Perspectives from Hasan Mandal

President of The Scientific and Technological Research Council of Turkey (TÜBİTAK)

What do you see as the main benefits of EMBO's Programmes?

EMBO is a very important example of collaborative, multidisciplinary, and multinational research efforts to address the grand challenges of our times. For instance, molecular biology has played an immense role in advancing the life sciences and has been a key driving force for biomedical and translational research during the pandemic. TÜBİTAK is dedicated to supporting the R&D and innovation ecosystem, including the life sciences, and this has underpinned our long-term commitment with EMBC and EMBO.

TÜBİTAK has been a major supporter of EMBO activities, including as a founding member of the EMBO Strategic Development Installation Grant, which supports young researchers in establishing labs in their home countries. Becoming an EMBO Fellow, grantee, or participating in an EMBO scientific event can have a great impact on a researcher's career. It provides opportunities to learn, build collaborations, and network, while also supporting institutions in furthering international scientific relations. Many researchers active in EMBO have also received prestigious TÜBİTAK Science and Incentive Awards.

Basic research in areas such as molecular biology requires continued, long term commitments and well-designed incentives and policies. We are determined to build on our ongoing partnership with EMBC and EMBO and welcome efforts to encourage broader participation. I have confidence that these important collaborations will continue, so that the molecular biology research landscape is strengthened at a time when it is needed most.

What are the current trends in the life sciences landscape in Turkey?

The life sciences landscape is being shaped by new opportunities as well as new challenges. For example, we have mobilized our research ecosystem during the pandemic through the COVID-19 Turkey Platform, an initiative to drive the development of vaccine and drug candidates against the SARS-CoV-2 virus. The platform has brought more than 400 researchers from nearly 50 different institutions together, sharing research infrastructures, resources, and expertise. The platform has accelerated vaccine and drug candidate development: two vaccine candidates and two repurposed drugs projects have proceeded clinical studies. Together with the Minister of Industry and Technology, we both participated as volunteers in the phase 1 clinical studies of one of our vaccine candidates: the fourth of its kind in the world to be based on groundbreaking virus-like particles technology that is now completing phase 2. We believe in the vast potential of our scientists and an enormous effort has been put into this intense process.

It is estimated that there are around 6,500 human diseases with a known molecular basis, while we are only able to provide treatments for around 500 of them – there a pressing need for more breakthroughs. Co-creation based collaboration will continue as a trend to help meet these challenges, as will the integration of technologies such as high-performance and grid computing. We are also focussed on supporting young researchers to take part in collaborative research: TÜBİTAK's STAR program, for instance, supports undergraduate researchers with project placements across a wide range of scientific disciplines, including in the life sciences. TÜBİTAK provides a wide range of fellowships and grants for early-career researchers – including for postdoctoral researchers wanting to spend a year abroad, and support for early-career scientists who want to return to Turkey or come to our country to pursue research careers. Regardless of the scale of the challenges, they can be better addressed by working together.

What other opportunities are available for life scientists in Turkey?

TÜBİTAK provides an array of opportunities including fellowships for excellent international scientists to come to Turkey and renowned domestic initiatives such as the National Outstanding Researchers Programme. Life science projects resulting from such initiatives span a wide range of areas, from basic science to new technologies. Life scientists in Turkey are also engaged in multiple co-creation opportunities, particularly in high-technology platforms, with participation from European institutions. These include initiatives based on advanced drugs for autoinflammatory diseases, targeted pan-cancer therapies and diagnostic kits, and drugs and vaccines against influenza. Moreover, molecular biology, genetic engineering, and drug development technologies are priorities for university scholarships, while health firms in Turkey partner with universities through the Industrial Doctorial Programme.

Early-career life scientists in Turkey have exciting opportunities ahead of them that can be shaped according to their research goals and ambitions: my advice to them is to follow their curiosity and see where it leads, integrate themselves into research networks, and take advantage of opportunities provided by, for instance, EMBO, the European Research Council and Marie Curie Mobility Grants. Rising to the challenges that await us will require both talent and collaboration.

Meet scientists from the EMBO communities

Elif Nur Fırat-Karalar
Breaking boundaries

Principal Investigator, Koç University, and EMBO Young Investigator

As a mother of three young children, EMBO Young Investigator Elif Nur Fırat-Karalar hails the impact of EMBO's childcare support grants. "They have been amazing and removed the limitations of me attending scientific conferences" says Fırat-Karalar, who is a group leader in the Department of Molecular Biology and Genetics at Koç University, Istanbul. "Being part of the Young Investigator Programme puts me amongst a great network of scientists, provides great opportunities for mentorship and collaborations, and facilitates access to some of the best research infrastructures in the world for me and my team."

Fırat-Karalar's group study the centrosome-cilium complex – the main microtubule-organizing and signaling center of animal cells. "Through this work we want to uncover the mechanisms by which cells divide and communicate with each other," she explains. "When these processes go awry, it leads to many diseases, such as cancer and multisystemic developmental disorders."

She hopes that scientific outputs from her lab will ultimately have a direct impact in the clinic. "For me, it's not just about scientific passion, we get to see the challenges from the patient's perspective," adds Fırat-Karalar. "In Turkey, if you are a successful scientist, it is possible to play a major role in furthering the careers of talented young scientists, as well as contributing to areas such as policymaking and public dissemination of science. Turkey is a beautiful country, is culturally diverse, the people are friendly, and it has a long, fascinating history: it is home."

Mehmet Öztürk
Driving dreams

Professor of Medical Biology, Izmir Tinaztepe University, and EMBO Member

When EMBO Member Mehmet Öztürk returned to Turkey in 1995, he seized an opportunity to promote life sciences by mobilising the development of centres of excellence that bring together learning with cutting-edge research. "What excites me is not only scientific discovery, but establishing ways for young people to realise their dreams," says Öztürk, a Professor of Medical Biology at Izmir Tinaztepe University, who founded Bilkent University's Molecular Biology and Genetics Department and Biotechnology Centre in Ankara and the Biomedicine and Genome Centre in Izmir. "These were the first centres of their kind in Turkey. Fast forward 25 years and across the country there are almost 50 departments set up in this way."

"I know many researchers and students who have benefited greatly from EMBO Programmes and fellowships," Öztürk explains. "Such initiatives are very important in instilling quality in the life sciences, and many of the people decorated by EMBO are playing leading roles in the positive evolution of Turkish life science."

"Life sciences and technologies play an increasingly important role in our lives," continues Öztürk, whose own research focuses on understanding the mechanisms underpinning liver cancer. "Turkey is a fascinating place to do science: there is easy access to patient material, we have excellent collaborators, there are a variety of funding opportunities, and we have a young, smart, and enthusiastic population. There is a lot of potential to develop the research base. Nothing happens in a day, but science has no limits in uniting people from many different countries and cultures. Together we can make the world a better place."

Nazlı Ecem Dal-Bekar
Creating connections

PhD student, Institute of Health Sciences, Dokuz Eylul University, and EMBO Scientific Exchange Grantee

An EMBO Scientific Exchange Grant enabled Nazlı Ecem Dal-Bekar to expand her academic and social horizons by spending three months in the group of Agnieszka Siomek-Górecka at Nicolas Copernicus University in Bydgoszcz, Poland in 2019. "It was a fantastic experience and gave me direct access to amazing chromatography and mass spectrometry facilities, where I was able to develop new methods and use existing techniques to verify and validate my research," says Dal-Bekar, who is a PhD student at the Institute of Health Sciences at Dokuz Eylul University, Izmir.

Dal-Bekar's work focuses on the role of vitamin D and its molecular pathways in scleroderma, a rare autoimmune disease that causes hardening and tightening of the skin and connective tissues, but whose underlying causes are largely unknown. "Vitamin D is really important in many areas such as metabolism, immune system, and antioxidant capacity," she explains. "But vitamin D deficiency has been linked to several autoimmune disorders, including scleroderma. There are many unanswered questions, and there are many important avenues to explore."

Making connections with researchers across the international science community is a motivation for her. "At the moment Turkey is underrepresented in basic life science research, but there is a lot of potential and I hope to see opportunities for fundamental life scientists grow in future. I met Agnieska whilst networking at an international biochemistry conference: there are some great opportunities out there if you are open to them. I am just at the beginning of my academic journey, but we never stop asking questions and dreaming about what we can achieve."

Turkey and EMBO in numbers

3 **EMBO Members**

Izmir
1 Tınaztepe University

2 Retired

15 **EMBO Installation Grants**[a]

Ankara
2 Bilkent University

Istanbul
3 Boğaziçi University
6 Koç University
1 Sabancı University

Izmir
2 Izmir Biomedicine and Genome Center
1 Izmir Biomedicine and Genome Center and Dokuz Eylül University

25 **EMBO Scientific Exchange Grants**[b]

1 **EMBO Young Investigator**

Istanbul
1 Koç University (predecessor of EMBO Installation Grants)

2 **EMBO Practical Courses in Turkey**[c]

55 participants
282 Turkish nationals attended EMBO Courses & Workshops throughout Europe[d]

EMBC Delegates

Prof. Ahmet Ademoglu
Professor in Biomedical Engineering, Boğaziçi University, İstanbul

Dr. Jale Sahin
Senior Programme Coordinator at the Directorate for International Cooperation, The Scientific and Technological Research Council of Turkey (TÜBİTAK), Ankara

The EMBO Programmes are funded by the European Molecular Biology Conference (EMBC), an inter-governmental organization that comprises 30 Member States. Turkey has been an EMBC Member State since 1993.

a Holding an active grant in 2021
b From 2016 to 2020. EMBO Scientific Exchange Grants were called EMBO Short-Term Fellowships until March 2021.
c From 2016 to 2021
d From 2016 to 2020

EMBO opportunities in Turkey

EMBO Postdoctoral Fellowships

fund scientists to carry out research for a period of up to two years. International mobility is a key requirement.
New: Five additional EMBO Postdoctoral Fellowships are reserved for researchers applying to work in one of the following countries: Croatia, Czech Republic, Estonia, Italy, Lithuania, Luxembourg, Poland, Slovenia, and Turkey.

EMBO Scientific Exchange Grants

support new, international collaborations, enabling the transfer of expertise unavailable in the applicant's laboratory. They fund research visits of up to three months. Applications open all year around.

EMBO New Venture Fellowships

help early career scientists to explore topics outside their current area and enter a new research direction. They fund research visits of up to three months. Application deadline: 1 June 2021.

EMBO Core Facility Fellowships

support training for staff of core facilities that provide services to research institutions or universities. They fund international exchanges of up to one month. Applications open all year around.

The EMBO Young Investigator Programme

supports group leaders in the early stages of setting up their independent laboratories for a period of four years. Networking is a key aspect of the programme. Application deadline: 1 April.

EMBO Advanced Collaboration Grants

are a new scheme for group leaders in participating countries such as Turkey who wish to visit scientists in other EMBC Member States to develop or carry out collaborative projects, or to prepare joint grant proposals. This scheme will start accepting applications by December 2021.

EMBO Practical Courses

provide training in new techniques for researchers as well as core facility staff. Application deadlines: 1 March and 1 August.

EMBO Workshops

bring together scientists to present and discuss their latest discoveries. Application deadlines: 1 March and 1 August.

EMBO Lecture Courses

provide funding for lecture courses to train PhD students and postdoctoral researchers in participating countries such as Turkey. Application deadline: 1 March 2022.

EMBO Lecture Series

provide funding to invite EMBO Members and Young Investigators to give lecture series in institutions in participating countries such as Turkey. Applications open all year around.

EMBO Press

publishes five journals that serve the global life science community: *The EMBO Journal*, *EMBO Reports*, *EMBO Molecular Medicine*, *Molecular Systems Biology*, and *Life Science Alliance*, published together with Rockefeller University Press and Cold Spring Harbor Laboratory Press.

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Focus on Turkey

EMBO

Facts and figures

Turkey has more than eight million students enrolled across more than 200 higher education institutions[1]. Median age of Turkey's 83.6 million people is 33 years[2]. Turkey's Council of Higher Education oversees higher education institutions in Turkey[1]. The past two decades have seen a significant expansion of dedicated departments and centers for molecular life science research within the university system[3].

The Scientific and Technological Research Council of Turkey (TÜBİTAK) is the primary funder of research in the country. Publicly funded grant, exchange, and scholarship programmes promote a wide range of activities[4]. These include research, technology transfer, and university-industry collaborations[4]. There is also support for international mobility, including fellowships for established and young international researchers. Under Horizon 2020, Turkey had a strong participation in European Research Council (ERC) and Marie Skłodowska-Curie Actions (MSCA) programmes[5].

The country scores favorably on key innovation measures such as creative outputs[6], job-to-job mobility of human resources in science and technology[7], and government support for business R&D[7]. The proportion of innovative firms in Turkey has also increased substantially during the past two decades[2]. In 2019 Turkey averaged 550 new startups each year[2].

In 2020, gross expenditure on R&D in Turkey was 1.09 % of GDP[8]. Business enterprise financed 49.4 % of GERD expenditure, the Turkish government 33.6 %, 3.5% was funded from abroad, while 13.5 % was provided by other national funding sources[9]. Turkey has set out ambitious plans to increase its national research and innovation capacity. The country aims to increase GERD expenditure to 1.8% of GDP by 2023[10]. It also plans to increase the number of high-tech products, drive international collaborations, and build more human resources[11].

Key figures

Population: 83.6 million[1]

R&D spending: 1.09 % of GDP[8]

Total researchers: 243,773[12]

Researchers per 1,000 employed: 4.8[12]

Patents: 372[13]

Number of higher education institutes: 206 with more than 8 million students in total[1]

Horizon 2020 funding:

1,189 organizations and 201 SMEs involved in H2020 projects[14]

25 ERC Principal Investigators[14]

186 Marie Skłodowska-Curie Actions funded researchers[14]

All information as of December 2021.

References
1 https://www.yok.gov.tr/Documents/Yayinlar/Yayinlarimiz/2019/Higher_Education_in_Turkey_2019_en.pdf
2 https://www.tuik.gov.tr/Home
3 Interview with Mehmet Öztürk
4 https://www.tubitak.gov.tr/sites/default/files/rd_ecosystemofturkey.pdf
5 https://ec.europa.eu/info/research-and-innovation/strategy/strategy-2020-2024/europe-world/international-cooperation/turkey_en
6 https://www.globalinnovationindex.org/gii-2021-report#
7 https://ec.europa.eu/docsroom/documents/45939
8 https://data.tuik.gov.tr/Kategori/GetKategori?p=bilgi-teknolojileri-ve-bilgi-toplumu-102&dil=2
9 https://ec.europa.eu/info/sites/default/files/srip/2020/ec_rtd_srip-2020-report.pdf
10 Eleventh Development Plan for Turkey (2019 – 2023) S.A.B.M.O. Turkey Ankara (2019)
11 https://ulakbim.tubitak.gov.tr/en/haber/president-tubitak-prof-and-hasan-mandal-joins-open-science-summit-turkey-2018
12 https://data.oecd.org/rd/researchers.htm
13 https://www.epo.org/about-us/annual-reports-statistics/statistics/2020/statistics/granted-patents.html
14 https://webgate.ec.europa.eu/dashboard/extensions/Country-Profile/CountryProfile.html?Country=Turkey