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Co-creation based approaches are transforming the way R&D and innovation is being conducted with interactive processes replacing linear processes

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Prof. Hasan Mandal, president of the Scientific and Technological Research Council of Turkey (TÜBITAK), explains how the COVID-19 platform coordinated by the agency has transformed the Turkish ecosystem by bringing together 436 researchers from 49 different institutions to collaborate on 17 drug and vaccine development projects. In addition, Prof. Mandal highlights the benefits of a co-creation approach and TÜBITAK's work with international organizations.

What is the current role of the Scientific and Technological Research Council of Turkey (TÜBİTAK)?

TÜBİTAK is the leading agency in charge of managing, funding, conducting, and coordinating scientific and technological research in Turkey. The agency operates as an affiliated institution of the Ministry of Industry and Technology with adequate administrative and financial autonomy.

TÜBİTAK was established in 1963 with the mission of advancing science and technology, carrying out research, and supporting Turkish researchers. This year, we have celebrated our 58th anniversary as an institution that serves the entire Turkish research ecosystem, including about 5,000 researchers in 23 research institutions that focus on strategic areas.

Each year, thousands of researchers from universities and industrial firms benefit from our support programs and thousands of scholars receive scholarships. In addition, TÜBİTAK is the executing agency in the deployment of international scientific and technological agreements, and the

national coordinating body for the European Union Framework Programs in Turkey.

It is also important to emphasize that TÜBİTAK not only supports innovation, academic and industrial R&D studies but also, in line with national priorities, develops scientific and technological policies and manages R&D institutes, carrying out research, technological advancement and developmental studies.

How is the agency structured and how does it support research and development in the field of health sciences and biomedical technologies?

TÜBİTAK is governed by a Management Board whose members are selected by prominent scholars from universities, industry and research institutions. I currently serve as Chair of the Management Board and President.

Our headquarters coordinate different streams of research funding via three main directorates, namely the Academic Research Funding Programs Directorate (ARDEB), the Technology and Innovation Grant Programs Directorate (TEYDEB) and the Directorate of Science Fellowships and Grant Programmes (BIDEB).

The agency collaborates with multiple institutions that focus on genetic engineering and biotechnology, chemical technologies as well as information technologies. Advances in health sciences and biomedical technologies that are making an impact in the healthcare industry are supported by ARDEB and TEYDEB while researchers in these technologies are encouraged and supported by BIDEB.

TÜBİTAK also implements the national research and innovation policy and national priorities identified by the Science, Technology and Innovation Policy Council (STIPC).

The 11th Development Plan of Turkey has put a special emphasis on R&D and innovation activities that support high value-added production. The chemical, pharmaceutical and medical devices industries have been determined as priority sectors in the field of healthcare. In terms of specific technologies, advanced materials, robotics, micro-nano electromechanical systems, biotechnology, artificial intelligence, and big data have been determined as critical technologies where human resources must be supported and infrastructure developed.

TÜBİTAK has been praised for its role during the COVID-19 pandemic supporting several research projects. Can you explain the agency's role during the pandemic?

Even before the pandemic, TÜBİTAK had been mobilizing stakeholders through co-creation-based initiatives in high tech areas, including vaccine and drug development.

Co-creation based approaches are transforming the way R&D and innovation is being conducted with interactive processes replacing linear processes. Approximately six weeks before the official pandemic declaration by the World Health Organization (WHO), the ecosystem's drug and vaccine development competencies were unified in a platform under the patronage of the Ministry of Industry and Technology with the coordination of TÜBİTAK.

This platform, called the COVID-19 Turkey Platform, has transformed the ecosystem by bringing together 436 researchers from 49 different institutions in 17 drug and vaccine development projects based on a co-creation approach from the very beginning.

Among the 17 projects, seven are innovative vaccine development projects. The virus-like particle (VLP) vaccine candidate of the platform became the first to enter clinical trials and the fourth VLP vaccine to do so globally, according to the WHO. Phase I clinical studies included 36 participants, including the Minister of Industry and Technology and myself. Phase II trials were completed with 349 participants and phase III will begin soon.

In addition, the inactive vaccine candidate is progressing to phase II studies, the adenoviral vector vaccine candidate is initiating phase I studies, and the DNA, mRNA, recombinant Spike protein and ASC particle-based recombinant vaccine candidates are moving closer to starting phase I studies.

Beyond vaccines, the COVID-19 Turkey Platform includes 10 different treatment-oriented drug development projects that involve drug molecular modelling, recombinant neutralizing antibody, convalescent plasma and synthetic drug synthesis and production.

20,000 molecules have been virtually scanned within the two drug molecular modelling projects; phase II studies are ongoing to evaluate the two most promising antiviral drug candidates. Of the 436 researchers with our platform, 213 are early-stage researchers.

What opportunities does TÜBİTAK and other agencies offer to researchers interested in life sciences?

There are multiple opportunities for researchers working in life sciences to collaborate both locally and abroad. In addition to providing research project grants, TÜBİTAK supports leading researchers with national scholarships.

Due to the big opportunities in biomedical engineering and the convergence of artificial intelligence with life sciences, some of our leading researchers are working in projects related to the use of robotics in healthcare, new therapeutic agents for gene expression and new generation cardiovascular devices.

As part of the Industry Doctorate Programme, over 1,160 doctoral students are being trained in projects that involve 224 industrial firms and 80 universities.

Moreover, TÜBİTAK supports entrepreneurs in the sector, from project design all the way to scale-up of startup companies, with the Entrepreneurship Support Program, where we have supported over 1,670 entrepreneurs.

It is necessary to further highlight the importance of the various funding opportunities provided by international organizations, such as the European Molecular Biology Organization (EMBO) and the International Centre for Genetic Engineering and Biotechnology (ICGEB). TÜBİTAK makes financial contributions to the annual budgets of international organizations that boost mobility and networking support schemes to initiate new scientific collaborations, including EMBO and ICGEB.

Collaborative, multinational and multidisciplinary research efforts are crucial to solve the grand challenges of our times.

TÜBİTAK represents Turkey in international research efforts including memberships in European Science Foundation and the European Union Framework Programmes for Research and Technological Development. What achievements has the agency attained at the international scene?

TÜBİTAK has been preparing to strongly participate in the new Framework Programme, Horizon Europe through high level political commitment, adaptation of the national research and innovation system, and organization of promotional events and activities. We are currently negotiating the inclusion of Turkey in Horizon Europe.

According to unofficial data we have 934 funded projects that include 1,328 stakeholders from Turkey, granted with more than EUR 296 million. This shows significant increase in our Horizon

2020 performance compared to previous EU Framework programmes. 40 of those are multi-beneficiary health research projects, ranging from pan-European COVID-19 vaccine trials and cohorts to digital diagnostics, big data and AI.

Increased success in Horizon 2020 programme reflects the efficiency of the national coordination system and the research community’s rising interest in the program.

I am proud that the number of multi-beneficiary consortiums coordinated by Turkish entities has increased to 29, one of which is PandeVITA, a project we are coordinating that involves 7 different institutions from 5 different countries to provide support during the pandemic.

In order to ensure an effective integration into the European Research Area, Turkey’s national support programs are harmonized with Horizon 2020; since 2019, EUR 54 million were invested in the national projects.

The country is prioritizing research an innovation projects that align with EU policy objectives, including the Digital and Green Transition, European Green Deal, Innovation Union Commitments and Horizon Europe.

During the pandemic, Turkish talent was put in the spotlight after the success of Ugur Sahin and Ozlem Tureci, the Turkish couple that founded BioNTech. What does their success say about the scientific capacity and know-how available in Turkey, particularly for healthcare?

We are proud of the great accomplishments of the successful couple who have founded BioNTech and rapidly produced a COVID-19 vaccine. Both Uğur Şahin and Özlem Türeci have been a great source of inspiration not only in our country but also across the world. This inspiration is also supported by the value of hard work and determination in guiding scientific capacity and the accumulation of know-how.

We are constantly motivating the younger generation of researchers to consider research careers in the life sciences and healthcare, which is receiving great interest especially with the appreciation of the opportunities in this area. Young researchers have been acquiring knowledge of important topics that are expected to take a leading role in the upcoming decade, including are also gaining an outlook to important topics within the next 10 years, including single cell analysis, mapping of the brain, regenerative medicine, cancer immunotherapy, new vaccines, gene editing and precision medicine. In order to support them, TÜBİTAK founded a science school on the Gebze

research campus.

How is TÜBİTAK helping the country discover and develop the next Ugur and Ozlem?

Beyond a wide range of scholarships, education and internship opportunities, another example is the Biotechnology Innovation Competition in the large technological festival organization of Teknofest, where students have an opportunity to compete based on their innovative ideas in biotechnology.

Fostering scientific and technological creativity supports success and innovation in the life sciences and healthcare. If we take the different opportunities that we provide to the ecosystem within one framework, early career researchers and entrepreneurs have a rich array of opportunities to pursue their ideas, goals and aspirations. TÜBİTAK is always on their side, including through mentorship support from experienced human resources. We clearly see that hard work and determination combined with opportunities for support leads to high impact and innovative ideas and will produce many more leaders in this field just like the great achievements of Uğur and Özlem.

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