ISSUE 02 2021

TOBB

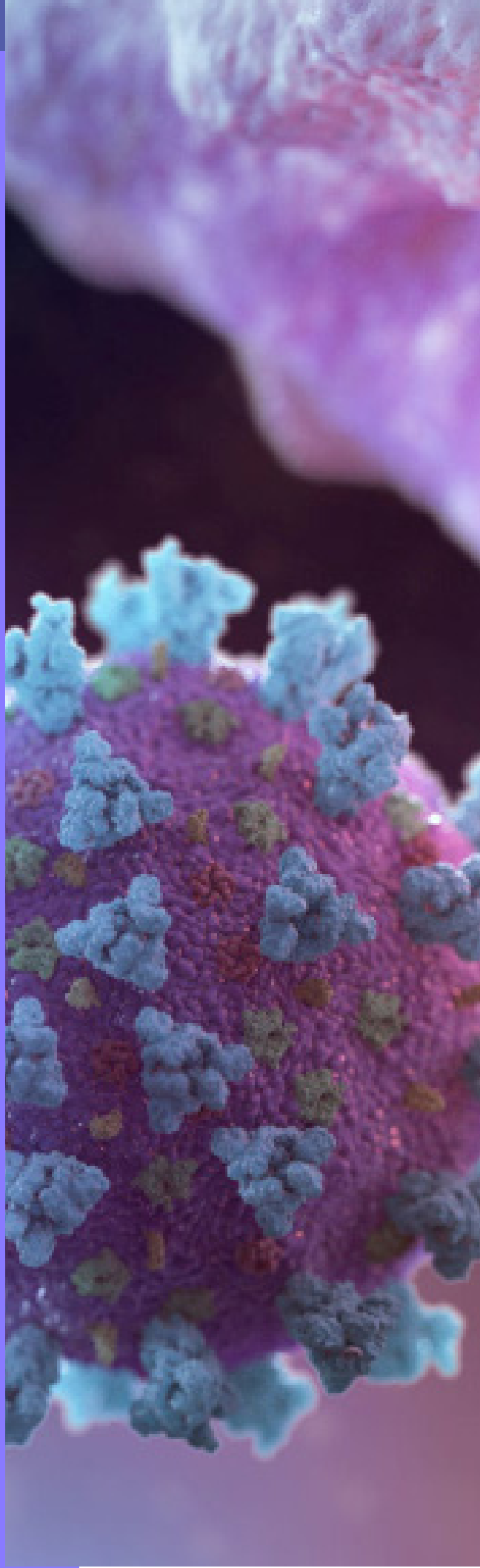
ETU BIYO MEDI KAL

COVID'19

SECTOR COMMENT FROM TURKEY DRUG AND MEDICAL DEVICES INSTUTION

PRODUCTION AND ENTREPRENEURSHIP IN TURKEY

HEALTH WITH CHANGING TECHNOLOGY




TOBB ETÜ
Ekonomi ve Teknoloji Üniversitesi
2003
Yapay Zeka Mühendisliği
Türkiye'de İLK DEFA
TOBB ETÜ'de!
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TOBB Ekonomi ve Teknoloji Üniversitesi
Sağlık ve Biyomedikal Bilimler Topluluğu

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PREFACE

I joined the Health and Biomedical Sciences Society in the first month after I entered the university, and I have been in the journal team from the very beginning. I have been part of this community for three years and I think it gives a student the chance to take responsibility, to collaborate in a team, and to graduate by setting a target from the university, which is the step before real life. Student communities are very important for university students as it enables networking and improving themselves on their profession. We say "ETU SBBT is not just a community but a family" and I am very happy to be a member of this family and to work with this family.

Dear Reader,

ETU BIOMEDICAL journal, which is as ambitious as the previous issue, aims to shed light on our research and studies as Biomedical Engineer candidates and to bring you up-to-date scientific studies. During the process of diagnosis and treatment of COVID'19, which is a global issue now, it has become clear that it is fundamental for all healthcare workers to collaborate and generate solutions.

The issue starts with an introduction to our community, followed by Ali Eren YÜKSEL's article on COVID'19. We included interviews, that we thought would be beneficial, with three graduates who work in different fields. We aimed for promoting the most successful names in the field of Biomedical Engineering in Turkey, thanks to the interviews with Recep USLU, the Vice President of Medical Devices and Cosmetics in the Turkish Medicines and Medical Devices Agency, Prof. Dr. Melih BULUT, a pediatric surgeon who is actively using social media for bridging science with the young people, and Mete ÖZGÜRBÜZ, who is the owner of BMT Calsis company, which is very successful interms of R&D. Following, we wanted you to witness what could be achieved in academia with the research of our faculty member, Prof. Dr. Fatih BÜYÜKSERİN, on Alzheimer's.

The second issue of our journal, which we worked hard as much as the first issue is with you. We believe that it will be found useful and it will be appreciated by our readers. We hope you enjoy reading.

Nur Su VENEDİK
ETU BIOMEDICAL Chief Editor

Danışmanlık

Mentörlük

Başarı

Ticarileştirme

Tecrübe paylaşımı

Ağ geliştirme

Etkileşim

genç SEİS

gelecek için üretiyoruz

YENİLİK ÜRETMEK İÇİN GENÇLERLE GÜÇ BİRLİĞİ

Bilgi birikimi yüksek, donanımlı, teknolojinin gelecek vizyonuna hakim, araştırmacı, üretmeye hevesli, mucit gençlerin sağlık endüstrisi alanındaki buluşlarını ticarileştirmeleri sürecinde yol göstermek ve yeni ürünlerin ülke ekonomisine kazandırılmasını kolaylaştırmak için Genç SEİS.

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A Message from the President of ETU SBBT

Human wellbeing is the most important goal that affects everybody at the end of the day. Individuals are working and performing under the psychological pressure of the threat to our wellbeing in these days we live. The workers who struggle or sometimes collide in the front line against this pandemic, which has taken the planet under its control, are again healthcare workers. Biomedical engineers play a significant role in the center of this storm, including the masks used to shield us from this storm and also antiseptics, during the production, development, supply and subsequent stages of all medical devices such as mechanical breathing devices called ventilators to more sophisticated oxygenators such as ECMO. There are confusions about what Biomedical Engineering is and what it means in our country in the parties of the private sector and state. We are at a period when we want the solutions to needs and problems to be recognized and addressed and we think the society is now becoming more conscious of how important this branch of engineering is for human wellbeing. Traditional methods have been substituted by increasingly innovative methods of new technologies, and the role of medical devices has once again been influential in preserving human health, treating illnesses, and enhancing health systems. The high significance of these medical devices to human life also demonstrates their confidence in themselves. The qualification of engineers, project drawers, technicians engaged in the manufacture of such devices, and then the institutions linked to the supply to the market, can ensure this trust. At this stage, the Biomedical Engineering Department within our TOBB University of Economics and Technology, to educate qualified and successful Biomedical Engineers. Afterward, by our department's first and successful students, the Health and Biomedical Sciences Community (ETÜ SBBT) was established in 2013 to introduce biomedical sciences, following developments in medicine and other fields of health and exchanging these developments with people in the community within the TOBB ETU Health, Sports and Promotion Directorates. ETÜ SBBT has continued to grow its vision through the organization of many activities since its formation.

During my Presidency, by advancing this vision I have gathered Biomedical Engineering students who are struggling problems under one roof, to increase our awareness and make our voices heard louder, to organize bigger events with more detailed and we are not only contented with national recognition, and we have prepared and completed activities and projects together with our board of directors and community members to create international recognition firstly on behalf of ETÜ SBBT, then other Biomedical Engineering communities. As ETÜ SBBT, we want not only to be satisfied with what we have accomplished but to always go much further, to raise our country above the level of contemporary civilizations, which is one of Mustafa Kemal ATATÜRK's greatest goals, but also to take the world health system one step further.

As ETÜ SBBT's 6th term Chairman, I present the 2nd issue of our journal ETU BIOMEDICAL, which is one of the most wonderful and important works we have achieved, to take our community and industry one step further and wish you a pleasant time for reading.
We wish for our country and our world to have a more lovely and healthier future...

Kemal Onur CUNEDİOĞLU
Health and Biomedical Sciences Society
Chairman of the Board

PANDEMIC PROCESS MANAGEMENT

Minimize The Risk: Rules to Get You Through the Pandemic

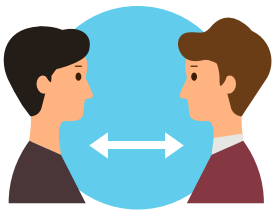
Canada's Chief Public Health Officer Dr. Theresa Tam

Wear a mask

Know the status of Covid'19 cases in your region

Avoid moving around

Spend more time outdoors

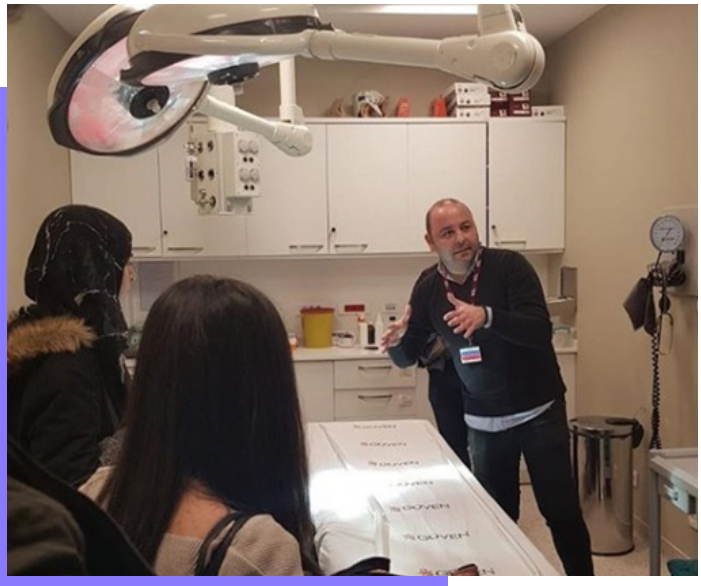


Limit exposure to strangers

Maintain open dialogue about physical distancing

EVENTS AND ACTIVITIES

TECHNICAL VISITS



FACTORY

Abdi Ibrahim
Ertunç Özcan
Point Medical
TMS
Üzümcü

HOSPITAL

Dünya Göz Hospital
Özel Koru Hospital
Ankara Güven Hospital
TOBB ETÜ Hospital
Gülhane Training and Research Hospital
Memorial Hospital
Güven Health Campus

SOCIAL ACTIVITIES

Breakfasts (SoFıstıq Lounge...)

Welcome Dinners (Bolu Mangal Keyfi...)

Nature Visits (Abant...)

Evening Entertaintments (Sess...)

Dinners (Mangalköy, Annem Kebap)

CONFERENCES

Our trainings

Sleep and Neuroscience Summer School
10-11.06.19

SADER Academy education on 'basic concepts of sales in health sector'
12.11.19

Live Coverage

Covid-19 Outbreak
Prof. Dr. Melih Bulut
11.04.20

Healthy-balanced diet, physical activity and regular sleep
Emre Kurubaş
18.04.20

Philosophical Perspectives to Death
03.12.2013

Biomed
04.02.2014

Our Mind and Its Control
19.02.2014

Custom Made Implant and Prosthesis Production
07.05.2014

Functions and Responsibilities of Biomedical Engineers in Hospitals
2015

Functions and Responsibilities of Biomedical Engineers in Hospitals
2015

Hypnosis
11.02.2016

What Technology Brings to Classic Surgery/ Aesthetic Interventions
24.11.2016

Personal Innovation – Happiness, Health and Success
22.01.2018

Robotic Surgery
12.03.2019

What Is This Biomedical Engineering?
09.01.20

FUTURE MEDICINE

FUTURE MEDICINE is a student-based boutique event organized every year by TOBB ETU Health and Biomedical Sciences Society within TOBB University of Economics and Technology. FUTURE MEDICINE, which started as a national one-day event with 5 speakers in 2014, has now become a big international organization with 3-day 25 speakers. The goal of FUTURE MEDICINE is to benefit from the experience of health care managers and individuals who have contributed to this field; at the same time, to be aware of future changes and innovations in the field of health.

FUTURE MEDICINE '2014
Future Medicine '14 Speaker List

Fuat YALÇIN / GE Healthcare PPP Project Manager
Mustafa Uçak / Okuman Medical Systems General Manager
Prof. Dr. Vasıf HASIRCI / Middle East Technical University lecturer
Dr. Lütfi TUNÇ / Gazi University Faculty of Medicine Department of Urology lecturer
Mehmet Ali ÇİFTÇİ / BAMA TEKNOLOJİ – Mechanical Engineer

FUTURE MEDICINE '2015
Future Medicine '15 Speaker List

Prof. Dr. Osman EROĞUL / TOBB ETU Head of Biomedical Engineering Department
Kuntay AKTAŞ / Btech Innovation General Manager
Jeremy GOOSSENS / Materialise Customer Director
Ali Sait SEPTİOĞLU / Turkish Medicines and Medical Devices Agency Deputy Director of Medical Devices and Cosmetic Products
Dr. Altuğ ERGİN / Medtronic Coronary & RDN Turkey and Central Asia officer
Assoc. Prof. Dr. Selçuk TUNALI / TOBB ETU School of Medicine lecturer
Esen TÜMER / Philips Healthcare Turkey General Manager
Assoc. Prof. Dr. Dilek ÇÖKELİLER / Başkent University lecturer
Tolga İPEK / ASELSAN UGES Sector Directorate, Director of Engineering
Assoc. Prof. Dr. Bahattin KOÇ / Sabancı University Faculty of Engineering and Nature Sciences lecturer
Şevket ON / Siemens Healthcare Turkey General Manager
Assoc. Prof. Dr. Sinan CANAN / Ankara Yıldırım Beyazıt University School of Medicine lecturer
Şahin EKŞİOĞLU / Popular Science Turkey Journal Chief Editor
Kozan DEMİRCAN / Popular Science Turkey Journal Science and Technology Editor
Prof. Dr. Mehmet MUTLU / TOBB ETU Biomedical Engineering lecturer
Assoc. Prof. Dr. Fatih BÜYÜKSERİN / TOBB ETU Biomedical Engineering lecturer
Asst. Prof. Dr. Cevat ERİŞKEN / TOBB ETU Biomedical Engineering lecturer
Prof. Dr. Mehmet ÖZSÖZ / Gediz University Head of Biomedical Engineering Department
Dr. Tuna YAVUZ / Abdi İbrahim Otsuka General Manager
Prof. Dr. Erbil OĞUZ / GATA METÜM Director
Dilşad NEVRUZ / Osimplant Foreign Trade and Marketing officer
Ertan HALAÇ / Koru Ankara Hospital Biomedical officer
Op. Dr. Feridun KUNAK / Channel 7 Dr. Feridun Kunak Show Ankara Hospital Biomedical officer

FUTURE MEDICINE '2016

This organization has been canceled for security reasons under the emergency-state.

FUTURE MEDICINE 2017
Future Medicine '17 Speaker List

Seda YEKELER / SEYEV Head of Board
Tuncay PAŞAOĞLU / representing Ministry of Health
Prof. Dr. Cüneyt GÖKSOY / Health Sciences University Gülhane Medical School, Biophysics Department
Dr. Cenk TEZCAN / B-Wise Founding Partner and Ankara Head of Board member of Futurists Association
Prof. Dr. Emin ÖZMERT / Europe Eye Grad School Turkey Director and Ankara University School of Medicine Head of Eye Diseases Department
Dr. Tarık ÖĞÜT / Asst. Prof. Dr. Erdem ÖĞÜT - Levent KANDEMİR / FİGES A.Ş. Head of Board-Senior Project Leader, Control Design and Automation Team Leader
Ersun NASIRLIOĞLU / GEOTEK Founder & Ostim Medikal Clustering Board Member
Elvan ODABAŞI / FORMEO Deputy General Manager and FITIZDIET Executive Dietician
Dr. Erol TEBEROĞLU / BTECH INNOVATION and EKMOB Investor & ERIH VENTURES Executive Partner
Baran KALAYCI / 2013 Athletic Physics Champion & 2013 Athletic Physics World 5th

Merthan ÖZTÜRK / INOFAB and SPIROHOME Founder
Prof. Dr. İbrahim A. SARAÇOĞLU / Chief Consultant of the President and SARAÇOĞLU Tur. and Çev. Tek. San. Tic. Inc. Founder
Canan OKUTANOĞLU / LIMATEK SYSTEM General Manager
Yavuz S. SILAY M.D., M.B.A / ICG (İstanbul Consulting Group) Inc. Head of Board & SoPE (Society of Physician Entrepreneur) Turkey Director
Uğur BAYRAKTAR / BOZLU Holding PPP Operation Manager
Dilara Balkan TEZER / PFIZER Turkey Medical Director and Innovative Products Medical Leader
Seyyal HACIBEKİROĞLU / SEY Consulting Founder
Çağrı ÜNAL / ANKARUNNING Founder & PASİNOKS End. Ltd. Şti. General Manager
Fuat YALÇIN / PHILIPS Business Development Director
Dr. Nazife Selcan TÜRKER / TÜBİTAK ARDEB Chief Expert

FUTURE MEDICINE 2018
Future Medicine '18 Speaker List

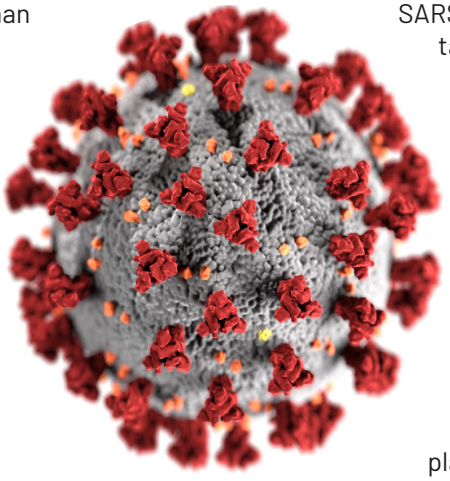
Bülent ERGAN / CEO Group Chairman
Dr. İbrahim BEKAR / ASELSAN Vice President and UGES Sector Head
Mete ŞAYLAN / BAYER Market Access Director
Professor Dr. Cüneyt GÖKSOY / Department of Biophysics, University of Health Sciences
Head & Neuroscientist
Assoc. Dr. Ayhan OLCAY / Innoway RG Chairman of the Board
Onur KOÇAK / Samtotech Engineering Inc. General Manager
İpek YILDIRIM / 2017 WBFF Diva Fitness Pro World Champion
Barış Okan BELOVACIKLI / Founder of Bob GYM & Fitness Coach
Atilla ERGÜVEN / ABBOTT CHAFER Turkey General Manager
Professor Dr. Alper ÇELİK / Head of Turkey Metabolic Surgery Foundation
Gülçin TÜRKMEN SARIYILDIZ / Medicana International Hospital General Manager
Professor Dr.Osman EROĞUL / TOBB ETU Head of Biomedical Engineering
Department
Professor Dr.Tayfun AYBEK / President of TOBB ETU Medical Faculty Cardiovascular Surgery Department
Fatma Gülşah DİZAR / Create the Craft Chairman
Professor Dr. Mehmet MUTLU / TOBB ETU Biomedical Engineering Assistant Professor
Mustafa DAŞÇI / President of All Medical Device Manufacturers Association & Editor-in-Chief
Surgeon Gökçen ERDOĞAN / 2012 Businesswoman of the Year Awarded Gynecologist & Sexual Therapist

FUTURE MEDICINE 2019
Future Medicine '19 Konuşmacı Listesi

Recep Uslu (TİTCK Kurum Başkan Yardımcısı)
Mehmet Akif Erdem (SGK-GSS Tıbbi Cihaz Daire Başkanı)
Dr. Asım Hocaoğlu (Tıbbi Cihaz Onaylanmış Kuruluş ve Klinik Araştırmaları Daire Başkanı)
Aydın Kaplan (TİTCK Tıbbi Cihaz Kayıt Daire Başkanı)
Mustafa Karamızrak (Meril Life Science Medikal Türkiye Genel Müdürü)
Arafat Mansur (LivaNova Türkiye Genel Müdürü)
Emre Kurubaş (Personal Coach)
Ferda Bayşu (Johnson&Johnson Medikal Türkiye Pazar Erişim Müdürü)
Hasan Eser (Carl Zeiss Satış Pazarlama Müdürü)
Gökhan Ergut(Carl Zeiss İnsan Kaynakları Yöneticisi)
Prof. Dr. Hilal Göktaş (Ankara Üniversitesi Biyomedikal Mühendisliği Bölüm Başkanı)
Tansu Halıcı (SADER Yönetim Kurulu Başkanı)
Çetin Asilsoy (CCN Holding Biyomedikal Müdürü)
Prof. Dr. Polat Dursun(Jinekolojik Onkoloji Uzmanı)
Mete Özgürbüz (TTGV-Teknoloji Yatırım Aş. Yönetim Kurulu Başkan Yardımcısı)
Mehmet Ali Özer (SADER Yönetim Kurulu Üyesi)
Dr. Ahmet Salduz (Yeryüzü Doktorları Yönetim Kurulu Üyesi)
Dr. Hüseyin Arslan (Hastalıklarda Tamamlayıcı Tıp Uygulamaları Uzmanı)

THERE IS A MURDERER AMONG US: SARSCoV-2

There is a murderer who has been among us since the beginning of 2020, hiding, covered up, and violent. This killer's main asset is its existence in nature. And our murderer is killing for survival. The name of this coronavirus-family killer is called SARSCoV-2, and the pandemic it induces is named COVID-19. The new type of coronavirus first identified on December 12, 2019, in Wuhan, China, spread in a very short period to all of China, and eventually to the globe. Lastly, COVID-19, seen in 215 countries, has caused more than 15 million cases and sadly more than 600,000 deaths. While several species have been identified as the origin of this virus, it has not yet been determined how the virus spreads from which organism. Scientists, on the other hand, think that carrier animals such as anteater play a significant role in the transmission of the virus. And how is the killer leaking in? The general method of transmission is through the airways, and the virus which infiltrates through droplet infection and body fluids can infect our cells either by insertion or endocytosis after binding to the surface receptor of the cells located in the lower respiratory system. Nevertheless, with the benefit of being an enveloped virus, it can easily achieve this. For situations in which there are no suitable circumstances for the infection, the virus nearly falls asleep and will hence secretly live until desirable circumstances are met. Researchers note that the current coronavirus will linger in the air, and the tiny particles in the air will also induce infection. The spread of SARSCoV-2 by air can also help understand how it got so rapidly and broadly into the masses. Then again, its ability to keep its longevity on many surfaces for 1 week makes it harder for us to get rid of it. Basically, it a murderer striving for survival. Once our killer fails to be concealed, it presents itself as a flu virus in the early phases of the illness, with cough, but in more serious cases, with pneumonia and significant acute respiratory infection. So how can you diagnose this virus, whose symptoms may vary from basic flu to pneumonia? For diagnosis, two main techniques are used: The first is to detect the virus itself by using the PCR method, and the second is to detect the response of the immune system to the virus. The first one is the most commonly employed approach since it produces more reliable and faster results. SARS-CoV-2 is an RNA virus. Viral RNA is taken from samples within the space just behind the throat and isolated. Last, by reverse PCR technique, the viral RNA replicated as DNA. If the test tube contains virus DNA the result is positive. Is there some way to stop this killer who is shutting us to our houses? Indeed there is more than one type of treatment. Immune-plasma therapy is the most effective form of treatment. In studies carried out in China and the USA, in addition to antiviral agents, plasmas of antibody-rich blood from COVID-19 infected patients were isolated and 200 mL recovery plasma dose generated from donors was given to patients who are in critical illness stage. At the end of the studies, it was demonstrated precisely that plasma therapy in severe COVID-19 cases would prevent death by neutralizing viremia. Viral neutralization is the mode of action of healing plasma, also named passive antibody therapy, and is the most effective treatment choice for COVID-19. Antibodies detect and attach to proteins on the surface of virus particles. Therefore, the virus can not adhere to the host cells, so it prevents contamination. For this reason, the researchers identified 500 potential antibodies. The New York pharmaceutical company Regeneron is planning to start mass production for the strongest antibodies it has detected. However, it is stated that it will require a long time to determine which treatments are effective and can decrease the severity or span of COVID-19.



Another strategy is to slow down the development of virus copies by utilizing antiviral medications, thus transforming the process in favor of the immune system to deter and prevent infection. There is no particular medication currently available for COVID-19, though. It's very challenging to combine current drugs. This is why study groups in China and America who continue their research are investigating medicines for Ebola, HIV, and malaria viruses. The most promising of all is the antibiotic treatment for malaria medication. The third approach used in COVID-19 treatment is to monitor the immune system. The body, sensing the virus, starts developing antibodies automatically and transfers it to the lungs. Excessive antibody production, however, triggers the hyperactive reaction, that is to say, the immune system gets out of control. Harm from this condition leads to a syndrome of severe respiratory distress and multiple organ failure. The Swiss pharmaceutical company Roche started investigating the impact of a rheumatoid arthritis medication on this process for the fix. The medicationworks by inactivating cytokine interleukin- 6 which acts as an immune system booster. Vaccine trials also have critical significance for the treatment of epidemic. SARS-CoV-2, an RNA virus, is one of the longest genomic viruses. It dramatically raises the probability that the virus would mutate. So our killer is a master in camouflage. However, there are already over 120 vaccine candidates. It is a massive asset to get so many vaccine applicants in a limited span of 5 months. Experts however state that it will take at least 18 months to develop the adequate vaccine. The vaccine to be manufactured will have a protective functionality for each individual, so the safety phases that must be passed before it can be used on human beings, and the process of integration of the vaccine into serial production leads to extending the development process. A worldwide vaccine competition is still ongoing. The United States, China, and the UK are already in phase 1 (starting trials on healthy volunteers). Four vaccine candidates, two in the U.S., one in China and one in the UK, received approval for early testing in humans. For the other vaccine candidates, the studies are going on at a fast pace. Generally, regarding the SARS-CoV-2 vaccines that target the thorn protein which is utilized by the virus to enter human cells, it is aimed to trigger the immune system to produce antibodies that recognize and block these proteins. Turkey where the vaccine studies completed the first stage of virus isolation with 216 researchers and 14 vaccine development projects is also in the race. Could our murderer be a hired killer?

Nobel prize winner French virologist Prof. Dr. Luc Montagnier claims that the SARS- CoV-2 virus is produced in the laboratory. Researchers at the Pasteur Institute, however, state that this assertion is incorrect and that the SARS-CoV-2 genomic sequence is similar to other adenoviruses and coronaviruses, and that the emergence of this virus is a quite normal process.

While SARSCoV-2 is a killer, it has taught humanity the significance of hygiene, the wonder of mother nature, and how important basic sciences like biology are, and so on. Dr. Mike Ryan, director of emergencies at the WHO, advised that COVID-19 may be permanent, just like HIV. So it may have many things to tell mankind.

Kaynaklar
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Bilim ve Teknik, "Salgında Tanı, Tedavi, Aşı, Stres, İstifçi Tüketim", Mayıs, 2020 Sayı 630
WHO, "Novel Coronavirüs-2019", Erişim Tarihi: 13/05/2020

HOW ARE THE GRADUATES DOING?

We know that you started your journey at Medtronic by doing an internship and offered a job after graduation. Can you tell us a little bit about this process?

My Erasmus + internship application was accepted for my first internship, but later, for personal reasons, unfortunately, I had to cancel it and I was loafing around because I didn't prepare my internship preferences list that I normally should have done. Then I found out via my teachers that Medtronic company asked to meet me for an internship interview and was glad to accept. This internship, which was helpful in terms of professional growth and network, lasted for 5 months until the start of the academic period thanks to the offer from the company and my acceptance. After this internship where I left with really positive intentions, the company said they hoped to see me again for my next internship in a different department. After that, I performed my 2nd and 3rd cooperative education periods as a Clinical Support and Sales Intern in the department of CRHF (Cardiac Rhythm and Heart Failure). I also received a job offer for after graduation at the end of my last internship. I graduated in August 2016 and started a full-time job as a Clinical Service and Sales Officer in October in the CRHF department. After 3 very successful years, I transferred to the role of Application Engineer in the RTG (Restorative Therapy Group) department in January this year.

What is the importance of having a biomedical engineer in a surgical operation?

Firstly, it must be remembered that all surgical operations, as you might expect, are teamwork, from the easiest to the most complicated one. Besides, these teams consist of the Operator Doctor, nurse, and technical team to support the procedure. The technical team is composed of individuals such as radiology technicians, electrophysiology specialists, and perfusionists based on the case type. As a specialist in cardiac electrophysiology, in our cases, I provided doctors professional assistance due to our products which I am responsible for in the CRHF department. While the cases are often similar by their name and procedure, every patient needs a specific operation. In these processes, completing the process in the optimum timespan without any complications has great importance to reduce the risks of infection and complications. At this stage, we provide technical assistance to the operators on the use of devices and supplementary equipment, their implantation, and the requisite measurements. It is also the utmost responsibility of the technical teams in the cases, such that the operator will complete the procedure in the optimal time, as I stated above, to carry out the measurement and other procedures of the devices we specialize in the various circumstances that may occur in each patient and to assist in the technical issues that the operator may ask or may emerge in the case. In difficult circumstances, the operator attempts to select the best possible scenario with your opinion. To sum up, a clinical support specialist must be present along with the operator, in the operation room and offer solutions for routine operations and any possible procedural issues. Of course, the operators are informed regarding the process and products, but sometimes evaluating and analyzing it from an engineering point of view translates to the effective outcome of the processes, which are sometimes quite complicated.

As a biomedical engineer, we understand you often conduct your job in hospitals, could you talk about the roles of the biomedical engineers working in hospitals?

All medical devices, systems, and gases used in the

hospital usually indicated responsibility in the job description of the biomedical engineers employed in the hospital. It can be described as the preparation of usage summaries, maintenance and malfunctions of the devices and systems, routine supervision of the gas and gas lines, evaluation of the technical features and requirements of the new products to be purchased, and the identification and tracking of the devices after the procurement phase.

Regarding the production of cardiac pacemakers, what is the position of Turkey, and what are the roles of biomedical engineers in the production?

First, about cardiac pacemakers, unfortunately, neither a production nor R&D activities are currently available in Turkey. Production of implantable cardiac pacemakers started in the late 1950s, and the latest technology products, 25 mm in size, are currently produced. Biomedical engineers have great importance in software and material structure if we split these products into 3 as the electronic, software, and material structure. For software, the primary aim of pacemakers is to express the biomimicry behavior that we describe as imitating the body's usual order, as seen in many other medical implants, and this is accomplished by its software. It is of significant interest that biomedical engineers at this stage, to build tools to improve biomimicry focused on the body's interdisciplinary approaches. Regarding materials, biocompatibility, inflammation, and allergy are the main issues with implantable devices and these are also valid for pacemakers. In this respect, they integrate the fields of the body, medicine and materials science, and conduct critical studies in the selection and creation of suitable materials.

How do you evaluate the mission and vision of your company, since Medtronic is a company with international employees?

Medtronic was founded in America by Earl Bakken and its mission is as follows: "To contribute to human welfare by application of biomedical engineering in the research, design, manufacture, and sale of instruments or appliances that alleviate pain, restore health, and extend life." This mission continues

to guide the company unchanged. My humble opinion is that this mission is a great guide for all biomedical engineers and not just for the company. As it was published in 1960 and includes the word "biomedical," it also holds a significant role in the history of this area of engineering that we are proud to embrace.

You are one of the first graduates of the Department of Biomedical Engineering at TOBB ETU, did you feel the privileges and benefits of our school and department?

Of course, my career has been greatly influenced by the Cooperative Education Program and Undergraduate Curriculum which only our school has in our country.

Thanks to the Cooperative Education Program, I began the business life early and made my plans for the future, and it provided a huge contribution to choosing a career in the academic-private sector and then joining the industry. My undergraduate program, including internship, put me one step ahead in the work environment so I didn't have any feeling of shortage of knowledge regarding the fields I have worked throughout my whole career. I want to thank our department, the Society for Health and Biomedical Sciences, and the ETU Biomedical Team for this good interview.

Sinan OFLAZ

HOW ARE THE GRADUATES DOING?

Could you introduce the company you are working in, the ZEISS? What are you working on, what are you producing and selling?

Carl Zeiss, an entrepreneur, and also a scientist, founded ZEISS in Jena, Germany inn1846. This journey, which originally started in a small workshop, has guidedtechnology since day one and has become a global enterprise.

ZEISS is active in many industries as a company. Thus the portfolio of the company is compiled in four main sections. All these are;

- **Medical Technology:** Products for ophthalmology, nerve surgery, ENT surgery, dentistry and oncology, and their solutions.
- **Research and Quality:** Coordinate measuring devices, metrology software, and microscope systems developed for the inspection of science, measurement, and material.
- **Semiconductor Production Technology:** Microelectronics and microchip production (almost all of the world's microchips are manufactured utilizing ZEISS optical technology.)
- **Optical Products for Users:** Video and camera lenses, planetarium and observation systems, binoculars, long-distance binoculars, and flight simulators.

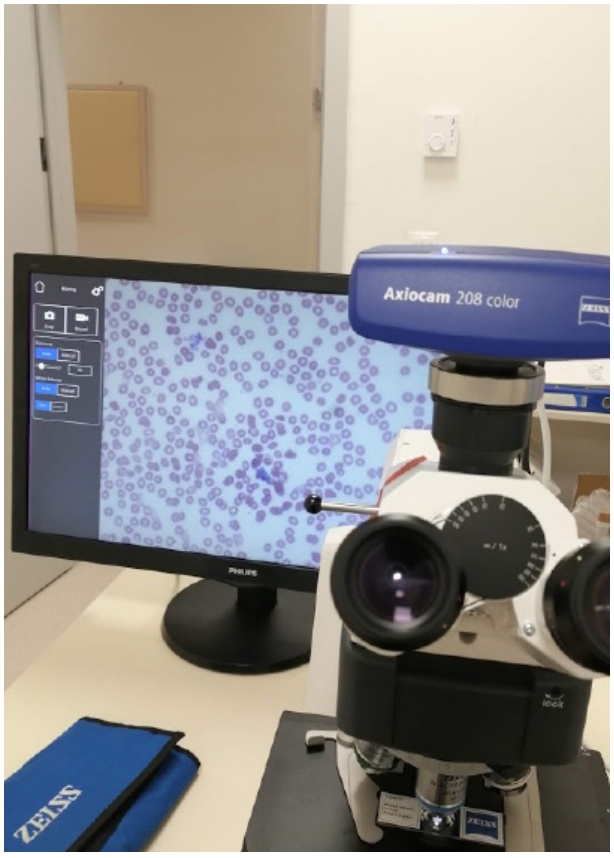
We know you completed your internship at the ZEISS and started to work there after graduation. Could you please advise us about the process?

I began to work at ZEISS before I graduated. So, my experience at the ZEISS company began in September 2018 with my mandatory internship. With the end of my internship, we asked our managers about whether we can continue as part-time. The main issue here is that I needed 3-3.5 days a week to be at work. Since at the time I didn't have many courses and the company was near to our university, it wasn't an obstacle and I resumed to work. In December 2019 I graduated from university and am still working at ZEISS.

Can you explain what your responsibilities in the company are? What are the differences between what you did when you perform the internship versus what you do now?

I could indeed say that since I first started at ZEISS I've had the chance to work in every area within the company. I have worked in most of the divisions Marketing, Sales & Application, Technical Service, and Quality. This enabled me to find out what I could do better, in which areas I might be more successful.

In a real sense, the difference between an internship and professional life varies from company to company. I think that's a lot less difference in ZEISS than other companies. In other words, the internship provides you that responsibility. This prepares you for professional business life and enables you to begin with a more experienced method of working.



As one of the TOBB ETU graduates in Biomedical Engineering, what could you say about the positive effects the university brings to you while you are working?

I think the education offered in TOBB ETU Biomedical Engineering guarantees that you are always one step ahead in your professional life even though you can work in several different fields. However, I think the main issue that needs to be addressed here is not education, and since we are new to this sector as a country, the students who have graduated from this department can not find a job that is best suited for the quality of education they have received.

I do not think it is possible to work in an industry where production and R&D are not carried out or carried out at a minimum level, so it is necessary to develop yourself in various industries, apart from biomedical engineering.

The students can steer for many fields during and after their undergraduate studies. How did you choose to get into this field?

As I stated in the previous question, inadequate conditions are leading us all to various industries and even to different occupations. I am lucky in that way, of course. However, I still believe that as the number of producers in our country increases our profession will gain value. I observe and keep hoping the Covid-19 pandemic we are experiencing today will have a positive impact on our industry.

Alperen ŞAHBAZOĞLU

SECTOR COMMENT FROM TURKEY DRUG AND MEDICAL DEVICES INSTUTION

Recep Uslu

Medical Devices and Cosmetic Products Vice Presidency

How did you decide to enter the biomedical industry as an individual with a background in electrical and electronics engineering who started working in this sector from the baseline? Have you seen the benefits of graduating from Electrical and Electronics Engineering in the industry?

Of course. As an electrical and electronic engineer, my career in this profession started as follows; when I was thinking about where to do my summer internship in the university years, my place of internship determined as Yüksek Ihtisas Hospital's tabon unit and after seeing the work performed by the colleagues in this unit and the added value they created, I realized I could work in this field. After my internship, when I took the medical electronics course offered as senior by our professor Osman Eroğul-who is currently the head of your department-I figured that by working in this sector I could create added value and so the decision I made in my internship become official. But also, when we studied engineering, departments of biomedical engineering were just starting to open up so those who graduated from other fields of engineering were filling the gap for biomedical engineering. Although I was a graduate of electrical and electronic engineering, I started to work at the place where I completed my internship and started my career in this field. The advantage of being an electrical and electronics engineering graduate has been that I was capable of entering the technical service dimension of the job. Throughout the technical service, we generated more detailed solutions along with advanced technical personnel, we made various changes to some equipment in the production configuration and there were situations where we accomplished more effective usage of devices, causing less failure. As an example, the G brand device used in our hospital's endoscopy unit was quite frequently failing. It was commonly linked to cable malfunction, together with experienced technicians, we identified why this cable malfunction was triggered. Other thin cables in the hose were stuck and therefore damaged due to the thick cables running through the cooling unit mounted just below the tube. We avoided the cable s from splitting and, by transferring this cooling machine to the back of the device and utilizing a cable that could cool the tube, we minimized the number of cables within the hose. Another example I would give is that when the production firm immediately replaces the card for any defect that usually happens in any product, we managed to fix the malfunction directly through buying a digital product repair device, fixing the fault within such cards and able to repair multiple cards. We were, therefore, able to develop affordable solutions for malfunctioning devices. This made a budget contribution to the hospital where we worked. In other terms, as a plus of having studied electrical and electronic engineering, I would state those points.

Do you consider the education in biomedical engineering sufficient enough as someone making his career steps in different units? What kind of suggestions do you give us to improve ourselves beside the education we receive at school?

While biomedical engineering 's curriculum planning varies from university to university, it is generally easier for biomedical engineers to think physiologically since the related medical classes offered in the biomedical engineering program. As a graduate of electrical and electronic engineering in the past, I can say that your distinction and advantage from others working in this sector would be that you are informed of the profession 's physiological aspect.

However, fundamentally, I think the most critical issue is to learn the practice in the field and it's been provided very well by TOBB ETU University. Other university students do not have sufficient field experience when they go on the field if they have finished school with only 2 summer internships. I believe that TOBB University has created a graduate community with greater added value and more field experience by keeping field and internship periods much longer than other universities. Since otherwise, internships are only performed in 40 working days. 40 Working days are 2 months, but unfortunately, this 2-month duration is hardly adequate to get to know the company, learn the process, and build a certain dialog with the personnel. I think that in the case of accumulation of this field experience, biomedical engineering departments will have more productive, more eligible graduates.

You are carrying out the drug tracking system and medical device tracking system project with Tübitak. Are there biomedical engineers among the employees involved in this project or what kind of contributions can we make? For what kind of need this project has emerged?

Ees, under our coordination office for the registry of medical products, we have a product tracking system (PTS) development unit that we used in the development of our product tracking system program. The responsible person of this PTS unit is a biomedical engineer who has about 9 assistant staff. One of them is a doctor, one of them a statistician, and all our others are biomedical engineers. On that basis, I would claim this is the unit is the place where our biomedical engineer colleagues are the most. This product tracking system simply came from a need. We had a drug tracking system in our institution's department which is responsible for drugs but we didn't have a tracking system for medical devices and cosmetic products. There was a 'tiktup' system for medical devices registration and the 'eup' system for cosmetic product registration. These, of course, we're at the point of a simplified recording method. Once again, with the great efforts of our biomedical engineering colleagues and biomedical engineering consultant friends working in our institution, first, we started writing the product tracking system project and after this project writing, our department heads at the time gained assistance from the Ministry of Development by describing this project. A product tracking system project was launched with this funding from the Ministry of Development. We initiated the project intending to track and document medical devices as well as cosmetics. It's been almost 3 years after we began the single follow-up phase after the registration process of medical devices completed and during this period we managed to achieve even more than our targets. For the Udi and 'Udemed' scheme this phase should be carried out in the EU. While the phase in Udemed and Udi integration has been postponed twice by the EU, and we, as the institution, realized all the implementation measures that we planned in the product tracking system, with qualified personnel groups in our sector- in which biomedical engineers are at most- by closely observing and solving issues quickly, we have successfully completed this project. All class three products have been in the singular tracking phase since January 2019 for over a year now. Our process of transition is planned for 2020, regarding other product groups. By nearly the end of 2020, we will launch the singular follow-up process of almost 90% of medical devices.
The prerequisite for the contribution and accomplishment that our biomedical engineers can provide in this process is to have the appropriate training and follow the current developments and needs. For the graduates; they can learn PTS' registration and singularization processes by viewing the training videos they can easily access on our PTS Portal page to understand the procedures related to the product tracking system at the stage before they join the company. They would, therefore, achieve an advantage in getting the job as well as contributing to their job applications.

As the Vice President of Medical Devices and Cosmetics in Turkish Medicines and Medical Devices Agency, regarding the cosmetics used in Turkey and what is your perspective about their development, how do you evaluate the situation, to what extent it is positive or negative?

Currently, we release cosmetic products to the market by registering them through the product tracking system. It can not be claimed that as our country we are far behind in the production of cosmetic products. Our cosmetic export market is close to our import market. Neither medication nor medical device was able to attain this rate. Looking at the registration numbers of our cosmetic producers within the product tracking system, we can see that in terms of the number of products there is half of them are registered. Of the 250,000 products registered, 125,000 are registered as domestic production and 125,000 as imports. The harmonization of our cosmetics manufacturers in terms of working together and their search for overseas markets are genuinely tempting. I might claim they are one step ahead of the medical device industry's manufacturing and marketing capabilities. I may tell that simply since they are the second category of products that we supervised during the same Vice-Presidency. I think it would increase much further in the coming years. Especially in the field of fragrance, our local producers' products are used extensively, from liquid hand soaps to roll-on, from cologne, which is the product that comes to mind when talking about fragrance, to soaps that contain fragrances. They compete with the products of many companies around the world, in terms of quality. We may even claim our cosmetics companies are very qualified in the essential oils market. We can say that the essences, which are the basis of many fragrances, are also widely manufactured in our country and used in companies that manufacture products related to fragrances overseas.

As you know, Biomedical Engineering is an interdisciplinary department and we take courses from many fields. For example, materials, electrical electronics, biology, statistics. And we think we need to concentrate on one of them to be successful. What are the factors that should determine our decision regarding the area that we should focus on?

Biomedical engineering, as you said, is a multidisciplinary field and includes the various fields you've listed. It covers material, electrical electronics, software, biology. However, it is the environment in which our students would like to work after graduation that will determine the field they should be focused on. If someone wants to work in the manufacturing sector and feels closer to working in companies operating in the production area, then they should develop their skills in that field. If we give an example, if a student wants to work in a field of graft production he/she has to develop himself/herself in the field of materials. But this person would need to learn biology to know the physiology of the work, apart from the material field. Like where the graft is used, and its anatomy. Or, if a person wishes to work with devices where there are more electrical and electronic products, such as a defibrillator, effort, ECG, or x-ray device, it is not enough to know the electronics field alone. Knowledge of the desired field is not sufficient. If this individual wants to work in production, he/she must learn about the disciplines of production, follow the literature and scientific studies in this field. If a student decides to work in the sales sector so he or she has to reach medical device market data, technology values data, articles published in this area. This would change depending on the field he/she intends to work in. We do have biomedical engineers who may work throughout a medical device's entire life cycle starting from R&D, design, prototype to its implementation in the preferred industry after graduation. In which of these fields he/she feels best (R&D, design, production, regulation, reimbursement, sales and marketing, technical service, application), after choosing the field to work in, I think focusing on a certain device group, specializing in that field and searching related vacant positions would benefit his/her employment process.

SELECTED ESSAYS

Storing Data to DNA

Ayşe Gül Bulut 23 December 2019

How much data do we load onto our phone and computer's memory throughout the day with images, photographs, and messages? When we think about all of humanity, we observe immensely and increasing digital data that has reached this moment. EMC, one of the world's leading data storage providers, reported that by 2020 they were estimating a cumulative amount of 44 zettabytes (44 trillion GB) of data generated by all humans. The space used on processing the increased digital data, the increased costs for the companies operating for this, and the microchip-grade silicone that is projected to be run short in 2040, make the question of storing data to DNA very significant.

Well, Why DNA?

DNA is an organic form transmitting genetic codes. This can copy itself easily and costs nothing to you. It is very small. It'll occupy far less space than the latest storage device you use today. It's a lot more durable. While CDs used today can remain without deterioration for up to 50 years, the lifespan of hard and external discs is around 20 years. However, in ideal conditions DNA will remain unchanged for tens of thousands of years. We can see this from DNA belonging to the ancient mammoth and human tissue.

How it is made?

There are many common things with computers and organic cells. In brief, theoretically storing data in DNA is just like the binary code we use. The information is recorded as A, T, G, and C (Adenine, Timin, Guanine, and Cytosine) in DNA instead of using the 0 and 1s in conventional approaches. In other words, by translating it to the letters of the DNA alphabet, we rewrite the information of our data and save it in DNA. DNA can be translated using today's technology, and the coded information can become meaningful again.

In 2012 Professor George Church and his team at Harvard managed to encode a book of 53,400 words and 11 JPEG images into DNA, according to an article in Science journal.
In 2016, Twist Bioscience, Microsoft' s DNA synthesis firm established a partnership for 200 megabytes of DNA data storage.

Recently, Microsoft and the University of Washington have jointly implemented a fully - automated DNA data storage and retrieval system. The American DNA storage company Catalog encrypted all English texts in Wikipedia to DNA in early 2019, breaking Microsoft's data storage record (16 GB of data). We are still at an early phase regarding computers dependent on DNA. To make DNA data storage a feasible option for data storing, the whole process of data coding, writing, reading, and decoding should be automated. Currently employed technology is subject to failures and is time-consuming.

The techniques used first of all need to be economically feasible. I hope all of this will happen with the fast-growing technologies. I wish to have organic computers with very big storage capacity and cell phones that never get full of memory. Stay with science.

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May 20, 2020 Ecegül Ergün

A DEADLY PANDEMIC "YELLOW FEWER"

Yellow fever is an acute illness occurring in tropical and subtropical areas of Africa and South America with viral bleeding. This is an RNA virus in the Flavivirus type. The World Health Organization (WHO) reports that there are 200,000 yellow fever cases per year, resulting in the death of 30,000 people, according to its research.

YELLOW FEVER SYMPTOMS
Fever and yellowing of the skin are the most visible signs of yellow fever but most people have no symptoms. It contains typically 3 stages.
In the first stage symptoms observed are similar to other infections.

Rapid Fever
Shivering
Severe headache
Back pain
General body aches
Nausea
Vomiting
Fatigue (feeling tired)
Weakness

Usually, those symptoms improve within a week. The second stage would be remission. Around this point, patients mostly recover.

At the third stage (toxic stage), the symptoms become severe.

Recurring fever
Abdominal pain
Sometimes vomiting with blood
Fatigue, weakness, drowsiness
Hepatitis gives the skin and eyeballs a yellow color
Kidney failure
Liver failure
Bleeding
Delirium, seizures and sometimes coma
Arrhythmias or irregular heartbeats
Bleeding from nose, mouth, and eyes

In 15% - 25% of patients, this stage takes place. The World Health Organization estimates that 50 %of people have died who have reached the third stage.

MODE OF TRANSMISSION

Mosquitoes belong to the species Aedes and Haemogogus transmit yellow fever.

Transmitting cycles are found in three types:

Sylvatic (Forest) Yellow fever: TMonkeys are infected by mosquitoes (Aedes and Haemogogus) carrying the infection in rain forests. The mosquitoes have spread the disease from monkeys to humans while people travel or work in the forest.
Moderate Yellow Fever: This form of the disease is the most widespread one in Africa. The virus is transmitted in this process from monkey to human, or from human to human. A lot of different villages in an area can experience outbreaks at the same time.

Urban yellow fever: A condition in which the Aedes mosquitoes transmit the virus to humans and urban mosquitoes. Normally, the virus spreads when an infected individual carries the disease into the city.

TREATMENT

There is no particular drug treatment for yellow fever, but the symptoms (such as liver, kidney failure) that patients demonstrate can be treated. Countries should take specific actions to minimize the spread of disease. These are;
Vaccination:
This offers life-long protection from the disease, as well as being safe and affordable.

Babies under 9 months,
Pregnants- (except when the infection risk is high during the yellow fever epidemic),
People who are severely allergic to egg protein,
And people who have a severe immune deficiency or thymus disorder due to symptomatic
HIV / AIDS or other reasons cannot be vaccinated.

Vektör Kontrolü:

It is a measure reporting where the risk of an urban epidemic resides. The determination of mosquito distribution throughout the country plays a very significant role in avoiding the disease.

Outbreak Precautions and Response:

Like several diseases, also for yellow fever, rapid diagnosis and response are essential. Measures can be taken before the infection spreads, thanks to quick diagnosis and response. The World Health Organization stated that every country at risk should have at least one national laboratory where blood testing for yellow fever can be performed.

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PRODUCTION AND ENTREPRENEURSHIP IN TURKEY

SBBT which is a student community, established to introduce the Biomedical Engineering department and to find the answer to the question of "Where the world stands in the health sector?". You are the Vice Chairman of the Board of Health Industry Employers' Association of Turkey and the Technology Development Foundation of Turkey. Would you like to tell us about your responsibilities?

Health is a field pursued not only by people but also by governments and large organizations all over the world. Non-governmental organizations, therefore, have considerable importance in this field. I have also been paying attention to being a part of NGOs since I began working in the health sector. Medical technologies are the most value-added and licensed industry in Europe, according to world records. The explanation of why the health field is reasonable for patenting and investing is that the knowledge you gain about the biomedical industry can be financially useful. On the other hand, since the field of health is ecosystem dependent, it is separated from other fields.

As a part of this community at the university, we benefit from it both for improving ourselves and also to meet valuable names from the sector. What is the importance of participating in health-related foundations and associations after graduation?

The important thing is not hard work but good relationships. There is such a thing as a gray hair effect, implying that everything has a certain time and it is important to wait for the correct moment for certain issues. So, timing is the most important thing in terms of a job. When you have committed to work in a given sector, you must begin to take action. There is a need to remain as open as possible to changes. I've never, in my career, aspired to work for a title, I aspired to work. If there was a job to do, I 'd do it. They always find an alternative to substitute you in the title but you'll be the only option if you know the work. If an engineer is experiencing a problem, he breaks the issue into its parts. An engineer has the potential to offer analytical thinking. Engineering is a discipline, what you do with this discipline concerns you, that is to say, it is your concern to continue in academia or to go directly into business life. For me the concept of diversity makes sense. Studying electric-electronic engineering, for example, and then having a Master's degree in history, broadens your perspective. Right now it might seem like an insane concept but in the future, you can see a lot of benefits. In certain instances, a difference has to be put forward. In your future corporate life, the school would potentially become a network. Expanding the network always benefits the friends. If there's a good place for your friends, you can have it too.

Mete Özgürbüz
President of the Medical Council of Turkey
BMT Group Founder and Manager
Teknoloji Yatırım Aş. Vice Chairman of the Board
Former TÜBİTAK Head of Biomedical Technologies

When we look at your career history; since you are still a lecturer in a university, execute the founding presidency role of TÜBİTAK Biomedical Technologies Research Center, founded Turkey's leader innovative biomaterial company of BMT Calsis and still executing its captainship, tell us that you attach so much importance to the science and R&D. At our university, also, we are trained to research, develop, and think. Yet in such matters, Turkey is considered to be inadequate, so as students, we have a prejudice that we can not get the payoff of our efforts. What do you think of these issues?

People think that the efforts made by Turkey in any field are inadequate. What suits you is doing stuff that is going to change this. It's almost impossible to change things after the age of 40-50 The younger generation will be guiding us. You've got to find the issues and remedies

of this time. Because people over 40 can't be radical, radicalism usually takes place between the ages of 20-30. It 's important that you radically change things. The works that you will be doing should be far more structured and effective.

There are several products like Putty, Granule, Asc-Kit developed, and produced by BMT Calsis which you are the leader of. Could you inform us about these products, and how are the feedbacks for your products offered for sale?

We are concerned with regenerative medicinal products, primarily biomaterials. We have other companies which manufacture related goods. In 2009 we launched our first products and have been in this business for over 10 years. We had the chance to use it in over 100,000 cases, we had successful outcomes and overall returns are optimistic. The same applies to overseas. Technology is a dynamic field so you have to continuously adjust what you are doing and how you are doing it. When you experience a little bit of inertia, you'll have trouble there. Thus it is an area that we need to be very dynamic and we are striving for that, we are making sacrifices. It's also tiring to keep producing something new. It's not an easy thing, but I always do some research on a new area, a new product, instead of relying on the problem of selling the goods that we have. Mahmut Kiper had a saying: "If you ban R&D in Korea, R&D goes underground," that is to say, citizens become unlawful in order not to abandon R&D, they resist the rule. I consider being an entrepreneur as running away from home to become an artist. You see good examples, and some unlucky people are there too. So, I think it's something like that, being an entrepreneur, being innovative and inventive, so R&D is similar. You don't see the efforts, the torments that have been endured. You assume I can start a company only due to getting excited after seeing the positive outcomes from other people. Running a company means hitting the wall every day. Imagine how many individuals could do it, and how much they could handle it. After a while, a man's character changes. Work begins to run with that transformation. You get addicted after a while, and a kind of masochistic situation emerges. When the chemicals that provide the excitement and pleasure in the body when reached the target, which implies the individual is fulfilled after achieving a reward. Therefore, continuing on the path is a crucial thing and there is no such thing as getting there and staying. You 're on your journey through your entire life and where you're headed is not clear. If you're ready for this, you have to go in that way, I don't think entrepreneurship fits everyone.

Why do you want to give lectures on engineering management and keep students informed in this field? Can you elaborate on the significance of this subject in the field?

There is a saying: whoever knows does the job, whoever doesn't know teaches, and whoever doesn't know anything, supervises. People accomplish very little by themselves in life. Even though if I have a rather stable outer appearance, it is not so. Most stuff happened by chance in my life, and it's going to be the same for you, even though you want to externally reflect like that ... I guess no one can schedule their future. I am not one of those psychopaths, I know the psychopaths who do so. People come across something in life, they like it and they want to do it. My lessons involve no field research, but students love it, they love it so I told it. Imagine that there is nothing different in the lessons than the conversation we are having with you right now. They're saying let's talk about X, you're talking about it, they're asking questions about Y, you respond. Other than that, I don't worry about being too planned, or what I'm supposed to articulate. What I'm trying to explain to students and you is that, what you're reading in school, what you're seeing would mean very little in your life. When you look at the mistakes of life in the future, the issues you are concerned about now would appear as small mistakes. The successes you think are enormous right now are the ones that don't count in life, however, it seems important to you now of course. Many of you are going to be managers in the future, you are going to manage processes or people, or you are going to try to adapt new ideas to somewhere, or you are going to try to preserve your work against detrimental things. You are going to manage the process so I've explained it to the students. I'm not your most important instructor but I believe your most valuable lesson after finishing school is the course of the production. I'm using very little of what you've learned, maybe 1-5%. The individual who does engineering physically and designs something also can not use more than % of the knowledge. And I consider management to be critical. Management cannot be taught but can be learned. I basically can't make you a manager, but you can learn from me how to do it. There is nothing beyond that.

It is estimated that 32 of the world's 46 medical technology firms, who have annual revenue of more than $1 billion, are of American origin. Considering that US health expenditure is $2.5 trillion according to 2009 CDC (Centers for Disease Control Prevention) statistics, and this number is more than three times our GNP (Gross National Product); can we suggest that Turkish health technology expenditure is adequate for the development of sophisticated products?

Tracking of money is critical. If I 'm an artist, you 'd wonder if I'd get an Oscar. Money is a reasonable tool for people to measure things when you explain the importance of this value, it becomes simple to grasp. Money is an essential factor but it is the economy that people do not understand.
If the health screening of a country is high, then that technological developments are more likely to come from that country. If a company has 5 looms, that company is more likely to produce something than a company that does not have a loom. Technology can not develop in a country if there is a health expenditure cut, and health cannot improve at all. Any wasted money constitutes an obstacle to your production. This is why I think that's relevant. People go where there's a market. The biggest challenge you will experience is that no one would want to sell products to Turkey. No manufacturer wants to sell products to Turkey. We don't have enough of a market. There are numerous biomedical engineers, and there is an overwhelming competitive environment. In this dynamic environment, you should certainly look for an international market in the future. India, for example, is one of the Pharmaceutical industry's biggest markets, but almost no Indian corporation sells medicines to India. All are willing to sell abroad. That was close to our case. The domestic market is becoming limited. How well a company functions domestically and overseas has become a significant parameter. Target businesses that export abroad.

What was the idea that encouraged you to execute your projects with the Technology Development Foundation of Turkey (TTGV)?

My position is different over there. I was in the department of Entrepreneurship and received funds, some people invested in me and some of them were my partner. On the investment side of the business, I have worked as a funder for new ventures. There was an offer, and I accepted it, to be in that part of the work. TTGV does not have any organic ties to the investments I made with our company. However essential institutions like TUBITAK and TTGV of Turkey are simply a school and even you don't work them physically and don't see them, they inevitably affect your life or the world. Of all scientists educated in Turkey, they have origins in TUBITAK. I see TTGV as that kind of school. We collaborate with lots of people who are educated there. And I consider TTGV as valuable in my life. We are trying to provide funding for companies that our precious fellows like you will establish in the future. As a result, my job is different from my role here, I am in the position of an investor there.

In the scope of Action Plan of Structural Adjustment Program in Healthcare Industry that you work intensively with SEIS in which you execute the role of Vice Presidency, is the intended progress achieved in terms of supplying 20% of medical devices and medical product needs of Turkey by the domestic production, what do you think about the position we are at and can we get your suggestions for improvement on this subject?

No. There is an ecosystem in every area. For example, in tourism and construction, but the ecosystem in us is very deadly. What the decision-makers have done, no matter how successful you are, affects the overall result. We are still unable to make proper buying in Turkey. If you can't do that, you can't improve the industry. If the produced things cannot be sold, it is not possible to develop. This 20% decision is not a decision that the industry can make, but it may be a result. The industry can say: "I was producing this in 100 manhours, but I will reduce it to 90 manhours." this is an internal goal, it is doable by the industry but an expression such "I will meet this need by local production" should be the government's objective. The government should ask for it and work for it. I set that target as well since other targets mentioned were unreasonable. Study the etymology of engineering. The term engineering originates from the root of the word measurement, the ell. An engineer measures; you can't do something you can't measure: you can't produce something you don't measure and you don't have data; you can't manage a process which you can't measure. We are trying to manage the process without trying to create engineering data in Turkey, and we are trying to meet the targets. Those are major shortcomings.
The goal of 'Let's produce 50% locally' is set, ok, what percentage does Germany produce locally? Thirty percent. The goal on which you are focused should have a solid base. An engineer should estimate through supports, estimate from measurements. Only Japan and America produce over 50 percent of their own needs in the world and receive the rest from outside. Domestic production percentage: 30 in Germany, 15 in England, and 12 in France, Hausmann states, "Growth is not about what you are producing, but about which network you are in." But strong network owners-like Germany-are free to do whatever they want. What we have to do is evaluate holistically. There's nothing you can produce that isn't in Turkey. The credit rating of a company can not exceed the credit rating of that country. If you want to be AA you are called B- because your country is B-. You can't be stronger than your country and you can't be stronger than the network in which you're. Your perspective should always focus on questions like which network I should be in or in which position I should bring my network.

HEALTH WITH CHANGING TECHNOLOGY

Prof. Dr. Melih Bulut
Pediatric Surgeon
Chairman of the Board of Health and Insurance Managers Association
Former International Hospital Chief Physician
Former Yeditepe University Chief Physician
Medicana Beylikdüzü Hospital General Directorate

We initially came across your Youtube account named Changing Health (Değişen Sağlık) when we searched for Prof. Dr. Melih BULUT over the internet. We believe that shifting improvements in the health sector to social media, is a really successful way to meet the generations of Y and Z. For what purpose you decided to post on social media and w hat kind of feedback do you receive through your social media pages ? Who is the target audience?

For me, social media is a really powerful tool, and I am fed by the scientific and social developments from there. I appeal to everyone, I both impress the people and influenced by them. I began this business because I describe myself as a science politician; since people who are doing science actually make choices on what they are developing and then they work for their developed works to be understood and used by the society. In other words, our goal is to build an inclusive environment for both decision-makers and people that can affect the decision. On social media, I want to use a language for this purpose and I can interact effectively with everyone using all my accounts. Obviously, when reaching too many people, sincerity and attention are always quite necessary.

We can conclude that you are competent in all areas of health, from devices to medical practices since you have executed the roles of the Chairman of the Board of Directors in the Association of Health and Insurance Executives and considering the conferences you attend. What do you think about the current state and future of the biomedical engineering department?

Health is a very wide field, and a lot of money has been spent for it. But in a sector with such a vast volume of spending, the system's inefficiency restricts sustainability, and the possible device faults may be catastrophic. Biomedical engineering arises here as a branch of science which will allow medicine to make more progress. We are at a phase when most procedures without medical devices are not possible and I was directly observing the development periods of such devices. The importance of biomedical engineering will continue to rise.

Every innovation, every new invention is born out of necessity and we biomedical engineers should be aiming to fulfill the needs in the area of medical devices and health care. The devices you have been utilizing since you started the profession, what has been the most remarkable shift in medical procedures and which device or which device would overcome to a great need, if it is developed?

In my professional life the development I find most striking is the emergence of ultrasonography. In past years palpation has not been adequate for pediatric surgery for the diagnosis of appendicitis and tumor. I can claim that the advancements in tomography, MR and liquid biopsy are significant. Also, in new technologies, everything must be inside the phone. Multidisciplinary studies enable the formation of phone tests and applications that can be developed.

We acknowledge that this aim should be targeted from childhood and effort that should be made to be successful in one field and we also know that your biggest wish is to win the Nobel prize in medicine as Turkey.
What are the reasons you suppose for not winning the Nobel Prize in Medicine so far? Do we have some work you already know that can be nominated for the Nobel Prize?

Yes, this has been my dream since childhood. I am a graduate of Ankara Science High School, and since then it has been in my mind, because winning the Nobel Prize appeared quite impossible and too far away. I assume we can obtain it at the end of teamwork and I have an obsessive goal for this. The world's record-breaking marathon runners work multidisciplinary with many professionals, and they are accomplishing extraordinary things. I hope the Nobel Prize should be awarded until I pass away, and I'll be attending the ceremony. There were no awards granted because the country's science environment is not healthy until today.
Our goal to start these studies is to build this environment in a positive manner. At universities we meet original scientists and students, individuals are participating from of all ages and from abroad. As Mustafa Kemal Atatürk said, we have a huge essence in us, so we have to use this resource. I think about all the things that Atatürk endured in my dead-end circumstances, and I encourage myself. Although, after concentrating on the target, the Turkish nation has a function which is ideal for working and managing crisis and doing very successful work in a short time. Aim to build beautiful environments for yourself . My high school, my university offered me the opportunity to work on my goal but in my later career I couldn't get this environment again. Fight with poor managements in your work life, it's not enough to run your own business only. Develop yourself in many aspects, aim to develop your speaking skills and work with everyone, maka efforts. Multidisciplinary studies are developing in our country recently. Such collaborations should be focused on the desire to build trust and benefit others. Interaction with the individuals who are different than yourself is always more efficient. Some of our aspirations of young people is to turn crises into opportunities, to think positively, to have a vision and to communicate regularly with abroad, and I believe that success can be accomplished in this manner.

In our country, departments of artificial intelligence engineering are newly opening at universities. Firstly, this year education started at TOBB ETU and Hacettepe University. We think department graduates will be doing really good work in the future. What do you think of the world's place in the artificial intelligence field and where do you think we are in this broad arena?

We are not in a bad position, however we follow from behind. China and then America has come a long way. Yet we have benefits as well. The Turkish culture is A type society, I was told by Mustafa Akgül in the 2000s who is a professor at METU. The internet, quantum, and artificial intelligence are, in his opinion, the fields which we are very prone to. There will be two groups of doctors following the development of artificial intelligence, the doctor who can and can not use the artificial intelligence. Depending on how you can utilize artificial intelligence, it's potentially so powerful that you can turn an average person into a wise man. Even you can be Leonarda da Vinci!

If we don't take reasonable steps in time regarding artificial intelligence, we'll miss it. Advancements in the US and China are making rapid progress, especially in the health sector. Artificial intelligence arises in the health field with very significant technical development opportunities. This inclination would also hold a very significant position in the biomedical industry. Our book "Artificial Health Intelligence" is expected to be released soon. If we look at departments established at universities, the process of creating such departments has been very controversial discussion, since artificial intelligence is not only an engineering field. Multidisciplinary work is essential for the advancement of emerging technology, artificial intelligence engineers should cooperate with biomedical engineers, pharmacists, medical students, nurses who use the most practical tools, social scientists, philosophers and designers should work together, and only in this way can success be accomplished.

We note that you always think research goes hand in hand with politics. Do you think they go parallel in our country in this context?

We are living through a revolution in the science. This is the second time this has occurred in human history. The first major revolution was that of the agricultural revolution. All that we see today is the product of the agricultural revolution and the industrial revolution which is the subsequent. The scientific revolution that started in the 2000s marks a split from the industrial and agricultural revolution. In reality, it is science politics to understand and describe this revolution which occurred after 2007 with the incorporation of other technologies into our lives. Science and politics are humanity's oldest and most prominent characteristics. Politics and science need two individuals and are produced jointly. Those two concepts ought to be addressed which are considered to be contradictory. In the context of science, we have to cope with everyday politics just like every atom in the universe has interactions.

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INNOVATIVE

The new treatment triggers pancreatic cancer cells to self-destruct themselves

One study found that a small molecule can cause self-destruction of pancreatic cancer cells."A molecule called PJ34, which is permeable in the cell membrane but only affects human cancer cells, has been treated for within the mice. During replication of human cancer cells this enzyme induced anomaly and sudden death of cells. The pancreatic cancer cell experienced a decrease of 90% in treated mice. Even in a mouse, the tumor has completely disappeared. ”

Via the Pharmacogenetic tests, it is determined which patients will respond to which drug and how

Professor Dr. Esra Sağlam clarified that 70 percent of patients taking the medication responded to standard treatment, and the other 30 percent either did not have any progress or that adverse effects occurred:"By delivering the correct medicine at the right dosage and the appropriate period, the patient will benefit from the medication at a high level and we strive for the side effect to appear at the lowest. Genetic tests specify the medications and doses that appropriately compatible. "She adds that we take samples of blood and hair follicles from patients and conduct genetic tests, "Following this, people will go to their doctors and take their medical testing with them. Prescriptions are to be provided accordingly. Those tests will be carried out immediately after birth in the future."

Promising developments in space medicine

Researchers created a special head-mounted sensor for monitoring body temperatures of astronauts. More than half of astronauts experience back pain as a consequence of extended involvement in a non-gravity atmosphere. The team believes they've found a way to use a transformed exercise device to stimulate the muscles around the spine, by using ultrasound to track the muscles in motion. "With our experiments, we hope that low back pain problems seen in employees sitting while working all day will accelerate their treatment processes. In this case, astronauts become the perfect combination of volunteer patients and scientific assistants. ”

'In-body GPS'; implants will be able to locate tumor tissues

MIT scientists have been able to detect a point with a margin of 1.4 cm inside the human body. Soon, the position of the tumor can be calculated very clearly thanks to this method, and the treatments that will be administered to cancer cells without affecting healthy tissues. The implant you swallow can be followed by inches while traveling through your body, in the system called 'ReMix' which operates with the satellite GPS logic.

Now 'capsule robots' can do a biopsy

Smart robots will be able to perform biopsies in hard-to-reach organs such as the stomach,small and large intestine with the project carried out by scientist Dr. Mehmet Turan. Turan said, "We plan to have a robot in the system that we will be developing that can be navigated with an accurate control mechanism. In capsule endoscope samples used in hospitals under current conditions, separate capsules should be used for the stomach, large intestine, and small intestine. With a single capsule robot, you can observe three organs in our system at the same time. It also enables medical interventions such as biopsy and drug injection. ”

Three-dimensional map of human organs was created

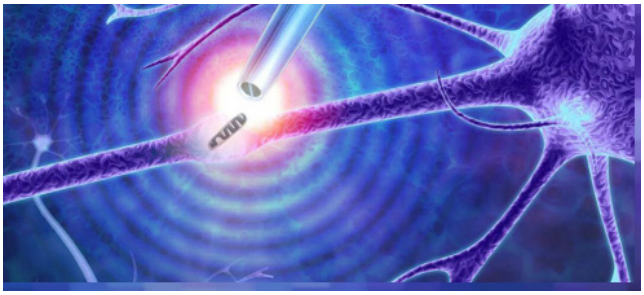
Dr. Ali Ertürk and his team have managed to map the human eye and kidney three-dimensionally. Explaining that this technique will be used in the detection and treatment of cancer within a few years, Dr. Ertürk said, "We want to start utilizing this artificial intelligence as early as possible on biopsy analysis. Since presently only 0.1 percent of biopsy samples taken from cancer patients can be examined by pathologists. A further aim for us in the medical world is to produce organs using such technologies with three-dimensional printers. "

Talent discovery can be possible with a brain scan

The respondents were asked to mimic an operation in an experiment with 30 surgeons and medical students with varying degrees of experience. Meanwhile they studied the signals in their brains thanks to a device mounted on their heads. In the prefrontal cortex, which is the region of the brain responsible for conducting complicated tasks, more activity was observed when simulating inexperienced medical students, while the active region of experienced surgeons was the motor cortex associated with executing learned actions. Regarding these results, scientists would determine who is ideally qualified for a profession in the future by analyzing brain signals.

A new treatment has been created for depression: Sending Electroshock therapy to the brain

Research by the University of California also shown that brain implantation will cure depression. Deep brain stimulation (DBS) decreases the influence of depression by delivering electroshocks directly to the person's brain. American scientists used the DBS method in neurological disease management, such as Parkinson's disease, for the 'abnormal' function in the person's brain during the depression. Some parts of the brain are electrically stimulated, and this person's brain will be properly functioning.



MOVEMENTS

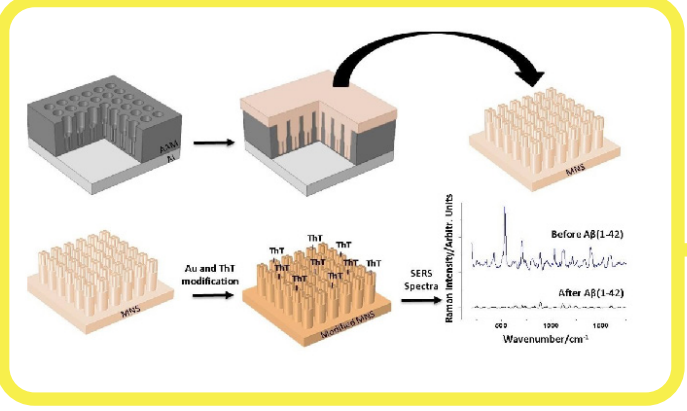
Professor Dr. Fatih Büyükserin and his research group continue their studies at TOBB ETU Engineering Faculty Biomedical Engineering Nano type Laboratory. The studies of the Büyükserin research group can be summarized as the production of nano/biomaterials which are originated from anodic alumina membrane and electrospun, and tissue engineering applications, targeted carriers, and development of SERS-based biosensors. The beta-amyloid (1-42) peptide, which is the biomarker of Alzheimer's disease, was found in a recent biosensor analysis on the platform covered with generated nanorods. As a consequence of the study, the Aβ (1-42) protein detection limit was measured as 0.5 pg / mL, and hence the lowest detection limit obtained from nano biosensor platforms reported in the literature for Aβ (1-42) detection was identified. This article outlines the study in detail.
Alzheimer's disease (AD) is a neurodegenerative disease that does not yet have a straightforward treatment and that can lead to death. Diagnosis of the disease typically happens when the brain's insoluble fibrils, called amyloid plaques, accumulate outside the cell that can only be noticed in advanced degrees of dementia. Sad to say, if the disease reaches this stage, current methods can not prevent or delay the development of the disease. Repeatable and reliable detection of biomarkers is therefore crucial for the diagnosis of Alzheimer's disease as quickly as possible, and for starting treatment and following its course.

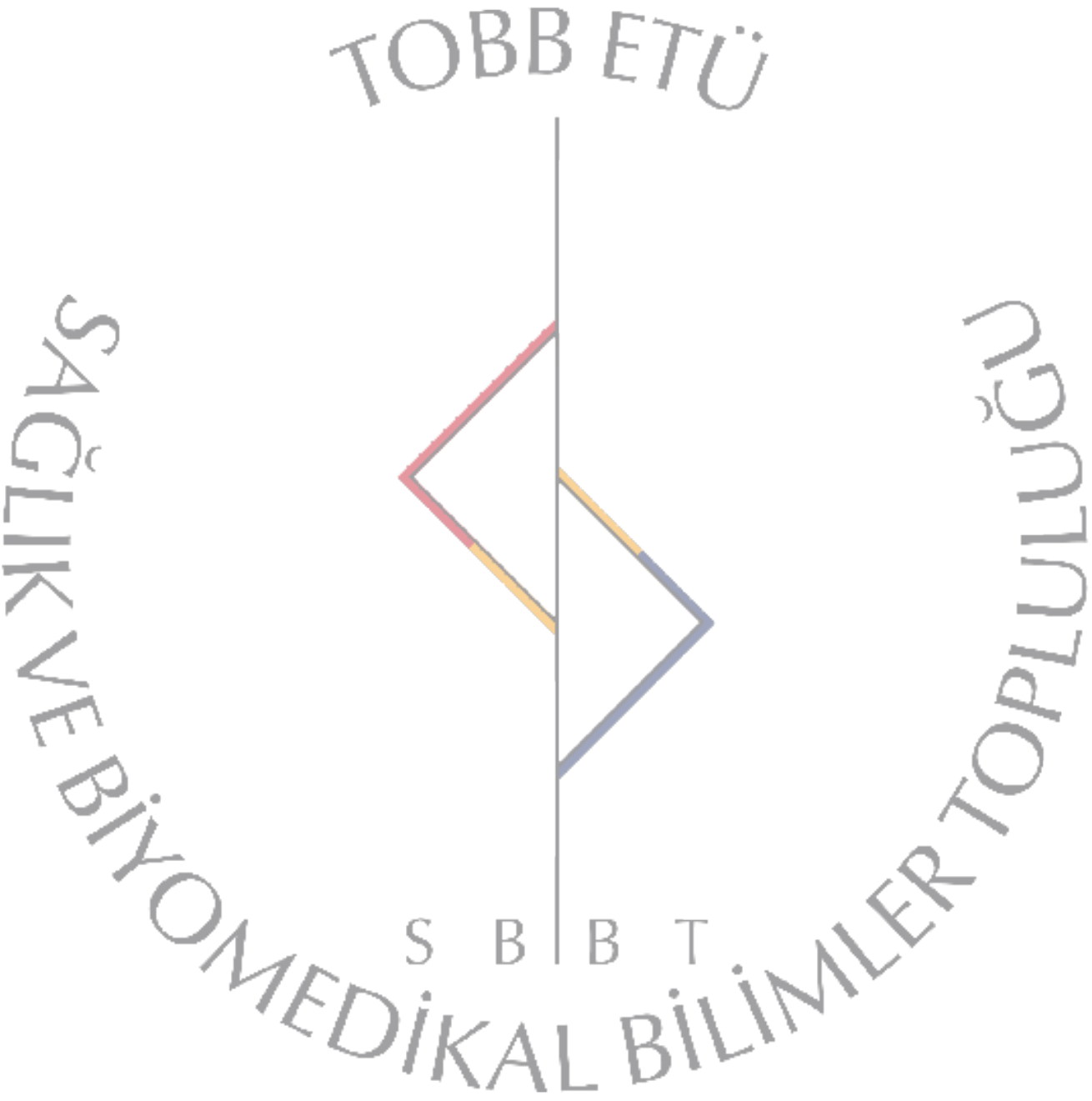
The beta-amyloid peptide (1-42) is the most frequently utilized AD biomarker as the central ingredient of the senile amyloid plaque. This peptide's hydrophobic nature tends to cause accumulation in the brain and hence a lower level of Aβ (1-42) in the cerebrospinal fluid as particularly in comparison to a healthy person. The greatest setback in detecting Aβ (1-42) protein is its very low presence in body fluids, and conventional PCR and ELISA-based methods require expertise and are costly. Relatively affordable but sensitive optical-based nano biosensor platforms have been utilized to address these problems. Among these methods, Raman spectroscopy (SERS) enhanced by surface allows ultra-sensitive detection of biomolecules and is optical spectroscopy that can foreseeably pinpoint single molecules. The specific vibrations of molecules close to plasmonic metal nanoparticles can be identified via amplification using the appropriate optical light source. A fluorescent dye used to detect the presence of senile plaques in Alzheimer's disease which is namely the Thioflavin-T (ThT), joins the rich structures of the beta layer of amyloid fibrils, creating an intense fluorescence boost. The molecules are then covalently bonded to the metal surface to produce enriched ThT SERS signal characteristics.

In a recent study it was reported that periodic nanorod sorted surfaces obtained using non-lithographic methods. In this approach a broad variety of periodic nanostructures can be obtained with nano-sized pores by anodic aluminum oxide membranes (AAM), utilizing a basic method of polymer processing such as drop drying. To be used as an ultra-sensitive SERS platform for the surfaces produced, a thin metallic coating must be made.
The study developed the SERS platform (Figure a) for the detection of Aβ (1-42) protein in a hierarchical bifurcated structure. Bifurcated polycarbonate nanorod arrays (MNS) were produced using AAM mold, using the drop-drying method. They then covered MNS surfaces with a thin layer of gold. Firstly, on the produced surfaces, the ThT SERS signal was identified and detection was performed at the pM level. More crucially, as the amount of Aβ (1-42) protein added to the environment has increased, the ThT signal was decreased linearly. The detection limit of Aβ (1-42) protein was calculated as 0.5 pg / mL as a result of the study. In the literature for the detection of Aβ (1-42), the lowest detection limit obtained from nano biosensor platforms was therefore found. Furthermore, hopeful findings were achieved by making artificial saliva experiments at the end of the study (see https://doi.org/10.1002/jrs.5376 for details).

Specific studies on the production of SERS-based biosensors are carried out within our research group (Figure b). The effects of adjustment in the AAM mold on the generated sensor platform (Figure c) were illustrated in a new report published. Then, in another study, it was reported that AAM was being used and successful as a direct sensor surface.

Prof.Dr. Fatih BÜYÜKSERİN
Academic Member of the Tobb Etü Biomedical Enginering Department

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