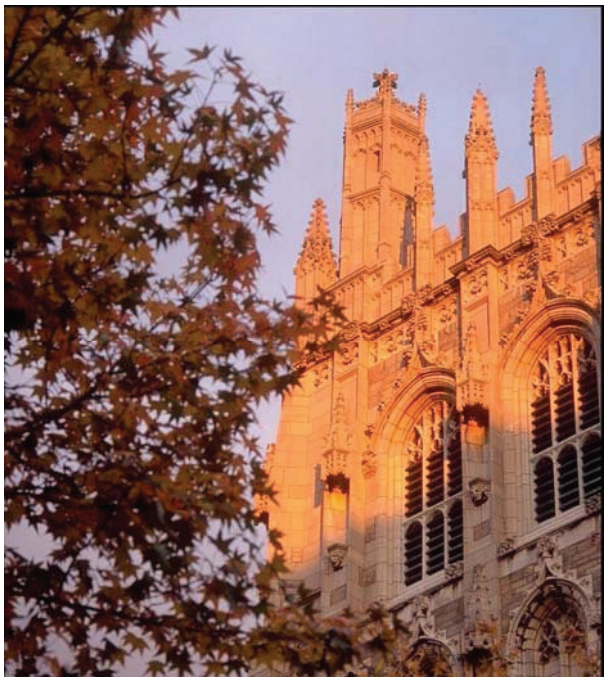

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Philadelphia, PA, USA

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TURKISH-AMERICAN SCIENTISTS AND SCHOLARS ASSOCIATION

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From H.E. Nabi Şensoy

Ambassador of the Republic of Turkey to the United States

Distinguished Scientists and Scholars and Respectable Members of TASSA, It is a pleasure to be able to address you. I wish to first point out that, as the Turkish Ambassador, being in the company of so many accomplished Turkish scholars and scientists here makes me proud. I also wish to express my thanks to the leadership of TASSA for their vision and tireless efforts which have made this young organization strong and vibrant in such a short time. No organization can live, let alone flourish as TASSA has done, without a supportive and involved membership, and in that regard, I would like to also thank all of the members. You are the backbone of this organization.

Turkey and the United States enjoy relations firmly anchored in shared values and we cooperate on a wide range of issues. Our countries are close allies and friends that have parallel strategic interests and a political vision founded in establishing peace, security and prosperity in the world. I believe that our relations will grow even deeper in the future.

Yet it would be inaccurate to describe Turkish – American relations through official contacts and government relations alone. One important aspect of our bilateral ties that we must not loose sight of is what we may refer to as the human factor. This can be defined as the network of relations between Turks and Turkish - Americans and Americans here in the United States. In that sense, it is fair to say that the human factor plays a pivotal role in our relations since the understanding of each others way of life and character is vital to further developing these relations. This aspect of our ties can be best handled by the interactions of persons like yourselves with other Americans on a daily basis. These relations create a dynamic of familiarity and understanding that is a pillar of prime importance for our bilateral ties. TASSA members, as accomplished and well integrated members of this society, play a significant role in keeping that pillar upright and strong.

I wish to once again congratulate all TASSA members and the leadership on a successful conference and look forward to meeting with you again.

Message from Amb. Dan Fried,

Assistant Secretary of State for European and Eurasian Affairs

I am sorry that I cannot be with you in Philadelphia today, but wanted to make sure that you know how much the State Department values the work of the Turkish American Scientists and Scholars Association. The Turkish people have created a secular democracy with a predominantly Muslim society, established on a foundation of scientific learning and tolerant faith.

This spirit of tolerance and broadminded pursuit of the great questions of science and philosophy live on in the Turkish Republic, and in TASSA. As the great Turkish statesman Mustafa Kemal Ataturk once said:

"We do not consider our principles as dogmas contained in books said to come from heaven. We derive our inspiration, not from heaven, or the unseen world, but directly from life."

We in the United States are fortunate that so many of you are now living and working here as professors, researchers and teachers.

As a career diplomat, I've spent my life trying to build bridges between nations. Today, I want to tell all of you -- as scientists, professors, researchers, writers -- that the United States, Turkey, and the world need your efforts to advance the blend of reason and tolerant faith that form the core of the values our two countries share. It is in this way that we can escape the spiral of violence and terrorism. You are the real bridges, and your knowledge, your example, and your teaching are the pillars on which new bridges will be built. You are rational examples for a world in which the cruel and the irrational remain too prevalent.

You can and should be diplomats as well as scientists. In your work and your daily lives, share your respect for scientific inquiry, for reason, and for tolerant debate with the people your lives touch. As scientists, teachers, and engineers, you are sources of inspiration for every Turk, American, or anyone else who dreams of a better, safer, more tolerant world.

Please accept my best wishes for a successful conference.

From Süleyman Gökoğlu

President, TASSA

His Excellency Ambassador Nabi Sensoy, Honorable Dignitaries, Distinguished Scientists, Esteemed Scholars, Dear Colleagues, Friends and Guests,

As the inaugural President of TASSA, I would like to express my great pleasure and honor for reaching this major milestone. It is indeed inspiring to address a crowd of incredible talent, of most eminent brain power, and of elite scholarship who have gathered for knowledge, for innovation, and ultimately for the benefit of society. This is the theme that brought us all together at this 2006 TASSA Annual Conference.

Within a year of the seating of its first Board of Directors, I am proud to report that TASSA has taken many strides towards fulfilling its vision to build a sustainable science bridge between the US and Turkey. It has launched a significant program called the Visiting Scholars Program. It has initiated a potential landmark activity called the TASSA-TUBITAK workshops; in fact, the second of this intended series will take place this coming May. It has been earning and gaining the respect of many reputable institutions for science and technology and for policy-making, both in North America and across the Atlantic. It has drawn nearly 1700 scientists and scholars into its pool of registered members, doubling the count from last year's.

Today, TASSA is being recognized by many people as an organization that undertakes new initiatives, that undersigns ground-breaking activities, and that establishes first-ever connections and joint collaborations. We have many new happenings in our organizational and governance structure too; we have recently passed our newly amended bylaws, we have established a new membership category for institutional members, and we have constructed a brand new membership database structure, which we will announce soon. The word "new" is becoming almost a trademark of TASSA. And here we are, at the second annual conference of TASSA, at yet another new location in the city of Philadelphia.

I would like to express my most sincere appreciation first and foremost to our hosts at Drexel University for their hospitality and generosity to make this major TASSA activity a reality. Thank you, Drexel! I would also like to thank all of our distinguished speakers, our session moderators, our poster presenters, our conference organizing committee, and our numerous and tireless volunteers. Last but certainly not least, I would like to express my gratitude to our sponsors, to our donors, and to the Turkish Embassy. Without them, this conference could not have been possible. Thank you all for your attendance, participation, contributions and for sharing our vision.

Dear TASSA Members and Conference Participants,

We would like to welcome you to the 2006 TASSA Annual Conference hosted by Drexel University in Philadelphia. We are certain that the conference program fulfills the expectations of our distinguished community and serves its theme "Knowledge and Innovation to Benefit Society." It showcases the accomplishments of many eminent American, Turkish, and Turkish-American scientists and scholars and establishes a forum for many young and experienced researchers to explore and develop new collaborative initiatives. We are pleased that you did not miss this rare opportunity to listen to the experts the world is talking about and to experience the enriching venue.

The list of honorary speakers and dignitaries is a meaningful tribute to the commitments of both the U.S. and Turkey for promoting scientific cooperation between the two countries. Prof. Nuket Yetis, the Acting President of the Scientific and Technological Research Council of Turkey (TUBITAK), will deliver the keynote address on the first day. Dr. Gazi Yaşargil, honored as the Neurosurgeon of the Century in 1999 by the Journal of Neurosurgery, will give the keynote speech on the second day. Key policy making organizations such as the U.S. State Department, TUBITAK, the National Science Foundation (NSF), and the American Association for the Advancement of Science (AAAS) will participate with prominent representatives on various panels.

The technical group sessions will feature world-renown speakers under themes reflecting today's emphasis on "bio" sciences, namely, bio-nanotechnology, bio-chemical physics, and bio-medicine. While the social science session will focus on discussing the relevance of the Turkish political model in a globalizing world, the session concentrating on meeting the needs of the private sector for R & D will host top-level executives of major U.S. and Turkish companies.

The final session of the conference is devoted to exploring new visions for the Turkish higher education system. About ten presidents of major universities in Turkey will participate in discussions with the representatives of other relevant institutions of Turkish higher education to tackle the challenges for a brighter future.

TASSA is delighted to accept nearly ninety poster presentations this year. The contributions came mostly from graduate students and postdoctoral fellows in academia as well as institutions and included participants from Turkey, Europe, Canada, and the U.S. TASSA is proud to support a few of these colleagues for their conference travel expenses.

Thank you for coming to Philadelphia to share our excitement and pride.

Selcuk Guceri PhD
Conference Chair

Suleyman Gokoglu PhD
TASSA President&Conference CoChair

Friday, March 24, 2006

19:00 - 21:00 **Welcome Reception (A.J. Drexel Picture Gallery, Main Building)**

Saturday, March 25, 2006

8:00 - 8:45 **Breakfast (Behrakis Hall, Creese Student Center)**
Registration (Bossone Research Center)

8:45 - 9:00 **Welcome and Introduction**

Suleyman Gokoglu, TASSA & Selcuk Guceri, Drexel University

9:00 - 9:30 **Honorary Speakers: Role of Turkey in the New Geopolitical Order**

H.E. Nabi Sensoy, Ambassador of the Republic of Turkey
Matthew Bryza, US Department of State
Kenan Sahin, TIAX LLC
Introduced by Selcuk Ozgediz, World Bank Group

9:30 - 10:30 **Keynote Address**

Nuket Yetis, TUBITAK
Introduced by Nihat Bilgutay, Drexel University

10:30 - 10:45 **Coffee Break**

10:30 - 18:30 **Poster Presentations/Exhibits**

10:45 - 12:15 **Technical Group Sessions: Engineering & Applied Sciences**

Theme: Bio-nanotechnology
Panelists: Selim Unlu, Boston University (Moderator)
Hur Koser, Yale University
Mehmet Sarikaya, University of Washington

12:15 - 13:15 **Luncheon (Behrakis Hall, Creese Student Center)**

13:15 - 14:45 **Technical Group Sessions: Natural Sciences**

Theme: Biochemical physics
Moderator: Selcuk Cihangir, Fermi Nat. Accelerator Lab
Panelists: Ivet Bahar, University of Pittsburgh
Ibrahim Cemen, Oklohoma State University
Ahmet Yildiz, UC San Francisco

14:45 - 15:00 **Coffee Break**

15:00 - 16:30 **Technical Group Sessions: Social Sciences, Arts and Humanities**

Theme: Relevance of the Turkish Political Model in a Globalizing World
Moderator: David Cuthell, The Institute of Turkish Studies
Panelists: Ersel Aydinli, The George Washington University
Marcie Patton, Fairfield University
Omer Taspinar, The Brookings Institution

16:30 - 16:45 **Coffee Break**

16:45 - 18:15 **Technical Group Sessions: Health & Biomedical Sciences**

Theme: Bio-medicine
Moderator: Gonul Velicelebi, TorreyPines Therapeutics, Inc.
Panelists: Serap Aksoy, Yale University
Aziz Sancar, University of North Carolina
Murat Tuzcu, The Cleveland Clinic

18:30 - 21:00 **Reception Dinner (Behrakis Hall, Creese Student Center)**

Hosted by Drexel University

Sunday, March 26, 2006

8:00 - 9:00 **Breakfast (Behrakis Hall, Creese Student Center)**

9:00 - 9:45 **Keynote Address**

M. Gazi Yasargil, University of Arkansas for Medical Sciences
Introduced by Cemal Ekin, TASSA Vice-President

9:00 - 17:00 **Poster Presentations/Exhibits**

9:45 - 11:15 **Meeting Private Sector Needs for R&D - From Research to Commercialization**

Moderator: Yilmaz Arguden, TAIK (Turkish-US Business Council)
Panelists: Izak Bencuya, Fairchild Semiconductor
Gorkem Guven, Hittite Microwave Istanbul
Tibet Mimaroglu, Beko
Cengiz Ultav, Vestel

11:15 - 11:30 **Coffee Break**

11:30 - 12:45 **Challenges in Building a Sustainable Science Bridge between the US and Turkey**

Moderator: Mirat D. Gurol, San Diego State University
Panelists: Guldal Buyukdamgaci Alogan, TUBITAK
Norman Neureiter, AAAS Ctr. for Sci., Tech. & Security Policy
Osman Shinaishin, National Science Foundation
Alex King, US Department of State

12:45 - 14:00 **Luncheon (Behrakis Hall, Creese Student Center)**

14:00 - 16:30 **New Visions on Higher Education: Challenges for Turkey**

Moderator: Banu Onaral, Drexel University
Panelists: Omer Cebeci, TUBITAK
Ustun Erguder, Istanbul Policy Center, Sabanci University
Tuncalp Ozgen, Turkish Higher Education Council

Discussants: Representatives of Turkish Universities and Other Invitees
Ural Akbulut, President, Middle East Technical University
Suheyl Batum, President, Bahcesehir University
Metin Lutfi Baydar, President, Suleyman Demirel University
Ugur Buyukburc, President, Harran University
Nilufer Egrican, Vice-President, Yeditepe University
Faruk Karadogan, President, Istanbul Technical University
Tahsin Kesici, President, TOBB Economics and Technology University
Tuncalp Ozgen, President, Hacettepe University
Ayse Soysal, President, Bogazici University
Semra Ulku, President, Izmir Institute of Technology

16:30 - 17:00 **Closing Remarks**

Suleyman Gokoglu, TASSA; Selcuk Guceri, Drexel University

MARCH 25, 2006 SATURDAY

NATIONAL SCIENCE, TECHNOLOGY AND INNOVATION INITIATIVE: A NEW PATH FOR A NEW HORIZON

Nüket Yetiş, Ph.D.
Acting President, TÜBİTAK
Professor of Industrial Engineering, Marmara University

Your Excellencies, Mr. Ambassador, and Distinguished Friends,

I welcome you with the best wishes of Turkey. Today, I have some news regarding the challenges and opportunities of Turkey's science and technology system. First of all, I will interpret the challenges and try to underline the interaction between science and technology, innovation, and the national competitiveness. Second, I will try to benchmark Turkey's place in the world in science and technology. Finally, I will present the new TUBITAK initiatives on science, technology and innovation that have been initiated during the last two years.

National Competitiveness

I will start with national competitiveness. Simply put, the national competitiveness is the ability of a country to raise the incomes of its citizens under free global market conditions.

Michael Porter´s Diamond Model for Competitive Advantage of Nations [1] gives us a view to understand the competitive position of a country in global markets. In the framework of his model Porter points out Factor Conditions such as labor, natural resources, capital and infrastructure which are necessary to compete in a given industry.

Turkey has more land and more population than all the ten new EU members combined together. As for "age demographics", excluding some Middle Eastern countries, our country has the best to offer in the world. But, unfortunately, this is not going to be a sustainable advantage by the year 2025, and we are going to have the same demographic challenges that Western countries have today. The age demographics is not a long-run advantage for Turkey. Besides the young population, we have skilled labor readily available and in this regard Turkey is in a better situation.

As for "productivity", Turkey is below EU-10, but above China. Furthermore, if you look at the global market shares for space, electronics, computers, medicine, and equipments, Turkey barely has any presence except in electronics. If we look at "national competitiveness", Turkey is near the bottom. This has begun to change but we are still the 48th country out of 60. Clearly we are not satisfied with our performance, and we are equipped with necessary conditions to improve our standing in this regard. This is one of the challenges I have alluded to earlier.

Regarding "human development", Turkey ranks 88th out of 188 countries. This is our place among the contemporary nations. That is why we should change. "We should have something different today than yesterday" as Mevlana says. Of course, at TÜBITAK, our duty rests with science, technology, and innovation, and so I will continue with those.

If you ask whether technology, science, and innovation really affect the national competitiveness, the answer is "yes". If you do have research and development, your quality of living, production, competitiveness, market share, and profitability will increase. Then you are going to have more money to invest in R&D. This is a kind of circle: If you do not invest in science and technology, you cannot increase your quality of products, production, and competitiveness, market share and profitability. This is up to you, it is in your hands.

In today's world, all the developed nations use science, technology, and innovation in a very robust way. G.R. Mitchell in his study named "The Global Context for U.S. Technology Policy" suggests that the impact of technology to the economic development of world's leading economic powers in the last 50 years is as follows:

- **Germany 78%**
- **France 76%**
- **United Kingdom 73%**
- **Japan 55%**
- **USA 50%**

The numbers prove how technology and innovation affect economic and social development. I would like to focus on this issue from another point of view. In Figure 1, you see how much a nation spends for their R&D out of their GDP. You see that the more it invests for R&D, the more competitive it becomes.

The same correlation is true for national competitiveness versus number of scientists. The more scientists you have,

the more competitive you are. Unfortunately, with respect to the number of scientists Turkey pales in comparison with the countries benchmarked. This is one of the greatest challenges and bottlenecks of Turkey's science and technology.

Let us focus on national science and technology indicators in Figure 2. We normalized the values of EU 15 which is the black pentagon. The relative places of Germany, Japan and U.S. are easily seen. In order to see where Turkey stands, we have to zoom in this black pentagon as shown on the right. We see that Turkey is behind Spain and Hungary.

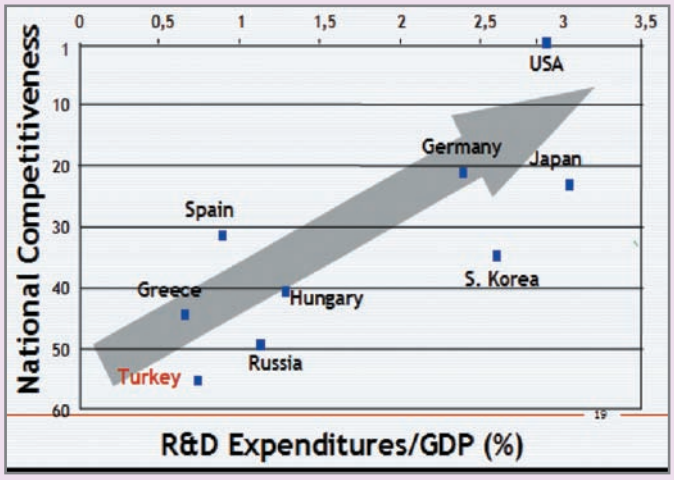

Figure 1: National Competitiveness versus % of GERD in GDP
(IMD, Competitiveness Year Book-2004 / OECD, Main Science and Technology Indicators-2004)

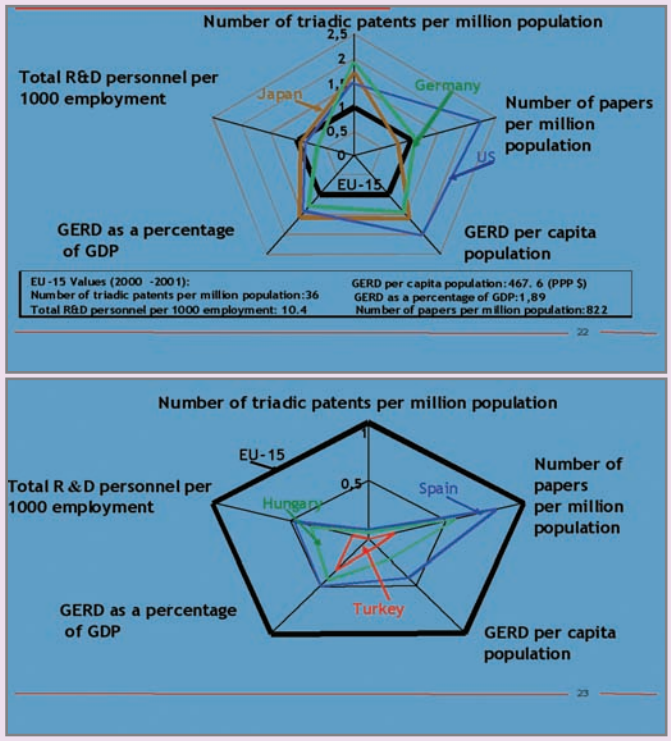

Figure 2: Portrait of selected countries concerning S&T indicators.

We carried out an in-depth analysis of the possible causes of this situation with several groups and identified the following issues:

- No strategic approach in dispending funds
- Inadequate or misallocated resources
- Inadequate demand for STI (science, technology and innovation) both in individual and in decision making level
- Lack of quality and quantity of scientists
- Lacking a result and performance-oriented approach

Evolution of Turkish Science and Technology System

After stating the current situation of Turkish Science and Technology, now I would like to give you some information about the evolution of Turkish Science and Technology System. The establishment of TÜBİTAK in 1963 is the basic milestone of Turkish Science and Technology. During the second stage, the first national science policy document was prepared under the leadership of Mr. Nimet Özdaş. The third stage was between 1993 and 2003. During this third stage, public R&D funds were allocated to the industrial firms for the first time. The fourth stage has been initiated in 2004 and this presentation will focus mostly on this last stage.

The highest policy making body for science, research, and innovation is the Supreme Council for Science and Technology (SCST). It has been established in 1983. The Council is chaired by the Prime Minister and composed of representatives from government, university, industry, and NGOs. TÜBİTAK serves as the secretariat of this Council. Regrettably, even though it was established in 1983 and it is supposed to convene twice a year by legislation, the SCST did not hold its first meeting until 1989. The September 2004 meeting was just the 10th meeting of the Council although it should have been the 42nd meeting. Decisions are binding the public institutions, in the form of a Prime Minister circular, and they coordinate the activities by various agencies, and review and evaluate science and research policies. Fortunately, since the year 2004, it has been convened regularly twice a year.

The Supreme Council of Science and Technology, Turkish Atomic Energy Council, TÜBİTAK, Ministry of Industry and Trade, The Turkish Academy of Sciences, Higher Education

Council, Small and Medium Sized Industry and Development Organizations, Turkish Accreditation Board, State Planning Organization, Ministry of Education, Foreign Trade and Treasury are the policy actors of Turkish Science and Technology System. On the other hand, the state universities, private universities, research institutes, national research centers and also Turkish industry are the performers of Turkish R&D. Besides this role, another duty of TÜBİTAK is to perform R&D via its institutes. This is the "big team" of Turkish science and technology system.

National Science, Technology and Innovation Initiative

In year 2004, at the 10th meeting of SCST, the Turkish Research Area has been established with common objectives, principles and priorities. All actors of the system are supposed to work toward a common goal to solve social problems, to increase the quality of life for Turkish citizens, to enhance their welfare, and to improve their national competitiveness.

Again, in year 2004, SCST took two basic decisions for the STI targets for the year 2010. According to these targets, the R&D spending of Turkey will be increased from the year 2002 figure of 0.67% of our GDP to 2% of our GDP. The number of FTE scientists is planned to be increased from 24,000 to 40,000 though this is clearly a very ambitious goal. Most recently, in its March meeting, the Council established science, technology, and innovation performance indicators.

The strategic objectives of Turkish Research Area: are to enhance the quality of life, to find solutions to social issues, to increase national competitiveness and to raise public awareness on STI. That is why we put in place a new science and society policy at TÜBİTAK. Furthermore, following the meeting of the SCST in 2004, Turkish government for the first time allocated 446 million New Turkish Liras (YTL) as an additional amount to the 2005 R&D budget. That money was allocated for the strengthening of the Turkish Research Area. It will not be the first and the last. This year, that additionally allocated budget has increased by 20%.

Public R&D funds in Turkey are allocated via TÜBİTAK, SPO, KOSGEB, TTGV and other organizations. The public R&D funds have increased substantially in recent two years. It was about 271 million YTL in 2002, and in the year 2006, it will reach 1.3 billion YTL with a more than four times increase as compared to 2002. This is the money directly injected into to the Turkish Science and Technology System.

Besides these decisions, the Prime Minister himself initiated four basic programs. These are:

- Defense Research Program
- Space Research Program
- Scientist Education and Development Program
- Science and Society Program

As I mentioned before, the first challenge was the lack of strategic objectives and strategic approach, and the second was allocation of money for research. Now, I would like to talk about the third challenge which is the lack of sufficient demand for science and technology. We initiated a two pronged approach to stimulate the demand for science, technology, and innovation. The first was from the industry side. Turkish Government grants about 50%-60% of the expenditures made by the industry for their R&D activities. The funds that are allocated to private sector have reached $100 million. Our goal is to double these funds by next year.

The second component of our approach was the public institutions program. The SCST recently decided that all the ministries, public administration, general directories, and municipalities are expected to create their own research programs and complete their arrangements as soon as possible. As part of this decision, numerous "common mind" meetings [2] have been organized with the stakeholders of public institutions to evaluate their strengths, weaknesses, opportunities and threats. Through these meetings, key research areas have been determined. Moreover, together with Public Institutions Research Program, other two new programs have been launched by TÜBİTAK. These are, National Defense Research Program, and National Space Research Program. I would like to give some recent data concerning these new programs:

- As of February 2006, public institutions and research institutions submitted 142 joint projects for the Public Institutions Research Program, 11 of these are funded, 39 are revised and 77 have been rejected by the panels. Total requested budget of submitted proposals is about 66 million YTL, and for the funded ones, it is about 30 million YTL.
- Under the National Defense Research Program, 26 projects were submitted to TÜBİTAK, with a total budget of 170 million YTL. Contracts of four projects have been have been signed and come into-force with a total budget of 10.6 million YTL.
- 238 project proposals were submitted for the National Space Research Program. About one-third of those have been funded.

The fourth challenge was the number of researchers. The GERD/GDP ratio for EU is about 1,9 % but in order to reach Lisbon Strategy goals they want to increase it to 3%. For this to happen, EU will need 1,700,000 FTE researchers. At the moment, they have about 1,150,000 researchers. If we look at Turkey, in order to increase the GERD to 2% we need 20,000 more FTE researchers. We have to almost double the current number of FTE researchers. If we compare the number of FTE researchers with Belgium, which has a population of 10 million, the number of Belgian FTE researchers is more than double of our FTE researchers. These are the challenges of Turkey's science and technology.

In order to improve the research capacity, we plan to carry out the following tasks:

- increase the quality and quantity of scientists,
- improve the research infrastructures,
- stimulate national and international scientific links,
- improve science literacy in the society.

We also launched new programs which are in line with our capacity development strategy. For the first time, TÜBİTAK has begun to fund the social sciences and humanities with the approval of new TÜBİTAK act. We firmly believe that research in social sciences and humanities is an essential component of scientific studies and exploration and without which it is not possible to acquire social and economic wealth. Rapidly, the social sciences and humanities program has become one of the most demanded programs of TÜBİTAK:

We also created an Early Research Career Program in response to Turkey's lack of scientists in key scientific subjects such as mathematics, biology, and sociology, among other basic science disciplines. This program aims to promote the basic sciences among bright undergraduates. Our message is very clear. We say that, "If you are among the first 5000 of students in the Turkish University Entrance Exam, and if you choose to study in one of the thematic areas supported via this program, your scholarship is ready for the bachelors degree. If you would like to pursue a graduate degree, your graduate degree fellowship is also ready. We have increased the amount of the scholarship to internationally competitive amounts. Our aim is to attract the brilliant young minds of Turkey to pursue careers".

The other key initiative that has been in effect for the two years is the National Young Investigator program. More recently, we designed and put in place a universal research program which is called EVRENA to attract scientists from all over the globe to collaborate with their fellow researchers in Turkey. Another new program is "Techno-entrepreneurship program" which is aiming to promote entrepreneurship among young people.

In addition to these new initiatives, two new programs are on the way:

- The National and International Networks Program,
- Global & Mega Research and Development Centers Program.

As a part of Global & Mega Research and Development Centers Program, we aim to encourage multinational companies to establish their own global R&D centers in Turkey.

We also see a need to develop an infrastructure for the researchers to have access to more scientific publications, online. In one of our institutes, ULAKBİM, we manage the whole academic network. We pay for it and all academia institutions use it. We are working to reach more databases and electronic journals via ULAKBİM and have our academia use this service free of charge.

Science, technology, and innovation management is one of the weak areas in Turkey. To help alleviate this problem, we held project management workshops for project coordinators. In addition, we will have a PICMET conference in Istanbul this June. Prior to the conference, we are going to have a week-long intensive technology management training for senior managers responsible for R&D in public institutions, research centers, universities, private organizations and NGOs. Our aim is to bring together all stakeholders of Turkish Research Area and to increase the technology management awareness through all R&D actors in Turkey.

TÜBİTAK has the duty to manage and coordinate the international scientific interactions between scientists in Turkey and scientists of other countries. We have several bilateral and multilateral cooperation agreements. Also, we are the national coordinator of FP Programs of EU. Even though it is the first time that Turkey has fully joined the EU research programs, the total budget of consortia in which Turkish researchers take part is around 2 billion €.
To create a synergy and promote joint research with Turkish scientists in US, I would like to give brief information about the possible ways of linking the research activities with TÜBİTAK. This can be done via our international programs.

We have a bilateral scientific research program between TÜBİTAK and NSF.

The following programs can be tapped for research collaborations between Turkish and US scientists:

- TÜBİTAK International Research Fellowship Program for PhD students
- TÜBİTAK International Graduate Fellowship Program
- TÜBİTAK International Postdoctoral Research Program
- Visiting Scientist Fellowship Program
- The EVRENA Program

Beside the several challenges I have outlined, I also have some good news for you. The allocation of R&D funds in the 2005 TÜBİTAK budget was very carefully analyzed and determined. The total amount was 415 million YTL and about 80% of this was allocated within 9 months, about half of it has been allocated for the projects started before 2006. Therefore, in 2006 we can allocate about 300 million YTL for new projects.

I want to present you some examples of where the Turkish science and technology frontier currently stands. For example, the TÜBİTAK-UEKAE CMOS microchip technology is one of them. The development of the in-house first generation 3-micron CMOS technology took about 17 years. The second generation technology took 8 years, the third one took about 3 years. The fourth generation, 0.35-micron CMOS technology, took about 2 years to materialize. All of these generations were designed and developed at TÜBİTAK-UEAKE.

We have also started to export high-tech products, some of which are listed below:

- TEMPEST exported to Irish banking sector
- Document Observing Equipment exported South Korea and Hungary.
- The Glass Measuring Equipment exported to Israel
- Data transfer and Crypto Equipment sold to NATO

Conclusion

I have described the challenges TÜBİTAK had faced at the beginning of 2004, and tried to describe you some of our achievements at TÜBİTAK within the last two years. We have a strategic approach now; we have great financial resources, and we rely on international standards and norms like Frascati, Oslo, Canberra to evaluate our proposal submission, evaluation, and awarding processes. We have established new programs and work-flow mechanisms. We have restructured and are still restructuring the project evaluation and selection system. We have developed a performance monitoring and assessment system, enhanced our administrative and legal infrastructure, and we are beginning to intensify our efforts on national and international collaborations.

In conclusion, a nation will export those goods that make most use of the “factors” with which it is relatively well-endowed. But, in sophisticated industries, a nation does not inherit, but create the most important factors of production. These are the skilled human resources and scientific base. We can say that Turkey is blessed with both. Let us work together to create a prosperous and peaceful future for our globe.

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Nüket Yetiş *was born in Eskişehir, Turkey in 1950. She was educated at Bogazici University. She received her MBA in Operations Management at the same university and Ph.D. in Industrial Engineering at the Istanbul Technical University.*

She is the former dean of Marmara University Faculty of Engineering (MUFE) (1994-2000) where she established Master and Doctoral Programs of Engineering Management. She led Continuous Quality Improvement activities at MUFE which is the first Turkish public organization that became a finalist at the European Quality Award in 2000. She also led MUFE to be the first applicant and finalist of European Quality Award in higher education.

She was the Director of the Turkish Institute for Industrial Management (2000-2003). She became Acting President of the Scientific and Technological Research Council of Turkey (TÜBITAK) in 2004.

Her major interests are engineering and technology management, quality management and reengineering, production and resources management. She has several national and international academic publications.

She led several projects for institutions and companies both in public and private sector on continuous quality improvement and reengineering at the Turkish Institute for Industrial Management.

She is a member of several professional societies including Turkish Quality Association (KalDer), EFQM Education Community of Practice, EFQM HealthCare Working Group. She is married with two daughters.

BIO-NANO TECHNOLOGY
MODERATOR: SELIM UNLU

APPLICATIONS OF MICRORESONATORS: FROM PHOTODETECTORS TO BIOLOGICAL SENSING AND IMAGING -A STORY OF INTERNATIONAL CALLOBORATION

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Optical resonance is one of the key properties of light enabling important devices such as interference filters and lasers. The importance of optical resonance has long been recognized and the interference due to multiple reflections had in fact been analyzed theoretically by George Airy nearly two centuries ago. Optical resonator has become a household name since Fabry and Perot. Over the past decade a new family of optoelectronic devices has emerged whose performance is enhanced by placing the active device structure inside a Fabry-Perot resonant microcavity. In such structures, the device functions largely as before, but is subject to the effects of the cavity, mainly wavelength selectivity and a large enhancement of the resonant optical field. We have demonstrated a variety of RCE photodetectors [1] in compound semiconductors and Si, operating at optical communication wavelengths ranging from 850nm to 1550nm. In late 1990s, we established an international collaboration between Boston University and Bilkent University (Prof. Ekmel Özbay) on the development of high performance RCE photodetectors [2]. The collaboration has been

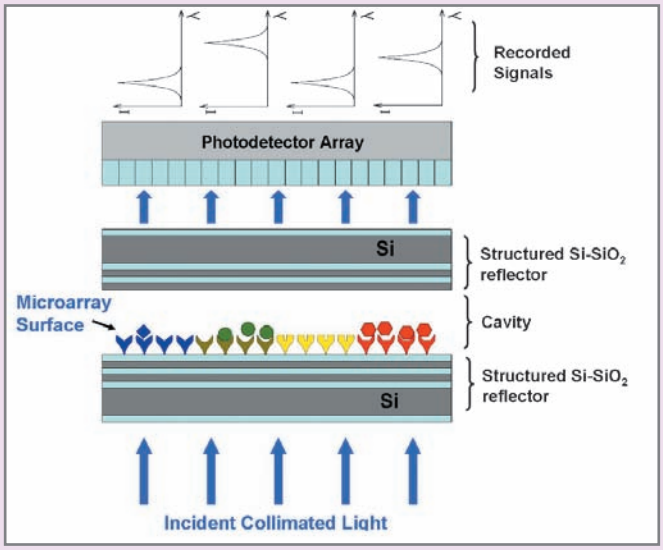

Fig. 1. Schematic representation of RCIB principle. The wavelength of the incident light is swept, and local transmission is recorded by a photodetector array (camera).

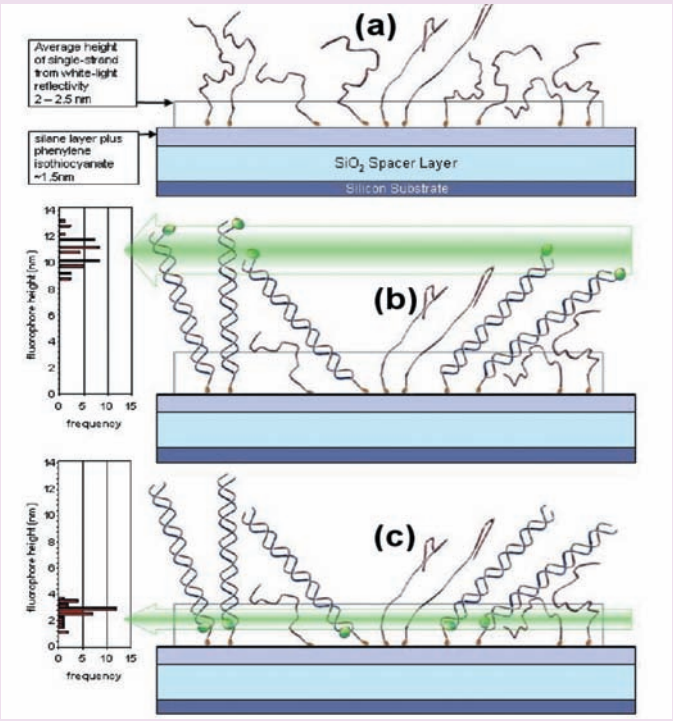

Fig. 2. (a) Schematic representation of signle-stranded DNA. Average height of the film is determined by white light spectroscopy. After hybridization with the complementary strand with a fluorophore label bound to the distal end (b) and proximal end (c).

extremely fruitful resulting in record high-speed performances. We have demonstrated very high speed Schottky type photodetectors operating at 900 nm [3] and 800-850 nm wavelengths. To meet the low cost requirement Si based receiver circuits are the most viable option, however, manufacturing high speed, high efficiency silicon photodetectors presents a technical challenge. We developed commercially reproducible silicon wafers with a 90% reflectance buried distributed Bragg reflector (DBR) that enabled Si-RCE photodetector arrays for optical interconnects. In collaboration [4] with Prof. Yusuf Leblebici of Swiss Federal Institute in Lausanne (EPFL) we demonstrated Si-RCE photodetectors that have 40% quantum efficiency at 860 nm, a FWHM of 25 ps, and a 3dB bandwidth in excess of 10 GHz. We also demonstrate Si-RCE 12x1 photodetector arrays that have been fabricated and packaged with silicon based amplifiers to demonstrate the feasibility of a low cost monolithic silicon photoreceiver array [5].

Building upon our experience in optical resonance we have recently developed techniques in biological sensing and imaging. While the use of optical resonators for sensing applications has been studied for many years, the unique capabilities of Resonant Cavity Imaging Biosensor (RCIB) have emerged from innovations in fabrication of high-reflectivity Si substrates (as a result of Si-RCE detector research described above) and the interdisciplinary research environment. The basic operation principle of RCIB is shown in Fig. 1. Two highly reflecting lossless mirrors are positioned with their reflecting surfaces facing one another to form the cavity which is illuminated by a collimated tunable laser. At specific wavelengths and at specific feature positions, light resonates within the cavity, building up energy, corresponding to a peak in the recorded transmitted light. A camera (or photodetector array) is positioned to image the transmitted intensity from each feature on the cavity surface. The resonant condition at each feature will be modified by the local binding of target biomolecules to probes patterned and immobilized to one of the reflectors. Sensitivity is proportional to cavity finesse F (or enhancement factor) which can be as much as 100 or higher. A microarray fabricated on the surface of one of the reflectors in the cavity may contain features of different immobilized DNA sequences. We propose to detect at least 100 features simultaneously, and to demonstrate a clear development path towards arrays with as many as 100,000 independent features.

We have developed a new interferometric technique in fluorescent imaging called spectral self-interference fluorescent microscopy (SSFM). In SSFM, analysis of the spectral oscillations due to the self-interference from the direct and reflected emission of a fluorophore several wavelengths above a reflecting surface yields the vertical position of that fluorophore to within a nanometer. Using a combination of white-light reflection spectroscopy and SSFM, we have estimated the shape of coiled single-stranded DNA, the average tilt of double-stranded DNA of different lengths, and the amount of hybridization (See Fig.2) [6]. The data provide important new proofs of concept for the capabilities of novel optical surface analytical methods of the molecular disposition of DNA on surfaces. The determination of DNA conformations on surfaces and hybridization behavior provide information required to move DNA interfacial applications forward and thus impact emerging clinical and biotechnological fields. In this interdisciplinary project including biotechnologists, physicists and engineers, we also collaborated with Prof. Aksun of Koç University [7].

In summary, we have applied engineering and physics principles of optical resonators to develop practical optoelectronics devices, and high-throughput label-free biological sensors as well as demonstrating a new modality of high resolution fluorescence imaging technique.

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M. Selim Ünlü *is a Professor of Electrical and Computer Engineering, Biomedical Engineering, and Physics at Boston University. He received the B.S. degree in electrical engineering from Middle East Technical University, Ankara, in 1986, and the M.S.E.E. and Ph.D. in electrical engineering from the University of Illinois, Urbana-Champaign, in 1988 and 1992, respectively. Prof. Ünlü's interests are in research and development of photonic materials, devices and systems focusing on the design, processing, and characterization of semiconductor optoelectronic materials and devices, as well as high resolution imaging and sensing of biological materials. During 1994-1995, Dr. Ünlü served as the Chair of IEEE Laser and Electro-Optics Society, Boston Chapter, winning the LEOS Chapter-of-the-Year Award. He was awarded National Science Foundation Research Initiation Award in 1993, United Nations TOKTEN award in 1995 and 1996 and both the National Science Foundation CAREER and Office of Naval Research Young Investigator Awards in 1996. In 2005, he was selected as a recipient of LEOS Distinguished Lecturer Award. He has authored and co-authored over 200 technical articles and holds several patents. His professional service posts include the current chair of IEEE/LEOS Nanophotonics committee, an Associate Editor for IEEE Journal of Quantum Electronics and a VP of LEOS.*

MAGNETIC LIQUIDS FOR LAB-ON-A-CHIP AND RAPID DIAGNOSTICS APPLICATIONS

Hür Köşer
Yale University

Ferrofluids are stable colloidal suspensions of nanosize ferromagnetic particles in either aqueous or oil-based media. Typically, the magnetic particles are magnetite (an iron oxide) with diameters ranging between 5-15 nanometers (nm), and can be obtained as precipitates of simple chemical reactions [1]. These sizes are such that the thermal motion of particles at room temperature is sufficient to prevent them from agglomerating due to magnetic attraction, and from settling down due to gravity. A surfactant layer covers the surface of the nanoparticles and helps overcome the Van der Waal's forces by preventing the particles from coming too close, either by steric or electrostatic repulsion.

Ferrofluids have found their way into a variety of applications, such as sealing, damping and blood separation; in dilute, functionalized forms, they have also been used as drug delivery and MRI contrast agents [2]. These complex liquids offer attractive alternatives to moving mechanical components in miniaturized cooling, pumping and integrated micro-total-analysis-systems for chip-scale chemistry and biology [3]. Water-based ferrofluids can also be made bio-compatible, rendering them useful in novel cell manipulation and sorting schemes.

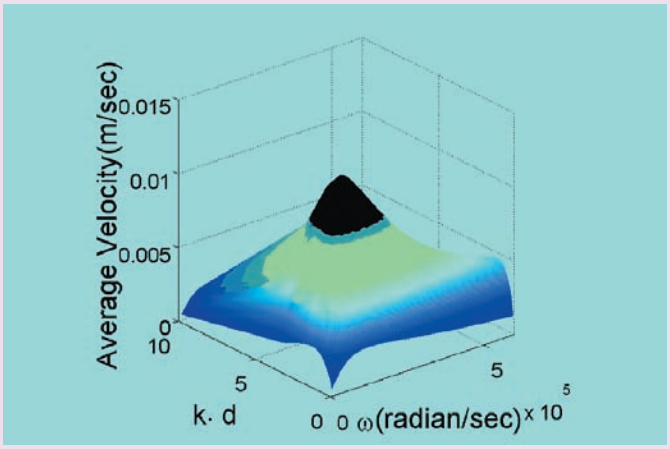

Fig. 1. The ideal conditions for ferrofluid pumping in a closed-loop system depends on channel height (d) and the electrical excitation frequency (ˆ). Maximum pumping is achieved when d is the inverse of the traveling field wavenumber (k), and ˆ is about the inverse of the magnetic nanoparticle relaxation time-constant of the ferrofluid. Adopted from [4].

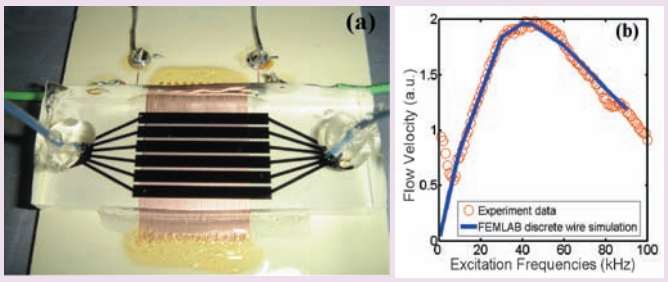

Fig. 2. A prototype microfluidic device used in ferrofluid pumping experiments (a), and the systematic pumping results obtained (b). The hydrodynamic simulation of ferrofluid actuation explains the experimental data well.

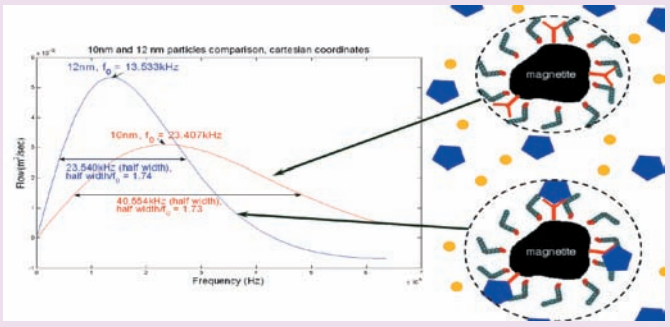

Fig. 3. Pathogen detection scheme based on ferrohydrodynamic pumping. Functionalized nanoparticles attaching to pathogen molecules obtain slightly larger hydrodynamic volumes (a radius increase of only 1 nm is shown here), resulting in easily detectable shifts in pumping dynamics.

We have recently proposed, modeled and experimentally confirmed that ferrofluids can be actuated and pumped in closed-loop geometries, even within geometries of micro-scale devices [4] (Fig. 1). The pumping dynamics depend on the average nanoparticle size within the ferrofluid. If particles are functionalized with a receptor molecule, the entire volume of the ferrofluid becomes a pathogen sensor that can detect minute quantities of target antigens efficiently and effectively. We are working on creating portable, disposable, cheap and miniaturized sensor and diagnostic devices based on this dynamic effect [5] (Fig. 2 and 3).

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Hur Koser *is an Assistant Professor in the Electrical Engineering Department at Yale University. Dr. Koser graduated from Kadikoy Anatolian High School and Robert College of Istanbul prior to coming to U.S. for undergraduate education. He obtained double B.S. degrees in Electrical Engineering and Physics from the Massachusetts Institute of Technology (MIT), a Master's of Engineering degree for his work on magnetic random access memory devices at IBM T. J. Watson Research Laboratory. He stayed at MIT's Electrical Engineering Department for his Ph.D. in the field of Microsystems (2002). After a post doctoral work in microfluidics at the Research Laboratory of Electronics at MIT, he joined Yale University in 2003, where he currently conducts research in micro and nanotechnology applications to biomedical engineering and power devices. Dr. Koser has recently received the NSF Career Award for his work on ferrofluid dynamics and will be on Junior Faculty Fellowship (awarded by Yale) during next year. He is also the recipient of the 2003 Yale Information Technology Systems Instructional Innovation Award and the Moore Award for the development of a microfluidics-based teaching laboratory. During his years at MIT, he was selected as a member of academic honor societies such as Sigma Pi Sigma, Sigma Xi, Phi Beta Kappa, and Eta Kappa Nu (1998).*

MOLECULAR BIOMIMETICS: NANOTECHNOLOGY THROUGH BIOLOGY

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Mother Nature provides not only lessons on macromolecular materials constructs with enormous variety of biological (and engineering) functionalities, but she also allows us to (genetically) engineer molecular systems at will for a wide range of practical applications in physical and medical technologies. Among the fundamental building blocks in biology, peptides (and proteins) provide one of the most useful sets of molecules with immense information content. Polypeptides, based on amino acids and their sequences, have specific molecular conformations that lead to molecule's specific recognition properties. The sequence, leading to structure and molecular recognition, then dictates the self-assembly characteristics of the polypeptides. The structure-property (recognition, binding, and assembly) can then be evolved for better and more specific functions via cycles of evolution.

Based on the Nature's premise, we have adapted molecular biology approaches and developed protocols for genetically engineered polypeptides for inorganics, GEPI.[1-2]These short polypeptides, when evolved in the laboratory in a predictable fashion, can be used for a wide range of materials and medical-related applications. As summarized in the figure, 7-50 amino acid long polypeptides are selected in vivo and in vitro with affinity to inorganic materials, including oxides, metals, dielectrics, and semiconductors, as well as to synthetic organic and biological materials. The peptides so selected are called first generation polypeptides. Based on the their initial screening, in terms of specific and cross-specific affinities for various materials, these GEPIs have been used directly for the synthesis of materials and immobilization of nanoparticles (see figure). By taking full advantage of the protein recognition and functionalities to achieve robust utilities, however, the GEPIs need to be molecularly characterized in terms of their quantitative inorganic binding kinetics, self-assembled nanoarchitectures, sequence-related bioinformatics characteristics and conformational structures. The molecular recognition and functional information is then fed to the process of post selection genetic engineering for designing multiple repeat formations, molecular architectural control, introduction of multifunctionality and genetic conjugation with other well-know proteins known structures and functions (e.g., enzymes).

In the final stage, for practical medical and materials applications, the molecular biomimetics protocols so developed are then combined with the latest developments in nanotechnology, e.g., nanolithography, to create new methodologies. The newly created peptides and their multifunctional constructs are then used as synthesizers, assemblers, and molecular erectors in the control of inorganic material formation, directed nanosystems immobilization, and in nanostructured constructions. Our presentation will give detailed explanations of these three focused stages of our center's collaborative research.

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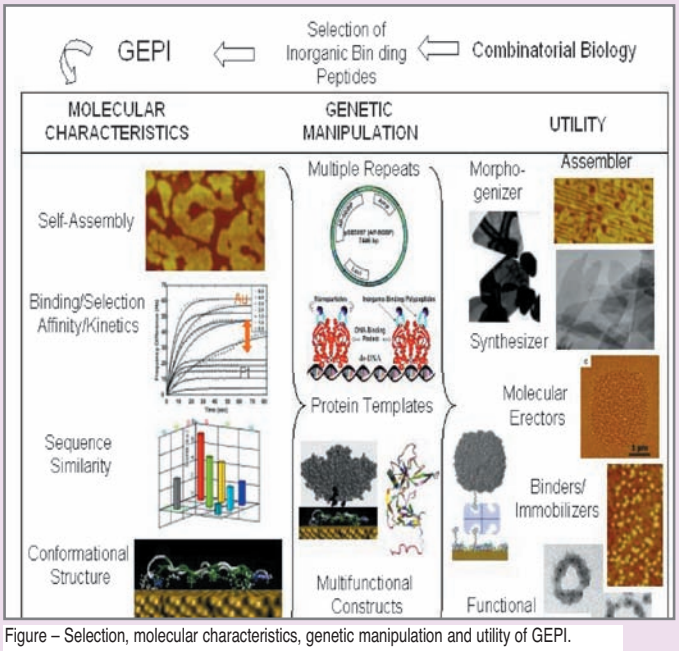

Figure – Selection, molecular characteristics, genetic manipulation and utility of GEPI.

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Mehmet Sarikaya *is a Professor in the Materials Science and Engineering (MSE) and Chemical Engineering Departments and the Director of the Genetically Engineered Materials Science and Engineering Center, an NSF supported Center, at University of Washington (UW). Dr. Sarikaya earned his BS in Metallurgical Engineering from the Middle East Technical University in Turkey in 1977, and received his MS and PhD in MSE from the University of California, Berkeley in 1979 and 1982, respectively. He was a postdoc at the Max-Planck Institute fur Metallforschung in Germany and the Edgar Bain Fundamental Research Laboratories with U.S. Steel in Pittsburgh, PA. He was a lecturer at the Lawrence Berkeley Laboratory for one year before he joined UW in Seattle. He was a visiting professor at both Princeton and Nagoya (Japan) Universities during the 90s. Profesor Sarikaya is leading a new area of polydisciplinary research called Molecular Biomimetics, combining commonly known areas of nanobiotechnology, synthetic biology, and medical material science and engineering. Dr. Sarikaya is a member of many professional societies including MRS, ACS, APS, ACerS, MSA, AAAS, etc. He has been a member of large federal panels, including National Academy of Sciences, NSF, NIH, DOE, ARO, DARPA, and AFOSR, and the reviewer of many scientific journals and publications.*

BIOCHEMICAL PHYSICS
MODERATOR: SELCUK CIHANGIR

***Selcuk Cihangir** is a Physicist at Fermi National Laboratory (Fermilab) in Illinois, USA. He received his Ph. D. in physics from the University of Rochester, New York in 1981. He was a Research Associate at the University of Illinois, Urbana-Champaign and Texas A&M University. He taught at Texas A&M as a Visiting Assistant Professor before joining Fermilab. He also teaches physics at Elmhurst College, Elmhurst, Illinois as an Adjunct Faculty. His research is in Experimental High Energy Physics. He participated in construction and operation of five major experiments at Fermilab. He authored or co-authored more than 300 research articles and experimental proposals. He is a member of the American Physical Society.*

COMPUTATIONAL BIOLOGY IN POSTGENOMIC ERA

Ivet Bahar
Computational Biology at the School of Medicine, University of Pittsburgh

Recent years have seen a remarkable change in the type and scope of the biological research problems due to significant advances in the experimental characterization of logical processes, and rapid progress in computational technology. Computational studies became increasingly important in the postgenomic era due to the rapid accumulation of genome-scale data in databases, and the need to simplify, categorize or explain observed data. There is now a shift in focus, from sequence analysis to structure determination, from single molecule interactions, to those at the genome or proteome scale, from static description of biological systems, to their dynamics. With the rapid accumulation of information on protein structures and pathways new questions indeed arise. Knowledge of interacting molecules' identity and structures is not sufficient in many instances for predicting, and more importantly devising methods of controlling or designing, function. Function is a dynamic property. It is closely related to the conformational mechanics of the structure in its physiological environment. Efficient methods for predicting dynamics at the molecular level are becoming increasingly important for understanding and controlling the function of target proteins. The present talk focuses on the computational characterization and prediction of protein dynamics.

Our computational studies of protein dynamics using network representations of structure give support to the ing hypotheses [1]: First, each structure has a unique global dynamics. These are cooperative conformational changes , that involve the overall structure. Second, there is a correlation between global dynamics and molecular mechanisms of function. Third, global dynamics can be predicted to a good approximation with coarse-grained models that take rigorous account of the topology of inter-residue contacts in the native state. Finally, systematic examination of protein dynamics suggests patterns for the structure -> dynamics -> function mappings. A number of key residues located at mechanically critical sites usually coordinate the collective dynamics [2], which suggests that function can be controlled by targeting these key residues. These residues usually occupy mechanically constrained loci on protein architecture. The most flexible regions, on the other hand, are usually chemically variable, and act as substrate-specific recognition sites that might be targeted if one needs to preserve dynamics while altering specificity. Another important observation is the intrinsic predisposition of structures to undergo conformational changes that are required for their biological function, recently demonstrated for a series of enzyme-substrate complexes l3].

Recent advances in computational characterization of structure-function relations will be described, along with the underlying theoretical and computational methodologies and future directions. In particular, methods for elucidating the mechanisms of allosteric communication will be presented, and illustrated for the *E. Coli* chaperonin system GroEL-GroES [4].

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4) **Chakra Chennubhotla & Ivet Bahar. Markov Models for Hierarchical Coarse-Graining of Large Protein Dynamics"** *RECOMB'06, in press.*

Ivet Bahar *is the Founding Chair of the Department of Computational Biology and Professor of Computational Biology at the School of Medicine, University of Pittsburgh. She received her B.S. and M.S. from Bogazici University, Turkey, and her Ph.D from Istanbul Technical University, Turkey. She served as an Assistant Prof (1986-1987), Assoc Prof (1987-1993), Full Professor (1993-2001) and as the Director of the Polymer Research Center at the Chemical Engineering Department of Bogazici University, until she joined the University of Pittsburgh in 2001 as the founding director of the Center for Computational Biology and Bioinformatics. Dr. Bahar's research expertise is in modeling and simulations of macromolecular dynamics, developing new theories and computational tools for analyzing complex biological processes, which opened the way to a wealth of computational studies of protein dynamics and improved our understanding of the structural basis of biomolecular functional mechanisms. She is the recipient of TUBITAK-TWAS prize in 1995, several NATO, NIH and NSF awards, including a recent HHMI/NIBIB award for the PhD program in computational biology, jointly offered by the University of Pittsburgh and Carnegie Mellon University. Dr. Bahar authored over 170 research articles. She is an elected member of the European Molecular Biology Organization (EMBO) since 2000, and she is a principal member of the Turkish Academy of Sciences since 1997.*

WHERE AND WHEN WILL THE NEXT BIG TURKISH EARTHQUAKE OCCUR?

Ibrahim Çemen,

School of Geology, Oklahoma State University,

Turkey is located in a tectonically active region and contains two of the world's well-known active strike-slip fault zones namely the North Anatolian (NAFZ) and East Anatolian Fault (EAFZ) zones. The NAFZ has a 24±4 mm/yr slip rate (Stein et al., 1997) and controls the northern margin of the westward escape (Şengör et al., 1985) or lateral extrusion (Çemen et al., 1999) of the Anatolian platelet due to the collision between the Arabian and Eurasian plates in the southeastern Turkey. Between 1939-1999, there has been nine earthquakes of Ms>7.0 along the NAFZ . They are 1912 Şarköy-Mürefte, 1916 Tokat-Samsun, 1942 Erbaa-Niksar, 1943 Ladik-Tosya, 1944 Bolu-Gerede, 1953 Yenice-Gönen, 1957 Abant, 1967 Mudurnu, 1999 Gölcük-Arifiye and 1999 Düzce earthquakes. These earthquakes suggest that there is a westward migration of the earthquakes along the fault zone (Toksöz et al., 1979; Stein et al., 1997).

The last big earthquake along the NAFZ is the17 August 1999 İzmit earthquake (Mw=7.4) which lasted 45 seconds, a relatively long time for an earthquake with a Mw=7.4. The earthquake caused about 4.00-m. displacements at two geographic locations that are about 80 km apart. The field observations together with a detailed inversion analysis of seismic data suggest that there were two earthquakes with 7-seconds apart; the first earthquake occurred in a hypocenter below the town of Arifiye and the second one occurred in a hypocenter below the town of Gölcük (Çemen et al., 2000). The earthquake claimed close to 20,000 human lives and about 100,000 people were left homeless. Every since then the biggest question in Turkey is: **Where and when will the next big Turkish earthquake occur.**

The fracture zone that formed during the Izmit earthquake has released the stored elastic strain energy along the segment of NAFZ from Düzce to Karamürsel. It was very likely that stress accumulated along the eastern termination of the segment would be released as a matter of time (Varol et al., 2000). This stress was released by the 12 November 1999 Kaynaşlı (Mw= 7.1) earthquake. Afterwards, the question most asked was: when, if ever, will the stress accumulated along the segment of the fault to the west of Yalova in the Sea of Marmara be released. If this stress release happens, the next big earthquake is likely to occur in an area directly to the south of Istanbul. It is, however very difficult, with the available data to locate the active fault zones under the Sea of Marmara that will be a major threat to İstanbul

although large amount of data have been accumulated since the 1999 İzmit Earthquake.
The east and southeast Anatolia contain many active faults in addition to the EAFZ. These faults have produced many large earthquakes (Ms>6.5) during the 20th century. During the early 1990s, my colleagues at METU and I conducted a detailed study of the earthquake potential of east and southeastern Anatolia. We prepared a detailed tectonic map and located the epicenters of Ms>4.5 earthquakes that occurred from 1900 to 1980. We used this map and, other geological and geophysical data to determine the seismic zones in the region and distinguished 13 seismic zones. However, three of these zones are major zones which can be located along the North Anatolian, East Anatolian and Bitlis fault zones. We determined that large magnitude (Ms >7.0) earthquakes are possible in several locations in east and southeast Anatolia. We used a total of 72 different combinations in a Bayesian sense to derive iso-acceleration maps corresponding to 100, 225, 475 and 1000 years (Doyuran, et al., 1993). These maps can actually serve as a base for dynamic design decisions for major engineering structures in the region.

Western Turkey has also experienced many devastating earthquakes within the last 2000 years. Many of the city states, including Ephesus and Troy, were destroyed by large historical earthquakes. Western Turkey has experienced several large earthquakes during the second half of the 20th century giving normal fault focal mechanism solutions. They are the Demirci (3/23/1969; M: 5.5), Alaşehir (3/28/ 1969; M: 6), Gediz (3/28/1970; M: 7); Cubukdağ (10/11/1986; M: 5.5); Dinar 10/1/1995. M: 5.7) and Sultandağ 12/15/ 2000; M: 6) earthquakes. These earthquakes had caused substantial damage and loss of life in the region.

The next big earthquake Ms> 7.0 will probably happen along the North Anatolian fault zone. It is also important to note that there has not been a large earthquake along the East Anatolian. Therefore, a big earthquake is also likely to occur along the East Anatolian fault zone. Earthquakes with magnitudes less than 7.0 are likely to occur along the major normal faults in western Anatolia.

It is impossible to know the exact timing of the next big Turkish earthquake. The science of earthquake prediction is in its infancy. Geological and geophysical processes that lead to a big earthquake along large active fault zones such as the San Andreas Fault zone in the USA and the North Anatolian fault zone in Turkey are poorly understood.

A new NSF supported project called EarthScope in the USA is designed to provide a better understanding of the natural crustal discontinuties in the USA, especially in the western USA where large eartquakes are likely to happen. A similar project in China called In-Depth has also been conducted.

In Turkey, there is an urgent need to design a similar project to provide a better understanding of the natural crustal discontinuties and physical mechanisms that are producing large earthquakes. With the new broadband studies, it is possible to determine the geometry of large geological crustal discontinuties and active fault zones down to the upper mantle. A large international geological and geophysical project should be designed to conduct this important research.

This project will provide us data:

1) To better determinate the depths and locations of the future earthquakes along all active fault zones in Turkey.
2) To determine the seismic zones along the active fault zones where stress is accumulating to produce earthquakes.
3) With new insights and knowledge to better determine the seismic wave velocities and the physical factors that effect seismic wave propogation.

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HOW DO MOLECULAR MOTORS MOVE?

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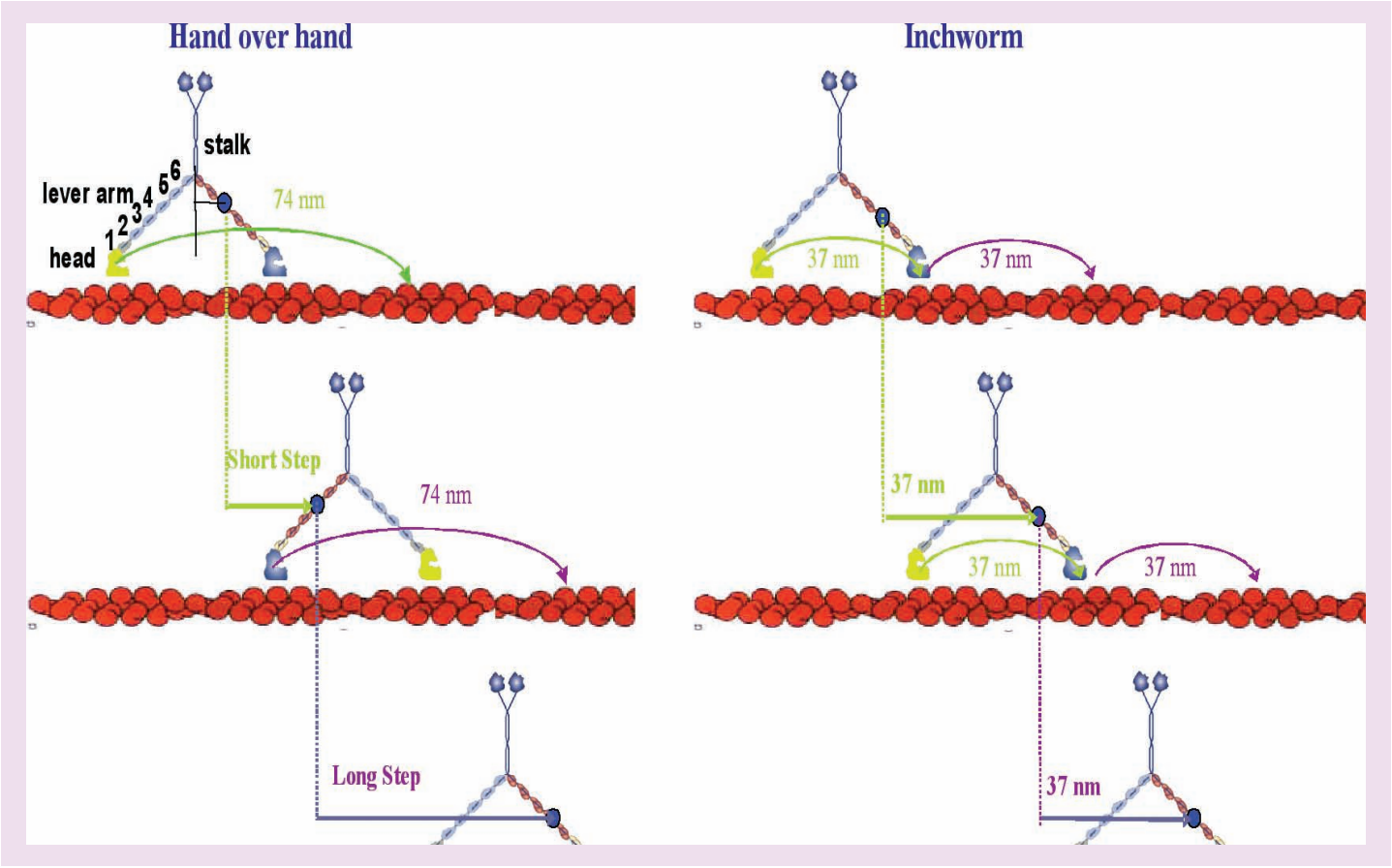
The motor proteins play an important role in transporting vital materials around the cell. The cell distributes membrane proteins to the cell surface, mRNA from mother to the bud cells and organelles to specific regions. Specific and fast cargo transportation is essential for survival. Functional problems in the cargo transport cause serious diseases including paralysis, deafness, Alzheimer and cancer. The most striking example to the importance of the fast and directed cargo transportation is our nerve system. Neuron cells are very thin and can be a meter long. The axon does not have a ribosome to synthesize proteins, so all the proteins required for the axon and synapses need to be transported from the cell body after protein synthesis. Synapses also require energy production machinery. Transportation of big organelles like mitochondria from the cell body to the synapses would take several years by diffusion. This period is too long for a cell and it requires faster transport of cargoes than just diffusion. Motor proteins haul those cargoes and travel that distance on the order of minutes simply by walking along the cytoskeleton. From the distribution of actin and microtubule within the cell, one can infer that long range transportation is mediated by microtubule motors and specific short delivery is provided by actin motors. Transportation of cargo requires a motor protein to move on the cytoskeleton in a directed fashion without dissociation [1].

Myosin V, myosin VI, and conventional kinesin are cargo-carrying motor proteins. They use energy obtained from ATP hydrolysis to transport a cargo along the cytoskeleton. Myosins move on actin, and kinesin moves on the microtubule filaments. Structurally, they all form dimers, having two motor heads held together by a common stalk. In the tail region of the stalk, they have a cargo-binding domain, which binds to specific organelles and vesicles. They are processive in that each motor can take hundreds of consecutive steps without detaching from the track and can move a cargo several microns. It is not clear how the two heads of a motor move to create a net movement. The best approach to elucidate processive movement of the motors would be to visualize the motion of the heads as a motor walks on the cytoskeleton. However, one needs to place a nanometer-sized probe to the head region and track its position with a nanometer precision to answer such question.

During my graduate work in Paul Selvin's laboratory at

University of Illinois, I developed a new fluorescence technique that is able to locate the position of a single fluorescent dye within 1 nm on a glass surface. The technique of FIONA (Fluorescence Imaging with One Nanometer Accuracy) is achieved by locating the center of the diffraction limited image via two-dimensional Gaussian fit. Increasing the number of collected photons and minimizing the background were essential to obtain high precision in localization. We used highly sensitive camera to detect emitted photons from the dyes. Moreover, we have extend ed the life of the fluorescent dyes and collected 1.4 million photons from a single dye molecule and achieved signal to noise ratio of 30. These improvements have provided 1.5 nm localization and minutes of observation of single organic dyes [2].

We then used FIONA to elucidate the mechanism of molecular motors. Whether they move by a "hand-over-hand" or an "inchworm" has been a controversial topic. In the hand-over-hand model, a motor moves by swapping its heads similarly to human walking, while the inchworm model states that one head leads and the other head follows. To distinguish between these two models, I have attached a single fluorescent dye to the head region of a motor and tracked the position of the dye while the motor walks. For myosin V [2], myosin VI [3], and kinesin [4], I found that an individual head alternates between moving twice the stalk step size and staying fixed to let the other head to move forward. This observation directly showed that two-headed motor proteins move by a hand-over-hand mechanism. Recently, I have co-localized two closely-separated dyes on myosin V motor and observed the movement of both heads simultaneously. We also started to use this technique to measure the distance between two labeled sites in protein complexes. FIONA has become a widely-used technique in biophysics and potential applications extending to newer directions are yet to come.



Myosin V: Walking or inchworming? Predicted movement for the heads and a dye molecule label (green dot) on the lever arm in the hand-over-hand model (left) and the inchworm model (right). The FIONA assay has revealed that myosin V, along with kinesin and myosin VI, walks hand-over-hand.

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RELEVANCE OF THE TURKISH POLITICAL MODEL IN A GLOBALIZING WORLD
MODERATOR: DAVID CUTHELL

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THE ESSENCE OF THE TURKISH MODEL: REFORM SECURITY

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When looking at the developing world in terms of political liberalization, three broad categories of experience emerge: a) countries that have been successfully transforming to Western democratic statehood (e.g. Turkey); b) countries that have successfully resisted such transformation (e.g. Saudi Arabia, Iran, Syria); and c) countries that have collapsed either due to an overly rapid and uncontrolled transformation (e.g. the former Yugoslavia, and arguably today's Iraq) or to an excessive and therefore untenable resistance (e.g. Afghanistan).Clearly, success has not been the norm. Interest in a so-called 'Turkish political model' therefore, derives from the understandable impression that the developing world, and in particular the Muslim lands, have failed to respond effectively to the various waves of global democratization and liberalization. In the post-9/11 world, efforts to prevent spillovers of violence coming out of these fragile undemocratized zones have turned previous idealistic (but generally unsubstantiated) rhetoric for regime change into an apparent global strategy for confronting security challenges. This strategy has, in turn boosted the search for successful examples that might be replicated.

The change sought by the West is one intended to transform authoritarian governance systems into western style democracies with free economies. Based on the widely accepted assumption that democracies are inherently peaceful (see the vast literature on Democratic Peace theory), the argument follows that transformation to a free and democratic political system will promote these countries' participation as peaceful members of the international community. Popular belief in this approach is reflected in both societal and elite adoptions of regime change as a virtual magic formula for peace and stability. However, poor records of regime change attempts by outsiders are forcing a more realistic understanding that what is in fact feasible—and therefore more desirable—is to seek gradual, secure transformations. This shift from an understanding of surgical, almost overnight "regime change", to one of gradual state building, means that the processes or 'hows' of such transformations are rightfully beginning to take on greater significance than their ultimate outcomes or 'whats.'

Discussion of the Turkish case as a political model is controversial if we look only at the visible outcomes or 'whats' of the country's historic and on-going transformation. Can, for example, Turkish Islam provide a starting point for modeling democratic transformation throughout the Muslim developing world? Probably not, since Turkish interpretations of both Islam and secularism seem to have unique characteristics that may not flourish in other Muslim contexts. Indeed, the populations of countries that would be at the receiving end of such a Turkish Islam 'model' do not necessarily have positive images of these particular Turkish constructs. Can the Turkish degree of attraction to westernization and resulting Turkish western identity be a major component of a "Turkish model"? Again, probably not, since every country's elite will have their own degree of dedication to Western-oriented values and products, and such dedica-

tion will naturally be context and history bound. Can the Turkish liberal economic structure serve as the foundation of a Turkish model? Again, no, since one can argue that such a 'model' is a general IMF-managed one, and therefore has long been out there for anyone to replicate if they desire. Overall, can the Turkish political system of pluralist democratic practice be a model for the developing world and in particular for Muslim countries? Unfortunately, probably not, because like any existing example, the Turkish one is bound to have its unique native characteristics. Even the long established examples of democracies in Western Europe and North America show how democratic experiences and resulting formats can vary widely. Clearly, the desired outcomes or 'whats' of existing transformation examples are inadequate tenets for modeling, as every case is bound to produce its own context, history, and culture-bound outcomes. We must instead turn our attention to the processes of how existing transformation examples have evolved.

How can we create a generalizeable model out of the complex processes of regime transformation? One way is to start by identifying the most common challenge that faces countries undergoing this process. A quick look at the unsuccessful cases of regime change (both failed and resisting ones) reveal that the safety of the transformation from unpredictable turns that the change may produce, is the most important concern. One of the primary reasons that states collapse is the lack of an overarching stability and safety provider. Unsurprisingly then, the primary rhetoric used by authoritarian regimes to justify their continued undemocratic practices is generally an appeal to security concerns, both internal and external. Many Arab dictators for example justify their presence by pointing to the Israeli threat or to a domestic fragmented societal structure. One can also point to the example of the retreat to more authoritarian rule in Russia, which President Putin has justified to the public as the only way to secure the country's transformation.

In fact, countries that are at the beginning of a major political liberalization period do face a reform security dilemma. While attempting to undertake the decentralization of power that is required by political opening up, the resulting security risks that such an opening up introduces (for example, ethnic or sectarian clashes or the possible attraction of external challenges at a time of weakness), demand further governmental strength or power centralization. The challenge is to reconcile the contradictory needs for power centralization and decentralization simultaneously. This dilemma is particularly valid in the parts of the world that are deemed most threatening and are therefore currently targeted for regime change.

The importance of Turkey as a potential 'model' emerges if it can be shown to have found a way of successfully responding to this structural reform security dilemma. This research explores therefore the dynamics of how Turkey has managed this dilemma. It does so by presenting a graphic depiction of the evolving Turkish Inner State Model and its potential culmination in a successful integrated democratic state. The model draws on the Turkish experience to show how security and reform pressures translate into respective pressures for power centralization and power diffusion. When national response to these simultaneous pressures becomes strong enough that neither can be sacrificed, the result is a bifurcation of the political space into realms of hard and soft politics, and, eventually, into varying degrees of institutionalized inner and apparent states. The boundaries between the realms are not static, but may shift depending on the relative degrees of the security and reform pressures, the leadership, possible coalitions within the states, and other contextual factors, to comprise a dynamic domestic balance of power. The model proposes that there is a self-justification process for the realms of institutions. While hard politics/the inner state appeal to the security dilemma to preserve and expand their prerogatives and realm, soft politics/the apparent state turn to the increasingly influential elements of reform for this purpose. Finally, if successfully managed, the inner state model moves towards an ideal of an integrated state structure, in which the inner state becomes subordinated to an overarching democratic state.

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THE WAR ON TERROR AND TURKEY'S DEMOCRATIZATION PROBLEMATIC

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Since 9/11 considerable debate has ensued across the world regarding the extent to which national security should be privileged over democracy. This question is especially relevant for Turkey, which stands at the crossroads of replacing its state-centric political model with a society-centric one. Turkey's ambition to pursue full integration in the EU entails the adoption of democratic reforms that increasingly empower society vis-à-vis the state. Meeting the conditions for EU membership include displaying a greater tolerance for freedom of expression and speech, better respect for minority rights and societal pluralism, and the establishment of a more accountable, transparent mode of governance. However, the global war on terror has fortified defenders in Turkey of the state-centered, Kemalist-based political model which, in privileging state over society, sanctions leniency with respect to undervaluing human rights, suspending civil liberties, silencing expressions of identity politics, and dodging democratic controls over security functions.

The tug of war in Turkey between the forces that would "bring society in" and those that would preserve a state-centered polity became especially pronounced after the Justice and Development Party swept to power in the November 2002 elections introducing in rapid succession democratic reforms to meet the political criteria for membership in the EU, and has intensified since the government opened accession talks on October 3rd of this past year. One of the fault lines in this tug of war lies between those who believe that the society-centric model is the best model for democratic consolidation and those who believe that the state-centric model is the best model for combating terrorism.

In today's hyper security-conscious environment Turkey finds itself buffeted and caught in the crosswinds of two very powerful and conflicting external dynamics: the lure of EU membership and fighting the global war on terror. In the past three years Turkey has taken many significant steps toward EU membership by adopting laws to enhance democratic freedoms, but Turkey also faces criticism that forward progress, in particular the implementation of reforms, has been inhibited due to anti-reform, conservative nationalists in the judiciary, bureaucracy, and military. State-defending circles have adopted the working premise that liberal democracies are ideal havens for the support of terrorist networks, and are making the case that the 'war on terror' warrants stronger measures to augment national security. In contrast to the US and the EU where debates are raging over the extent to which democratic values are being sacrificed in the war on terror, in Turkey a post-Kemalist consensus has yet to be reached over whether civil liberties are to be prized or whether there is virtue in diversity and societal pluralism, and mechanisms of civilian checks and oversight over the military and security policy have yet to become institutionally embedded.

While on the one hand, Turkey's democratic reforms have opened up new opportunities for breaking free of official Kemalist thought, on the other hand defenders of the original Kemalist project increasingly play on the fears and insecurities about loyalty and dissent that the war on terror climate feeds to re-balance trade-offs between democratic freedoms and national security in order to vivify and reinvigorate the state-centric political model. Turkey has yet to prove its commitment to freedom of expression as not even the pro-democratic reform government has stood up for the many academics, writers and journalists who have been indicted for nonviolent speech. The AKP government's waffling and failure to clearly and unambiguously affirm the

principles of free speech and the right to dissenting opinions gives rein to those who paint an image of unregulated speech as the unpatriotic act of disloyal citizens. That is to say, those who express opinions that challenge or contradict the incontrovertible tenets of the Kemalist model—that the nation is culturally and ethnically homogeneous and that radical secularism is a requisite instrumentality for modernization—are accused of fomenting public disorder; for, inciting or encouraging others to question Kemalist dogma threatens the integrity of the Kemalist state. There is no doubt but that the war on terror helps foster a climate of intolerance of dissent, and that when public discourse is restricted, democracy is under attack.

In addition to raising the specter of an unruly public if civil liberties are uncontrolled, the climate of insecurity engendered by the global war on terror has fueled anxieties that provisions for the protection and expansion of minority rights included in the package of EU democratization reforms is hampering efforts to combat terrorism. Just as free expression has become associated with disloyalty, support for minority rights is linked to separatism, and thus support for terror. Last summer in Diyarbakir Prime Minister Erdoğan appeared to side with the EU, delivering a highly publicized speech in which he promised that his government would handle the Kurdish problem with "more democracy." However, the prime minister's move to separate the Kurdish issue from the problem of terrorism and his pledge to seek resolution of the Kurdish question within a democratic framework was severely criticized by proponents of a national-security state as a step in the direction of enabling Kurds to reach their separatist aims through democratic means. There is still the opportunity for Turkey to affirm its commitment to minority rights, however democratic solutions, such as language rights, are increasingly jeopardized by instability in the region. The conflation of Kurdish nationalism with separatism leads to precisive abstraction of the Kurdish problem as a national security concern. When minority rights are construed as threats to national unity and solidarity, then tolerance of plural identities is more easily construed as a vice rather than a virtue.

Lastly, just as the global war on terror promotes fear management politics with respect to individual liberties and minority rights, the compulsion to move away from an open government to one of secrecy is also strengthened. Of the democratic reforms the EU has demanded of Turkey, limiting the autonomy of the military by erecting tighter mechanisms of civilian control is the most challenging and goes to the heart of expunging the state-centered political model. In line with European harmonization requirements, the structure and function of the MGK (National Security Council) have been constitutionally amended. Nevertheless the military continues to enjoy significant autonomy and influence over the political process partly because civil-military institutional reforms have failed to disengage many of the informal mechanisms that the military uses to influence policy. Moreover, the AKP is haunted by uncertainty as to how much longer the military will cooperate with the democratic reform agenda of the EU project as its policy priorities diverge from those of the guardians of the Kemalist political order.

Like Turkey, the global war on terror presents governments in well-established democracies with hard choices in determining the trade-offs between security and democracy, and since 9/11, examples abound of these governments leaning to the side of security at the cost of democratic freedoms. But although the trade-offs confronted are similar, the contest of balancing trade-offs differs. In Turkey the values and norms that support individual freedoms and minority rights have yet to be firmly fixed, a social consensus over identity politics has yet to be reached, and civilian-dominated governance has yet to triumph. In other words, the Turkish nation has yet to fully commit to a society-centered political model. Taking on Turkey's democratization problematic in the context of the global war on terror calls for the courage to resist the exhortations of those who insist that a war on democracy is the best way to wage a war on terror.

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THE TURKISH MODEL: HOW APPLICABLE?

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The Brookings Institution

When discussing the "Turkish model," it is important to note that a model does not mean an exact blueprint for necessary reforms. It would be a critical mistake to conceptualize a model as the exact emulation of a particular country. A more realistic conception should consider a model to offer relevant lessons from past political experience and a practical framework for a progressive agenda.

There is no quick fix or one-size-fits-all formula for democratization. Yet there are valuable lessons that can be learned from other democracies and countries in democratic transitions. One such lesson from the Western and Turkish experience is that democratization is a long and painful process. Its consolidation and successful internalization may take generations. Yet, partly because of the fast pace of globalization and modern technology, we often lack patience and have high or unrealistic expectations. There seems to be a utopian desire to witness the speedy emergence of liberal democracies in the Middle East. In that sense, one crucial mistake would be to set the bar too high. A healthy transition from authoritarianism to constitutional liberalism and "a sense of pluralism," where the governing center is more or less representative of the governed periphery would in itself be a great accomplishment for the Middle East. On the long path leading to democracy, it is crucial to remember that free elections are often the culmination, rather than the inauguration, of the process.

It is also important to remember that model countries or universal principles and guidelines for democratization are much less important than the domestic attributes of each country. Maximum attention must be paid to variables such as literacy rates, economic development, and past political experience. At the end of the day, the prospects for constitutional liberalism and pluralism will primarily depend on improvements in human and social capital. Since democratization has to come from within no external model or well-intentioned guidance can substitute the domestic willingness and demand for change.

With these caveats in mind, Turkey has become the role model which many in the U.S. point that the Arab world should strive towards. Not only is Turkey often singled out as the only secular democracy in the Islamic world, but it also shares borders with Syria, Iraq and Iran. Indeed, President George W. Bush and many prominent members of the U.S. administration have repeatedly praised Muslim Turkey as a model that merits emulation in the wider Islamic world.

While there are crucial lessons that can be learned from Turkey's Kemalist modernization, it should be kept in mind that the primary target audience for such a model, the Arab world, will not always share American enthusiasm for the Turkish example. In the eyes of many Muslims in the Middle East, the problem lies with Turkey's "authoritarian secularism." Where Americans see the only Muslim, democratic, secular and pro-Western country in the Middle East, Arab countries see a former colonial master that turned its back on Islam.

There is a widely shared feeling among Arabs that Turkey's radical cultural revolution under Kemal Ataturk, the founder of the modern Turkish Republic, came at the expense of the country's Islamic identity. According to this point of view, Turkish secularism lacks democratic legitimacy because its survival depends on the vigilance of the military. Most of the Arab intellectuals, let alone pious Muslim masses, are therefore unimpressed by the idea of following a Turkish path to modernity. It is hard to deny that Turkish democracy often displays tendencies that can be termed as "illiberal." This is most evident in the Turkish military's conceptualization of internal threats such as Kurdish nationalism and political Islam.

Despite this gap, the Turkish model is still relevant for the Arab world. There are many lessons that can be learned from Turkey's Kemalist political system. Iraq, in the short-term, and the Arab world in the longer run can hugely benefit from Turkey's experience with free elections and parliamentary democracy as well as from the country's determination to improve its human rights and economic record. It would certainly be a major improvement to see Middle Eastern norms evolve along the lines of Turkey's democratic achievements.

Such evolution will not be easy for Arab states, however. Proponents of the Turkish model need to be aware of the sui generis nature of nation building in Turkey. Turkey's deeply rooted Imperial state tradition, the unique role of Ataturk,

and a gradual approach to democratization (starting in 1876) were all crucial components of its modernization. The absence of similar conditions in the Arab world creates an important applicability gap between the Turkish model and its target audience.

Ultimately, the relevance of the Turkish model for the Middle East will greatly depend on what happens in Turkey. For a Turkish model that can truly provide inspiration, better harmony between democracy and secularism must be found. Outsiders can hardly impose such a change. This is why the arrival to power of the Justice and Development Party in late 2002 presents a crucial opportunity for reconciling Turkey's Muslim roots with secularism and democracy. The relationship between this moderately Islamic political party and the staunchly secularist military will provide a litmus test of democratic maturity for the Turkish model. The significance of this political experiment will also have major implications on the perceived compatibility of Islam and democracy

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BIO-MEDICINE
MODERATOR: GONUL VELICELEBI

Gönül Veliçelebi *is Vice President of Research and Drug Discovery at TorreyPines Therapeutics since 2000. Dr. Veliçelebi has over 20 years of research and management experience in biotechnology. Before joining TorreyPines Therapeutics, she was Vice President of Research at MitoKor and Director of Cell Biology at SIBIA Neurosciences. During her tenure at SIBIA, Dr. Veliçelebi directed cell biology and electrophysiology laboratories and managed several projects. She has played an integral role in strategic collaborations with pharmaceutical companies as project leader and steering committee member. Dr. Veliçelebi has published extensively in peer-reviewed journals and received the 1998 Scientific Achievement Award in Health Sciences given by the Scientific and Technical Research Council of the Turkish Republic (TUBITAK). Dr. Veliçelebi received her BA summa cum laude in chemistry at Randolph-Macon Woman's College, her PhD in biophysical chemistry from Yale University, and completed her postdoctoral fellowship in biochemistry and molecular biology at Harvard University.*

MOLECULAR MECHANISM OF HUMAN BIOLOGICAL CLOCK

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Circadian (circa = about and dies = day) is the cyclic changes in the biochemical, physiological, and behavioral functions of organisms with a periodicity of about 24 hours. The circadian rhythm is generated by an innate timekeeping mechanism that can function independently of any environmental input. However, under natural conditions the clock is synchronized with the daily light-dark cycles. In recent years the molecular mechanism of this extraordinary biological phenomenon has been elucidated. Six proteins, cryptochrome 1 and 2, Period 1 and 2, Clock, and BMal1 generate a time-delayed autoregulatory feedback loop that controls the expression of many genes involved in physiology and behavior and ensures their periodic expression.

Animal cryptochromes were discovered in our laboratory. In order to understand the roles of cryptochromes in the circadian clock we made mutant mice lacking one or both cryptochromes. We discovered that when both cryptochromes were mutated that the mutant mouse lost its circadian rhythm: instead of being active during the night and resting during the daytime the mutant mouse is active both day and night.

Work in our lab and other labs has provided a detailed molecular model for the circadian rhythm and now efforts are underway to put this knowledge into practice to improve human health. The following physiological and pathological conditions are targeted for intervention by modulating the activity of the molecular clock: [1] optimization of mental and physiological performance. [2] Treatment of sleep disorders. [3] Treatment of Seasonal Affective Disorder (SAD) that occurs in the winter and other forms of depression. [4] Treatment of Jet Lag. [5] Optimizing chemotherapeutic treatment of cancer (chronotherapy).

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Aziz Sancar *is Sarah Graham Kenan Professor of Biochemistry and Biophysics at the University of North Carolina School of Medicine. He was born in Savur-Mardin, Turkey in 1946. He obtained his primary and secondary education in Savur and Mardin and received an M.D. degree in 1969 from Istanbul University School of Medicine. After practicing medicine in Savur for two years he attended the University of Texas at Dallas and obtained a Ph.D. degree in Molecular Biology in 1977 with his work on a DNA repair enzyme called 'photolyase.' Dr. Sancar conducted postdoctoral work at Yale University on another DNA repair enzyme called 'excinuclease' in the period 1977-1982. He joined the Department of Biochemistry and Biophysics at UNC as an Associate Professor where he rose through the ranks to his current position in 1997. Dr. Sancar is currently conducting research on DNA Repair, Cell Cycle Checkpoints, Cryptochrome and the Circadian Clock. He has published 279 research articles and 32 book chapters. He is a recipient of the Presidential young Investigator Award (USA), the American Society for Photobiology Research Award, the Turkish Scientific and Technical Council (TUBITAK) Scientific Achievement Award, and the North Carolina Distinguished Chemist Award. He is a Fellow of the Third World Academy of Sciences, a Member of the American Academy of Arts and Sciences, a Member of the American Academy for Microbiology, and a Member of the National Academy of Sciences, USA.*

CAN WE STOP ATHEROSCLEROSIS?

E Murat Tuzcu

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As atherosclerotic cardiovascular disease remains the scourge of western societies and is becoming increasingly prevalent within developing nations, there is an ongoing need to develop interventions that effectively reduce vascular risk. While the final determinant of proof of efficacy of these agents resides in their ability to prevent clinical events, any assessment of an agent must be performed on the background of a combination of agents with proven efficacy. As development of experimental agents is a long and costly process, it has become increasingly attractive to assess the effect of agents on a number of surrogate endpoints. The evolutions of imaging modalities that visualize the arterial wall provide an opportunity to evaluate the effect of experimental strategies on the size and composition of atherosclerotic plaque. The application of intravascular ultrasound (IVUS) within the coronary arteries has allowed for an enhanced characterization of the extent of atheroma

and the natural history of the arterial wall's response to its accumulation. IVUS is performed safely at the time of diagnostic coronary angiography and involves the placement of a high frequency ultrasound transducer on the tip of a catheter within the major epicardial coronary arteries [1].

Aggressive Lipid Lowering

The lack of consensus regarding a possible LDL threshold, below which no further clinical benefit is derived, has stimulated debate with regard to what is an appropriate LDL target for patients with atherosclerotic cardiovascular disease. Serial IVUS recently reported the impact on coronary atheroma burden of moderate intensive lipid lowering strategies. In the Reversal of Atherosclerosis with Aggressive Lipid Lowering (REVERSAL) study [2] 502 patients with coronary artery disease and an LDL-C level between 125 mg/dL and 210 mg/dL received either pravastatin 40 mg daily or atorvastatin 80 mg daily for 18 months2. This resulted in reductions of LDL-C to 79 mg/dL and 110 mg/dL, with atorvastatin and pravastatin respectively. The therapies differed in their ability to lower CRP, by 36.4% with atorvastatin and 5.2% with pravastatin. While atheroma volume increased by 2.7% with pravastatin, serial IVUS revealed that there was no change in patients treated with atorvastatin compared with baseline. A continuous relationship was demonstrated between changes in LDL cholesterol and atheroma volume. The demonstration that intensive lipid lowering alters the natural history of plaque progression parallels the recent finding of a 22% reduction in clinical end points that resulted from high dose compared with low dose atorvastatin in the Treating to New Targets (TNT) study [3].

IVUS Assessment of the Anti-Inflammatory therapies

It was apparent that LDL lowering did not account for all of the benefit that was derived from use of the intensive lipid lowering strategy in REVERSAL. Examination of the regression lines demonstrating the relationship between changes in LDL cholesterol and plaque volume revealed that the lines for the different treatment strategies never met. Further analysis suggested that an additional 20% of lowering LDL cholesterol is required with pravastatin to achieve the same effect on plaque progression. This result provides further impetus for the suggestion that atorvastatin possesses beneficial properties that extend beyond their ability to lower LDL. One of these properties appears to be a reduction of vascular inflammation, as a continuous relationship was also demonstrated between CRP lowering and the rate of plaque progression [4]. These results paralleled the findings of an incremental benefit of high dose atorvastatin over pravastatin on clinical event rates and CRP in patients who participated in the Pravastatin or Atorvastatin Evaluation and Infection Therapy (PROVE-IT) study [5].

Conclusion

The ability to image the entire arterial wall by placement of an IVUS catheter within the coronary artery has made a substantial contribution to our understanding of factors that influence the natural history of atherogenesis. In particular, the ability to image the same arterial segment in vivo and in a serial fashion has provided a novel and powerful research tool to assess the impact of experimental interventions on atherosclerotic plaque. Its use has provided important evidence to support the need for aggressive modification of risk factors in patients with established atherosclerotic disease. IVUS has also reignited the concept that regression of atheroma, in addition to modification of its composition, should be a major goal in the development of agents that influence atherogenesis. Accordingly, the use of imaging modalities that accurately assess plaque burden and composition will become an integral component in the design of clinical trials

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Murat Tuzcu *is a Professor of Medicine at The Cleveland Clinic Lerner College of Medicine, CWRU and staff cardiologist at The Cleveland Clinic. He received his medical degree and residency in medicine at Istanbul Medical Faculty. He completed cardiology and interventional cardiology fellowships at The Cleveland Clinic and Massachusetts General Hospital. He was appointed to The Cleveland Clinic in 1992. As an interventional cardiologist Dr. Tuzcu's expertise includes transcatheter treatment of structural heart disease, in addition to coronary artery disease. Dr. Tuzcu has made seminal contributions to the understanding of transplant vasculopathy, subclinical atherosclerosis, and progression /regression of atherosclerosis through his work at the Intravascular Ultrasound Research Laboratory that he directs. He also leads the investigations of catheter-based t reatments for structural heart disease at the Cleveland Clinic. Dr. Tuzcu has authored more than 200 peer-reviewed publications and serves as a reviewer and editorial board member for many academic journals. Dr. Tuzcu is involved in the medical education of doctors from all over the world, including many young cardiologists from Turkey. Similar to his educational activities, his clinical practice involves management of patients from all corners of the world. He was repeatedly voted into the listing of "Best Physicians in America".*

NOVEL APPROACHES TO COMBAT GLOBAL INFECTIOUS DISEASES

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The fight between humans and their pathogens has an ancient history. Many past epidemics such as the Black Plaque and the influenza pandemics, which have killed millions of people are well known. Especially since we are in the midst of another potential influenza pandemic, a lot of resources are being devoted to public preparation and readiness. There is however another group of lesser-well known diseases called Neglected Diseases, which affect the poorest of the poor. Despite their heavy toll on the human race, less attention is given for their diagnosis, treatment and prevention. Many of these diseases are caused by parasitic agents, which involve an insect vector for their transmission.

The one disease that has remained a true orphan is African Sleeping Sickness. It has resulted in cyclic epidemics killing thousands of people in remote, often hard to reach terrains. It is caused by the protozoan African trypanosome and is transmitted through the bite of an infected tsetse fly. Despite extensive research on African trypanosomes in the developed country laboratories, there are no vaccines in sight as the parasites display the well-studied antigenic variation phenomenon, evading the host immune system ateach peak by displaying a new surface antigen. Disease treatment in the field requires active surveillance teams to find and cure patients in remote areas. Unfortunately the final diagnosis still relies on microscopic detection as it was in the late 19th century when the agent was discovered. There are no good drugs in sight and little incentive for one to be developed. It is imperative that sound public policy be in place in order to promote research and development of drugs for diseases with little commercial profit margins such as Sleeping Sickness. Disease management mostly relies on control of the tsetse insect populations. Given their local nature, vector control tools have not been sustainable over the long range. Through genomics studies, we are developing a novel vector control approach that may provide a more efficient disease management tool. It involves the modification of insect's parasite transmission ability as a means to block disease transmission. The approach that is investigated in the tsetse fly involves harnessing the natural midgut symbiotic flora of the insect to synthesize anti-para-

site products to interfere with parasite viability in fly gut. This approach is superior to other transgenic strategies where foreign genes are directly introduced into the insect's germline, which can reduce fitness of modified insects. Such parasite resistant insects can then be driven into natural populations where they can replace their susceptible counterparts using the Cytoplasmic Incompatibility phenomenon conferred by a different insect symbiont, Wolbachia. If the efficacy and the environmental safety of the modified insects can be demonstrated to satisfaction, the tool has the potential to provide an affordable approach for disease management in difficult terrains.

Leading the way among neglected diseases is malaria, which kills over 2 million people a year, with a child dying every minute. The heaviest disease burden is inflicted in subSahara Africa. Solutions have not been easy to come by however. Progress for the development of a successful vaccine has been slowed by the intricate biology of the parasite and its interactions with the host. To complicate control efforts further, both the parasites and the mosquitoes have quickly evolved mechanisms to bypass the drugs and insecticides used for their elimination, reducing the available tool box. The recently completed genome sequences of the human host, plasmodium parasite and the Anophelene mosquito now provide an impetus for new avenues for drug targets, insect repellents and vaccine candidates.

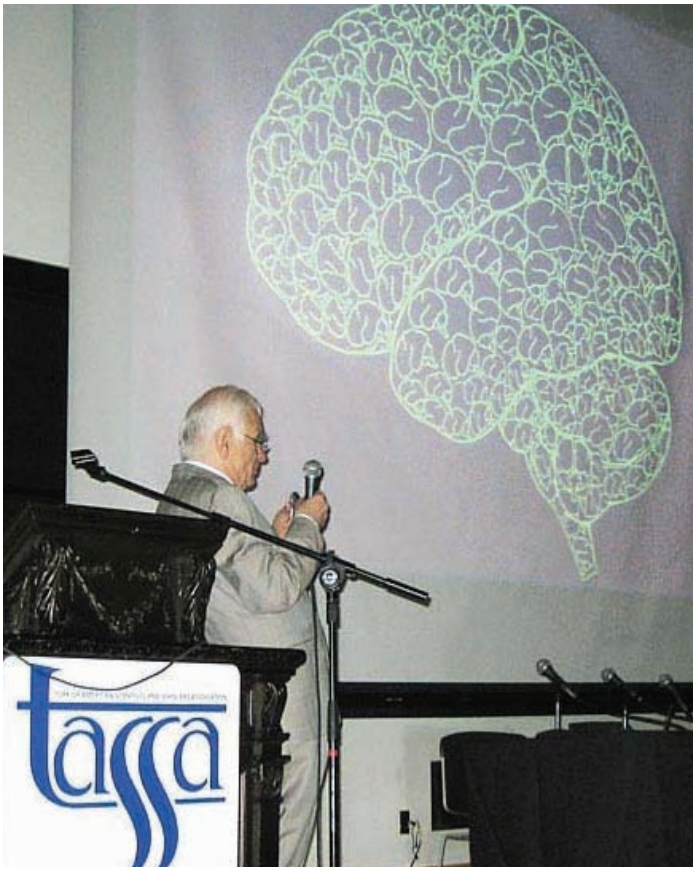
Of relevance for parasitic diseases in Turkey is the South Eastern Anatolia project (GAP). GAP is a comprehensive, integrated development project, which at its completion will have 22 dams, 19 hydroelectric plants and 2 conveyance tunnels on the Firat and Dicle rivers. It will allow irrigation of an additional 1.8 million hectares of agricultural land. Central for the health of such waterways projects are mosquito transmitted diseases such as malaria and dengue and snail transmitted schistosomiasis. Another insect-transmitted disease, which already has a historical focus in the region is leishmaniasis transmitted by sandflies. For the project to reach its full potential, it is imperative that adequate resources be devoted to the control of these parasitic diseases in the area given the increasing population expected in the area, extensive in and out migration anticipated and the anticipated ecological change in the region.

In summary, battle with infectious diseases has had a long history and one that will continue. Following the age of microbial innovations, we are entering another era of genomics and functional biology. This genomics information has the potential to generate new methodologies in diagnostics, treatment and prevention. The challenge will be in translating this vast knowledge into relevant public health applications that are readily accessible, efficacious and affordable for the endemic country populations.

Serap Aksoy *is a Professor and the Head of Epidemiology of Microbial Diseases at the School of Public Health at Yale University. She graduated in Biology from Vassar College and received her PhD from Columbia University. She completed her postdoctoral studies in parasitology in the Department of Internal Medicine at Yale University. She joined the ranks of faculty at Yale first in Internal Medicine and subsequently at her current position at the School of Public Health. Her interests are in the molecular basis of biological complexity that determines host-microbe interactions with a focus on disease control. Her research on tsetse flies investigates the molecular aspects of tsetse-trypanosome interactions. Dr. Aksoy has pioneered a paratransgenic approach, where insect commensal gut flora are exploited to express products that can block parasite development as a novel approach to control disease transmission.*

MARCH 26, 2006
SUNDAY

REFLECTIONS ON THE EVOLUTION OF THE NEURO-SCIENCES



Professor M. Gazi Yaşargil,

MD University of Arkansas for Medical Sciences

Ladies and Gentlemen,
Indeed I appreciate very much the honor and kind invitation from your president Suleyman Gokoglu, to give a lecture at the TASSA Meeting, March 25-26, 2006, in Philadelphia.

It is a great pleasure for me to meet the young generation of Turkish scientists, mathematicians, engineers and medical doctors.

We recognize that the evolution in languages, mathematics, philosophy, fine arts, sciences, technologies, engineering and medicine are closely intertwined with the particular socio-economic, socio-political and socio-cultural constellations of each world-region.

In retrospect, the human cultural evolution during two million years has been notably very gradual. For the past ten-thousand years, however, despite innumerable natural and social misfortunes, the striking increase in world-population, waves of migration, and their confrontation with different cultures have created an unforeseen transition to accepting novel concepts, assuming fresh attitudes, developing new patterns of social networks and restructuring organization. The dread of annihilation, and the drive of individuals and species to survive gave rise to a determined urge to prosper in economic endeavors, to progress in education and health, to cultivate the qualities of language, to advance mathematics, technologies, fine arts, sciences, medicine, surgery, and philosophy, to establish religions, and to launch physical and mental competition in each field of life.

Consequently, distinctive dynamic cultural centers in all continents emerged; some of them were successful, and prospered and expanded, then transferred to other geographic regions. The road from the stone-age was definitely not linear, and not a smooth journey, but followed an efficient pathway, directed towards the survival of the human species. Seen in a broad time-frame, the global cultural evolution can be declared a synchronic phenomenon, which, in the future, will be intensified by our current technologic facilities such as high-mobility, instant connections and rapid exchange of information.

It is not surprising that the invention of motor cars and airplanes was not considered 2000 or even 1000 years ago, due to the absence of their socio-economic necessity. However, it is surprising that inventions for optic glasses, microscopes and telescopes remained fairly delayed, not only to advance scientific research, but also to help those people with inherited or acquired weakness of their visual functions.

Mathematics, astronomy and some preliminary scientific and technologic knowledge for the construction of mechanical and hydraulic systems and for architectural structuring, achieved respectable levels of engineering even some 3000 years ago. However, no artifacts designed for optical use have been found in China, India, Mesopotamia, Egypt or in Greco-Roman cultural areas.

A great number of mathematicians, astronomers, scientists, architects, geographers, engineers, philosophers, artists, and medicine experts are mentioned in the Islamic encyclopedia. Worldwide are known the names of Abu Ma'shar (787-886), Al-Khwarizmi (783-847), Al Kindi (died 870), Hunayn ibn Ishaq (808-873), Al Battani (858-929), Ar Razi

(865-925), Thalmit ihn Quarra (876-901), Al-Zahrawi (Abulcasis, died 1013), Al Beyruni (973-1050), Al-Zargal (died 1080), Ibn-Sina (Avicenna 980-1037), Ibn Rushd (Averroes (1126-1198). However, the names of the brothers Ahmet and Benu Musaoglu (9th centrury), and Al-Cezeri (1130-?) who is known only as an expert historian are not well known; but they have all been mathematicians and engineers, and constructed not only practical equipment, but also fancy, but very sophisticated mechanics and robots. They never invented a telescope.

It is indeed astonishing that Ibn al-Haytham (Alhazen) (915-1039), astronomer and mathematician, initially an engineer for hydraulics, who examined such phenomena as the rainbow, atmospheric refraction, mirror and lentiform crystals, as well as anatomy and physiology of the eye, and wrote numerous manuscripts which were widely distributed in Latin Europe and influential until 17th century, also failed to consider developing an optical aid.

The first single lens “spectacles” were manufactured in Florence, Italy (1303-1313), but the demand for them remained low until the invention of cheap books in the 17th century. The manufacture of sophisticated eyeglasses with individual dioptries, the availability of contact lenses, and finally laser surgery of the cornea required 600 years of diligent research.

At the end of the 16th century and beginning of the 17th century simple microscopes and telescopes were constructed in the Netherlands and Italy. Interestingly, periods of devastating epidemics and several wars in Europe did not inhibit the incessant endeavor of manufacturers, glass grinders, mathematicians, astronomers, scientists, and even philosophers (Descartes, Spinoza). The upheaval of the industrial revolution in England between 1770-1825 culminated in the production of achromatic microscopes without spherical aberration. The formulation of the equation “angular aperture” in 1880 by Emry Abbe, at Zeiss Company in Jena, Germany, allowed the serial production of high quality microscopes and telescopes, followed by the invention of the Electron Microscope in 1933, scanning tunnel microscope in 1981, and positron microscope in 1987.

The continuing accelerating evolution in mathematics, basic sciences and scientific technology, particularly within the past 150 years has influenced the advances and innovations particularly in medical sciences, surgical disciplines, and medical industries. The driving forces of socio-politics and socio-economics ushered in the establishment of functional design and architecture of hospitals, offering optimal work conditions to medical and surgical specialties for the care and cure of patients.

During this same time period, the founding of nursing schools and the availability of professional nursing personnel established another essential factor influencing the social evolution as well as the history of medicine and surgery. An evaluation of this particular development has so far been neglected, and unfortunately, an adequate evaluation and appropriate emphasis is lacking. We owe our success to nurses, as we perform daily diagnostic and therapeutic procedures, which require appropriate care of patients, and the attentive commitments of expert personnel. The complicity of patient care finally culminated in the foundation of schools for physiotherapists, respiratory therapists, occupational therapists and speech-language pathologists. In addition, the high technology revolution in medicine and surgery has recently resulted in the emergence of a new profession, the expert technician, whose constant assistance is indispensable for the success of delicate diagnostic and therapeutic procedures, as well as for the adequate care of patients during various phases of treatment.

Advances in neuroanatomy, integral neurophysiology, neuro-psychology, neuro-chemistry, neuro-immunology, neuropathology, neuro-oncology, neuro-molecular biology, neuro-imaging technologies, neuro-recording technologies, neuropharmacology, and neuroanesthesiology, and improvements in the facilities of well-equipped laboratories handling a broad scale of reliable data in the pre-, per-, and post-operative phases of surgical treatments constitute nowadays the prime and essential components of neuro-diagnosis and neuro-therapies.

Within the past 50 years, neurosurgery has experienced a great number of technological innovations such as the introduction of stereotactic technology, computer assisted neuronavigation, operating microscope, bipolar coagulation technology, bipolar forceps, different sizes and shapes of temporary and permanent vessel and aneurysm clips, microsutures, ultrasound devices to identify the deep localized lesions, ultrasound microflowmeter, ultrasonic suction, ultrasonic microdrill apparatus, high speed drill apparatus, flexible and rigid endoscopy technology, intraoperative stimulation and monitoring technology, intraoperative tractography using diffusion tensor mapping and anisotropic diffusion weighted MRI which provides spatial and directional information of the neuronal fibers, intraoperative angiography, intraoperative MRI, MRA, MRV, DTI and MR spectroscopy technology, endovascular technology, computer assisted,

gradient respondent gamma-surgery, and intensity modulated radiation therapy. Modern operating rooms offer hitherto unimagined technologies for the accurate targeting of the lesions and their complete elimination without endangering adjacent normal structures and their functions. A great number of lesions localized in so-called eloquent areas of the CNS and defined as inoperable, are, at the present time, explored on a routine basis and successfully treated in many centers. The above qualification of a fully equipped department with a team of expert personnel represents ideal working conditions.

The positive developments in neuro-diagnosis and neurotherapies represent only one side of the medallion. The reverse side reflects insufficiencies in our basic knowledge of neuroanatomy, of neuroscience and of neurosurgery, and reveals widely diverse opinions with regard to therapeutic concepts and surgical tactics and techniques. These discrepancies actually signify a newly emerging paradigm in neurobiology, neuropathology and neurotherapy which is guided by the cellular to nano- to pico- to femtometric dimensions of molecular biology. This new paradigm causes us to modify our comprehension pertaining to our professional knowledge, surgical concepts and treatment recommendations. Ongoing research and inventions as well as the innovative visualization modalities such as diffusion and perfusion MRI, multivoxel spectroscopy, and PET will, without doubt, assist us to identify accurately the predilection sites of lesions in the specific compartments of the CNS, to follow their local, regional and distant effects on normal structures, and to differentiate the true nature of perilesional changes in the white matter. After a 100-year evolution of histopathologic and diagnostic methods, the breakthrough in molecular analysis of tumor-species related to gene-expression, membrane receptors and protein activities will allow differentiation between true low-grade benign tumors and those tumors with a potential to mutate to a higher grade. This classification and grading of tumors, based on a molecular analysis, offers us the possibility to define more precise indications when selecting therapeutic modalities.

For the diagnosis of a brain infarction, diffusion MRI is of great value, and for the identification of a hemorrhage, gradient echo MRI (MPGR) is the investigation of choice. The 3D CTA, 3D MRA, and the endoscopic visualization of arteries, aneurysms and AVMs represent great advances for the planning and performance of endo- and exo-arterial treatments. However, important and relevant information indicating the wall-quality of aneurysms, and the vessel configuration of angiomas, as well as the quantity, quality and functionality of arterial and venous collaterals is lacking. Consequently, indications for the treatment of unruptured aneurysms, of asymptomatic AVMs and cavernomas, and of neuro-revascularization remain unclear, and the consequences of temporary or permanent occlusion of arteries and veins remain uncertain and obscure.

A similar insecurity and lack of clarity exists when classifying the clinical condition of patients who have experienced subarachnoid, or parenchymal or intraventricular hemorrhage, causing internal brain trauma of various degrees. The availability of transcranial monitoring of essential parameters (hemodynamics, CSF dynamics and specific parenchymal physico-chemical and immunodynamics) would be of great advantage in defining an objective evaluation of the “struggling” brain of a patient. Such bedside, instant, and continuous measuring of these and other parameters will surely be introduced in the near future, thus permitting evidence-based judgments and the application of appropriate and effective, therapeutic modalities.

The development of technological facilities, and the broadening of information in biology and pathology, and the number of neurosurgeons, (which is estimated at the present time to be 25,000-30,000 worldwide) are rapidly increasing. The quality and outcomes of their neurosurgical procedures deserve objective and honest appraisal, and the achievements of the young colleagues throughout the world merit recognition.

One of the axioms guiding open societies is the issue of ethics, desiring us to respect the rights, freedom and dignity of each individual and, in cases of illness, requiring us to fulfill each patient’s claim to equal benefit from advances in medicine and surgery. Our professional goal is to further improve diagnostic and therapeutic procedures, and ensure their availability globally to each and every individual.

Within a span of 150 years remarkable progress has been achieved in neuro-diagnosis and neurotherapy. Coming generations engaged in these specialties will continue to advance, develop and improve, creating innovative ideas and initiating sound concepts for the ultimate benefit of our patients.

I have tried to discuss in my brief lecture, the valuable achievements but also the disappointing limits in the field of neurosciences, particularly in neurosurgery, with the purpose of signifying to you where we urgently need help for further advances. My goal is to stimulate young and eager mathematicians, scientists, engineers and medical scientists.

Prof. Dr. M. Gazi Yaşargil *was born July 6 1925 in Turkey. He attended Medical School at the Friederich von Schiller University, Jena/Germany and at the University of Basle, Switzerland, where he received Doctor of Medicine degree March 2, 1950. After completing residency in Psychiatry, Internal Medicine, General Surgery and Neurosurgery he become Chief Resident in Neurosurgery at the University of Zurich, Switzerland in 1957, where he became first Assistant Professor in 1965, and later Associate Professor in 1969. He became full professor and chairman of the Department of Neurosurgery, University of Zurich, Switzerland in 1973, until he retired there in 1993. Since 1994 he works as a Professor of Neurosurgery, in the Department of Neurosurgery, at the University of Arkansas for Medical Sciences.*

Prof. Dr. M. Gazi Yaşargil has a collection of Honorary Medical Doctorals (Ibni Sina University, Ankara-Turkey, 1990; Cerrahpasa University Istanbul-Turkey, 1991; University of Lima/Peru, 1999; Hacettepe University Ankara-Turkey) and he is Honorary Professors of Capital University of Medical Sciences Beijing and Xian (China, in 2001), Fourth Medical University in Xian (China, in 2001), 19th May University in Samsun (Turkey, in 2003) and Friedich von Schiller University in Jena (Germany in 2003).

Prof. Dr. M. Gazi Yaşargil is the receipient of numerous awards, to name few: Vogt-Award of the Swiss Ophthalmological Society (1957), Robert-Bing-Prize of Swiss Academy of Medical Sciences (1968), Marcel-Benoist-Prize of Swiss Federation (1976), Pioneer Microsurgeon Award of the International Microsurgical Society, Sidney, Australia (1981), Universita di Napoli e della Compagna (Honorary Medal, 1988), Medical Award of the Republic of Turkey (1992), Gold Medal of the World Federation of Neurosurgical Societies (1997), Distinguished Faculty Scholar, University of Arkansas for Medical Sciences (1998), Honored as "Neurosurgeon of the Century" by the Brazilian Neurosurgical Society (1998), European Association of Neurological Surgeons Medal of Honor (1999), Honored as "Man of the Century 1950-2000" by the journal, Neurosurgery at the Congress of Neurological Surgeons Annual Meeting (1999), Fedor Krause Medal, German Neurosurgical Society (2000), Honorary Fellowship of the American College of Surgeons (2000), "Yaşargil Endowed Chair in Neurosurgery" University of Arkansas for Medical Sciences (Founded, 2000), Medal of the Republic of Turkey (2000), Award of the Turkish Academy of Sciences (2000), First International Francesco Durante Award, Italy (2002).

He has honorary memberships in Academia Brasileira de Neurocirurgia, Society of Neurological Surgeons, American Heart Association, Canadian Neurosurgical Society, Congress of Neurological Surgeons, Japan Neurosurgical Society, American Association of Neurological Surgeons, Harvey Cushing Society, Swiss Society of Neuroradiology, Royal Society of Medicine, London, Section of Neurology, Turkish Neurosurgical Society, International Skull Base Society (ISBS), Swiss Neurosurgical Society, Argentine Neurosurgical Society, American Society of Neuroradiology, Turkish Academy of Sciences, Peruvian Neurosurgical Society, Italian Neurosurgical Society, Hong Kong Neurosurgical Society, Georgia Neurosurgical Society, Polish Neurosurgical Society. Prof. Dr. M. Gazi Yaşargil has over 350 publications with 13 monographs and over 41 contributions to handbooks and monographs.

FROM RESEARCH TO COMMERCIALIZATION
MODERATOR: YILMAZ ARGUDEN

Yilmaz Arguden *is a leading strategist, advisor, and board member of major public and private sector institutions. He is the Chairman of TAIK (Turkish-US Business Council) and ARGE Consulting, a leading management consulting firm in Turkey. ARGE has been recognized at the European Parliament as one of the best three companies "shaping the future" with its commitment to corporate social responsibility. Dr. Arguden is also an Adj. Professor of Business Strategy at Bogazici University and the MBA program of Koc University and a columnist focusing on business and strategy issues. He was selected as a "Global Leader for Tomorrow" by the World Economic Forum for his commitment to improving the state of the world. (www.arguden.net)*gy-restricted home appliances such as washing machines and air conditioners.

POWER SEMICONDUCTORS' ROLE IN OUR DAILY LIVES

Izak Bencuya,
Fairchild Semiconductor

In the next few years, semiconductor suppliers will play a more pivotal role in the future of power. This role definition is driven by a number of factors. The demand for energy continues to accelerate faster than the pace of the supply. Oil supplies and battery technologies cannot support this burgeoning need without large investment. The consumer adoption of electronics in regions such as China will be exponential and consumers expect smaller, lighter electronics with more power hungry features. With these forces, the industry needs to rely on the semiconductor supplier to produce more power density per volume, develop solutions that take up less space and consume less power, while delivering the functionalities and high performance that consumers are asking for. These driving factors can be seen in white goods, computing, communications, consumer and automotive applications.

Today's designers must both energize new features to differentiate their products in the market, as well as offer consumers applications that conserve energy to meet the existing and emerging regulations that are mandating power efficiency. This is a formidable challenge. Semiconductor suppliers are engineering creative ways to miniaturize the total footprint on the PCB board, while packing high performance features and often times, high voltage features into a package that can handle the thermal environment.

In white goods, we see this creativity in the emergence of smart modules that provide efficient motor control for energy In automotive applications, there are a number of forces driving innovation. Mechanical systems continue to move to solid state, ignition has moved from mechanical to electrical and the engine, itself, is moving to electrical. As all of these

systems change toward DC motors, there is the need for more electronics and more power expertise.
As many designers acknowledge, traditional "smart power" monolithic technologies are reaching their limits in terms of power efficiency. These technologies involve a complex fabrication process that slows design cycle time and have a high specific on resistance, higher interconnect resistances and limited signal and power isolation. Having a modular solution that integrates sense transistors, diodes, resistors, MOSFETs with IGBTs into small and innovative packaging can address key performance and design issues. In automotive applications, heat removal in small spaces is a key issue. Modules, such as Smart Power Switch technology, can address this concern by using the lowest power loss (heat generating) devices that the board space defines. An added advantage of the module solution vs. a monolithic approach is the reduction of design cycle time and improved time to market. From a performance perspective, automotive designers must reduce noise and have an accurate sensing of load conditions in automotive modules.

In all of these markets, semiconductor suppliers continue to contribute technology and expertise to support consumer demand for high performance, smaller and more energy efficient products. By forging strong partnerships with customers, semiconductor suppliers are integral in the quest to provide design efficient solutions for electronic appliances with severe power budgets and size constraints to meet the burgeoning consumer demand.

***Izak Bencuya** is the Executive Vice President of Fairchild Semiconductor and the General Manager of the Functional Power Products Group in San Jose, California. Dr. Bencuya has 25 years of industry experience. He began his career at Yale University where he researched ultra thin oxide MOS devices. Dr. Bencuya later worked at GTE Laboratories and Siliconix in various research and management roles to develop and market leading edge Power Devices, such as MOSFETs, IGBTs and SITs. He joined Fairchild Semiconductor in 1994 to start the Low Voltage MOSFET business which has grown to be the major revenue and earnings generating line at Fairchild. The Functional Power Products Group, at $900M annual revenue, mainly supplies Power Semiconductor solutions for all power supply applications in the computing, communications, industrial, consumer and automotive markets. Dr. Bencuya has a B.S. in Electrical Engineering from Bogazici University in Istanbul, Turkey, an M.S. and Ph.D. in Engineering and Applied Science from Yale University and an M.B.A. from the University of California-Berkeley. He is a member of the IEEE Electron Device Society. Dr. Bencuya holds 15 patents and has published extensively in the electronics field.*

A SILICON VALLEY IN ISTANBUL?

Gorkem Guven
Hittite Microwave Corporation
Istanbul Design Center

After understanding the importance of the Research and Development on innovation, Turkey has been looking to build a solid Techno park system in order to provide advantages to the companies which put solid emphasis to promote constant innovation.

Although the system is relatively new and experiencing problems due to the immaturity of the related law, the main idea behind this huge project is not only to provide advantages to the high-tech start-ups but also to attract well established domestic or international high technology investments. Along with the synergy of the environment, the Techno park zones provide income tax, sales tax and corporate tax advantages to the admitted companies. There are four different techno parks with more than 250 companies at the moment. Istanbul Technical University and Middle East Technical University techno parks are among the most prominent ones. While almost 85 percent of the companies are working on software related applications, the number of the hardware related companies has been increasing in the recent years. Hittite, Cypress Semiconductor, ST Microelectronics and Alcatel are among the most prominent examples.

The efforts to promote high technology research and development in Turkey yielded to an international awareness that sets the country as an emerging outsourcing possibility for the high technology software and hardware applications. Bill Gates' visit to Turkey, Intel's visit to scout start-ups and its intention to develop its multimillion dollar fund for its

prospective investments are among examples illustrating this awareness. Meanwhile, Turkey is not alone at its efforts to attract international investments. There is a lot of growth in the Middle East and the institutions are in the process of establishing Venture Capital funds to further support the new ventures along with providing outstanding conditions to the already established companies.

While Turkey's main asset and advantage is its young and very talented high technology engineers, a well established Venture Capital system is missing. Thus the start-ups heavily rely on the individual share holders and the government-based funds through the Scientific and Technological Research Council of Turkey (TUBITAK). While TUBITAK may give outstanding amount of risk capital to the admitted companies based on the projects and the targets, the lack of a solid VC system is among the heaviest burdens on Turkey in the competition with other countries which provide High Technology Development zones. To illustrate this fact, one can give the example of a Bahrain based investment firm recently announced that it will form a 250 million dollar venture capital fund for the eligible startups and ventures. Dubai is trying to promote a technology development zone with unprecedented advantages. Daman Asset Management recently announced the launch of a 270 million venture to assist the entrepreneurs.

Although a well established VC structure is very important and can be viewed as a fundamental flaw for Turkey to compete with its rivals, the country has a significant advantage to balance the cumulative problems mentioned above. It is indeed true that Turkey's dynamic and talented work force will create the difference for the country to establish itself as an abundant human resource for start-ups and established ventures. Along with the motivated new graduates, the scientists, engineers and scholars who have gone to United States or other European countries years ago and willing to come back to their home countries in order to establish ventures or contribute to the existing domestic or international companies constitute an abundant resource for many high technology ventures. A very solid example of the above fact is Airties Wireless Networks. This company was founded by Turkish individuals who met in Silicon Valley and decided to bring their years of High Technology experience in United States to Turkey in order to establish a company which captured a significant market share in wireless Modem and IP based communications in relatively a very short amount of time. The company now employs 66 individuals recruited either among the foreign experienced individuals or among the new graduates in Turkey.

In conclusion, the tendency of the U.S or European experienced Turkish academic or industrial based individuals to return back to their home country will yield to more entrepreneurs. This trend should definitely be blended with a solid V.C. system and with the help of the tax advantages; we are likely to see more of both new ventures and subsidiaries of the existing establishments in Turkey.

Gorkem Guven *is the General Manager of the Istanbul Technology Center of the Massachusetts based Hittite Microwave Corporation (HMC). After graduating from the Middle East Technical University in 1998, Mr. Guven began his career in a Lockheed Martin Company. He joined the Chelmsford Headquarters of HMC in 2000 and has been with the company ever since. He recently came back to Turkey to establish the HMC Istanbul Technology center within the ITU Technocity. HMC designs and develops high performance integrated circuits (ICs), modules and subsystems for technically demanding radio frequency (RF), microwave and millimeterwave applications covering the frequency range of DC to 110 GHz. HMC products are used by more than 2,300 customers in a variety of applications and markets, including; automotive, broadband, cellular infrastructure, fiber optics, microwave & millimeterwave communications, military, space and test & measurement market applications. Mr. Guven is also one of the initial shareholders of Airties Wireless Networks in Istanbul, which is a prominent name in the wireless communication market.*

FINDING QUALIFIED R&D ENGINEERS IN TURKEY AND COMPARISON OF R&D TO SILICON VALLEY

Tibet Mimaroglu
Beko

I have always thought that Turkey has ample experienced engineering talent available for hire, since a lot of the engineers who worked overseas would be returning back for jobs and opportunity to be back in homeland. I thought it would be employer's market since they could choose from a large population of engineers, and that jobs would be more scarce than qualified candidates. Furthermore, I thought the engineering salaries would be much lower than Europe and North America.

Now I realize all of these assumptions are false. Trying to hire software and hardware engineers with 10+ years of experience have not been successful. For the hardware positions, most applicants do not have even the basic Digital Design experience. Thus, these have to be trained on the job for quite a while before they could become effective. There are more software engineers, but these typically have less then 3 years of experience, and this is usually not in the video or consumer electronics field we are trying to hire. Advertising in major news papers and working with job web sites and recruiters did seem to help much either.

What happened to experienced software and hardware engineers? They have either become managers quickly and quit the individual contributorship positions, or they did not return to homeland and stayed overseas. Part of the reason is that there are not many high technology companies which help train and give experience to people as in Silicon Valley. Only a handful like Beko, Vestel, Netas, Profilo, Aselsan are not enough to train a large pool of experienced people. Furthermore, there is a gentleman's agreement between most of these companies not to hire each other's employees. Another reason is that dual track is not used often in companies, which would allow advancement in technology expertise such as expert level one, two, and so forth, or titles for technical track such as principal engineer or chief engineer used in Silicon Valley.

In contrast with Silicon Valley, where the major design and development effort is in chip architecture, design and software, the Turkish companies seem to focus on software, and board-level designs. Furthermore, tools commonly used in Silicon Valley for board level analysis, simulation, and chip design are not utilized much, and there is not much experienced pool of engineers to use these. Hardware and software architects are extremely difficult to find. Most of the engineers have 6 month to 3 years of experience. There is much room for advancement in this area.

Similarly the use of well established engineering process flows is not well established or used in Turkey even in major firms. Sometimes these do exist on paper or used in the past, but are not used to save development time. The source of this goes back to lack of engineers who are trained and experienced with strong design and development methodology and those who could train and mentor less experienced engineers.

There is also the perception overseas that salaries in Turkey for engineers are very low. This prevents qualified engineers from overseas to apply for positions in homeland. This is mostly a misperception since salary levels for technical people have gone up considerably during the last decade. Salary levels for senior engineers in Turkey for R&D positions are in the range of $30K to $77K.

Access to technology is not much different than Silicon Valley, since most high technology companies frequently visit Turkey to win design-ins and to promote consulting and other services. This is because Turkey is a major exporter of white appliances and consumer electronics such as TVs. Overnight delivery services provide to two day access for parts from anywhere in the world for engineering work.

To build a scientific bridge between USA and Turkey, hiring engineers and research staff who are experienced in technology and methodology in USA is necessary. These engineers, preferably handful of key software and hardware architects, could train other engineers with regard to design methodology and also teach and mentor the use of advanced engineering and analysis tools. Another method to build a bridge is to partially outsource some projects to USA consulting companies, small or large, thus creating an environment of joint development between USA and Turkish companies, which will also allow transfer of technological know-how during the project development to Turkey. Furthermore, work in advanced engineering areas such as chip development will further advance transfer of high technology.

__Tibet Mimaroglu__ is the Deputy General Manager of R&D at Beko in Istanbul. He started his professional life as Medical Imaging Equipment Designer at Quantex X-Ray in 1981. He designed digital video recorder at Vicom Systems and developed biometric security systems at Identix. During 1987-1993 he worked as Director of System Development at Compression Labs. During 1993-1999 he worked as Technical Staff Member and Project Manager at Silicon Graphics. During 1999-2001 he worked as Director of Engineering at Ubicom. During 2001-2005 he worked as Senior Staff Engineer and Project Manager at Nextray, CEO at Spreadvision, Director of Video Systems at Atheros Communications, and Mobile Imaging Director at Insilica. Before joining Beko, he worked as Consultant for both Intel Corporation and Connex Technology. He received his B.S. and M.S. degrees from Bogaziçi University, Electronics Engineering Department in 1976 and 1978, respectively, and his Ph.D. degree on Digital Image Processing of Computer Engineering from Oakland University, Michigan in 1981. He authored a textbook published by Prentice Hall "Programming and Designing with the 68000 Family". He taught Digital Image Processing Courses at UC, Berkeley in 1987 and was a Visiting Professor at Bogaziçi in 1998. Dr. Mimaroglu worked at MPEG Committee for more than 10 years and is a member of SMPTE. He has 12 patents.

THE INNOVATION POTENTIAL OF TURKEY

Cengiz Ultav
Vestel Electronics

One of the best kept secrets about Turkey is the potential of its young and educated population. According to well reputed World Competitiveness Yearbook published by The International Institute for Management Development in Lausanne Switzerland, Turkey ranks favorably on a number of categories like 'Total expenditure on R&D,' 'Total R&D personnel,' 'Basic research capabilities,' 'Number of patents,' 'Educational system,' 'University education,' but more importantly, on categories like 'Information technology skills,' 'Interest of youth in science and technology,' 'Quality of engineers' Turkey has a very high rating. On a different study carried out by the OECD, Turkey's 'Innovation Potential' has the highest rate of positive change and the current level of 'Innovation Potential' is fairly respectable with respect to its GDP.

A number of companies from Turkey have become global players reflecting this potential.

Vestel, a consumer electronics company, has become number 1 in Europe and number 4 in the world in terms of volume of consumer electronics products in a period of 10 years based on an innovative strategy. Vestel now has a market share close to 30% in Europe, serving both major retailers like Carrefour, Metro, etc., as well as almost all Japanese brand names with a wide range of manufacturing services: design, manufacture, point deliver and regulatory management. Compared to its far eastern competitors with an average of 300 models per year, Vestel manufactures 3000 models per year for the highly segmented European markets. This level of differentiation strategies require a high level of innovation power. These differentiation strategies are backed up by unmatched manufacturing flexibility built into their Turkish factories whereby order sizes vary from a single container to 100K units to be delivered per week which require high levels of Information and Communications capabilities built into the system.

Another example is Temsa, a bus manufacturer which has brought the mass customization with very quick turnaround times to the European bus market. The company was successful in getting specialized bus business with customers like Austrian Post, French Tourist Board, etc.

Another good example of Turkish felexibility, hard work and innovative power combined, is Yonca Onuk, a shipbuilder which has established a reputation for manufacturing the fastest composite coast guard boards up to 63 meters. The company makes the best use of developments in advanced composite and nanotechnology materials, couples it with a very young but innovative design team and excellent manufacturing perfection to turn out the strongest, lightest, and fastest coast guard boats covering the wide range of sizes almost outmoding steel based models.

These are only three examples of successful cases reflecting in a concrete way the Turkish innovation potential.

On the political, social and economic arena, Turkey is also displaying its innovation potential. Turkey is on its way to EU integration although it is a tough road which may take some time. But Turkey has already achieved Customs

Union with the EU back in 1995 far ahead of many of the early accession members from Eastern Europe. This results in very effective trade relations in the interim increasing the business opportunities for EU from a Turkish base. Turkey is secular for more than 80 years in a part of the world torn apart by religious strife. Turkey represents a working model for managing democracy, tolerance, and religious freedom in harmony that will secure peace in the region for coming generations.

Cengiz Ultav *is a Senior Vice President at Vestel in Istanbul responsible from Strategic Planning, Investor Relations and New Business Development. He received his BS and MS degrees in Electronics Engineering from Middle East Technical University. He held technical and management positions at Bimsa A.S. and Info A.S. in Turkey, and Philips and Dornier System GmbH in Europe between 1973 and 1981. He worked as a consultant to major groups in Turkey (Koç, Sabanci and Eczacibasi) between 1981 and 1988. He was an Assistant GM at NCR Turkey and GM at Sun Mikrosistemler Turkey between 1988 and 1992. He established his own company Multima in 1992, as a Microsoft Certified Solution Provider (top winner two years in a row), personally became a Microsoft Solution Development Discipline - SDD consultant, serviced major holding groups (Koç, Sabanci and Eczacibasi) and Vestel. He joined Vestel in 1995 as a VP participating from day one as Zorlu Group acquired Vestel and embarked upon a major growth challenge that by 2005 achieved more than 25% market share in the EU in consumer electronics. Multima continues as a software company with ERP sales to Far East. He is a founding member of UNIX User's Group in Turkey and a founding member of Turkish Informatics Society and a current board member.*

CHALLENGES IN BUILDING A SUSTAINABLE SCIENCE BRIDGE BETWEEN THE US AND TURKEY
MODERATOR: MIRAT D. GUROL

Mirat D. Gurol *is the Blasker Chair Professor and Director of Environmental Engineering Program at San Diego State University (SDSU). She received her degrees in Chemical and Environmental Engineering from the Middle East Technical University in Ankara and the University of North Carolina at Chapel Hill. She had served as a faculty member for seventeen years at Drexel University before moving to SDSU in 1997. She has been quite active in research, receiving numerous national and international awards and recognitions on her contributions to innovative processes of water treatment and fundamental understanding of chemical oxidation technologies in elimination of environmental pollutants. She has closely collaborated with private sector her understand the importance of public and private partner included installation of a water treatment system into a tsunami-hit hospital in Southern India. Her continuing efforts have been recognized by the President of India who granted her three private meetings, and the President of SDSU who bestowed on her the President's Leadership Award. Dr. Gurol was a member of the delegation that recently visited TUBITAK-MAM for development of collaborative research programs.*

ENHANCING S&T RELATIONS BETWEEN THE USA AND TURKEY: CHALLENGES AND OPPORTUNITIES

Güldal Büyükdamgacı Alogan
Vice President, TÜBİTAK

Some 25 years ago when people from my generation were here in the U.S. for academic study, at a time when the world was not yet this one big village that it is today, connected by fiber optic cables and by multinational scientific endeavors, making future plans involving both the U.S. and home, Turkey, was almost impossible. Moreover, when one went back home after finishing study, finding a match in the job market was often a real challenge. We had to live through many-a-stories of mismatch, no-match, frustrations, and sometimes having to go back to the U.S. just to survive. Today, you are fortunate in two ways: You are living in a well-connected world, and you have TASSA which helps build a strong bridge between the two countries for scholars and researchers.

In this context, there are three major barriers. First is very simply the geography. It is difficult and costly to travel back and forth across an ocean. Despite all the improvements in travel, this remains a problem. Second is 9/11 which made it more difficult for everyone on both sides to connect. People started to feel apprehensive about others and about ships in bringing new ideas and technologies to life. Over the last few years, she has worked towards providing safe drinking water to impoverished societies of the world, which *on many research and development projects, which helped* moving around. These are things that time will heal, obviously. The third barrier is Turkey's concentration on the membership process in the European Union. We have to realize that this is a big distraction for Turkish researchers and research institutions. However, the fact remains that when it comes to science education, graduate studies, and just doing research, the U.S. has always been at the top of our list. Despite distractions, difficulties, or challenges, we have always had, and will always have strong relations.

The U.S. and Turkish S&T relationship is formalized at two levels: One is between the governments through an agreement made in 1994. This is due for renewal, but we don't have any problems there. Second is through a letter of intent which was issued in 1996 between NSF and TÜBİTAK enabling scientists from two countries to work together on projects that are supported by both funding institutions. When you look at our S&T relationship, we do see an asymmetrical situation. The "brain-drain" is a fact. However, we cannot blame anyone or any country for this, it's only natural that talented people would want to walk forward and seek opportunities for growth. Yet, for this to work for everyone involved - for Turkey, for the U.S., for the globe, for peace, for the development of S&T – the unevenness has to be managed well. We have to find ways to allow every country to form an S&T critical mass of its own. We keep seeing natural disasters, epidemic diseases, political unrest, etc. in any part of the world eventually impacting the entire world. Just remember the Avian Flu. If we don't take care of the most underdeveloped parts of the world, we all live with the consequences. We all are floating on the same boat that was made really small by all this connectedness. Turkey too needs its critical mass. It is not sustainable to rely entirely on importing technology. We have to maintain core competencies just to survive, because technology is in everything. And it's just not high technology we are referring to here. To be able to produce a tomato that actually tastes like tomato requires S&T competency! No one country can aim to produce technology in all areas anymore, but one has to have capability in strategically selected areas. And for that, one has to have human resources in those scientific fields. This is why you all are very valuable resource for Turkey.

I see you in two groups. There are those who decided to stay here in the U.S. We are happy for you. But we would like to see you – if you are willing - helping us out in solving some of our country's problems. Then, there are those who want to move back. We would like to see you start a productive and happy life that is good both for you and for the country. TÜBİTAK perceives all of you from a strategic point of view. In this view, long term sustainable results are essential. It used to be that an academician living in the U.S. would visit home every summer for giving a seminar, or offering a summer course. Most of such efforts left little permanent trace behind. What we would like to see are consistent, systematic, planned efforts yielding significant and sustainable results. That's possible by really connecting with researchers, academicians, or industry people in Turkey through well thought out projects. Another important output we seek is synergy. This should be a win-win-win game because here there are three players: the U.S., Turkey and you as individuals. Therefore, in designing instruments for collaborative work, we seek models that will be good for all three players. The strategic objectives of Turkish Research Area entails that we encourage projects that are done by interdisciplinary, international, inter-organizational teams that aim to solve problems in Turkey, and while doing that, to train young scientists, and to utilize strengths of Turkey. This brings forth an environment conducive for you to import your expertise if you stay connected.

To sum up the pointers: TASSA meeting is a good marketplace for jobs and project partnerships; you should take advantage of that. Make yourself known to the researchers at home; through being active during your visits, and making sure that you are registered and updated in ARBIS, the database for researchers. Do visit TÜBİTAK's Web site (www.tubitak.gov.tr) to familiarize yourselves with relevant support mechanisms.

We all wish you would bring some return on investments that Turkey made in you, I know you do too, that must be why you are here. I hope that you are prepared to make the effort. Thank you.

Guldal Buyukdamgaci *Alogan is a Vice President at the Scientific and Technological Research Council of Turkey (TUBITAK). Dr. Büyükdamgaci received her BS degree (1976) from the Middle East Technical University (METU), MS (1982) and PhD (1985) degrees from the University of Wisconsin-Madison, all in Industrial Engineering. After working as a strategy advisor for a major corporation in Turkey between 1987-88, she taught in the Departments of Industrial Engineering and Management at the University of Wisconsin-Madison and Whitewater, WI between 1989-92, and at Polytechnic University - New York between 1993-96. In 1996-97, she served in the top management of two secondary education institutions. In 1998, she joined Industrial Engineering Department of Marmara University in Istanbul, and later got concurrently (2001-04) involved in the Institute for Industrial Management (TUSSIDE) of TUBITAK. In March 2004, she was appointed to TUBITAK in Ankara where she is a Vice President. She also teaches at the Department of IE at METU and the Faculty of Medicine at Hacettepe University. Her areas of interest and research are decision theory, measuring health outcomes, strategic management, and organizational excellence. Her affiliations are Society for Medical Decision Making (SMDM - USA), The Institute of Operations Research and Management Sciences (INFORMS - USA), Operational Research Society of Turkey (YAD - Turkey), and Society for Health Related Quality of Life (SAYKAD - Turkey).*

THE ROLES OF SCIENCE AND TECHNOLOGY IN INTERNATIONAL RELATIONS

Alex King
Jefferson Science Fellow, US Department of State
& Professor and Head School of Materials Engineering
Purdue University

It is my privilege to speak at the end of this panel discussion. Dr. Neureiter has provided a compelling and persuasive argument for pursuing collaborative research. The presentations made by the other two panelists have covered a number of specific programs supported by TUBITAK and NSF that encourage and support collaborative research between scientists and engineers in Turkey and the United States. All of their presentations resonate strongly with my own point of view.

As an American engineering department head, I am very much aware of the valuable contributions that international graduate students (and especially those from Turkey) make to the US research enterprise. I am also convinced of the value of the continuing connection between professors and their former students, whether they remain in the United States, or return to their home countries. The connections between individuals from different countries form an important key to enabling research to advance, by bringing creative minds together, and also by bringing different mindsets and perspectives to bear on challenging problems.

Although American foreign policy was first pursued by scientists and engineers like Benjamin Franklin and Thomas Jefferson, the contributions of technology to peacetime international relations have not been prominently recognized in the history of the State Department. This is beginning to change as it is increasingly understood that scientific collaborations benefit from diplomacy, and that international relations also benefit from thriving scientific interactions. It was in recognition of the importance of science in international relations, that the State Department first created the Office of the Science & Technology Adviser to the Secretary of State, in 2000, and the Jefferson Science Fellowship Program, in 2004. Dr. Norman Neureiter was the first holder of the position of Science & Technology Advisor to the Secretary of State, and his successor, Dr. George Atkinson leads the Office today. Dr Atkinson is an educator and is passionate about reaching out to the next generation of scientists and engineers.

Recognizing the need for international collaboration as a means of pursuing science at the highest level, and also of developing the talents of scientists and engineers who can address the technological aspects of complex international issues, the Department of State is developing new approaches to encourage this type of work. These move beyond the mere provision of support for interested parties, to a more deliberate and targeted approach, intended to foster sustained research interactions that meet the goals outlined above.

Principles of the New Approach

- Establish arenas of science and technology (S&T) excellence abroad that are closely linked to corresponding U.S. S&T communities through collaborative education and research.
- The U.S. and the partner country or countries should benefit mutually.
- Geopolitical considerations (including S&T for development) would be considered in selecting projects to fund, in addition to scientific excellence, providing a capacity to use science as a tool to promote international relations.

As this approach is developed and put into practice, partnerships will be sought with countries that are well-suited to the approach, and have sufficient research infrastructures upon which to build the long-term collaborations that we seek.

***Alexander H. King** is a Jefferson Science Fellow at the US Department of State. This one-year appointment takes him away from his permanent position as Head of the School of Materials Engineering at Purdue University. Alex King was born and raised in London, England. He has a baccalaureate from Sheffield University, and a doctorate from Oxford. (UK) Institute of Materials and he has been a Visiting Fellow of the Japan Society for the Promotion of Science. He held post-doctoral positions at both Oxford and MIT before joining the faculty of the State University of New York at Stony Brook, where he also served as the Vice Provost for Graduate Studies. He left Stony Brook in 1999, to take up his present position at Purdue. A naturalized American citizen, he is a Fellow of both ASM International and the served as the President of the Materials Research Society in 2002, and he now serves as a member of the Executive Committees of the Federation of Materials Societies and the University Materials Council. Dr. King maintains an active research program. He has over 150 refereed publications and has edited four books in areas such as thin films, metals, electro-ceramics, semiconductors, polymers and materials processing. Thirty graduate students, from all around the world, have earned PhDs under his supervision*

TURNING A COOPERATIVE SCIENCE AGREEMENT INTO REAL COOPERATION

Norman P. Neureiter
Director of Center for Science, Technology and Security Policy American Association for Advancement of Science (AAAS)

It is really an inspiration to be here and to see the level of enthusiasm and the excellent presentations and papers. President Gokoglu, I congratulate you on putting together this outstanding conference.

I particularly welcome what is clearly an underlying objective of this meeting—to promote S&T cooperation between the US and Turkey. It was a pleasure to meet Dr. Yetis and Dr. Alogan from TUBITAK, the organization that will be involved in building those relationships and also to see the wonderful example of Dr. Sancar with so many Turkish collaborators in his exciting work on circadian rhythms.

It seems that I have spent much of my life in promoting international cooperation in science and technology--whether it was at NSF, in the US Foreign Service, in the White House Office of Science and Technology, in international business development with Texas Instruments, or most recently at the Department of State and AAAS. I firmly believe that S&T cooperation can be one of the most effective instruments of a positive and constructive foreign policy. It contributes to economic development; it stimulates rational, pragmatic thinking and it can also build people-to-people relationships across even sometimes not so friendly borders. This kind of cooperation is essential today, among the world's nations, since we absolutely must work together on the big issues of energy, of sustainable development, of stopping infectious disease, providing adequate food and clean water for growing populations, and building a safe and secure world—just to name a few of the challenges we all face together. All of these issues have large scientific and technical dimensions. Another way of saying all of this is that S&T cooperation can be one of America's strongest instruments of soft power diplomacy.

Yesterday we heard quite a discussion of the "Turkish model", but that was in a political context. One measure of Turkey in a scientific context is the number of Turkish articles published in international S&T journals. Turkey has the most of all 57 member countries of the OIC—the Organization of the Islamic Conference. Yet Turkey's total is still only one-half that of Korea, but four times that of Iran, which has about the same population.

(Showed a series of slides with the number of articles, fields of subject, principal universities involved, principal authors, countries with whom they cooperated, etc.)

Turkey emphasizes that it is not an "Islamic" country, but a secular one; however, with a population more than 99% Muslim, it is still a valid question to ask whether Turkey can serve as a "model" for those who would like to build scientific bridges to Islamic countries as one step toward closing the increasing gap between the US and much of the Muslim world.

In the remainder of his talk, the author discussed the various mechanisms for S&T cooperation, noted NSF's strong programs to be discussed by the next speaker, and emphasized the importance of exchanging researchers and students—even in a digital world where communication is so easy. He also stressed the desirability of building institutional linkages between universities or other scientific institutions in the two countries—linkages which can have longer-term stability as compared to ties just between individual scientists.

But he also noted the barriers to that cooperation—such as the lack of knowledge of what is happening in the other country and the lack of personal contacts; the current problems with US visas, which for some countries are particularly severe, despite monumental efforts by the State Department to facilitate the process; US export controls and the often arcane "deemed export" problem; intellectual property issues; the great distance between countries—both culturally and geographically; the differing levels of research quality and facilities; and, from the US government's position, the lack of funds dedicated clearly to the promotion of international S&T cooperation—in other words, the short-changing of S&T cooperation as a useful instrument of American soft power.

Yet, the most effective way of going about building these cooperative ties is just the way that you in TASSA are doing so—by drawing on the great accomplishments and connections of Turkish scientists working in America to team up with their colleagues in Turkey, and particularly with students, graduate students and post-docs who will spend some time in the US and then either return to Turkey or work

for a time in the US. And once Turkey has responded to the R&D challenges of the 21st century and made the necessary investments in science and technology, many of these young Turkish professionals will go back home--taking with them the skills and the cooperative ties that they have developed in the United States President Gokoglu and all you members of TASSA, please keep on with this very important work that you doing. It is through effective cooperation among the world's nations in applying science and technology to the globe's manifold challenges that we can secure a future of prosperity and sustainability for all the world's peoples.

Norman P. Neureiter *is the Director of the Center for Science, Technology and Security Policy at the American Association for the Advancement of Science (AAAS). With a Ph.D. in 1957 from Northwestern University, Norman Neureiter joined Humble Oil in Baytown, Texas. He moved in 1963 to NSF to run a cooperative science program with Japan that had been initiated by President Kennedy. From there he joined the US Foreign Service, serving in Germany and in 1967 became the first US science attache in Eastern Europe--based in Warsaw, Poland. In 1969, he moved to the White House Office of Science and Technology in charge of international affairs--playing a role in President Nixon's breakthroughs with both Russia and China. He left Government in 1973 and joined Texas Instruments where a 23-year career in international business development culminated in the position of Vice President of TI Asia based in Japan for five years. Retiring in 1996, he was a consultant until being appointed the first Science and Technology Adviser to the US Secretary of State in 2000, serving briefly under Madeleine Albright and then Colin Powell. In 2004 he joined AAAS at his current position. He speaks German, Russian, Polish, French, Spanish and Japanese.*

SUPPORT OF US-TURKEY SCIENTIFIC ACTIVITIES

Osman Shinaishin
US National Science Foundation

This paper is intended to focus on the background and parameters that will help US scientists build collaborative activities through proposals for support from the US National Science Foundation (NSF) and the Turkish Council for Science and Technology, TUBITAK.

The NSF Office of International Science and Engineering (OISE) supports programs to expand and enhance leading-edge international research and education opportunities for U.S. scientists and engineers, especially at the early career stage. It works to build and strengthen effective institutional partnerships throughout the global science and engineering research and education community, and it supports international collaborations in NSF's priority research areas.

The Office carries out its functions through close partnership with the NSF Directorates and through its own program activities. OISE is housed within the Office of the NSF Director since its role is Foundation-wide.
OISE encourages funding applicants to include an international component in proposals submitted to the appropriate research directorate. See the Dear Colleague Letter on OISE Support for International Activities for a description of recent changes in OISE activities.

The National Science Foundation encourages collaboration between scientists in Turkey and in the U.S. in the areas of NSF programs. A US scientist can still apply for international research collaboration, but the proposal must now be submitted to the appropriate disciplinary program, for example to an appropriate program in the Directorate of Engineering. All proposals for international cooperative research should be submitted by the U.S. scientist to the disciplinary science program in NSF, and not to the Office of International Science and Engineering (OISE). That program will receive the proposal under its deadlines and will conduct the review and make recommendation regarding funding. That program may also consult with OISE for participation in the funding.
OISE will continue to support other activities as described in the websites below.

1. A proposal for cooperative research may be submitted as a new proposal, or as a supplement request to an existing grant, to the program officer for the appropriate disciplinary program within NSF, see the GUIDE TO PROGRAMS for 2004, available on the web:
http://www.nsf.gov/od/lpa/news/publicat/nsf04009/start.htm

Please note that U.S. scientists may apply to NSF for a grant for collaboration with Turkish scientists, whether they have a domestic grant or not. New grants, or supplement grants, for US-Turkey collaborative research are for up to three (3) years. They may cover travel (primarily between the U.S. and the foreign country), living expenses and small amounts for instruments, computer time, software, and related items. The proposal can be submitted to NSF only from a US institution.

2. The New Guidelines for Activities by the Office of International Science and Engineering (OISE) are given in the three websites below:

Dear Colleague Letter
http://www.nsf.gov/pubsys/ods/getpub.cfm?ods_key=nsf04034

Planning Visits & Workshops
http://www.nsf.gov/pubsys/ods/getpub.cfm?ods_key=nsf04035

Developing Global Scientists -
http://www.nsf.gov/pubsys/ods/getpub.cfm?ods_key=nsf04036

Partnership for International Research and Education (Likely to be repeated in 2007):
http://www.nsf.gov/pubs/2005/nsf05533/nsf05533.htm

The specifics for preparation of proposals are in "Proposal Preparation Guide"
http://www.nsf.gov/pubsys/ods/getpub.cfm?gpg.

3. TUBITAK in Ankara agrees to consider the same project proposal if submitted to them early enough by the collaborating Turkish scientist. They may then approve paying for all or part of the costs of the collaboration in Turkey (in Turkish currency). The Vice President of TUBITAK will have the specific forms used by them for these proposals. The joint proposal forms to be submitted to TUBITAK are available at

http://www.tubitak.gov.tr/uidb/formlar/nsf.doc

Or by contacting TUBITAK directly

http://www.tubitak.gov.tr/
121 Ataturk Bulvari, Ankara, Turkey
Tel: +90 312 468 5300 Ext: 4402

The Office of International Science and Engineering would be willing to consider co-funding, with other NSF programs, provided the activity meets the following criteria:

1) *Represent true intellectual collaboration, rather than overseas research activities without a foreign partner;*

2) *Support new international collaborations as opposed to mature, well-established ones;*

3) *Be well-justified, in that they utilize the expertise and specialized skills, facilities, and/or resources of the foreign collaborator;*
4) *Provide U.S. students and junior researchers with international research experiences.*

Other important considerations include whether or not the activity:

1) *Involves substantive collaborative research and education activities that take place in both the United States and foreign labs, and are conducted by both the U.S. and foreign investigators;*

2) *Enables the participation of women, minority, and disabled scientists and engineers in international research;*

3) *Takes advantage of special or high risk/high payoff opportunities.*

Osman A. Shinaishin *is a Senior Program Manager at the Office of International Science & Engineering (OISE) at the National Science Foundation (NSF). Dr. Shinaishin has served as Senior Program Manager for North Africa, the Middle East and South Asia (except for India and Nepal) since October 1993. He has served in a number of capacities within the OISE at NSF. From 1976 to 1977, he served as Program Manager for the US-Pakistan program. From November 1977 until October 1993, he served as Senior Program Manager for South Asia, with programs mainly in India and Pakistan. Dr. Shinaishin's experience includes work as a research engineer at the Boeing Company Aircraft Division, at the General Electric R&D center, and at the EPA Directorate for Research and Development. Dr. Shinaishin received a B.S. in Agricultural Sciences from Cairo University, Egypt, a M.S. in Agricultural Engineering from Michigan State University and a Ph.D. in Mechanical Engineering from the University of California, Davis and Berkeley. He has published technical articles in acoustics and in non-destructive testing, and has made several presentations, in the U.S. and abroad, about science and technology in developing countries in general and in the Middle East in particular.*

New Visions on Higher Education: Challenges for Turkey

Moderator

Banu Onaral, *Drexel University*

Panelists

Omer Cebeci, *TUBITAK*

Ustun Erguder, *Istanbul Policy Center, Sabancı University*

Tuncalp Ozgen, *Turkish Higher Education Council*

Discussants

Representatives of Turkish Universities and Other Invitees:

Ural Akbulut, *President, Middle East Technical University*

Suheyl Batum, *President, Bahcesehir University*

Metin Lutfi Baydar, *President, Suleyman Demirel University*

Ugur Buyukburc, *President, Harran University*

Nilufer Egrican, *Vice-President, Yeditepe University*

Faruk Karadogan, *President, Istanbul Technical University*

Tahsin Kesici, *President, TOBB Economics&Technology Univ.*

Tuncalp Ozgen, *President, Hacettepe University*

Ayse Soysal, *President, Bogazici University*

Semra Ulku, *President, Izmir Institute of Technology*

A PERSPECTIVE ON TURKISH HIGHER EDUCATION

Üstün Ergüder
Istanbul Policy Center, Sabanci University

23 years will have passed since Law No. 2547, and YÖK, the Council of Higher Education (CHE), were introduced to the Turkish higher education. In almost a quarter of a century of its existence the system introduced by Law 2547 has shaped and dominated Turkish higher education. This is a fairly long period for a legal and systematic framework to stay in place given the accelerated pace and nature of demands, both national and international, on the services and outputs of the higher education system. Foundation (private) universities have been introduced and the number of state universities has almost doubled, increasing to 53 from 28. Currently there are 25 foundation universities. Universities have also acquired a regional flavor as they have become more evenly spread throughout the country. In practice as well the differentiation in the higher education system has increased as many universities have adopted different missions on pure and applied research as well as in postgraduate and undergraduate education. In other words, the heterogeneity of the system has increased by leaps and bounds while legal and legislative changes to accompany and facilitate this important transformation have not been forthcoming.

The "CHE system" popularly referred to as YÖK in Turkish was the product of a vision of late 1970's and the early 1980's. This vision also had its European roots as central direction and guidance by the political authority was a rising trend to cope with the increasing demands for massification in higher education. Namely the problem was defined as making universities more responsive to demands of increasing numbers of students to receive higher education. The most important political drawback of the CHE system was its enactment during a period of military rule (1980-1982) and its unavoidable association with authoritarianism. Yet, it was a design reflecting a European trend as well as discussions in Turkey during the 1970's on the need for a central authority and a central system to cope with the demands of massification in higher education.

The system law 2547 imposed is centrist and emphasizes uniformity among institutions. One of the major accomplishments of the system was to increase the rates of enrollment in higher education in response to demands for mass education. Another important contribution was to set minimum standards for academic quality. International standards in research and publication became a part of the Turkish higher education agenda after the enactment of Law 2547. A third important accomplishment was the introduction of foundation universities into Turkish higher education. This has increased competitive pressure in the system and increasingly performance criteria in education and research became benchmarks for comparison between institutions. However, this system started becoming insufficient due to the increasing diversity and differentiation of the Turkish higher education life in the 1990's. Some legal changes in the form of amendments have been made in Law 2547 since 1982. Yet, these amendments have not altered the centrist nature and the philosophy of the system that does not leave much room for institutional autonomy. In practice, the universities have gone their own way by taking advantage of gaps and loopholes in Law No. 2547 and in financial regulations to make life easier for themselves. This, of course, has contributed to the increasing de facto diversity in the system.

In response to the need for change in the system, several drafts have been prepared by YÖK, the Ministry of National Education (MoNE), and the Inter-University Council since 2002. Political controversy has helped shelve all these documents. Yet, none these drafts have modified or changed the vision that led to the emergence of the higher education system in 1982. The Ministry of Education, highly critical of the system and responding to the political agendas of the governing party and of various pressure groups, did not go beyond amending the various articles and stipulations of Law No. 2547 regulating system and university governance. There was no attempt to come up with a new vision in accordance with fundamental changes taking place in higher education.

Kemal Gürüz, the former president of YÖK, prepared a draft law (3708) in 1991, on transforming five state universities into universities with a special status having more financial and institutional autonomy. This project also had the support and the approval of Turgut Özal, the President of the Turkish Republic in 1991. This indicates that policy makers had realized, as early as 1991, that the higher education system was unable to meet the changing national and global conditions. This draft was approved by the Council of Ministers as a decree law, but the law was not implemented because it was never published in the Official Gazette, and was effectively thrown out after the government changed hands with the 1991 general elections.

In short, Turkish higher education life has gone through important changes within the last two decades. Furthermore, there are new challenges that the system is

facing. They may be summarized as follows:

• Increasing international student mobility and the response of the higher education system.

• The design of a public funding system that would provide more institutional autonomy in setting goals and achieving strategic missions of individual institutions.

• National quality assessment and performance evaluation system closely integrated with international systems.

• Student contributions to the funding of higher education within innovative framework that takes into social justice and income distribution problems specific to Turkey.

• A financial framework that would facilitate income generation by the universities as state funding is not expected to increase in the future.

• Transparent and responsive governance systems that is conducive to strategic leadership.

• Establishing institutional links with stakeholders.

• An innovative national system that allows differentiation between institutions in order to respond to a need to increase quality in education and research while also responding to massification given the pressures from a young population. The response of the "CHE System" was to come up with uniformity and centralization.

• Promotion of science and research.

• Promotion of applied research and lifelong education within the framework of services to the society.

• Alignment with the Bologna process and the European Research Area.

Designing a legal framework for this de facto transformation is still to be realized. Turkey needs a new higher education vision based on national and global trends. The emphasis should not be on solving the problems of the past, as it is often done, in response to political pressures. A future oriented approach and a national consensus involving the stakeholders is necessary in coming up with a new vision.

POSTERS

ENGINEERING & APPLIED SCIENCES

E1) Adaptive Grid Modeling with Direct Decoupled Method for Predicting the Air Quality Impacts of Biomass Burning, Alper Unal and M. Talat Odman, *MACTEC Inc., Trenton, NJ, Georgia Institute of Technology, Atlanta, GA*

Prescribed burning is becoming an integral part of land management. Prescribed fires have a number of benefits ranging from reducing the risk of uncontrolled wildland fires to maintaining functional ecosystems. However, they produce combustion byproducts that are potentially harmful to human health and welfare. These products may lead to the formation of secondary products such as ozone and particulate matter that can be transported long distances in the atmosphere and contribute to the air pollution problems in more populated distant areas. The objective of this study is to improve the ability to model the air quality impacts of biomass burning on the surrounding environment. The focus is on prescribed burning emissions from a military reservation, Fort Benning in Georgia, and their impact on local and regional air quality. The approach taken in this study utilizes two new techniques we recently developed: 1) Adaptive grid modeling and 2) Direct sensitivity analysis. We equipped an advanced Three-Dimensional Eulerian-type Air Quality Model, Multiscale Air Quality Simulation Platform (MAQSIP), with these techniques and conducted regional scale air quality simulations. Grid adaptation reduces the grid sizes significantly in areas that have rapid changes in concentration gradients consequently the results are much more accurate than those of traditional static grid models. Direct sensitivity analysis calculates the rate of change of concentrations with respect to emissions from specific sources. This paper presents the novel methods used in this study as well as the comparative findings. Implications on regulatory planning and exposure assessment studies will also be presented.

E2) Bio-Assisted Assembly at the Nanoscale: Towards Functional Nanostructures and Devices, Cengiz S. Ozkan, *Center on Functional Engineered Nano Architectonics, University of California, Riverside, CA 92521*

Conventional device fabrication strategies must be augmented by new techniques including self assembly methods in order to truly take advantage of the quantum nature of novel nanoscale electronic devices and systems. I will describe self assembly processing for the fabrication of nanoassemblies of carbon nanotubes (CNT) and quantum dots (QD). Such heterojunctions could become better alternatives for the synthesis of nanoscale devices which would preserve the electronic properties of MWCNT's compared to configurations that depend on the bending or overlapping of CNT's. Such configurations could be useful for the bottom-up assembly of nanoscale circuits or as dropin technologies for the existing device platforms. During processing, CNT's are primarily functionalized with carboxylic end groups by oxidation in concentrated sulfuric acid. Thiol stabilized QD's in aqueous solution with amino end groups were conjugated to carbon nanotubes using the ethylene carbodiimide coupling reaction. Next, I will describe self assembly processing by making use of DNA (Deoxyribonucleic Acid) and PNA (Peptide Nucleic Acid) molecules which could become more useful due to their spatial encoding capabilities for the integration of devices. Detailed chemical and physical characterization of the heterojunctions have been conducted using Fourier transform infrared spectroscopy, transmission electron microscopy and energy dispersive spectroscopy. Current research aims to combine chemically mass-produced nanoscale building blocks with biomimetic structuring schemes employing DNA recognition to encode the desired structure at various levels Next, I will discuss the applications of carbon nanotubes for biological applications including encapsulation and mass transport of DNA. We have shown by molecular dynamics computations that DNA fragments can be spontaneously inserted into carbon naotubes and this phenomenon was confirmed by experimental observations. Potential future applications of our studies include the fabrication of novel electronic and spintronic devices and biosensors and gene transfer vehicles for cell differentiation.

E3) Semi-Automatic Lymph Node Segmentation in LN-MRI, Gozde Unal , Greg Slabaugh, Tong Fang, Mukesh Harisinghani, Ralph Weissleder, *Siemens Corporate Research, Princeton, NJ, Massachusetts General Hospital, Harvard University, Boston, MA*

Accurate staging of nodal cancer still relies on surgical exploration because many primary malignancies spread via lymphatic dissemination. Recently, Harisinghani et al. utilized nanoparticle-enhanced lymphotropic magnetic resonance imaging (LN-MRI) to explore semi-automated noninvasive nodal cancer staging. Radiologists outline borders of lymph nodes manually in order to assess nodal characteristics and for follow-ups on malignancies. This is a time consuming and laborious process. Our goal in this study was to develop semi-automatic lymph node segmentation techniques to increase the efficiency of the clinical workflow in lymphatic spread assessment. We present two problem specific and efficient image segmentation approaches. The first one is based on a joint segmentation and registration idea, which makes use ordinary differential equations and rigid transformations. The second one utilizes a front propagation technique known as fast marching, and builds competing distance functions for the object and its background. We obtain 3-dimensional surface of lymph node, which is visualized with respect to vascular anatomy of the patient

for surgical planning. In addition, volumetric measurements and features of the nodes are extracted to help the clinicians in their malignancy assessment. We demonstrate these methods with a given lymph node analysis problem in post-contrast pelvic MRI sequences.

E4) Removal and Recovery of Heavy Metals from Industrial Waste Streams by Means of a Hybrid-Precipitation and Polymer Enhanced Ultrafiltration, Sezin Islamoglu, Prof.Dr.Levent Yilmaz, Prof.Dr.Onder H. Ozbelge, *Middle East Technical University, 06531-Ankara/Turkey*

In this study, for selective removal and recovery of the metals like Cd, Cu, Fe in cadmium electroplating bath (containing high amounts of Cd, Zn, Cu, Fe and small amounts of Ni, Co, Mn), hybrid precipitation- polymer enhanced ultrafiltration based separation scheme was developed. The precipitation scheme comprised three consecutive steps: 1) Acid treatment with HNO3: Cyano-metal complexes were decomposed. Whole Fe content and almost half of the Ni were removed 2) Alkali precipitation by NaOH: pure Cd(OH)2, was obtained which is a valuable product used in electroplating industry 3) Sulfide Precipitation by Na2S: pH is an important parameter, such as: Addition of sodium sulfide in alkali pH range leaded to cadmium precipitation whereas Cu is totally precipitated in acidic pH range. Depending on the quality and quantity of the desired solution obtained at the end of the precipitation experiments, different acidification, alkalination and sulfide precipitation paths were followed. Cd-rich samples were obtained by making sulfide precipitation in acidic pH range where as Cu-rich samples were obtained by making sulfide precipitation in basic pH range. After precipitation experiments, PEUF was applied to the selected samples. It can be concluded that, by adjusting the precipitation parameters (pH, time, precipitation agents), together with the parameters of PEUF experiments (pH and loading (metal/polymer ratio)) selective separation of heavy metals from industrial wastes can be achieved. Process sequencing can be suggested for the removal and recovery of heavy metals, especially for Cd and Cu, from electroplating industry's waste effluents.

E5) Effect of Carbon and Inoculum Sources on Filamentous Growth in Activated Sludge, Gamze Gulez, Francis De Los Reyes, *North Carolina State University, Department of Civil, Construction, and Environmental Engineering, Campus Box 7908, Raleigh, NC, 27695*

Filamentous bulking in activated sludge treatment plants is a worldwide problem. Understanding the growth requirements of specific filamentous organisms will allow the development of better control strategies for bulking. In this study, the short term effects of eight carbon sources and three inoculum sources on the growth of filamentous bacteria were tested. Three lab scale sequencing batch reactors (SBR) were operated. Microscopic (Gram and Neisser staining) and molecular methods (Denaturing Gradient Gel Electrophoresis [DGGE], Fluorescent in Situ Hybridization [FISH]) were used to track the microbial population changes in the reactors. Sludge volume index (SVI) measurements were used to monitor bulking in the reactors. DGGE and sequencing results indicated the presence of the filamentous bacteria Sphaerotilus natans and Thiothrix. S. natans grew in glucose-, acetate-, and sucrose-fed reactors, regardless of the inoculum source. It also grew in propionate- and pyruvate-fed reactors inoculated with the sludge from the Neuse River Wastewater Treatment Plant (WWTP). Thiothrix was detected in propionate- and pyruvate-fed reactors inoculated with sludge from the South Cary WWTP, and in glucose- and acetate-fed reactors inoculated with the sludge from the Neuse River WWTP. In addition to these two filaments, Gram and Neisser staining indicated the presence of Nostocoida limicola in Neuse River WWTP inoculated reactors. The presence of S. natans and T. nivea was confirmed with FISH. SVI measurements were consistent with the level of bulking, showing an increase as the number of filaments in the reactors increased. This study confirmed that readily biodegradable substrates favored the growth of S. natans T. nivea and, N. limicola in activated sludge. The simultaneous use of microscopic and molecular tools was crucial in obtaining these insights, because one approach compensated for the other's limitations.

TASSA YOUNG SCIENTISTS GRANT RECIPIENT

E6) SUSTAINABLE INTEGRATED SOLID WASTE MANAGEMENT FOR WAKW COUNTY USING LIFE CYCLE BASED DECISION SUPPORT TOOL, GAMZE GULEZ, RANJI RANJITHAN, MORTON BARLAZ, *NORTH CAROLINA STATE UNIVERSITY, DEPARTMENT OF CIVIL, CONSTRUCTION, AND ENVIRONMENTAL ENGINEERING, CAMPUS BOX 7908, RALEIGH, NC, 27695*

In World Summit on Sustainable Development 2002, the importance of solid waste management (SWM) was stressed and it was indicated that priority attention should be given to the waste minimization, reuse, recycling, and the development of environmental friendly disposal and treatment technologies, since the growing economic activities and consumption results in an increased level of waste problem. Deciding an optimum management strategy, however, is a complex and difficulty task, as environmental impacts, economics, and public policy issues have to be taken into account. Due to this complexity and the emergence of growth of the environmental problems, a decision support tool for integrated SWM planning is necessary. The Integrated Solid Waste Management Decision Support Tool (ISWM DST) developed by NCSU enables a comprehensive

analysis. The ISWM DST performs life cycle inventory (LCI) based optimization for environmental emissions, energy recovery, and cost, and generates alternative SWM strategies (recycling, waste to energy, landfilling with energy recovery, etc.) to satisfy desired environmental and economic goals. Currently, ISWM DST is being used to explore and generate alternative management strategies for Wake County, NC. Present efforts are focused on data gathering and model formulation. While no results are available yet for this Wake County case study, through the end of the study, we anticipate to quantify the cost, energy and environmental implications of varying levels of utilization of alternative waste management options, including waste-to-energy facility, recycling programs, composting options, energy recovery from landfill gas, and long-haul of waste for external disposal.

E7) Discrete to Continuum Modelling Shear Buildings under the Effect of the Gravity Loads, Sahin, M., Ozturk M, *Mechanical Engineering and Mechanics Department, Lehigh University, Bethlehem PA 18018*

This study is about modeling and analysis of the sufficiently long, multistory, uniform, discrete shear buildings under the effect of gravity load as continuum model. The model is derived from the finite-difference form of the governing dynamic equilibrium equation. The stability parameter for static loading case, which is required prior to a dynamic analysis, for the discrete and continuum models is derived. Eigen-frequencies, displacement and drift modes of the continuum model are obtained by eigen-analysis. It is shown that how the non-dimensional structural parameter $\beta = mgNkh$ for the discrete model and equivalently $\beta = \bar{m}gH/\bar{k}$ for the continuum model shear building respectively affect eigen-analysis including the drift ratio modes. Eigen-solution of the governing equation for the continuum model shear building results in the Bessel functions of first and second kinds. It is also shown that how the non-gravity shear building eigen-solution can be approximately obtained from the gravity shear building using asymptotic values of the Bessel functions for small b values. The modal load and mass equations are solved using orthogonality relations of the Bessel functions. The non-dimensional parameter b, which contains all the parameters existing in a uniform shear building, controls all aspects of the dynamic characteristics of the shear buildings. The eigen-modes shapes under the effect of gravity loads are similar to forced sine-waves towards to down.

TASSA YOUNG SCIENTISTS GRANT RECIPIENT

E8) TOWARDS FASTER MACHINE LEARNING ALGORITHMS FOR AUTOMATIC CLASSIFICATION, ŞEYDA ERTEKIN, LÉON BOTTOU, C. LEE GILES, *THE PENNSYLVANIA STATE UNIVERSITY, UNIVERSITY PARK, PA, 16801, NEC LABORATORIES AMERICA, PRINCETON, NJ, 08540*

In recent years the amount of digital data available has increased significantly due to the wide use of computers and improved storage facilities. As the volume of electronic information increases, people need more effective tools to better find, filter and manage these resources. Classification, -the assignment of instances (i.e. pictures, text documents, emails, Web sites etc.) to one or more predefined categories based on their content- is an important component in many information organization and management tasks. Support Vector Machines (SVMs) is a popular machine learning algorithm for classification problems due to their theoretical foundation and good generalization performance. However, SVMs have not yet seen widespread adoption in the communities working with very large datasets due to the high computational cost involved in solving quadratic programming (QP) problem in the training phase. The dataset sizes are quickly outgrowing the computing power of our computers. During the last decade, processors became 100 times faster, hard disks became 1000 times bigger. Therefore we need faster machine learning algorithms in order to make computers learn faster from the example data. This research presents an online SVM learning algorithm, LASVM, which yields classification accuracy rates of the state-of-the-art SVM solvers but requires less computational resources. LASVM tolerates much smaller main memory and has a much faster training phase. We also show that not all the examples are equally informative in the training set. We present methods to select the most informative examples and exploit those to reduce the computational requirements of the learning algorithm.

E9) Micro- and Nanoscale Robotics, Metin Sitti, *NanoRobotics Laboratory, Department of Mechanical Engineering and Robotics Institute, Carnegie Mellon University, Pittsburgh, PA 15213, USA*

For the miniaturization of devices and machines down to nanometer sizes, micro/nanorobotic approach enabling precision manipulation, manufacturing, and
interaction at the micro- and nanoscales is indispensable. Micro/Nanorobotics as an emerging robotics field is based on the micro/nanoscale physics, fabrication, sensing, actuation, system integration, and control taking the scaling effects into consideration. Micro/Nanorobotics encompasses: (i) programmable assembly of micro/nanoscale components; (ii) design and fabrication of micro/nanorobots with overall dimensions at the millimeter and micrometer ranges and made of micro/nanoscopic components; and (iii) programming and coordination of large numbers of micro/nanorobots. This poster will present current

micro/nanorobotics research activities at the NanoRobotics Laboratory. As the first focus area, precision micro/nanomanipulation systems using Atomic Force Microscope (AFM) or other nanoprobes will be introduced. Here, AFM probes are utilized as a pushing, pulling, cutting, and indenting type of nanomanipulator, and also as a three-dimensional (3-D) topography and force sensor. As the first application, using an AFM probe and a teleoperated human-machine interface, fine gold particles down to 14nm radius are positioned in two-dimension by mechanical pushing for developing micro/nanoassembly technology, and teleoperated touch feedback from the surfaces at the nanoscale is realized. Next, liquid polymers are pulled and solidified precisely by nanoprobes to manufacture customized 3-D polymer micro/nanofibers. As the second focus area, biologically inspired micro/nanoscale robots and materials will be reported. Design methodology, analysis, and fabrication of biomimetic fibrillar adhesives inspired by geckos will be explained. Geckos have unique dry adhesive fibers in their feet to climb any surface with a very high maneuverability. Discovering the principles of gecko adhesion recently, synthetic polymer micro/nanofibers are fabricated using micro/nanomolding and optical lithography techniques. The results of current prototype adhesive fibers and miniature climbing robots inspired by geckos are reported. Finally, miniaturization issues of biologically inspired micro/nanorobots will be discussed. As current miniature robotics activities, biomedical swimming and endoscopic capsule robots and water strider robots walking on water are explained briefly, and challenging issues are addressed. These miniature robots could revolutionize health-care, environmental monitoring, manufacturing, and space exploration applications in the future.

E10)Ultra-Low Power CMOS MICS Transceiver, Huseyin S. Savci, Zheng Wang, Dr. Numan S. Dogan, *North Carolina A&T State University, Greensboro, NC, 27411*

The Medical Implant Communications System (MICS) is an ultra-low power, unlicensed, mobile radio system for transmitting data between an outside control unit and implanted medical devices. The allocation of 402-405 MHz frequency band for MICS operations on a shared, secondary basis in 1999 by FCC, enabled MICS usage in many medical applications including cochlear testbed which is designed to find a treatment for patients with profound bilateral deafness. Biocompatibility, ultra-low power consumption, having extremely small size are some of the challenges in developing an implant device. From an IC designer perspective, power and size constraints are main issues. Since the implants are battery operated devices, they are expected to work with only couple mWs which enables them to operate for many years. Ultra-low power consumption can be achieved with reduced supply voltage and low drain current. However reducing the supply voltage and driving the transistors with lowest possible current will push their operations toward weak inversion region where the device models are not as precise as in saturation in standard CMOS processes. MICS transceiver, under development, is being designed by using 0.18-μm RF CMOS process with reduced supply voltage, 1 V. To reduce the power consumption, effective power reduction techniques and sleep mode operation will be employed. Direct conversion receiver architecture has been chosen for its lower power consumption and higher integratibility. After careful design of each blocks, such as LNA and VCO, corner analyses and post-layout simulations are being done to insure first-pass success.

E11)Pathways Database Querying and Visualization: PathCaseWeb, Z. M. Ozsoyoglu, G. Ozsoyoglu, J. Nadeau, S.F. Akgul, A. Cakmak, B. Elliott, M. Kirac, M. Starke, M. Reynolds, G. Yavas, *Center for Computational Genomics, Case Western Reserve University (CWRU), Department of Electrical Engineering and Computer Science, CWRU Case School of Engineering, Department of Genetics, CWRU School of Medicine*

In this poster we present PathCase: Case Pathways Database System. PathCase is an integrated set of software tools for modeling, storing, analyzing, visualizing, and querying biological pathways data at different levels of genetic, molecular, biochemical and organismal detail. The novel features of the system include: a) genomic information integrated with other biological data and presented from a pathway; b) design for biologists who are possibly unfamiliar with genomics, but whose research is essential for annotating gene and genome sequences with biological functions; c) database design, implementation and graphical tools which enable users to visualize pathways data in multiple abstraction levels, and to pose exploratory queries; d) a wide range of different types of querying including, "path" and "neighborhood queries", and graphical visualization of query outputs; and, e) an implementation that allows for web(XML)-based dissemination of query outputs (i.e., pathways data in BIOPAX form) to researchers in the community, giving them control on the use of pathways data.

E12) Polymer Waveguide Technology for RF-Photonics and Optical Communications Applications, Aydin Yeniay, Renfeng Gao, Yongming Cai, Anthony F. Garito, *Photon-X, LLC , Malvern, PA, 19355, USA.*

Polymer waveguide technology promises a highly integrated platform for cost-effective photonic devices with flexible design of optical properties, ease in processing and high-density device integration with high volume production. However, nearly all of the polymer planar waveguides demonstrated to date exhibit relatively high single-mode waveguide loss (>0.2dB/cm) within the 1300-1650nm telecommunications window compared to 0.05-0.07 dB/cm

for high- n silica-on-silicon waveguides. Various material systems such as partially fluorinated acrylates, polyimides, and silicone resins have been investigated to reduce the absorption loss that results from C-H groups, however, in order to achieve polymer waveguides with propagation loss comparable to silica waveguides, a fully fluorinated polymer material system with little, or no, C-H content is required. In addition to propagation loss, polarization dependent loss (PDL) is also a critical factor. PDL usually originates from material birefringence, asymmetric waveguide cross sections, or induced stresses, for example. Stress usually arises during waveguide fabrication steps, especially when the materials of the waveguide structure and supporting substrate have different coefficients of thermal expansion (CTEs). In the present poster, we introduce an optical device technology platform of unprecedented performance based on ultra low loss (<0.05dB/cm at C/L/O band), polarization independent, and athermal, perfluoropolymer waveguide architectures built on polymer substrates. Various highly efficient devices such as AWGs, true time delay modules have been fabricated based on this polymer platform. The new platform provides whole comprehensive classes of both passive and active integrated phonic device components and circuits for communications and RF-Photonic signal processing with orders of magnitude performance and cost improvements.

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E13) DEVELOPMENT OF POLYBENZOXAZINES AND THEIR APPLICATIONS AS HIGH PERFORMANCE COMPOSITE MATERIALS, TAMER UYAR, HATSUO ISHIDA, *CASE WESTERN RESERVE UNIVERSITY, CLEVELAND, OHIO, 44106-7202*

In this study, the properties and the applications of polybenzoxazines (a new class of ring-opening polymerized phenolic resins) are investigated. The phenolic resins still dominate the U.S. thermoset resin production due to their attractive properties including inexpensive raw materials, superb flame resistance, and excellent thermal and chemical resistance. However, the attractiveness of these properties is compromised by the problematic nature of phenolic chemistry. Very recently, a new class of phenolic resins called benzoxazines has been developed. The benzoxazine resins are formed from phenol and formaldehyde in the presence of amines and the choice for phenol and amine permits structural design flexibility where the properties of the resulting polymer can be tailored for the specific requirements of individual applications. These benzoxazine resins have overcome almost all shortcomings of the phenolic resins. Moreover, they exhibit several very unusual properties that have not been often observed by other well-known polymers. Their unique properties can be listed as; near zero volumetric change upon polymerization, low water absorption (less than 2%), high glass transition temperature (Tg = ~350^{O}C), high char-yield (ranging from 65 to 82 %) low coefficient of thermal expansion, low viscosity and excellent electrical properties etc,. Due to their superb mechanical, thermal and physical properties, these benzoxazine resins are excellent choice for materials to be used in aerospace applications, electronic packaging and high performance composites. Additionally, high char yield, no dark smoke and self extinguishing make them an attractive candidate as non-flammable materials for the industry. Our research group has been working on polybenzoxazines over ten years in which we have developed many different polybenzoxazines with diverse functionality for various applications. In this presentation, we will focus on three latest ongoing projects which are (1) Synthesis of Benzoxazine Resins for Development of High Performance Carbon-Carbon Composites (2) Development of Polybenzoxazines that are Stable under Very High Energy Radiation in Deep Space (3) Development of Very High Char Forming Matrix for Rocket Nozzle Application.

E14) Nuclear Energy Facts and Figures, Gokhan Gelisen, MS, PE, MASCE, *Washington Group International Inc., New York NY*

Nuclear energy has been the most controversial energy production method since its early stages. It has both advantages and disadvantages. There have been strong supporters and opponents. On June 27, 1954, the world's first nuclear power plant that generated electricity for commercial use was officially connected to the Soviet power grid at Obninsk, Kaluga Oblast, Russia, according to the Uranium Institute (London, England).

At the end of 2005, there were 443 nuclear power reactors in operation and 24 under construction in the world [1, 2]. Today, three nuclear power reactors are considered to be built in Türkiye. I asked myself the following three questions and this study is a result of my efforts to find the reliable answers to those questions: 1) Is it feasible to build three nuclear power reactors in Türkiye at the same time? 2) Are there any other alternative energy sources that can provide comparable energy with a comparable cost? 3)Should Türkiye continue with the existing Nuclear energy production methods or consider new options? Nuclear power reactor units under construction in 2005 were typically in the range of 600-1200 MWe. Electricity generating from nuclear energy is cheaper than it is from coal energy in seven of ten, and cheaper than gas in all but two of investigated countries [3]. Globally, 16 per cent of electricity generation is nuclear sourced. France is generating up to 78 per cent of its electricity from nuclear plants [4]. In OECD countries, electricity

from nuclear generation accounts for about 24 per cent of total generation [4]. Canada has over 353,000 tones of reserves and 1/4 of world production (85% exported) [5]. Australia has 863,000 tones of reserves and 1/7 of world production [5]. In my research, I studied the nuclear energy related data like populations, economies, resources, repositories, and other energy production methods of selected countries. I selected the countries based on the availability of their historical data from 1960s to post-2000. Refs: [1] http://www.iaea.org/cgi-bin/db.page.pl/pris.oprconst.htm [2] http://www.iaea.org/cgi-bin/db.page.pl/pris.opercap.htm [3] OECD/IEA NEA 2005 [4] World Nuclear Association [5] http://canteach.candu.org/library/20000401.pdf.

E15) Translational Hearing Aid Engineering, Julius L. Goldstein, Ph.D., Metin Oz, D.Sc. , Peter Gilchrist, Tai Lin, D.Sc., Michael Valente, Ph.D., Roger D. Chamberlain, D.Sc., *Hearing Emulations LLC, St. Louis, MO, 63132, Washington University Medical Center, St. Louis, MO, 63110, Washington University, St. Louis, MO, 63130*

Gain compression in the normal cochlea is effectively instantaneous, as revealed by cochlear distortion tones and suppression. We translated properties of nonlinear cochlear models for the design and fitting of hearing aids with compressive amplification. Gain compression in conventional hearing aids is provided by automatic gain control of linear amplifiers (AGC), resulting in adaptation constraints on attack and release times to avoid nonlinear distortion and unwanted gain variation. The normal cochlea avoids these constraints with effectively instantaneous compression embedded in a bandpass system. Cochlear mechanisms, including rapid tail suppression and slower intelligent efferent feedback, appear to optimize performance by adjusting the onset of instantaneous compression to control waveform quality with little effect on gain. We designed, implemented, and tested a computer-simulated hearing aid with instantaneous gain compression (IGC), comprising six octave band-pass-non-linear (BPNL) amplifiers, with intelligent adaptation of the instantaneous compression thresholds. Candidate compression ratios to counter loudness recruitment in SNHL were selected for our clinical tests from model fits to published psychophysical studies of most-comfortable and uncomfortable sound levels (MCL, UCL). Patients reported their loudness-scaling preferences and speech understanding. Hearing aids with conventional and instantaneous gain compression have different temporal dynamics, because IGC can provide gain compression without adapting and effective syllabic compression without syllabic-rate adaptation. The dynamic properties of IGC are expected to contribute to increased acceptability of hearing aids by the growing elderly hearing-impaired population. A wearable version of our IGC hearing aid has recently been completed, to allow field tests. Supported by NIDCD SBIR Grant 5R44DC04028.

E16) Design and Microfabrication of an Actuated PDMS High-Aspect-Ratio Microbeam Array for Piconewton Force Transduction, F Mert Sasoglu and Bradley E Layton, *Drexel University, Philadelphia, PA 19104*

We are developing a method for highly parallel piconewton force transduction. We have fabricated an array of optically transparent circular microbeams with Sylgard® polydimethylsiloxane (PDMS). We plan to measure beam tip-deflection as it pulls on an array of flexible structures such as axons in an array of printed neurons. A steel mold was manufactured by drilling a 4x4 array of holes with micro drill bits. PDMS was injected into the mold and the array peeled from the mold after freezing at -80°C. Each beam has a length of 4mm, and a diameter of 500μm. The array was calibrated with a scale with a precision of 1μN and found to have an average stiffness of 50 ± 40 nN/μm. The elastic modulus of PDMS in a prototype design was determined at different four curing agent concentrations of 5%, 7.5% 10% and 20% resulting in moduli of 300 ± 20, 410 ± 30, 510 ± 20, 610 ± 25 kPa. Our ultimate design will have a length of 4mm, and a diameter of 100μm. The high aspect ratio beam array enables to transduce forces even on rough surfaces. Linear and non-linear finite element analysis were also performed for stress analysis and found that at deflections of 500 micrometers the maximum stress was 10% of yield stress.

E17) Development of a Fiber Optic Probe to Measure Dynamic Behavior of Gas-Solid Two-Phase Flows (Engineering & Applied Sciences), Harun Bilirgen, Ph.D., *Lehigh University, Bethlehem, Pennsylvania*

The objective of this study is to perform instantaneous particle velocity measurements using a novel fiber optic probe and describe how the accuracy of calculations for particle velocity fluctuations could be improved by use of a window overlapping technique. First, the effects of various window-overlapping parameters on the results were investigated by the use of artificially generated signal pulses. Then, this technique was applied to the data obtained from the fiber optic probe to estimate the turbulence levels of the particle velocities. A reflective fiber-optic probe was designed and tested to measure instantaneous particle velocities in a dilute-phase pneumatic conveying system. The fiber-optic probe consists of two identical probes aligned parallel to the flow direction. Two glass fibers were used in each probe: one of the fibers was used to send light from a light emitting diode (LED) into the gas-particle flow region, while the other fiber transferred the reflected light onto the detector (Photodiode). Particle velocities were computed by using a cross-correlation technique and the signals received from the two photodiodes. Signals from the two fiber optic probes were sampled continuously for a short time period, then, the signals were broken into a number of equally spaced data segments (Data Windows). Then, the windows of data were

shifted in time, while the data in each window were used to calculate particle velocities by using cross-correlation techniques. Finally, the calculated velocities were used measure turbulence intensity of the particulate phase. The results indicated that the particulate phase turbulence could be measured up to 100 Hz with this technique.

E18) Mixing Behavior of Particle Ropes Downstream of a 90-Degrees Elbow (Engineering & Applied Sciences), Harun Bilirgen, Ph.D., *Lehigh University, Bethlehem, Pennsylvania*

Pipe bends are a common feature of most pneumatic conveying systems and are well known to create flow problems, even in single phase flows. The situation is further complicated with the presence of a solid phase, such as occurs in pneumatic conveying. As the air-particle mixture approaches the pipe bend, a double vortex flow structure occurs in the fluid phase and a significant phase separation in the particulate phase is experienced within the bend geometry due to centrifugal forces. Upon exiting from the bend, the particles flow together in a narrow localized stream and the velocity of the particles in the suspension is reduced to almost one half of the mean gas velocity. This phenomenon is referred to as "roping". Once formed, this flow stratification pattern can persist over a region extending up to 25 pipe diameters downstream of the elbow. It eventually breaks down due to flow turbulence and to the secondary flow induced by the elbow. The objective of this study is to investigate mixing mechanisms in lean phase pneumatic conveying, with the emphasis on techniques for dispersing the severe particle stratification caused by flow through a 90-degrees elbow. This study describes a combined numerical and experimental study of the rope dispersion characteristics of various mixing devices that were installed immediately downstream of the elbow. The laboratory experiments were conducted in a 0.154 m I.D. vertical test section. Local particle velocities and concentrations were measured using a reflective type fiber optic probe. The numerical simulations were carried out using the CFX-4.2 code developed by AEA Technology.

E19) A Secure Biometric Authentication Scheme Based on Robust Hashing, Yagiz Sutcu, Husrev Taha Sencar, Nasir Memon, *Polytechnic University, Brooklyn, NY 11201*

Although for most of the cases, traditional password based authentication systems may be considered secure enough, the level of security is limited to relatively weak human memory and therefore, it is not a preferred method for systems which require high level of security. An alternative approach is to use biometrics (fingerprints, iris data, face and voice characteristics) instead of passwords for authentication. Higher entropy and uniqueness of biometrics make them favorable in so many applications which require high level of security, and recent developments of biometrics technology enable widespread use of biometrics-based authentication systems. Despite the qualities of biometrics, they have also some privacy and security related shortcomings. Main weakness of the biometrics is the fact that, if biometrics compromised, there is no way to assign a new template, and therefore, storing biometric templates should be avoided. However, unlike passwords, the dramatic variability of biometric data and the imperfect data acquisition process prevents the use of secure cryptographic hashing algorithms for securing the biometrics data. In this paper, we propose a secure biometric based authentication scheme which employs a user-dependant gaussian based one-way transformation combined with a secure hashing algorithm. The robust hash function is a one-way transformation tailored specifically for each user based on their biometrics. The function is designed as a sum of properly weighted and shifted Gaussian functions to ensure the security and privacy of biometric data. We discuss various design issues such as scalability, collision-freeness and security. We also provide test results obtained by applying the proposed scheme to ORL face database by designating the biometrics as singular values of face images.

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E20) THE UTILIZATION OF A LIFE-CYCLE BASED COMPUTER MODEL TO SUPPORT SOLID WASTE MANAGEMENT PLANNING FOR DELAWARE, P. OZGE KAPLAN, S. RANJI RANJITHAN, MORTON A. BARLAZ, *DEPARTMENT OF CIVIL, CONSTRUCTION AND ENVIRONMENTAL ENGINEERING, NORTH CAROLINA STATE UNIVERSITY, RALEIGH, NC*

The management of non-hazardous solid waste must be addressed in every community. The objective of this study was to develop potential alternative strategies for solid waste management in Delaware in consideration of both cost and environmental emissions. The study was performed with the assistance of the Solid Waste Management - Life-Cycle Inventory (SWM-LCI) computer model. The SWM-LCI model identified optimal alternatives for Delaware on the basis of their planning objectives that represent specific goals for cost, environmental emissions, landfill diversion requirements, and the solid waste processes to be considered (e.g. curbside recycling, yard waste composting, mixed waste material recovery facilities, combustion). In addition to optimal alternatives, sub-optimal alternatives that are maximally different from the optimal alternative with only a small decrease in the level of performance as measured by net cost or emission level, were generated using the modeling to generate alternatives feature. This feature may be useful in developing alternatives that meet unmodeled selection criteria. Lastly, an uncertainty analysis utility of the model was applied to

evaluate the uncertainty in the performance of a selected SWM strategy and the relative robustness of alternate SWM strategies. These results are expected to provide valuable input to the Delaware as they evaluate future SWM plans.

E21)A Machine Learning Solution for Splice Site Prediction, Rezarta Islamaj, *University of Maryland, College Park, MD 20740*

The right set of features to describe a model is the essential step of statistical learning methods. However the right set is usually not obvious. So one often chooses to start with all possible features making the problem computationally very hard, possibly intractable. Thus it becomes very important to choose an effective subset of these. Here we present a new approach to feature selection for sequence data. We identify general feature categories and give construction algorithms for them. We show how they can be integrated in a system that tightly couples feature construction and feature selection. This integrated process, which we refer to as feature generation, allows us to systematically search a large space of potential features. We demonstrate the effectiveness of our approach for an important component of the gene-finding problem, splice-site prediction. We show that predictive models built using our feature generation algorithm achieve a significant improvement in accuracy over existing, state-of-the-art approaches.

E22) Investigating the Potential of Early Breast Cancer Detection by Characterization of Ultrasound Images of Breast Ducts, Ezgi Taslidere, Fernand S. Cohen, *Electrical and Computer Engineering Department Drexel University, Philadelphia, PA 19104, USA*

A wavelet-based decomposition algorithm of the RF Echo into its coherent and diffuse components is used for characterization of ultrasound images of breast ducts. Our work is extremely important for early cancer detection as over 90% of breast cancers start at the duct before infiltrating the surrounding tissue. The hyperplasia formation in breast ducts is studied in depth for early breast cancer detection. The hyperplastic growth in breast ducts is simulated for various conditions such as varying resolution and SNR values. We extract texture parameters obtained by the decomposition that would capture the signature of hyperplastic growth in ductal epithelium in its various stages. The discrimination power of the estimated parameters is studied based on the simulations. The results demonstrate the effectiveness of three parameters, in particular, the number of coherent scatterers, the Rayleigh scattering degree and the energy of the diffuse scatterers. The results are presented in terms of empirical receiver operating characteristics (ROC) curves. Values of Az>0.942 were obtained for resolution less than or equal to 0.4mm even in low SNR values, then it drops below the 0.9 range as the resolution exceeds the 0.4mm range. It is shown that the presented features are able to differentiate reliably between various stages of hyperplasia even in cases of low resolution and SNR values.

E23) Rational Design and Development of Nanophase Functional and Structural Materials, Material Systems, Tahir Cagin, *Department of Chemical Engineering, Texas A&M University, College Station, TX 77843-3122*

Using electronic structure theory, molecular level simulations and meso- and macro-scale models we aim at developing design principles for functional materials and materials systems. In this poster, we will present applications on, thermoelectrics, ferroelectrics, functional nanocomposites, dendrimers and nanocrystalline materials.

E24) Modeling and Simulation of Urodynamics, Coşkun Bayrak, İsmail Çelik, Asaf Varol, Remzi Şeker, Abdullah Şakarcan, Mohammed Abdallah, Nabil Bissada, and Alex Finkbeiner, *Computer Science Department, University of Arkansas at Little Rock, Little Rock, AR 72204, Mechanical and Aerospace Engineering Department, West Virginia University, Morgantown WV 26506, Computer Education Department, Technical Education Faculty, Fırat Universitesi, Elaziğ, Türkiye, Department of Pediatrics, University of South Carolina Medical School, Columbia, SC, Department of Urology, University of Arkansas Medical Sciences, Little Rock, AR, 72205*

The role of modern medical imaging is not limited to simple visualization and inspection of anatomic structures, but goes beyond that to patient diagnosis, advanced surgical planning and simulation, and radiotherapy modeling. In addition, segmenting and rendering methods currently plays an effective role in medical imaging. These methods help to provide more accurate models and simulations especially from digital and medical images. Therefore, the focus of this research investigation is to build and simulate realistic 3D environments of urodynamics to understand the holding or storage of urine in the bladder, the way the bladder empties, and the rate of movement of urine out of the bladder during urination. More specifically we are interested in studying stress incontinence related problems and provide diagnostic tools to detect and suggest remedies to such problems.

E25) Policy Recommendation to Manage the Emigration of Highly Skilled Labor from Turkey, *Sıtkı Ersin Esen Master of Public Policy Candidate, 2006 ,Harvard University Cambridge, MA 02138*

Turkey has set one of its development goals as formation of a high-technology-oriented economy that can compete in the international markets. To make rapid advancement in information technologies and to become one of the players in global market necessitate Turkey invest more in scientific research and increase productivity. This advanced development strategy requires utilization of sophisticated tech-

nology and highly skilled work force. However, Turkey like other developing countries looses its highly skilled work force to the developed countries.
The purpose of this study is to propose a set of policies for managing emigration of highly skilled labor from Turkey. The method used in the study consists of both literature review and a survey of Turkish people including both emigrants and those returned to Turkey. The survey has been concluded with 516 responses, of which 101 are from Turkey and 415 are from other countries.
In order to be able to create sound strategies, first, whether Turkey has a brain drain problem is questioned as part of the existing situation analysis. Next, the causes of brain drain are assessed. Finally, considering the findings of previous two chapters, the possible policies are discussed. The priority should be given to education, science and economy policies for retention and to policies remobilizing expatriates. In the medium term, encouraging emigrants to return and recruiting from international skilled labor pool should be considered. Neither restricting emigration nor compensating the losses with taxes is applicable policy options for Turkey

E26) The Process of Strategic Partner Selection in Privatization, *Cuneyt Gozu, Ataturk University and University at Albany*

Forming strategic alliances is a crucial approach for firms trying to gain a competitive advantage in the privatization process. In order to benefit from the privatization process, multinational firms form a type of alliance with state-owned enterprises or local private firms, but selection of the partner has great importance for the success of the alliance. In the literature, researchers has developed a typology to understand determinants of partner selection and recommended two types of criteria, which characterized task-related and partner-related criteria. Task-related criteria include the operational skills and resources needed by a venture to achieve success in the market, and the partner-related criteria are associated with the effectiveness of cooperation between the partners. However, the partner selection process has not been broadly investigated during the privatization process. The aim of this study is to determine the fundamental criteria of strategic alliances for partner selection process in privatization. For this purpose, it was proposed that during the selection of a convenient partner in the privatization process, the effects of privatized firm and country has vital role, in addition to partner effects. Therefore, the partner selection process in privatization process should comprise three main criteria: partner-, country-, and privatized firm-related criteria. The privatization implementations from Hungary and Turkey are examined as a case study.

E27) A Schema Theory Approach to Cooperative Promotions, *Hurrem Yilmaz, Minnesota State University, Moorhead, Moorhead, MN 56563, Amna Kirmani University of Maryland, College Park, MD 20742, B.P.S. Murthi University of Texas at Dallas, Richardson, TX 75083*

The purpose of this study was to investigate the effect of usage-situation-schema in relation to co-promotions. The proposed model of how consumers evaluate co-promotional coupons called for the following steps: 1) usage situation schema is activated, 2) complementarity of products is noted; 2) centrality of products for the usage situation decision is made; 3) if centrality of one of the products fails to be satisfactory then another reason for the products to be used becomes effective, i.e., distinctiveness. Hypothesis 1 stated that consumers would have higher use intention for co-promotion coupons that belong to same usage situation than co-promotion coupons that do not belong to same usage situation. Hypothesis 2 stated that products in the same usage situation would complement each other more than they complement other products that do not belong to same usage situation. Hypothesis 3 proposed that centrality of focal and partner product of co-promotion and coupon use intention are positively related. Hypothesis 4 proposed that distinctiveness of focal and partner product of co-promotion and coupon use intention are positively related. Hypothesis 5 proposed the moderating effect of distinctiveness on the effect of centrality on coupon use intention. The experiment provides evidence of the outcome at each of the three steps and support hypotheses.

E28) Perception of Aksak Rhythms, *Zehra F. Peynircioğlu, Brian Rabinovitz, American University, Washington, D.C., 20016 and H.Gürkan Tekman, Uludağ Üniversitesi*

Aksak rhythms combine time units of binary and ternary divisions without changing the tempo of the basic metrical units and include what is generally known as Bulgarian rhythms. Such asymmetric rhythms are common in Turkish music and are thus expected to be part of the rhythmic schema of listeners of such music. Other listeners, however, may show categorical perception by assimilating such rhythms into their preferred rhythmic schemas comprising simple duration ratios (cf., Hannon & Trehub, 2005). The present study was a follow-up to our original study in which listeners unfamiliar with Turkish music had been more efficient in processing melodies with symmetric than with aksak meters (Tekman, Kurt, & Peynircioğlu, 2003). We presented pairs of excerpts that were identical in melody but varying in rhythm in four different ways: a) symmetric as well as regular (same meter throughout the excerpt), b) symmetric but irregular (meters changing between measures but with the original symmetry intact within each measure), c) aksak and regular, and d) aksak and irregular. The task for the participants was to decide whether the two excerpts in a pair had the same rhythm or not, and, if not, which excerpt they liked better. Results showed that regularity of rhythm

facilitated the detection of symmetric-aksak differences but symmetry had no role in the detection of regular-irregular differences. Liking ratings showed that symmetric excerpts were the most preferred and aksak excerpts were least preferred, whereas regularity did not influence the liking ratings.

E29) Repercussion of Turkish Democracy: Young Universities, *Meral Öztoprak Sağır Antalya/TURKEY*

Republic of Turkey, which was founded in 1923, is not only an example of political transformation, but a modernization project that includes all economic and social spheres. The primary spaces where modernization is required with respect to demography, politics and education -especially higher education- are urban areas. Although an intrinsic value of modernizing philosophy of the republic, transition to multi party system was synchronic with the accelerating urbanization in 1950s. The role of second generation urban population, that has questioned the system during the political mobility of the 1970s, is significant. Today, however, after a period when democracy was interrupted with the 1980 military coup, we are witnessing the third and fourth urban generations who covet blessings of democracy rather than criticizing the system. Urban life style requires a growing need for new knowledge and possessing new professions. Besides, as a result of technological quantum leap, the families living in rural areasforesee –more than the past- their children's future in cities. These trends explain the objective conditions of the interest and demand in universities. The increasing population on one hand and the increasing demand for university education on the other have triggered populist approaches on the side of the politicians, and the number of young universities, along side with mature universities, that do not have adequate substructures have exceeded eighty. Thus, increasing demand for universities in a developing democracy could cast shadow on the quality of education. The problem is, in a sense, related to the paradoxical consequences of globalization, and the solutions should be produced based on the nature of this process. Hence, if we take the view that the most important scholar capital is brain power as a starting point, then, enhancing academic collaboration possibilities and fostering mobility or fluidity of scholar capital gains great importance. Today, also as a requirement for the intrinsic nature of social sciences, empowering national and international collaborations that consider comparative advantages of the universities of both developed and developing countries, is needed. And TASSA is a spectacular example of this.

NATURAL SCIENCES

N1) Shape Optimization for Image Segmentation, Günay Doğan, *University of Maryland, College Park.*

We introduce an efficient and reliable computational method to extract the boundaries of objects in given digital images. Potential applications are in medical imaging and computer vision. The basic idea of our approach is to place some curves on the image and to deform them iteratively, so that their final locations are the object boundaries. For this we define an energy on the curves. Then we choose a velocity that will deform the curves in a direction decreasing their energy. The object boundaries correspond to local minima of the energy where the curves should stop. Two fundamental tools for this method are shape derivatives and the finite element method. We use the shape derivatives to derive the correct velocities. We use the finite element method to compute the sequence of curves numerically. Our method has the following features: 1) Space adaptivity: the curves adapt their resolution with respect to variations in the image, 2) Time step adaptivity: at each iteration the curves take the time step that gives the best decrease in energy, 3) Topological changes: the curves may split and merge to detect an unknown number of objects.Our method works for surfaces in 3D volume images as well (without topological changes). (This work is joint with P. Morin and R.H. Nochetto)

N2) Sol-gel Thin Film Applications at Harran University, Ibrahim H. Mutlu, Bulent Yesilata, M. Zarbeliyav, Ugur Buyukburc, *Harran University, Turkey*

Sol-gel deposition of optical films is a rapidly advancing technology. The sol-gel process is based on hydrolysis and condensation reactions of organometallic compounds in alcholic solutions. In recent years this technique has been extend to the fabrication of thin films or coating on different substrates. This method exhibits a number of advantages; 1) increased chemical homogeneity in multicomponent system, 2) high surface area of gels or coated samples, 3) relatively high chemical purity, 4) lower cost film processing maintenance of and the fabrication of easier conventional thin film forming process such as evaporation, sputtering or chemical vapor deposition. Today sol-gel thin film coatings are being intensively studied for different applications as protective and optical coatings, sensors, dielectric constant films, inorganic membranes, semiconducting coatings, superconducting films, and ferroelectrics. In our work, CdS, CdTe, TiO_2, ITO, InSe coatings were obtained by the alkoxide route and deposited on to the glass using the sol-gel dip coating technique. The starting solutions were prepared by mixing organometal precursors, acid, and solvent. Optical properties of all these films were investigated as a function of the number of repeated dip coatings and annealing temperature. Measurements of optical band gap values were obtained by Perkin Elmer Lambda 45 UV-VIS Spectrophotometer. Transmission and absorption spectrums were analyzed and compared with other coating methods. X-ray diffraction of crystalline coatings was obtained using Rigaku Ultima III system.

N3) Can Remote Sensing Detect Aphid Stress in Crops? Mustafa Mirik, Gerald J. Michels, Jr., Sabina Kassymzhanova-Mirik, Norman C. Elliott, and Vasile Catana *The Texas A&M University, USDA-ARS,*

The Russian wheat aphid (Diuraphis noxia (Mordvilko)) and greenbug (Schizaphis graminum (Rondani)) are two devastating aphid pests of wheat (Triticum eastivum L.), barley (Hordeum vulgare L.), and other cereals in the Great Plains of the United States. The Russian wheat aphid and greenbug infestations in crops are unpredictable over space and time. Remote Sensing appears promising to observe Russian wheat aphid and greenbug infestations in crops. In this research, the potential use of spectral data to sense Russian wheat aphid and greenbug stress in winter wheat fields located in Texas, Oklahoma, and Colorado was studied. A multispectral ground radiometer and a digital camera were used to collect reflectance and digital images, respectively. The results indicate that vegetation indices associated well with percentage damage caused by the Russian wheat aphid and greenbug feeding in wheat. In addition, paired t-test indicates that there were significant differences between infested and uninfested wheat canopies. We concluded that remote sensing is a useful method to monitor aphid damage in wheat.

N4) Using Hyperspectral Imageries to Portray Musk Thistle from Surrounding Vegetation, Mustafa Mirik, Gerald J. Michels, Jr., Sabina Kassymzhanova-Mirik, *Texas A&M University*

Invasion by a noxious weed species presents a serious threat to the remaining fragments of the natural habitat. Identifying the population dynamics and extent of spread of noxious weeds in a temporal and spatial perspective improves monitoring, planning, and management practices. Methods for reliable, repeatable, quick, and cost effective mapping of invasion patterns are needed to facilitate these practices. Remote sensing has been used to map various plant species including invasive and noxious weeds. Musk thistle (Carduus nutans L.) a noxious weed, is a good candidate for detection by remote sensing platforms because it may produce a unique spectral signature due to a large, purple-reddish flower head. Therefore, airborne hyperspectral imageries acquired at two dates were used to map musk thistle infestation in a pasture at Friona, TX, in the second

week of April when musk thistle was at the rosette form and mid June when musk thistle was at the flowering stage in 2003. Imageries were classified using the supervised maximum likelihood classifier technique. Overall accuracy was verified to be greater than 80% by ground survey for both imageries. These results demonstrate the value of hyperspectral data for mapping noxious weed species and the habitats they threaten.

N5) Remote Sensing for Big Sagebrush Biomass, Mustafa Mirik, Jack E. Norland, Robert L. Crabtree, Mario E. Biondini, Gerald J. Michels Jr., *The Texas A&M University, North Dakota State University : Yellowstone Research Center*

The prediction power of the fine spatial resolution narrowband vegetation indices along with simulated multispectral reflectance measurments for estimating woody and herbaceous biomass was examined for a big sagebrush (Artemisia tridentata Nutt.) region in Yellowstone National Park, Wyoming. The modified normalized difference vegetation (NDVI) and structural-independent pigment (SIPI) indices of 1 m^2 spatial resolution of PROBE-1 hyperspectral imagery acquired in August 1999 was used to investigate the relationships between ecological variables and reflectance spectra. Biomass components were regressed on custom-built vegetation indices, which provided the R^2 values ranged from 0.83 to 0.96 by the simple linear regression models using hyperspectral data alone. As a result of observed correlations, it can be confidently concluded that fine spatial and spectral resolution remotely sensed data have been found to be an important tool to capture the information about vegetation properties enabling to estimate biomass components in big sagebrush areas at the time when data were collected.

N6) Classification of Hyperspectral Imageries for delineating Yucca and Tree Cholla in Grasslands, Mustafa Mirik, Gerald J. Michels, Jr., Sabina Kassymzhanova-Mirik, *Texas A&M University System*

Hyperspectral remote sensing is an emerging technology with the potential to identify plant species, delineate vegetation and habitat characteristics, differentiate causes of vegetation stress, and characterize soil properties. This technology can be used in range management as a tool to map various plant communities so as to determine current range production and utilization. Mapping of unpalatable rangeland species, such as yucca (Yucca glauca Nutt.) and tree cholla (Opuntia imbricata (Haw.) DC.), using hyperspectral data provides temporal and spatial information for monitoring and managing rangeland productivity for livestock utilization. The objectives of this study were to examine the spectral characteristics of yucca and tree cholla using an airborne hyperspectral spectrometer and to test hyperspectral one-meter-spatial-resolution remote sensing imageries for identifying and mapping individually distributed tree cholla and yucca species. The spectral reflectance of both yucca and tree cholla recorded with an airborne hyperspectral spectrometer was different from the co-occurring green grass species throughout the visible and near infrared spectrum. The classification results using a maximum likelihood procedure indicated that the dormant woody species were classified as yucca. A mixture of actively growing short grass species within tree cholla dominated areas were classified as tree cholla. However, areas dominated by each species within each rangeland were correctly delineated from the areas occupied with green grass species.

TASSA YOUNG SCIENTISTS GRANT RECIPIENT

N7) K-EXACT GROUP C*-ALGEBRAS AND COARSE EMBEDDABILITY, SEMAIL ULGEN, *UNIVERSITY OF MISSISSIPPI*

We define and develop the notion of K-exact C*-algebras and K-exact groups. This is the K-theoretic analogue of structural property known as exactness. A group G is called K-exact if the minimal tensor product by C*_r (G) preserves the K-theoretic six-term exact sequence regardless of whether it preserves short exact sequences of C*-algebras. We investigate the relationship between coarse embeddability and K-exactness of countable discrete groups and we prove the main result that under a technical assumption, every group coarsely embeddable into a Hilbert space is K-exact. It is known that every coarsely embeddable group satisfies the coarse Baum Connes Conjecture. The main result suggests the study of this fundamental conjecture for K-exact groups. Hence, K-exactness draws its significance from its relationship to coarse embeddability, and hence, to the Baum Connes Conjecture. We also present the foundations for further exploration of K-exactness and of related properties (e.g. generalizing K-exactness to KK-theory and E-theory for crossed product algebras); and the relation of K-exactness to geometric and other properties of groups.

N8) New Insights into the Maturation of C-Type Cytochromes in Rhodobacter capsulatus, Serdar Turkarslan, Carsten Sanders, Fevzi Daldal, *University of Pennsylvania*

C-type cytochromes (cyt) are universal electron carrier proteins with essential roles in important processes such as photosynthesis, respiration and apoptosis. Their heme (iron protoporphyrin IX) prosthetic group is covalently attached to the apoprotein in a post-translational process named c-type cyt maturation. In most gram-negative bacteria, maturation takes place in the oxidizing environment of the periplasm. Therefore, it was proposed that c-type cyt maturation requires periplasmic thiol-disulfide oxidoreductases DsbA

and DsbB that introduce disulfide bonds into heme-binding (Cys-Xxx-Yyy-Cys) motif of newly translocated apocyt c and membrane associated thioredoxin-like proteins (CcdA, CcmG and CcmH) that reduce the disulfides before the heme attachment. Previously we have demonstrated that Rhodobacter capsulatus DsbA and DsbB proteins are not directly involved in c-type cyt maturation but interestingly their inactivation restore the c-type cyt defect of thioreductive protein CcdA-null mutant. In this study, we have undertaken extensive study of another thioredoxin-like protein, CcmG whose mutation leads to the deficiency of c-type cyts. Here we show that absence of DsbA also enables CcmG mutants to produce c-type cyts albeit at lower levels. We also demonstrated that in the absence of CcdA, CcmG and DsbA, R. capsulatus can still produce c-type cyts at amounts sufficient to support physiological needs of photosynthetic growth. In the light of these findings we propose a model in which we define heme ligation core complex as well as accessory components of c-type cyt maturation.

SOCIAL SCIENCES, ARTS AND HUMANITIES

TASSA YOUNG SCIENTISTS GRANT RECIPIENT

S1) JOB STRESS AND PRODUCTIVITY AMONG FOREIGN WORKERS, ALI SOYLU, *HUMAN RESOURCE MANAGEMENT DEPARTMENT, FAX SCHOOL OF BUSINESS AND MANAGEMENT, TEMPLE UNIVERSITY.*

Stress is found in all workplaces, and can have both good and bad effects on individuals, their work performance and their health and well-being. Stress is the body's natural response to pressures or stressful situations we find ourselves in and which we are not certain. Situations that are unfamiliar, or challenge or threaten us, increase our level of stress. The level of stress you experience depends on your personality, your state of health and many others factors. Foreign workers with H-1B visa are individuals who seek overseas employment without sponsorship from a firm in their home country and hold temporary work visas in the United States. Despite the rising numbers of these particular foreign workers in the labor market, very little research examines workplace variables that may impact their motivation, affect, and performance of foreign workers. This study predicts unique differences in job-related stress between foreign and domestic workers that impact their productivity. The terrorist attack in the U.SA on September 11 was most significant act of domestic aggression event in the world since World War II. Therefore, the events of September 11 have changed the perception of foreign workers in the U.S. On one hand, for example, companies are very selective and careful in terms of hiring new foreign workers and monitoring their current foreign workers. Not only companies but also the U.S.' government and INS are monitoring them. This study will include individual and organizational factors and effects of stress. It also will summarize a detailed literature review of work stress and develop a stress model.

S2) Teacher-Efficacy Beliefs of English Language Teaching Trainees, Anil S. Rakicioglu, *William Paterson University of New Jersey, Wayne, NJ 07470*

This descriptive research studied the teacher-efficacy beliefs held by English Language Teaching Trainees during their preservice education, created suggestions for increasing efficacy beliefs of the teacher candidates, and explored teacher candidates' point of views while they are getting ready for the profession. Although there are studies focused on efficacy beliefs of other subject areas, few studies have investigated the teacher efficacy beliefs held by English Language Teaching trainees during their undergraduate education. A quantitative survey study was undertaken to explore efficacy beliefs of the candidates. Research questions: 1. what are the personal-efficacy beliefs held by English Language Teaching trainees? 2. What is the teaching-efficacy beliefs held by English Language Teaching trainees? 3. How is the efficacy beliefs related to cognitive development of teacher candidates?

S3) Reverse Globalization: From Yaglidere, Turkey to the Eastern Shore, MD - Entrepreneurial Movement Around the World, Dr. Hakan Kislal, *School of Business, Saint Leo University*

The Eastern Shore Region of Maryland covers three major states, Virginia, Maryland, and Delaware. The region is surrounded by the Chesapeake Bay on one side and the Atlantic Ocean on the other from New Castle, Delaware to the Chesapeake Bay Bridge in the South. The Eastern Shore has remained agrarian despite the proximity of industrialized areas that span from Boston to North Carolina along the I-95 corridor.

The Eastern Shore from Dover, Delaware to the Chesapeake Bay Bridge has seen an influx in Turkish entrepreneurs who began to appear early in 2002 and continue emigrate. Preliminary results show that Turkish entrepreneurs have established over forty businesses, predominantly diners or restaurants. Interestingly, over ninety percent of these entrepreneurs come from the same region of Turkey (Yaglidere, Turkey) and many of them are distant relatives of each other. Typical entrepreneurs come to the United States through the help of a network of people from Turkey. Almost all of them arrive in New York or New Jersey and work for a period of time at a diner with the help of the same network. The close-knit community helps each member find employment, housing, and provides psychological support. The relatively low cost of opening a business on the Eastern Shore helps Turkish entrepreneurs to own their first establishment. Today, these Turkish entrepreneurs have become prominent members of the Eastern Shore community.

S4) The Conditions of Brain Gain Strategies, Şenay Gökbayrak, *Department of Labor Economics and Industrial Relations, Faculty of Political Sciences, Ankara University*

Today, the demand of skilled labor force is increasing, owing to globalization, expansion of production process based on knowledge economy. In a consequence of economic activities that increasingly require skilled labor force, developed countries implement "open door migration policies" for skilled labor force. According with US Citizenship and Immigration Services official data, 5192 Turkish citizens were admitted USA, under H-1B visa category in 2004. While brain drain creates many positive effects for receiving countries, does it represent absolute loss for sending countries? The data of our case study which focused on Turkish engineers living in abroad indicate that it can be obtain positive externalities from brain drain under certain conditions. %89,7 of all engineers intended to give a support for development practices in Turkey, even if they were no-returning(n=130). Only %10,3 of all participants didn't think any kind of support. For brain gain strategies, our analyses indicate that strong relationship is necessary condition between colleagues living in Turkey and living in abroad together with relationship among Turkish intellectual diasporas. Cooperative projects, establishment of network and

forums and consultancy services to Turkish companies, were the most mentioned supports manners. To acquire positive externalities from brain drain, it is important to provide support for activities which are aimed at rising social life quality in Turkey in addition to scientific and technical activities. To realize these proposals, it is essential to develop active public policy by participation of all shareholders-public and private sector, universities, NGOs, profession associations etc.

S5) Income Inequality and Poverty in Turkey, Mexico and South Korea, Gokhan Guder, Tuncay Guloglu, *State Planning Organization of Turkey, Kocaeli University*

Overall purpose of the study is to analyze the situation of income inequality and poverty in Turkey, Mexico and South Korea within last two decades. The scientific questions of the study are: What happened to poverty and income inequality in these countries during last two decades?, What is poverty profile in these countries? and Is there an economic development in favor of the poor? In order to answer these questions a literature review and an analysis of household income surveys are done. Initial results are: Economic growth in Turkey is in favor of the poor. Absolute poverty declined within the period. On the other hand, Turkey experienced an inequitable growth during the period. In the periods of economic growth income inequality worsened and in the periods of recession and economic crises income inequality improved. Macro economic conditions in Mexico are unstable. Country experienced a recession between 1984 and 1989 and a financial crisis in 1994. Overall economic growth within the period is limited. The poor effected negatively from unstable macro economic conditions and economic crises. Income inequality worsened in the economic recession period between 1984 and 1989, improved in the period of 1994 financial crisis and again worsened in the economic growth period after 1994. South Korea experienced an equitable economic growth for decades. Both absolute poverty and relative poverty improved in 1980s and 1990s. The exception for that is the Asian crisis took place in 1998. The income inequality and poverty indicators worsened during the economic crisis.

S6) Teaching in America: Perspectives of Turkish Graduate Student Instructors, Asil A. Özdoğru, *University at Albany, SUNY Albany, NY 12222*

Teaching in higher education institutions is an arduous task including many elements like adult learner characteristics, instructional design, assessment concerns, and classroom management. Growing numbers of international students carry out various teaching responsibilities (i.e., teaching assistant, co-teacher, and adjunct instructor) in the United States. As one of the leading countries, Turkey is the top eight country of origin for international students. Purpose of this qualitative study is to provide a general perspective on the perceptions and experiences of Turkish graduate students on teaching undergraduate and graduate level classes in the United States. Semi-structured interviews were conducted with 6 Turkish graduate students teaching in a university setting. In addition to challenges and difficulties of teaching in a different environment, advantages and rewards of this experience were solicited through the interview protocol. Procedure was tailored to capture students' opinions and suggestions about teaching in a multicultural environment. Results suggested that it is not an easy endeavor but a rich and useful experience for both students and instructors to take place in ethnically and culturally diverse classroom settings. Linguistic limitations and cultural differences were the major barriers in creating an effective and efficient learning environment for Turkish graduate student instructors. Having a different background than students and knowledge of international issues were mentioned as being valuable qualities in teaching. Difference between undergraduate and graduate student expectations, needs, and attitudes was also one of the primary points interviewees referred. Implications for multicultural education are discussed in terms of teaching styles and strategies.

S7) Turkification of Anatolia - A Matrilineal Perspective, Omer Gokcumen, Theodore G. Schurr *University of Pennsylvania, Philadelphia 19104 USA.*

The Turkification of Anatolia remains a fascinating anthropological question. It not only marks the beginning of a significant political transition that has influenced world history, but also represents a unique moment of linguistic and cultural change. However, the complex processes through which Turkic-speaking groups moved into Anatolia from Central Asia and settled within the region remain relatively unexplored. Despite great interest in this topic, however, the scarce and incomplete historical documentation and the current political sensitivities in Turkey create considerable obstacles for the studies of population history in the region. The emerging field of molecular anthropology may allow us to hurdle these obstacles by introducing powerful new tools to reveal the complexity of the region's population history without emphasizing stable biological identities, which is generally the basis for ethnocentric or racist discourse. In this paper, we have analyzed the mitochondrial DNA (mtDNA) data from several studies, including our own, to map the patterns of genetic diversity associated the western expansion of the Turkic groups. Our findings suggest that, during the westward movement of Turkic nomads, there was varied, but substantial, maternal admixture with local populations. In addition, the population of contemporary Turkey differs from that of pre-Turkic Anatolia and Thrace. Thus, it is essential, from a genetic perspective, to characterize both the complex legacy of Turkic expansion and the multi-layered population history of Anatolia in efforts to elucidate the Turkification of the region.

S8) Research Opportunities in Europe, Dr. Hatice Duran, *Max Planck Institute for Polymer Research, Germany*

Research is a major driving force for economic and social development. New scientific and technological discoveries are constantly changing and improving the way we live and work. Europe has an enviable reputation in the world of

research thanks largely to its highly qualified research personnel and their rich intellectual capacity and know-how. The EU is responsible for producing one third of the world's scientific knowledge and boasts world-class expertise in areas such as environmental science, medical research, transport, aerospace and telecommunications. This poster presentation will provide an overview of the scientific research and career development opportunities in Europe mainly covered under the name of Marie Curie Actions. These opportunities are open to researchers of all ages and levels of experience regardless of nationality. (Hereby, I confirm that in this presentation I am not representing and/or engaging the European Commission. This is my personal point of view based on the documents available by the European Resarcher's Mobility Portal and on my own experience as a Marie Curie Fellow.)

S9) Students' Representations of Negative Numbers, Mehmet A. Ocak, *State University of New York at Albany, Albany, New York, 12222*

Teachers often believe that middle grade students have a good understanding of how to interpret and use negative numbers. Generally, students do not learn signed numbers as a topic until middle grade. In some curriculums, negative numbers are not taught until prealgebra. However, this can lead to confusion and cognitive obstacles. Students learn that "you can not subtract a larger number from a smaller number" and later they must reconstruct their understanding again. Teaching firstly counting numbers, addition, subtraction, then negative numbers leads to misunderstanding (National Council of Teachers of Mathematics, 2001).Moreover, negative numbers are more difficult to understand than positive numbers because they are not directly related to children's everyday experiences. Additionally, children seem to have some obstacles with negative numbers. Representational systems help us understand some of the obstacles that children may have for particular mathematical ideas. The general purpose of this poster is to understand some of the cognitive obstacles that students may have for negative numbers. This poster considers examples with young children, illustrating some of their early understandings of negative numbers. Specific obstacles may come from the particular representations that students use. This poster shows some interesting and different obstacles of this sort and explores how such obstacles can be overcome as more efficient, powerful representations develop.

TASSA YOUNG SCIENTISTS GRANT RECIPIENT

S10) MULTIPLE DETERMINANTS OF BUSINESS CYCLE SYNCHRONIZATION, CIGDEM AKIN, *GEORGE WASHINGTON UNIVERSITY, WASHINGTON, DC 20052 USA*

The phenomenon of globalization has recently incited the interest in understanding propagation of business cycle fluctuations across national borders. Despite the recent surge in trade and financial flows, studies have been unable to distinguish a clear-cut tendency for synchronization. One major reason is that various transmission channels can influence output correlations in both directions when we take into account the varying degrees of intensity across the world. In order to fully decipher this result, further research needs to be conducted about the underlying forces behind the co-movement of world economies. This study looks at the multiple channels of business cycle synchronization in a unified framework to explain the economic linkages behind synchronization of 47 countries including 27 emerging markets. Paper conducts a GMM-IV and simultaneous equations estimations on correlations of real GDP cycles for 1970-2003. Results show that bilateral trade intensity, intra-industry trade and similarity in economic structures are the most important determinants of bilateral output correlations. There are no statistically significant effects from trade partner similarity, free trade area membership and being commodity exporter when macroeconomic policy measures are accounted for. Similarity in idiosyncratic fiscal shocks increases synchronization while bilateral real exchange rate volatility has no significant effect. On average global financial integration has a positive but weak effect. Synchronization increases for country pairs with higher degrees of financial openness. Simultaneous equations estimation shows that there is a strong positive feedback from financial openness to trade integration. Oil price shocks increase synchronization for pairs with similar oil import dependencies.

S11) Knowledge Management in the Liberty Private Elementary School, Mustafa Cinoglu, *University of Illinois at Urbana-Champaign, Urbana, IL*

The purpose of this study was to examine knowledge management in the Liberty Private Elementary School (LPES) (pseudonym). Case study methodology was used in the study. I collected the data via participant observation and interviews and school documents. I used to semi-formal interview questions. Interviews were conducted with teachers, administrators, parents and students to explore the school culture and staff beliefs about authority and to identify a critical decision method that provide uncover knowledge structures used in decision-making. This study demonstrated that, in the decision process, school principal had considerable knowledge and were actively involved in the collective creation of shared values and common interpretation schemes. Teacher committees were independent from school management. Teacher committee members responded that they supported organized teamwork and that the work of administration was highly integrated with the work of the teacher committees. Collective values were part of the knowledge structures engaged by the all school staff during the critical decisions. The principal role of values in the critical decisions was to select out information that was deemed acceptable by the group or compatible with the group's existing knowledge base.

S12) Inquiry-Based Reading Assessment, Mustafa Ulusoy, *University of Illinois at Urbana-Champaign, Urbana, IL 61801*

Teachers spend extensive amount of time to find suitable reading assessment techniques for reading problems. An Inquiry Based Reading Assessment web site (WebQuest) was developed to help teachers find reading assessment techniques for common reading problems. This WebQuest provides participants introduction (general explanation about the WebQuest), task and process, cases (reading problems), useful resources, and evaluation (survey to assess WebQuest). In this WebQuest, every case contained a problem related to reading assessment. Participants were wanted to answer the following questions for each case: 1) What is the reading problem(s) in your case? 2) Which kind of reading assessment techniques can be used to assess the student's reading? 3) Why do you think this/these assessment technique(s) are the best? 4) How can you help this student to become a more fluent reader? Participants used resources section of the WebQuest to find useful sources. In similar cases, participants were expected to apply these techniques in their classrooms to find and solve reading problems. Twenty teachers examined the WebQuest web site and filled out an on-line survey. Analyses of the responses showed that participants easily identified problems in each case. Links were categorized according to the cases under the resources link. Due to this reason, participants found answers of the cases easily and did not have any frustrations. According to the survey results, 10 out of 20 participants had three or four years teaching experience. Open-ended survey questions revealed that the WebQuest was excellent, and the links were helpful.

S13) Process vs. Product: Rethinking Assessment in Teacher Education from Assignments to E-portfolios, Melda N. Yildiz, *William Paterson University of New Jersey, Wayne, NJ 07470*

This participatory research studied strategies for integrating media education into the curriculum, created suggestions for producing video in the classroom with minimal resources, explored teacher candidates' experiences with media production. To date, few studies have investigated the impact of assessment in creating media projects in teacher education. This study attempts to fill the gap by outlining the links between the role of assessment and educational media. Participants were encouraged to focus on process where they integrate new media into their projects. The study focused on the difficulties and characteristics of assessing new media projects such as videos and multimedia presentations. E-Portfolio model was designed and tested during three different courses. The study explored three key topics in order to understand the educational experiences of the participants: the wide range of meanings participants associate with assessment in media education; the impact of developing alternative assessment tools and strategies on participants' reaction and understanding of evaluating performance; and the ways in which they align their artifacts such as assignments and curriculum projects into their portfolios. Research questions: 1) Design: What types of Portfolio design, assessment strategies, and reflective practices are most conducive for Teacher Candidates? 2) Format: What is the value-added of publishing a portfolio in an electronic format? 3) The role of media: Does creating an electronic portfolio enhance a teacher candidate's multimedia development skills? 4) Assessment: How do we assess our teacher candidates? What kind of artifacts do they need to create and how do they create their projects.

HEALTH AND BIOMEDICAL SCIENCES

TASSA YOUNG SCIENTISTS GRANT RECIPIENT

H1) ENHANCEMENT OF CELLULAR MEMORY BY REDUCING STOCHASTIC TRANSITIONS, MURAT ACAR, ATTILA BECSKEI, AND ALEXANDER VAN OUDENAARDEN., *M.I.T., CAMBRIDGE, MA, 02139 USA*

On induction of cell differentiation, distinct cell phenotypes are encoded by complex genetic networks. Here we explore the key parameters that determine the stability of cellular memory by using the yeast galactose-signalling network as a model system. This network contains multiple nested feedback loops. Of the two positive feedback loops, only the loop mediated by the signal transducer Gal3p is able to generate two stable expression states with a persistent memory of previous galactose consumption states. A negative feedback through the inhibitor Gal80p reduces the strength of the core positive feedback. Despite this, a constitutive increase in the Gal80p concentration tunes the system from having destabilized memory to having persistent memory. A model reveals that fluctuations are trapped more efficiently at higher Gal80p concentrations. Indeed, the rate at which single cells randomly switch back and forth between expression states was reduced. These observations provide a quantitative understanding of the stability and reversibility of cellular differentiation states. (For more information: Nature 435, 228-232 (2005)).

H2) Infant Mortality in Turkey: Determinants of Access to Prenatal Care, Sule Calikoglu, MPP, MA, *Bloomberg School of Public Health Johns Hopkins University Baltimore, MD, USA*

Infant mortality declined in almost all regions of the world between the 1960s and the 1990s with varying rates raging from a 73 percent decline in East Asia (mainly China), down to a 34 percent decline in sub-Saharan Africa. Turkey was among the countries with the most striking declines together with Peru and Thailand. However, the rate of decline slowed down since 1980s and Turkey's infant mortality rate is higher than other nations with similar economic development. The first section of this study examines infant mortality rate in a historical and comparative perspective. The second section analyzes the determinants of receiving prenatal care, one of the leading factors in infant mortality, using Turkish Demographic Survey and Health Survey. Receiving prenatal care is explained by having no education, rural area residence, region, ethnicity, religion, health insurance and poverty. An analysis of the standardized coefficients reveals that the major significant variables in explaining access to prenatal care are education and the residence in the Eastern Anatolia. Furthermore, Kurdish identity, coverage of health insurance and poverty are statistically significant factors influencing the level of access to prenatal care. The importance of education can be related to women's sense of empowerment, which may result in more demand for health care during pregnancy. However, education may also reflect income levels and social class.

H3) Features of Distributed Thinking in Biomedical Communities, Murat Cokol, Ivan Iossifov, Chani Weinreb, Andrey Rzhetsky, *Columbia Genome Center, New York, NY, 10032*

We analyzed several large-scale properties of the growing knowledge about molecular interactions, using automated text-mining technology and a huge collection of full-text research articles. At least in three respects the growing knowledge appears analogous to evolving scientific collaboration networks: First, biomedical knowledge tends to advance by incremental attachment of newly discovered relations to islands of highly interconnected "old" facts. Second, the visibility of facts known to individual researchers appears to be restricted to "knowledge pockets" that are probably very small compared to the whole accessible knowledge. Third, at every given moment only a thin layer of knowledge is active and growing. The older knowledge appears to be largely abandoned and hidden from the active scientists, while the total amount of potentially useful knowledge is enormous: We estimated that at least a billion non-redundant molecular interactions are currently locked in biomedical literature covering just the last quarter of century of research.

OMER TUNCH TRAVEL AWARD RECIPIENT

H4) Loss of FilaminC (FLNc) Results in Severe Defects in Myogenesis and Myotube Structure, Isin Dalkilic, Jaclyn Schienda, Terri G. Thompson, Louis M. Kunkel, *Howard Hughes Medical Institute, Children's Hospital Boston, and Harvard Medical School, Boston, MA 02115*

FilaminC is the muscle specific member of a family of actin binding proteins. Although it interacts with many proteins involved in muscular dystrophies, its unique role in muscle is poorly understood. To address this, two models were developed: First, FLNc expression was stably reduced in C2C12 myoblasts by RNA interference. While these cells start differentiation normally, they display defects in differentiation and fusion ability and ultimately form multinucleated "myoballs" rather than maintain elongated morphology. Second, a mouse model carrying a deletion of last 8 exons of Flnc was developed. FLNc deficient mice die shortly after birth, due to respiratory failure and have severely reduced birth weight, with fewer muscle fibers and primary myotubes, indicating defects in primary myogenesis. They exhibit variation in fiber size, fibers with centrally located nuclei and some rounded fibers resembling the in vitro phe-

notype. Similarity of the phenotype of FLNc deficient mice to the filamin interacting TRIO null mice was further confirmed by comparing FLNc deficient C2C12 cells to TRIO deficient cells. These data provide the first evidence that FLNc has a crucial role in muscle development and maintenance of muscle structural integrity, and suggest the presence of TRIO-FLNc dependent pathway in maintaining proper myotubes structure.

H5) Simulation-based Teaching And Learning Resource For Cellular Physiology Training: iCell , Semahat Demir, Ph.D., *Program Director Biomedical Engineering & Research to Aid Persons with Disabilities (BME/RAPD), Division of Bioengineering and Environmental Systems, National Science Foundation, Arlington, VA, USA, Associate Professor of Biomedical Engineering, Joint Biomedical Engineering Program, Univ. of Memphis & Univ. of Tennessee Health Science Center Memphis, TN, USA*

The interactive cell modeling resource, iCell, that has been developed as a simulation-based teaching and learning tool for electrophysiology since 1998 by integrating research and education will be presented. Dr. Demir's interactive cell modeling web site can be accessed freely over the internet at http://ssd1.bme.memphis.edu/icell/. This JAVA-based platform-independent software, iCell, provides an interactive and user-friendly teaching and learning resource, and also a collaboration environment for electrophysiology to be shared and disseminated over the Internet.

H6) Development and Characterization of Laser Glucometer for Diabetes, Aysegul Ergin, Gordon A. Thomas, *New Jersey Institute of Technology, Newark, NJ, 07102*

In this study, we have measured the Raman spectra of near-physiological-level glucose in the aqueous humor of intact, ex vivo porcine eyes and determine the characteristic concentration constant for glucose. For this study, an optical, non-invasive technique, Raman spectroscopy, has been used as the measurements method. We inject the glucose solutions into the eyes, control the concentration, and measure the Raman spectra using a compact spectroscopic system with a laser excitation wavelength at 785nm. The measurement system in this study is designed to optimize the signal collection from the anterior chamber of the eye. Our preliminary data also show that the sensitivity of the system is almost adequate, since we can detect the glucose at near-physiological concentrations in the anterior chamber of the eye in the presence of the other eye components.This method can be used in the development of a detection system that could be an alternative to the current diabetic patients' blood glucose finger-stick test, which is painful and done infrequently. This method could allow for frequent testing in a fast, painless manner so diabetic patients can regulate their glucose levels more closely. Providing frequent and continuous glucose measurement would be useful in patient-based blood glucose control or in a closed loop automated insulin delivery system. We believe that a small, portable system like ours may be made sufficiently affordable and convenient for patient use.

H7) The Effectd of the Lipidiol on the Intraabdominal Adhesion and Ovarian Mass Formation on the Rats, Bahar Baskan MD, Orhan Gelisen MD, Gulay Beydilli MD, Dilek Bulbul MD, Ali Haberal MD, *Infertility Clinic , Pathology Department, Ankara Etlik Maternity and Women's Health Training and Research Hospital,*

OBJECTIVE: Hysterosalphingography (HSG) is used for the evaluation of the uterine cavity and tubo-peritoneal structures in infertile females. The aim of this study was to examine intraabdominal reactions of the Lipiodol, which is widely, used oil soluble contrast agent for HSG, experimentally on the rats.

MATERIAL and METHOD: Forty-five rats those weights ranging from 180 to 230 grams were included into the study. By insulin injector 0.5 cc lipiodol was injected peritoneal cavity of 35 rats while no medication was done to 10 rats reserved as control group. Under laboratory conditions the rats were observed 3 weeks. At the end of the third week after anesthesia with ketamin, total abdominal hystrectomy, bilateral salphingooopherectomy were done and peritoneal specimens sized 2x2 centimeters from anterior pelvic wall were taken . The specimens were preserved in formaldehyde solution. Dying with Hematoxylen-Eosine histopathologic examinations were done.

RESULTS: After macroscopic and histopathologic examinations fibrosis, granulomatous reactions, ovarian cyst formation were detected neither in control group (n=10) nor in the Lipiodol injected group (n=35). Only in two of the lipiodol injected rats, there were massive eosinophilic leukocyte infiltration in the perivascular spaces of the paratubal and paraovarian fat tissue. These findings were evaluated as nonspecific for adhesion or fibrosis.

CONCLUSION: It is observed that intraabdominal application of the Lipiodol do not cause granulomatous reactions in the peritoneal cavity or formation of the retention cysts or adhesion.

H8) High LET Radiation Exposure Yields Less Tumors than Low LET Radiation at Higher Doses, Zekiye Hiz, Rutgers, *The State University of New Jersey, Camden, NJ*

In this study a model considering possible different modes of action of low and high-LET particles is tested against the data of experiments on cancer induction by ionizing radiation in rat skin. Also included in the model are the multiple steps in completion of degeneration or mutation in genes, namely oncogenes and tumor suppressor genes on both chromosomes, biological repair of premutagenic damages, necrotic and apoptotic cell deaths, and proliferation due to

cell death. The dose-response relationship in the model for electron radiation (low LET) included the second, third and fourth powers of the dose and for neon and argon ion radiation (high LET) the first, second and third powers of the dose. Analyses of the experimental data showed that exposure to particles of different energy and LET show different cancer incidence dependence on the power of dose. For example, in 28 day old rats a dose of 8 Gy of 0.8 MeV electrons yielded 0.16 Cancer/ Rat.cm^2 and 640 MeV Argon ions about 0.37 Cancer/ Rat.cm^2, while 12 Gy of 0.8 MeV electrons caused 0.22 Cancer/ Rat.cm^2 and 640 MeV Argon ions 0.18 Cancer/ Rat.cm^2. Radiation with its different modes of action is a unique agent that reveals the effects of biological structure-function relationships on dose and time responses in carcinogenesis.

H9) Trabecular Micro-Structure in Lumbar Pedicle Differs from Vertebral Trabecular Bone, Serkan İnceoğlu, Andrew Burghardt, Atilla Akbay, Sharmila Majumdar, Robert F. McLain, *Spine Research Laboratory, The Cleveland Clinic Foundation, Cleveland, OH, 44195, Musculoskeletal Quantitative Imaging Research Group, UCSF, 94158*

The pedicle is a clinically crucial element of the spine. Although the anatomy of the pedicle is well-studied, the micro-structure of the trabecular bone in the pedicle and age-related changes are unknown. This study was designed to investigate the architecture of the trabecular bone in the pedicle and age-related changes in the structure by using micro-CT. Pedicles of eight L3 human lumbar vertebrae were sectioned off at the isthmus after DEXA-scanning. Pedicle sections were, again, DEXA-scanned for measurement of bone density. A micro-CT scanner was used to analyze following structural parameters: bone volume fraction (BV/TV), trabecular number (Tb.N), thickness (Tb.Th) and spacing (Tb.Sp), structural model index (SMI), and degree of anisotropy (DA). The results showed that the morphological parameters were not correlated with age ($p>0.05$). Significant correlation was found between Tb.Th and the pedicular BMD ($p<0.05$). BV/TV showed correlations with Tb.Th ($p=0.06$) and Tb.Sp ($p=0.07$), but not with Tb.N ($p=0.13$). The pedicular trabeculae were plate-like and isotropic. The vertebral BMD could explain only 63% of the variance in the pedicular BMD. In conclusion, the pedicular trabeculae are larger in thickness and number and have less spacing in the network than vertebral trabeculae. The measurement of BMD within the pedicle might provide a better sense about fixation quality in surgery. Changes in the bone volume in pedicle are through thinning but not loss of trabeculae in the pedicle. Thus, therapeutical interventions might be useful in the restoration of bone mass in the pedicle in elderly to improve fixation quality.

H10) Genetic Approaches in Human Congenital Diaphragmatic Hernia, Sibel Kantarci, Ph.D., Barbara Pober, M.D., Thomas B. Kinane, MD, Lihadh, Al-Gazali, MD, David Casavant, M.D., Dick Tibboel, MD, Ph.D, Meaghan Russell, M.P.H., Jay M. Wilson, MD, Charles Lee, Ph.D., Patricia K. Donahoe, M.D., *MassGeneral Hospital for Children, Boston, MA, USA, United Arab Emirates University, United Arab Emirates, Erasmus Medical Centre, Rotterdam, The Netherlands, Children's Hospital Boston, Boston, MA, USA, Brigham and Women's Hospital, Boston, MA, USA.*

Congenital Diaphragmatic Hernia (CDH) is a common developmental anomaly with a high mortality due to lung hypoplasia and pulmonary hypertension. Little is known about the etiology of CDH. We aim to identify genes involved in CDH in our carefully phenotyped cohort of patients. We have sequenced 66 of the 173 enrolled patients for 22 candidate genes. We found several potentially damaging SNPs, nor in 485 ethnically matched control group recruited as part of this study. To detect possible microdeletions or microduplications we used array-based Comparative Genomic Hybridization (aCGH) on 30 patients. A de novo deletion of chr1q41-q42.12 region was detected. Prior cases with deletions of 1q42 suggest this is a CDH hotspot. We are performing homozygosity mapping by application of the 10K Affymetrix SNP chip on a large family containing several members affected with an autosomal recessive multiple anomaly condition with CDH.These numerous strategies will identify genes contribute to the development of CDH. These approaches provide a model for elucidating the genetic basis of common, but etiologically heterogeneous, birth defects.

H11) Defining the Molecular Organisation of the Airway Mucosal Barrier: Proteomic and Biochemical Studies on Human Bronchial Epithelial Cell Cultures, Mehmet Kesimer, Raymond J. Pickles, Genevieve DeMaria, Ashley Henderson, John K. Sheehan, *Department of Biochemistry and Biophysics, Cystic Fibrosis/Pulmonary Research and Treatment Center, University of North Carolina, Chapel Hill, 27599-7248 NC USA*

Cleaning the air we breathe from chemical, pathological and physical toxins is a vital physiological function which is largely performed at the mucosal surface of the airway. The molecular organisation of this barrier is poorly understood but with the advent of effective normal human tracheobronchial epithelial (NHTBE) cultures which can recapitulate the behaviour of a real muco-ciliary surface it is now possible to integrate biochemical, biophysical and physiological approaches. We report here our integrated approach to proteomic, biochemical and histological studies on NHTBE cultures that are yielding new insights into both the secreted mucus and the underlying peri-ciliary liquid (PCL) layer. How this layer maintains its integrity and distinctiveness from the mucus above forms the main question of this work. We have identified over a 100 molecules in the

mucus secretion many of which are arranged in complexes with the large MUC5B and 5AC mucins which we are now defining. In particular we have identified by proteomics MUC1, MUC4 and MUC16 as the major glycoconjugate molecules in the PCL and biochemical studies indicate that these molecules are distinctively glycosylated with highly charged oligosaccharides as compared with the MUC5B and 5AC mucins in the mucus. On the basis of the proteomics identification we have designed new peptide antibodies to MUC4 that identify it as a major secreted component surrounding the cilia. On the other hand MUC1 is clearly identified on the microvilli but not the cilia. MUC16 is found in and above the PCL as well as in the mucus secretion.

H12) Effects of Shear Stress Injury on the Morphology and Structure of Cultured Chick Forebrain Neurons, Devrim Kilinc, Gianluca Gallo, Kenneth A. Barbee, *Drexel University School of Biomedical Engineering, Science and Health Systems. Philadelphia, PA 19102 USA, Drexel University Health Sciences. Philadelphia PA 19129 USA.*

Traumatic brain injury (TBI) is an important pathology associated with closed head trauma and affects around 2 million people annually. Diffuse injury to axons results in secondary axotomy if the injury severity is insufficient to disrupt the axon immediately. Secondary axotomy is a progressive event that involves increase in the axolemmal permeability and subsequent calcium ion (Ca^{2+}) influx followed by the increase in the activity of Ca-dependent protease Calpain and subsequent damage to cytoskeletal structure. We have applied fluid shear stress injury (FSSI) on cultured primary chick forebrain neurons to determine if this type of injury mimics the structural and morphological changes in central nervous system neurons following TBI. Our results demonstrate that axonal beading, which is the "hallmark" morphology of TBI, is increased following FSSI, suggesting that our in vitro model system mimics TBI-like changes observed in vivo. Beads appeared at the same distinct locations along the axon where microtubule (MT) mass is decreased, providing direct evidence for the hypothesis that beading is related with impaired axonal transport conducted over MTs. We have also found that post-injury application of the triblock co-polymer Poloxamer 188 (P188) reduces axonal beading to control levels. We suggest that focal changes in axolemmal permeability following trauma is responsible for focal peaks of intracellular Ca^{2+} concentration ($[Ca^{2+}]i$) which, in turn, causes focal loss of MTs via Calpain activation. We are currently investigating axolemmal permeability changes, $[Ca^{2+}]i$, and Calpain activity in response to FSSI.

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H13) AGONIST-INDICED CYCLIC ADP RIBOSE PRODUCTION IN AIWAY SMOOTH MUSCLE, SERTAC N. KIP, MOLLY SMELTER, ADEYEMI IYANOYE, EDUARDO N. CHINI , Y.S. PRAKASH, CHRISTINA M. PABELICK AND GARY C. SIECK. *DEPARTMENTS OF PHYSIOLOGY AND BIOMEDICAL ENGINEERING , ANESTHESIOLOGY AND MEDICINE MAYO CLINIC COLLEGE OF MEDICINE, ROCHESTER, MN 55905*

Cyclic ADP-ribose (cADPR) is a novel second messenger generated by the enzymatic activity of a trans-membrane protein, CD38. cADPR triggers Ca^{2+} release from sarcoplasmic reticulum (SR) via Ryanodine receptor channels in airway smooth muscle (ASM). SR Ca^{2+} release is an important component of the intracellular Ca^{2+} ($[Ca^{2+}]i$) responses of ASM to agonists. Whether cADPR is endogenously produced in ASM during agonist stimulation which results in contractility has not been established. In this study, cADPR production was examined in acutely dissociated porcine ASM cells. Acetylcholine (ACh) stimulation significantly increased cADPR levels, peaking between 30 s and 1 min. This effect was inhibited by M2 and M3 muscarinic receptor antagonists. Histamine stimulation also increased cADPR levels, the effect being inhibited by diphenhydramine, a histamine receptor antagonist. Although the time-course was slower, the extent of cADPR elevation with histamine was greater than that induced by ACh. These results indicate that in porcine ASM, agonist stimulation induces an increase in cADPR production that is mediated via membrane receptors, which may have importance in bronchial hyper-responsiveness. Furthermore, the extent of cADPR responses to ACh and histamine vary, possibly reflecting differences in G protein coupling. Better understanding of CD38/cADPR signaling involved in calcium homeostasis of ASM may provide new insights into novel therapeutic targets for the control of airway diseases, including asthma.

H14) Using Hyperspectral Imageries to Portray Musk Thistle from Surrounding Vegetation, Mustafa Mirik, Gerald J. Michels, Jr., and Sabina Kassymzhanova-Mirik *Texas A&M University System, Agricultural Research and Extension Center, 6500 Amarillo Boulevard West, Amarillo, TX 79106.*

Invasion by a noxious weed species presents a serious threat to the remaining fragments of the natural habitat. Identifying the population dynamics and extent of spread of noxious weeds in a temporal and spatial perspective improves monitoring, planning, and management practices. Methods for reliable, repeatable, quick, and cost effective mapping of invasion patterns are needed to facilitate these practices. Remote sensing has been used to map various plant species including invasive and noxious weeds. Musk thistle (Carduus nutans L.) a noxious weed, is a good candidate for detection by remote sensing platforms because it may produce a unique spectral signature due to a large, purple-reddish flower head. Therefore, airborne hyperspec-

tral imageries acquired at two dates were used to map musk thistle infestation in a pasture at Friona, TX, in the second week of April when musk thistle was at the rosette form and mid June when musk thistle was at the flowering stage in 2003. Imageries were classified using the supervised maximum likelihood classifier technique. Overall accuracy was verified to be greater than 80% by ground survey for both imageries. These results demonstrate the value of hyperspectral data for mapping noxious weed species and the habitats they threaten.

H15) Remote Sensing for Big Sagebrush Biomass, Mustafa Mirik, Jack E. Norland, Robert L. Crabtree, Mario E. Biondini, Gerald J. Michels Jr., *The Texas A&M University, Agricultural Research and Extension Center, Amarillo, TX 79106. North Dakota State University, Fargo, ND. Yellowstone Research Center Bozeman, MT.*

The prediction power of the fine spatial resolution narrowband vegetation indices along with simulated multispectral reflectance measurments for estimating woody and herbaceous biomass was examined for a big sagebrush (Artemisia tridentata Nutt.) region in Yellowstone National Park, Wyoming. The modified normalized difference vegetation (NDVI) and structural-independent pigment (SIPI) indices of 1 m^2 spatial resolution of PROBE-1 hyperspectral imagery acquired in August 1999 was used to investigate the relationships between ecological variables and reflectance spectra. Biomass components were regressed on custom-built vegetation indices, which provided the R^2 values ranged from 0.83 to 0.96 by the simple linear regression models using hyperspectral data alone. As a result of observed correlations, it can be confidently concluded that fine spatial and spectral resolution remotely sensed data have been found to be an important tool to capture the information about vegetation properties enabling to estimate biomass components in big sagebrush areas at the time when data were collected.

H16) Classification of Hyperspectral Imageries for delineating Yucca and Tree Cholla in Grasslands, Mustafa Mirik, Gerald J. Michels, Jr., Sabina Kassymzhanova-Mirik, *Texas A&M University System, Agricultural Research and Extension Center, Amarillo, TX 79106.*

Hyperspectral remote sensing is an emerging technology with the potential to identify plant species, delineate vegetation and habitat characteristics, differentiate causes of vegetation stress, and characterize soil properties. This technology can be used in range management as a tool to map various plant communities so as to determine current range production and utilization. Mapping of unpalatable rangeland species, such as yucca (Yucca glauca Nutt.) and tree cholla (Opuntia imbricata (Haw.) DC.), using hyperspectral data provides temporal and spatial information for monitoring and managing rangeland productivity for livestock utilization. The objectives of this study were to examine the spectral characteristics of yucca and tree cholla using an airborne hyperspectral spectrometer and to test hyperspectral one-meter-spatial-resolution remote sensing imageries for identifying and mapping individually distributed tree cholla and yucca species. The spectral reflectance of both yucca and tree cholla recorded with an airborne hyperspectral spectrometer was different from the co-occurring green grass species throughout the visible and near infrared spectrum. The classification results using a maximum likelihood procedure indicated that the dormant woody species were classified as yucca. A mixture of actively growing short grass species within tree cholla dominated areas were classified as tree cholla. However, areas dominated by each species within each rangeland were correctly delineated from the areas occupied with green grass species.

H17) Can Remote Sensing Detect Aphid Stress in Crops?, Mustafa Mirik, Gerald J. Michels, Jr., Sabina Kassymzhanova-Mirik, Norman C. Elliott, and Vasile Catana, *The Texas A&M University, Agricultural Research and Extension Center, Amarillo, TX 79106, USDA-ARS, 1301 N. Western Road, Stillwater, OK 74075.*

The Russian wheat aphid (Diuraphis noxia (Mordvilko)) and greenbug (Schizaphis graminum (Rondani)) are two devastating aphid pests of wheat (Triticum eastivum L.), barley (Hordeum vulgare L.), and other cereals in the Great Plains of the United States. The Russian wheat aphid and greenbug infestations in crops are unpredictable over space and time. Remote Sensing appears promising to observe Russian wheat aphid and greenbug infestations in crops. In this research, the potential use of spectral data to sense Russian wheat aphid and greenbug stress in winter wheat fields located in Texas, Oklahoma, and Colorado was studied. A multispectral ground radiometer and a digital camera were used to collect reflectance and digital images, respectively. The results indicate that vegetation indices associated well with percentage damage caused by the Russian wheat aphid and greenbug feeding in wheat. In addition, paired t-test indicates that there were significant differences between infested and uninfested wheat canopies. We concluded that remote sensing is a useful method to monitor aphid damage in wheat.

H18) Characterization and Long Term Maintenance of Rat Taste Primary Cells, Hakan Ozdener, Nancy Rawson, *Monell Chemical Senses Center, Philadelphia, PA 19104*

While much is known about molecular and biological basis of taste, comparatively less is understood about factors governing proliferation and differentiation of taste receptor cells. Our objective was to develop a protocol to maintain taste cells in culture for more 2 weeks and to establish a longer-term culture in which new taste cells would be generated

from stem cells.In this study, we report an in vitro culture method to maintain and generate rat taste cells in primary culture with good viability, physiological function and expression of taste cell specific markers. This optimized culture system maintains primary taste cells obtained from rat tongue foliate and vallate papilla and supports the de novo generation of new taste cells for at least two months. Gustducin and phospholipase Cb_2 ($PLCb_2$) expression was shown by immunocytochemistry and Western blot. PCR analysis indicated that mRNA for gustducin and $PLCb_2$ and taste cell receptors (T1R3, T2R5) was present in cultured taste cells. Labeling cultured cells with bromodeoxyuridine to identify cells that divided in culture concurrently with taste cell markers indicated that taste cells both proliferated and differentiated in vitro. Functional studies using the ratio metric indicator fura-2 showed that a subset of cells responded to taste stimuli. This system will enable studies of the process involved in proliferation, differentiation and stimulus responses of mammalian taste receptor cells in an in vitro preparation.

H19) Effect of Stress on the Pattern of LH Secretion in Sheep Passively Immunized against Adrenocorticotropic Hormone (ACTH), T. E. Adams, A. Ozpinar, C. C. Huxsoll, B. M. Adams, *Department of Animal Science, University of California, Davis, CA 95616*

The effect of inflammatory stress on LH secretion was assessed in castrated male sheep (wethers) passively immunized against the amino (N)- and/or carboxy (C)- termini of adrenocorticotropic hormone (ACTH). Sheep serving as anti-serum donors were actively immunized against immunized against peptides representing the N ($ACTH_{1-14}$) or C ($ACTH_{23-39}$)-terminal portions of ovine ACTH (oACTH). At passive immunization (PI), wethers (n = 6 animals/treatment group) animals in Group 1 (dual immunization) received 400 ml of anti-$ACTH_{1-14}$ and 150 ml anti-$ACTH_{23-39}$ sera. Animals in Group 2 received 150 ml anti-$ACTH_{23-39}$ sera and 400 ml of control sera. Animals in Group 3 received an equivalent volume of control serum alone. An immunologic stressv (lipopolysaccharide [LPS], 125 ng/kg IV) was administered 24 h after PI and serum concentrations of LH and cortisol were determined in blood samples collected during the post-stress period. In control animals (Group 3) LPS induced a marked, but short-lived, increase in serum concentrations of cortisol, with peak levels noted 1-1.5 h after LPS challenge. The adrenal response to LPS reached peak levels 2-5 h after LPS in animals in Group 2. In addition, the duration of stress-induced cortisol secretion was markedly extended in animals in Group 2. Conversely the adrenal response to LPS was abolished in animals passively immunized against both the N- and C-terminal portions of ACTH (Group 1). Serum concentrations of LH were significantly reduced 2-4 h after LPS challenge in control animals. The extent and duration of stress-induced decrease in LH secretion was amplified in animals passively immunized against the A-terminus of ACTH (Group 2). Conversely, LPS challenge did not significantly affect LH secretion in animals receiving the dual immunization treatment paradigm. Collectively these observations demonstrate that antisera targeting the N- and/or C-termini of ACTH have differential effects on the adrenal response to stress. In addition, stress-dependent modulation of LH secretion is inversely related to the magnitude and duration of stress-induced cortisol secretion. Taken together, these data indicate that cortisol is an important mediator of the decrease in LH secretion that is triggered by stress.

H20) Diagnostic Value of Adenosine Deaminase in Nontuberculous Peritoneal Effusions, Gülsevim Saydam, Cengiz Aydın, Aynur Terim Çağır, Tülin Yazıcı, Tuğrul Himmetoğlu, Perihan Oğuz, *T.C. Yüksek İhtisas Research and Training Hospital, Clinical Biochemistry Laboratory 06100 Ankara-Türkiye*

Adenosine Deaminase (ADA) can aid in the diagnosis of tuberculous peritoneal effusions. The purpose of this study is to assess the ADA levels in non-tuberculous peritoneal effusions of different aetiologies, to investigate false-positive results from peritoneal effusions and to show correlation between ADA levels and white blood count. ADA activity in periton effusions (82 cases) were measured by the Giusti method. Mean ADA activites were 7.47 ± 4.31 U/L in cirrhosis (17 cases), 10 ± 6.47 U/L in chronic liver diseases (23 cases), 26.14 ± 13.37 U/L in peritonitis carcinomatosis (7 cases), 16.1 ± 12.09 U/L in hepatic carcinoma (19 cases), 15.75 ± 13.12 U/L in miscellaneous cases (16 cases). The negative predictive value of ADA for the diagnosis of peritoneal tuberculosis was %96.34. The peritoneal fluid ADA levels were significantly higher in different types of exudative effusions than transudative effusions ($p < 0.001$) and there was weak correlation between ADA levels and white blood count.($p < 0.001$, $r = 0.648$). As a result, our study shows assesment of ADA in pathologic peritoneal effusions is helpful and it is supporting parameter as well as peritoneal biopsy in the diagnosis of tuberculosis.

H21) The in Vitro Analytical İnterference of Drugs on Tests of Thyroid Function, Dr. Hatice ERBEYİN , Dr. Gülsevim SAYDAM, *T.C. Yüksek ˙htisas Research and Training Hospital, Clinical Biochemistry Laboratory, 06100 Ankara-Türkiye.*

Many drugs may cause changes in the serum concentrations of the Triiodothyronine and the Thyroxine. It is important to know these changes in clinical thyroid state for the interpretation of thyroid function tests. Commonly prescribed drugs used for coronary artery disease, hiypertension, congestive cardiac failure may result in abnormal thyroid function tests in the absence of clinical features of thy-

roid dysfunction. In this study, we aimed to determine the in vitro effect of drugs as Furosemid, Metoprolol, Acetyl Salisilic Acid, ˙sosorbit Dinitrat are used frequently in the therapy of the patients with coronary artery disease, hypertension and congestive heart failure on FT_3 and FT_4 tests which are measured by Electrochemiluminescence. We performed our study according to "Analytical ˙nterferance Evaulation Guide"of IFCC as in vitro. In our study no in vitro analytical interference was observed on FT_3 and FT_4 tests with therapeutic doses of Acetyl Salisilic Acid (300 mg/day), Metoprolol (100 mg/day), ˙sosorbit Dinitrat (60 mg/day) and in vitro analytical interference was observed on FT_3 and FT_4 tests with only therapeutic doses of Furosemid (40 mg/day) ($p<0,01$). A nonlinear increase was found in FT_3 and FT_4 values with increased doses of Furosemid (10, 20, 40, 60, 80 mg/L) ˙n vitro. As a result we found that Acetyl Salisilic Acid, Metoprolol, ˙sosorbit Dinitrat had no analytical interference effects on FT_3 and FT_4 tests and Furosemid had analytical interference effect on FT_3 and FT_4 tests and FT_3 and FT_4 values showed a nonlinear increase with increased doses of Furosemid in vitro.

H22) Importance of The Fecal Elastase in Chronic Pancreatitis Diagnosis, Şebnem Gök, Gülsevim Saydam, Cengiz Aydın, Hüseyin Şimşek, Tuğrul Himmetoğlu, Dilek Oğuz, *T.C. Yüksek ˙htisas Research and Training Hospital, Clinical Biochemistry Laboratory 06100 Ankara-Türkiye*

Evaluation of exocrine functions of pancreas is important in the diagnosis and treatment of the chronic pancreatitis. Today determination of fecal pancreatic elastase gains importance due to being a non-invasive method. Our aim in this study are to determine the diagnostic importance of Fecal Elastase (FE-1) level on patients diagnosed as chronic pancreatitis in Gastroenterology Clinic, to investigate the effects of the usage of enzyme preparations on the fecal elastase method and to show correlation between FE-1 level and serum lipase level. In our study FE-1 level is measured by micro ELISA method in 26 patient with chrocic pancreatitis and 17 healty subject. The cut off value was found 240 μg/g. Sensitivity and specificty of the method were found as % 85 and % 70,6 respectivly. FE-1 levels of patient groups when compared with that of healty subjects, it was found significiantly low ($p< 0.001$). As a result we found FE-1 test might only be a supporting parameter as well as Ultrasonography, Computerized Tomography, Endoscopic Retrograde Colangio Pancreotography in the diagnosis of chronic pancreatitis because of the low diagnostic profiency parameters, FE-1 is unaffected by exogenous pancreatic enzyme treatment and there was no correlation between the FE-1 and serum lipase levels.

H23) Albumin Cobalt Binding Assay and Fatty Acid-Binding Protein in Early Detection of Myocardial Infarction, Kemal Sönmez, Gülsevim Saydam, Hüseyin Şimşek, Aygül Türkmen, Yücel Balbay, *T.C. Yüksek İhtisas Research and Training Hospital, Clinical Biochemistry Laboratory 06100 Ankara-Türkiye*

Diagnosis of acute myocardial infarction (AMI) in patients attending emergency departments with acute chest pain is often difficult. Cardiac Troponin I and T (cTnI, cTnT), CK-MB are sensitive and specific for detection of myocardial damage, but they may not rise during early stage of myocardial infarction. The release of currently used myocardial markers into the circulation are believed to require tissue necrosis, whereas the assessment of cardiac ischemia before or in the absence of cell death is frequently an important component of clinical decision-making in the suspected AMI patient. Albumin Cobalt Binding Assay (ACB) and heart type Fatty Acid-Binding Protein (H FABP) have recently been shown to be sensitive and early biochemical markers of ischemia. The aim of our study was to compare H FABP and ACB tests with cTnI, cTnT and CK-MB tests in the first 3 hours in the patients with the chest pain who have been diagnosed as AMI according to EKG, biochemical markers and family history. In our study, H-FABP was measured with the CardioDetect test kit based on qualitative immunocromotographic cassette method and ACB was measured with Bar-Or method based on indirect colorimeteric principle in 30 patients with chest pain, which started 2 hours before. The sensivity and specificity of the H FABP and ACB were higher than that of CK-MB and cTnT, cTnI. We conclude that H FABP and ACB are more sensitive and specific markers than cTnT, cTnI and CK-MB in the early diagnosis of AMI.

H24) A Novel Gene Regulating Autophagy and Development, Turgay Tekinay, Richard H. Kessin, *Columbia University, Department of Pathology and Cell Biology, New York, NY, 10032*

Autophagy is a cellular mechanism by which cytoplasmic molecules and organelles are degraded. Autophagy is activated by starvation and other stress conditions. Dictyostelium discoideum is a social amoeba that enters into a developmental pathway during starvation to form fruiting bodies, in which a stalk supports a ball of spores. We showed that autophagy is required to obtain the nutrients and energy necessary for Dictyostelium development. The autophagy pathway is conserved in all eukaryotic cells. By using genetic methods many of the genes involved in this pathway have been identified in budding yeast. However, there are significant differences between autophagy pathways in mammals and yeast. We hypothesized that there are genes that regulate autophagy and development, which are not found in yeast, but are conserved between mammals and Dictyostelium. To identify such genes, we

screened Dictyostelium mutants defective in development, since autophagy mutants are also defective in development. We tested these mutants for survival in nitrogen-free medium, which is hallmark of autophagy mutants. We isolated a gene, a mutation of which results in defects in Dictyostelium autophagy and development. This gene, which we named atgN, has homologues present in the mammals and the nematode Caenorhabditis elegans, but not the yeast genome. We are now elucidating the mechanism of action of this gene in lifespan extension in C. elegans. We propose that this novel gene regulates initiation of autophagy.

H25) Ewing's Sarcoma Oncoprotein EWS-FLI1 Activity is Enhanced by RNA Helicase A (RHA), Jeffrey A. Toretsky, Verda Erkizan, Ogan D. Abaan, Aykut Üren, *Lombardi Comprehensive Cancer Center, Georgetown University Medical Center, Washington D.C. 20057.*

RNA helicase A (RHA), a member of the DEXH box helicase family of proteins, is an integral component of protein complexes that regulate transcription and splicing. EWS-FLI1 oncoprotein is expressed as a result of a chromosomal translocation that occurs in patients with Ewing's Sarcoma Family of Tumors (ESFT). Although more than 95% of the tumors carry EWS-FLI1, therapeutic applications using this target have not been developed. Using phage display library screening, we identified an EWS-FLI1 binding peptide containing homology to RHA and chracterized human RHA protein as a potential EWS-FLI1 interacting protein. We observed endogenous RHA and EWS-FLI1 in the same protein complex in ESFT cell lines. GST pull-down and ELISA assays with recombinant proteins showed that EWS-FLI1 directly bound to RHA. Chromatin immunoprecipitation experiments demonstrated both proteins bound to EWS-FLI1 target gene promoters. RHA stimulated the transcriptional activity of EWS-FLI1 regulated promoters, including Id2, in ESFT cells. RHA expression in mouse embryonic fibroblasts cells stably transfected with EWS-FLI1 enhanced the anchorage-independent phenotype of EWS-FLI1 alone. Reduction of RHA protein levels by siRNA in ESFT cell lines decreased their growth rate. Our results provide strong evidence for EWS-FLI1 and RHA interaction and its oncogenic consequences. This finding may lead to development of better therapeutic agents that may target EWS-FLI1 and RHA interaction.

H26) Naturally Occuring Antibody Responses in Lung Cancer: Candidate Targets for Immunotherapy, and Diagnostic/Prognostic Markers Lin-Chi CHEN, Sowmita NARAYAN, Lloyd J. OLD, Nasser K. ALTORKI, Jerome HONNORAT, Ali O. GURE, *Memorial Sloan Kettering Cancer Center, New York, NY; Ludwig Institute for Cancer Research, New York, NY; Weill Medical College of Cornell University, New York, NY; University of Lyon, Lyon, France*

Cancer is known to associate with naturally occuring antibody responses to an array of antigens of which the SEREX database currently lists about 2000 (www.licr.org/SEREX.html). We have identified strong correlations between a group of neuroectodermal antigens and parameters indicative of indolent disease as well as with longer survival in 240 small cell lung cancer (SCLC), as well as in NSCLC patients, when stratified according to clinical stages. Although immune responses against some of these proteins have been associated with paraneoplastic neuronal disease (PND), none of the patients studied had neurological symptoms. While antibody titers to some antigens were very low compared to those associated with PND, Cox regression analysis shows them to predict better outcome, independent of stage, performance status and other confounding factors. The potential value of these proteins as cancer vaccine targets, and biomarkers in lung cancer is discussed.

H27) Cancer-Testis Genes are Coordinately Expressed in Response to Cancer Associated Genomic Hypomethylation and are Markers of Poor Outcome in Non-Small Cell Lung Cancer, Ali O. GURE, Woo Jung LEE, Ramon CHUA, Barbara WILLIAMSON, Mithat GONEN, Cathy A. FERRERA, Lloyd J. OLD, Yao T. CHEN, Nasser K. ALTORKI, *Ludwig Institute for Cancer Research, New York, NY; Memorial Sloan Kettering Cancer Center, New York, NY; Weill Medical College of Cornell University, NewYork, NY*

PURPOSE: Cancer-testis (CT) genes mapping to the X chromosome have common expression patterns and show similar responses to agents that induce hypomethylation of genomic DNA. We asked whether CT gene expression occured coordinately, and whether it correlated with parameters of disease and clinical outcome of non-small cell lung cancer (NSCLC). We also evaluated the association of CT gene expression with known epigenetic abnormalities known to occur in tumors. EXPERIMENTAL DESIGN: Tumor tissue from 523 NSCLC patients undergoing surgery were evaluated for the expression of 9 CT genes (NY-ESO-1, LAGE-1, MAGEA1, MAGE-A3, MAGE-A4, MAGE-A10, CT7/MAGE-C1, SSX2 and SSX4) by semiquantitative PCR. Clinical data available for 447 patients were used to correlate CT expression to parameters of disease and clinical outcome. Genomic DNA from CT geneexpressing and non-expressing cell lines were compared for genomic methylation content as well as for hypermethylation of cancer associated genes. RESULTS: At least one CT gene was expressed by 90% of squamous carcinoma, 62% of bronchioloalveolar cancer and 67% of adenocarcinoma samples. Statistically significant co-expression was observed for 34 of the 36 possible CT combinations. CT gene expression, either cumulatively or individually, showed significant associations with male sex, smoking history, advanced tumor, nodal and pathological stages, pleural invasion and

the absence of ground glass opacity. Cox regression analysis revealed the expression of NY-ESO-1 and MAGE-A3 as markers of poor prognosis, independent of confounding parameters for adenocarcinoma of the lung. Although CT expression was inversely associated with hypermethylation of some genes it was not related to an overall hypomethylation as reported earlier. CONCLUSIONS: CT genes are coordinately expressed in NSCLC and their expression is associated with advanced disease and poor outcome. CT genes are likely markers for selective hypomethylation in NSCLC at repeat elements and within CT genes.

H28) The in Vitro Analytical ˙nterference of Drugs on Tests of Thyroid Function, Dr. Hatice ERBEY˙N Dr. Gülsevim SAYDAM, *T.C. Yüksek ˙htisas Research and Training Hospital, Clinical Biochemistry Laboratory 06100 Ankara-Türkiye*

Many drugs may cause changes in the serum concentrations of the Triiodothyronine and the Thyroxine. It is important to know these changes in clinical thyroid state for the interpretation of thyroid function tests. Commonly prescribed drugs used for coronary artery disease, hiypertension, congestive cardiac failure may result in abnormal thyroid function tests in the absence of clinical features of thyroid dysfunction. In this study, we aimed to determine the in vitro effect of drugs as Furosemid, Metoprolol, Acetyl Salisilic Acid, ˙sosorbit Dinitrat are used frequently in the therapy of the patients with coronary artery disease, hypertension and congestive heart failure on FT_3 and FT_4 tests which are measured by Electrochemiluminescence. We performed our study according to "Analytical ˙nterferance Evaulation Guide"of IFCC as in vitro. In our study no in vitro analytical interference was observed on FT_3 and FT_4 tests with therapeutic doses of Acetyl Salisilic Acid (300 mg/day), Metoprolol (100 mg/day), ˙sosorbit Dinitrat (60 mg/day) and in vitro analytical interference was observed on FT_3 and FT_4 tests with only therapeutic doses of Furosemid (40 mg/day) ($p<0,01$). A nonlinear increase was found in FT_3 and FT_4 values with increased doses of Furosemid (10, 20, 40, 60, 80 mg/L) ˙n vitro. As a result we found that Acetyl Salisilic Acid, Metoprolol, ˙sosorbit Dinitrat had no analytical interference effects on FT_3 and FT_4 tests and Furosemid had analytical interference effect on FT_3 and FT_4 tests and FT_3 and FT_4 values showed a nonlinear increase with increased doses of Furosemid in vitro.

INSTITUTIONAL PRESENTATIONS

I1) Harran University - Sustainable Vision 2023, Ugur Buyukburc, Ibrahim H. Mutlu, Bulent Yesilata, *Harran University, Turkey*

The Harran University is committed to become a model of environmentally sustainable institution in the year 2023, which is the 100th year of the Turkish Republic. Very recently the university has initiated a foundation of the development program for its new Osmanbey Campus. The main objective is to be one of the sustainable university campuses in the world. The Osmanbey Campus is still in construction stage on 27 km^2 land. All the departments and units of the Harran University will be situated in this campus in near future. The first major phase of the Vision 2023-project-series is to incorporate advanced solar energy technologies in the Osmanbey Campus. In this poster presentation, we describe some past and present research activities accomplished at Harran University. The main emphasis is given to photovoltaic systems and their effective use in South East region of Turkey (GAP). We introduce here an ergonomically PV system rack with manually adjustable slope-angle and an economical data-acquisition card for testing and control of PV systems. Some results from our experimental measurements on PV-powered irrigation, PV-powered refrigeration and PV- fuel-cell system are also presented.

I2) Towards a Knowledge-based Society in Turkey *www.bilimmerkezi.org.tr, sanem@bilimmerkezi.org.tr*

As industrial societies have been developing, first of all, share of capital and labor decreased among growth factors, and contribution of technology increased. With the further development, a new factor has emerged: Knowledge and Knowledge Creating… in more technical term: Intellectual Capital. Hence, humanity has moved from the stage of accumulating capital and goods to stage of accumulating knowledge. One of the most important key concepts of this change has been finding sustainable solutions to the problems. Societies, able to achieve this change, are called as sustainable societies, in other words responsible societies or information societies. Today, education and learning process is getting transformed into lifelong adventure interfering and becoming a united whole at home, school, business and wherever possible. The expectation of information society from its individuals is to become knowledge and technology literate and even science literate. As knowledge creation by processing information is getting more important; new environments are required to facilitate learning, to support deep learning by comprehension and to make learning process a pleasure. TÜB˙TAK, TÜBA, The Chamber of Industry of Istanbul, Bogazici University, Istanbul Technical University, Y˝ld˝z Technical University, Marmara University... and a group of academicians, educators, businessmen, managers and artists who know the facts of the country and believe in necessity for strong and respectful role of Turkey in the emerging new civilization came together. They said that they couldn't suffice to know and express the facts and also had to do something. They decided not to expect everything from the government and thus established the Turkey Science Centers Foundation in September 1995. Vision: The vision of the Foundation is to enhance knowledge, skills and employability of Turkish citizens from all age groups; with special emphasis on our youth; by contributing to the growth of interest in the society towards natural and social sciences, innovative and emerging technologies and rising Turkish industries in order to help the strengthening of our national economy and to facilitate a healthy social transformation towards a knowledge-based society. Objectives: 1) To establish Science Centers that will stimulate the desire for learning, the bliss of discovering and the 2) enthusiasm for experimenting. 3) To provide scientific forums for our society to present and discuss new information, discoveries, innovations 4) To complement educational programs for our schools by offering application and practical opportunities. Targets: 1) to run a prototype Science Center in Istanbul in ˚i¸li, 2) to establish a national and contemporary Science Center in Istanbul with more than one million visitors capacity per year, 3) to guide and provide knowledge for science centers to be founded in other cities of Turkey, 4) to organize annual Science Festivals and celebrate throughout the country.

I3) International Association of Educators: A New International Platform Mustafa Koc, Mustafa Yunus Eryaman, Nihat Gurel Kahveci, *University of Illinois at Urbana-Champaign*

International Association of Educators (INASED) was established in 2001 at the University of Missouri-Columbia and is currently registered as a non-profit academic organization in the State of Illinois. INASED aims to develop new pedagogies and alternative languages for the cross-cultural communication and understanding. The association provides the global communications spheres for its members from 12 different countries and 18 different universities in order to contribute to the world peace through dialogue and education. It promotes educational theory and practice worldwide through publications, conferences, cross-cultural activities, international projects, research, online networking and professional development. INASED publishes International Journal of Progressive Education, and Turkish Journal of Educational Policy Analysis and Strategic Research. It uses Community Inquiry Labs (CIL) designed at the University of Illinois at Urbana-Champaign, Department of Library and Information Science to provide its members worldwide communication. The presentation will include overview of activities and discussion of future developments.

I4) International Journal of Progressive Education: Understanding Educational Inquiry Nihat Gurel Kahveci, Mustafa Yunus Eryaman, Mustafa Koc, *University of Illinois at Urbana-Champaign*

International Journal of Progressive Education (IJPE) is a peer-reviewed, interactive educational journal. IJPE takes an interdisciplinary approach to its general aim of promoting an open and continuing dialogue about the current educational issues and future conceptions of educational theory and practice in an international context. In order to achieve that aim, IJPE seeks to publish thoughtful articles that present empirical research, theoretical statements, and philosophical arguments on the issues of educational theory, policy, and practice. IJPE is published three times a year in four different languages; Chinese, Turkish, Spanish and English. IJPE is indexed in several major academic databases including but not limited to EBSCO, DOAJ, WORLDCAT and ULRICH'S periodicals directories. IJPE uses Community Inquiry Lab (CIL), an interactive inquiry page developed by University of Illinois at Urbana-Champaign, to provide a virtual communication environment to its readers and members. In this presentation, we will provide an overview of the editorial policy and decision making process, and demonstrate past and future special issues.

I5) Izmir University of Economics: Analyzed through Importance-Performance Analysis Yurdal TOPSEVER, Alev KATR˙NL˙, Gülem ATABAY, Gonca GÜNAY, Burcu GÜNER˙, Alp Giray KAYA, *Izmir University of Economics, Izmir*

Izmir University of Economics is the first foundation university in Izmir and the Aegean Region as well as the first university in Turkey that is founded by an organization representing the business world, Izmir Chamber of Commerce. Since its foundation in 2001, the university developed at an enormous rate increasing the student number initially from 282 to about 5000 by increasing the number and variety of programs offered at both graduate and undergraduate levels including a PhD program in Business as well as providing students with newly served opportunities such as international exchange programs and the Embryonix Unit through which they are able to establish their own enterprises. Although these developments served as a positive signal regarding the path the university took, a scientific analysis of the customers' viewpoints were required. Hence, a research to explore the image of the university from the viewpoint of the potential customers was conducted to address this need. Data is collected from high school students, their advisors and their parents regarding the importance of a set of selected attributes concerning the image of universities and the performance of Izmir University of Economics on those attributes in addition to three other universities in the region. Collected data is analyzed through importance-performance analysis to create a roadmap that shows areas to concentrate on and to keep up good work besides areas of low importance and possible overkill. The results provide a picture of the current setting for strategy development for Izmir University of Economics in comparison with other universities in the region.

I6) The Center of Knowledge and Innovation: METU-Technopolis Mr. Ugur Yuksel, *General Manager of Middle East Technical University Tecnopolis*

Nowadays the most powerful strategy for the development of countries is to use knowledge and innovation effectively. For the purpose of having a high national prosperity level, countries have to improve themselves by utilizing knowledge, innovation and technology. And it is obvious that the international collaborations have a tremendous role in progressing development and help to improve the level of knowledge and absorption of innovation. For these reasons Metutech; 1) Promotes and encourages 157 companies as regards research and technological development, 2) Builds platforms for synergy between hosting companies and international companies, 3) Hosts foreign companies within its territory, 4) Takes the role of a mediator between national and foreign companies for the purpose of knowledge, innovation and technology exchange (by utilizing the 6th Framework Programs Projects), 5) Forms regional innovation strategies by taking advantages of the international collaborations.

I7) Turkish American Scholars and Scientists, and Research Opportunities at Texas A&M University. Tahir Cagin, *Department of Chemical Eng. Texas A&M University, College Station, TX*

Texas A&M University is one of the largest state universities in USA. With about thirty Turkish-American professors, lecturers and scientific staff in its Faculty present great deal of opportunities in establishing collaborations with Turkish Universities and research organizations in Turkey. In this poster we present the research areas, existing projects and collaborations of each faculty member.

I8) State-of-the-Art Testing Facility at Columbia University for use in Civil and Geoscience Engineering, Ahmet Pamuk, *Columbia University, New York, NY, 10027*

Currently, centrifuge physical modeling is considered to be a cost effective method for modeling and predicting the soil behavior as well as the behavior of various soil-structure systems in civil and geoscience engineering. The main principle in centrifuge modeling is that a 1/N scale model subjected to a gravitational acceleration of Ng (g is acceleration of gravity) experiences the same stress as the prototype. Thus, stress-strain relationships at all similar points in the model and prototype will be equivalent and the behavior of

the model will mimic the behavior of the prototype. Consequently, with the help of scaling laws, measurements in centrifuge tests can be related directly to an equivalent full-scale prototype. Since 2004, the newest centrifuge facility has been in operation in the eastern US at the Department of Civil Engineering and Engineering Mechanics, Columbia University in the City of New York. The centrifuge machine is one of the largest centrifuges among the US universities. Having a 3 m-long radius with a 0.75 metric tone load caring capacity, the centrifuge machine is capable of increasing the gravity up to 200 times. The facilities are available to other research institutions, universities and private companies in an effort to provide invaluable contributions in the earthquake, geo-environmental, geotechnical and geological engineering.

I9) Knowledge and Innovation in Izmir Institute of Technology, *Prof.Dr. Semra ULKU, President*

The generation of new knowledge through research and the transmission of this existing knowledge in education and in production are two essential elements of a productive and innovative society. Knowledge drives innovation, innovation drives productivity, productivity drives economic transformation, and growth. Universities and their research can be important contributors in this regard; however, in the past it has been difficult for Turkish universities to both protect their innovations and use those innovations to fund new research. Izmir Institute of Technology (www.iyte.edu.tr) which is a research-intensive university with emphasis on interdisciplinary studies and graduate-undergraduate degrees in science, engineering and architecture has been a source of new innovations which range from biotechnology to nanotechnology to robotics and has launched an Innovation and Technology Transfer Center.

The main objectives of this Innovation and Technology Transfer Center are:

- to transfer knowledge and inventions for the benefit of the society through licensing of intellectual property of the university faculty,
- to diversify and increase private industrial funding and support of faculty research.

With the services which will be offered in

- evaluating research results for their commercialization potential,
- helping faculty to develop start-up companies,
- assisting in patent applications,…..etc.

Investment in education and research is the single best way for most persistent and difficult challenges and significant changes in science and engineering education are required if we are to meet the needs of our graduates in preparing them for the challenges of the future. Engineering and science students should develop learning, analysis, integration, synthesis capabilities and creativity. Innovation requires interdisciplinary teamwork, therefore graduates should be comfortable with it. Broad definitions of disciplinary boundaries and interdisciplinary research centers seems to be the proper model for the structure of the universities for effective interdisciplinary researchs and structural and administrative barriers between departments-institutions need to be removed.

Izmir Institute of Technology, where education is student-centered, research, and project oriented on all levels and encourages teamwork in an interdisciplinary context, designed to encourage scientific thinking and research with project courses from the first term of the freshman year, until graduation. Students become aware of the knowledge and skills necessary to complete their projects, and students' motivation for their course work is greatly enhanced. The motivation for research is increased by research and design project competitions. Interdisciplinary degrees awarded in materials science and engineering, bioengineering, environmental engineering, and energy engineering. The strength of the interdisciplinary degrees stems from supervision by at least two faculty members of different departments and multiple disciplinary approaches and facilities.

Additionally, Izmir Technology Development Zone (http://iztekgeb.iyte.edu.tr/), Izmir Technopark, with its 672 acres of land and currently incorporating three buildings, with 39 private companies, is located in the campus.

Izmir Institute of Technology with the education model, interdisciplinary research centers, innovation center, technopark is an excellent environment for rising global expectations about economic role of universities.

I10) Dual-Degree Cooperation between the Turkish University System and Binghamton University – State University of New York, *Oktay Sekercisoy, MA, MBA Assistant Director Dual-Diploma Programs Office of International Programs Binghamton University Binghamton, NY 13902-6000*

The purpose of this presentation is to introduce the Dual-Diploma Programs that represents a unique academic cooperation between major Turkish universities and Binghamton University of the SUNY system. Binghamton University and four Turkish universities (Bogazici, ITU, ODTU, and Bilkent) have recently inaugurated a pair of innovative dual-diploma baccalaureate programs. Turkish undergraduate students majoring in Global and International Affairs, Information Systems, and Management complete half of their degree requirements at Turkish universities and half their degree requirements at Binghamton University. The aim of the dual-diploma programs is to provide enrollees with a unique, rigorous, bi-cultural learning experience leading to the receipt of a high-value dual-diploma degree from a pair of well-respected research universities. Admission to the Dual-Diploma Program takes place in Turkey according to the standard

undergraduate university admissions procedures of the Turkish Council of Higher Education (YÖK) and the admission criteria of Binghamton University. Participants spend their freshman and junior years at Turkish Universities and sophomore and senior years at Binghamton University. This program is the first of its kind between Turkey and another country. Currently, there are 278 Turkish students participating in this program. This unique and innovative program provides Turkish students with the opportunity to:

- Earn a high-value undergraduate degree from a leading Turkish university and a major American research university
- Receive the innumerable benefits of an extended bicultural living and learning experience.
- Develop superior English language skills
- Prepare for graduate study at the best universities in Turkey, the United States or other countries

I11) A Proposal for Research Collaboration Between the Center for International Health Services Research and Policy at Washington State University (WSU) and TASSA Scholars, Fevzi Akinci, Ph.D., Joseph S. Coyne, Dr.P.H., *Center for International Health Services Research Washington State University, Spokane, Washington, USA*

This proposal aims to introduce the WSU Center for International Health Services Research and Policy (the Center) and areas of expertise to TASSA scholars, to foster future research collaboration. We propose that such a research collaboration will likely lead to funded international health services research projects and Fulbright Fellowship opportunities between the USA and Turkey. The Center was founded in March 2004 and is housed in a Carnegie Doctoral Research Extensive University at WSU. The mission of the Center is to work with Ministries of Health, Public and Private Universities, and Research Centers to conduct international comparative analyses regarding health system priority areas identified by the Ministries of Health around the globe, with particular emphasis on low or middle-income countries, to improve health system performance and global health. The Center includes scholars from around the world that span the following wide range of international areas of expertise: 1) Financing of healthcare delivery including payment methodologies and development of national health insurance and policies, 2) Developing and restructuring healthcare delivery with a focus on primary and acute care health services including facilities mergers and acquisitions, 3) Health outcomes research and quality improvement including program evaluation (cost benefit and cost effectiveness analysis), 4) Health promotion and disease prevention directed towards cancer, diabetes, and heart disease, 5) Epidemiological study design, implementation, and monitoring including primary data collection and statistical analysis. For more information about research conducted at the Center, you may visit their Website at www.ihs.wsu.edu.

I12) National Science Foundation and Bioengineering Funding Opportunities, Semahat Demir, Ph.D., *Program Director, Biomedical Engineering & Research to Aid Persons with Disabilities (BME/RAPD), Division of Bioengineering and Environmental Systems, National Science Foundation (NSF) , Arlington, VA, USA and Faculty of Biomedical Engineering Joint Biomedical Engineering ProgramUniv. of Memphis & Univ. of Tennessee Health Science Center Memphis, TN, USA*

Dr. Demir will present (1) the vision, mission, strategic goals and core strategies of NSF, (2) NSF's current priority areas, (3) a summary of different NSF Funding Opportunities for engineering and bioengineering, (4) Program of Biomedical Engineering & Research to Aid Persons with Disabilities (BME/RAPD) and (5) NSF Merit Review Criteria.

I13) Mustafa Kemal University (MKU) in Hatay, Turkey, Sermin Ornektekin, Vice President, Mustafa Kemal University, Hatay

The Mustafa Kemal University (MKU) founded in Hatay province in 1992 is based on 2 campuses in Antakya as well as Colleges and Vocational Colleges in several towns in Hatay. The university consists of 9 Faculties, 4 Colleges, 7 Vocational Colleges, 3 Institutes and 6 Research Centers and undertakes the education of approximately 14.000 undergraduate students and 400 postgraduates. The Faculties are Agriculture, Architecture& Engineering, Education, Fine Arts, Fisheries& Aquaculture, Medicine(will be accepted students in 2006), Management &Business Administration, Science & Arts and Veterinary. Four Year Colleges are Physical Education and Sports, Nursing, Tourism and Hotel Management and Civil Aeronautics (it has not accepted students yet). All of the departments in the faculties and the Colleges administer graduate programs. Research Centers and Laboratories are equipped well. The libraries stock of subscription to 132 periodicals provide for undergraduate and graduate course requirements. The library has internet access to online databases .The students have opportunity to pursue their sporting or recreational interests indoors and outdoors. Mustafa Kemal University has a young and dynamic teaching staff having post-graduate degree from the different Universities in Europe and in USA. Our university pays much attention to reach and keep the high standards in higher education and supports the international cooperation. All the aim of universalization strategy of MKU is getting ready all the students to live in multicultural and informative societies and make them ready for forthcoming life after the university education. By the way, our university is the individual full member of European University Association since 2000. In achieving these, The MKU has 25 Bilateral Agreements with different

countries in Europe in Socrates Erasmus frame. The MKU has collaboration agreement with Tottori University in Japan, with Texas Pan American University and Delaware Technical Community College in USA and with Aalen Fachhochschule in Germany.

I14) Biomedical Engineering Institute at Bogazici University, Cengizhan Ozturk M.D. Ph.D. *Boğaziçi University, 34342 Bebek-Istanbul-Turkey*

The field of Biomedical Engineering has emerged as an important profession in developed as well as developing countries and is concerned with the application of engineering technology and science methodology to the analysis of biological, physiological and health care problems. During the past several decades the medical profession has grown to depend increasingly on machines and sophisticated electronic instrumentation supported by elaborate clinical data processing procedures for the delivery of quality health care. As a response to these requirements the Biomedical engineers are responsible for producing high technology medical equipment and biological instrumentation, for devising new and efficient methods for physiological measurements, medical data processing and analysis, for developing prosthetic materials and artificial organs, and for introducing the suitable technological developments to the health care system. The Institute of Biomedical Engineering of Boğaziçi University was established in 1982 as an interdisciplinary graduate school in the field of Biomedical Engineering. The Institute of Biomedical Engineering is unique in Turkey and offers interdisciplinary instructional programs and research, leading to MS and Ph.D. degrees in three major areas, namely in Bioelectronics, in Biocybernetics and Biomechanics, and in Prosthetics and Artificial Organs. All classes are thought in English. From September 1982 to October 1992, the Institute had been receiving UNDP and UNESCO assistances in the framework of a development project, the consulting services, training programs and fellowships. The aim of the project was to support the activities of the Institute and strengthen its capacities in order to respond to the critical health care problems in Turkey, with the long-term objective of becoming a Regional Center for neighboring countries with similar problems. The Biomedical Engineering Institute has 13 full time faculty and over 130 graduate students actively involved research in dedicated labs for medical imaging, biophotonics, robotics, medical instrument calibration & quality assurance, psychophysics, cellular imaging & electrophysiology, biomedical instrumentation, biomedical signal processing and instrumentation. The Biomedical Engineering Institute is now a regional center for advanced biomedical research and is becoming a favorite spot for students and faculty who would like to visit Turkey or to start long term scientific collaboration. A solid bridge is already present between US and Turkey in the field of Biomedical Engineering.

TASSA BOARD MEMBERS WHO WERE AT THE CONFERENCE.

Standing from left to right: ***Murat Tarimcilar, Aziz Ulug, Pembe Hande Ozdinler, Cemal Ekin, Suleyman Gokoglu, Selcuk Ozgediz, Alkan Donmez, Hakan Tasci.*** **Sitting from left to right:** ***Cem Elbi, Mustafa Akkoyunlu, Levent Yanik, Cengizhan Ozturk, Baris Coskunuzer.*** **Not pictured:** ***Erol Tutumluer***

Hope to see you all at the next Annual Conference of TASSA, on March 24-25, 2007, at Yale University!

The Turkish-American Scientists and Scholars Association (TASSA) is an independent, non-profit and non-political organization promoting educational and scientific cooperation between the USA and Turkey. Established in June 2004 in Washington, D.C., it aims to facilitate the advancement of science in Turkey and the USA through scientific exchange and educational programs and increased networking.

VISION

TASSA's vision is to build a sustainable science bridge between the U.S. and Turkey. This bridge would facilitate the flow of people (scientists and scholars), knowledge, and technology and help link science and technology institutions in the two countries.

TASSA will accomplish its vision by:

- Exchanges of scientists
- Facilitating joint research projects and joint publications with scientists based in Turkey
- Facilitating sabbaticals
- Establishing a "Science Corps" for voluntary short-term assignments
- Forming networks of scientists based in the U.S. and Turkey in various disciplines
- Twinning of U.S. and Turkish scientific and academic institutions
- Facilitating the sharing of best practices among science institutions.

The building of a science bridge requires strong "legs" on both sides of the Atlantic. Thus, as a matter of priority, TASSA is strengthening its own internal organization, expanding its membership, and developing directories of people and institutions, in both Turkey and the US.

ACTIVITIES AND PROGRAMS

During its short existence TASSA has held its first annual conference, developed a Web site, started its first program, and completed its organization.

The Visiting Scholars Program

This first program launched by TASSA aims to promote communication and cooperation between TASSA members in the US and their counterparts in Turkey. It helps match TASSA members planning to visit Turkey and are willing to share their research activities and experience with their colleagues in Turkey with Turkish universities or other institutions expressing interest in the research area of the visiting TASSA member. A database of potential host institutions in Turkey has been developed, as well as online application forms for those interested to serve as visiting scholars, or to host them in Turkey. TASSA members wishing to serve as visiting scholars can join the program through the TASSA Web site and Turkish institutions wishing to host such scholars can express their interest through an e-mail addressed to:visitingscholars@tassausa.org.

ORGANIZATION AND MEMBERSHIP

TASSA is governed by a Board of Directors, whose members are elected for two-year terms by the dues-paying members. The Board's Executive Committee serves as the principal administrative and managerial oversight body within TASSA, led by the TASSA President and President-Elect. TASSA's operations are managed by the Executive Director. In addition, several standing and ad hoc committees facilitate the operations of the organization. Three of these have played significant roles in the establishment and "take off" of TASSA: the Elections and Bylaws Committee, the Web Development Committee, and the Annual Conference Committee.

TASSA's members are scientists and scholars in the fields of:

- Social sciences, arts and humanities
- Health & biomedical sciences
- Engineering & applied sciences
- Natural sciences.

For more information please visit: www.tassausa.org - For inquiries send message to: info@tassausa.org

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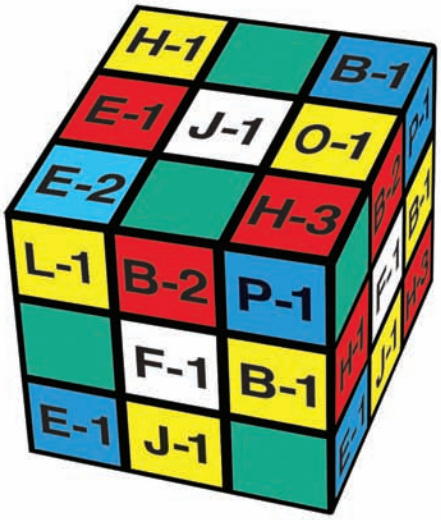

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Attorney **Jeff Goldman** has represented hundreds of foreign scientists and engineers for U.S. Immigration and Permanent Residency matters. He is a frequent speaker at MIT, Harvard, Brown, and other universities, and concentrates in representing Chinese Nationals for Extraordinary Ability, National Interest Waiver, Outstanding Researcher, and PERM Labor Certification Matters.

Read Jeff's articles on immigration at *Science* magazine's online site.

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