



HIGHLY PERSONALIZED MEDICINE

In February 2017, the School of Medicine and Health Sciences of the Universidad del Rosario established the Institute of Translational Medicine of the Universidad del Rosario (IMTUR). This pioneer initiative in the country seeks to combine the efforts of the institution's advanced medical research centers to improve prevalence and incidence registers for diseases affecting Colombians.

A great challenge. That's what brought Óscar Mauricio Arcos Burgos back to Colombia after 25 years of basic and clinical research, teaching, publications, and supervising projects in human genetics, and evolution. He had previously worked and studied in countries including Chile, the United States, and Australia.

Arcos has a Master's degree in biology from the University of Antioquia, his medical degree from the University of Cauca, a doctorate in genetics from the University of Chile, and a doctorate in clinical genetics from the residency program of the National



Translational medicine is highly personalized since it uses the genetic, medical, and environmental information of patients.

What is translational medicine?

Mauricio Arcos (MA): It responds to the need to build bridges between basic and clinical research. It seeks to make discoveries resulting from scientific and experimental activity available for use in direct medical practice with patients, and to see immediate results reflected in their health.

It is highly personalized, since it uses the genetic, medical, and environmental information of patients—even their lifestyles and cultural backgrounds—to produce systematic analyses of individuals that can generate specific diagnoses and treatments.

For example, the same treatment cannot be applied to everyone suffering from a particular respiratory disease. We now know that there are individuals who follow different patterns in keeping with their age, gender, origin, and history. We are talking here about precision medicine, which can only be reached in the degree to which we are familiar with patients' individual genomes.

The fact that we use technology to produce our own databases will allow us to work with data models that we believe will correspond to our population.

What are the origins of the Institute and how was it established?

MA: The Center for the Study of Autoimmune Diseases (CREA) had already been working with its translational medicine group, focused on researching and applying family-based and personalized treatments of autoimmune diseases. The Institute was established as an interdisciplinary amalgam uniting several research groups and centers to produce scientific knowledge for the early prediction and treatment of noncommunicable chronic diseases, and to improve their prevalence and incidence registers with an emphasis on the country's needs, which is not to say that any solutions that we find here cannot be used to serve other communities.

Human Genome Research Institute in the metropolitan area of Washington, D.C. Until the end of 2016 he was an associate professor and led the Genomics and Predictive Medicine Group at the Department of Genome Sciences of the School of Medical Research at the Australian National University in Canberra; now he is the director of the Institute of Translational Medicine of the School of Medicine and Health Sciences at the Universidad del Rosario (IMTUR).

BUILDING KNOWLEDGE TOGETHER

"The great challenge is to produce knowledge jointly through transversal and coherent research projects at the high-level research centers of the University's School of Medicine and Health Sciences," he explains.

To Arcos, improving people's health is something that cannot be accomplished alone, which is why knowledge should be shared and amalgamated.



← This work will contribute to the construction of a better university and better professionals through the production of knowledge.

→ "We want to have an effect on the treatments provided to patients. We should have products to offer to the community no more than two years from now," say researchers Claudio Mastronardi and Óscar Mauricio Arcos Burgos.



What are the principal goals?

MA: We have several specific goals that fall within the mission of the University. We want to use the techniques of basic research to answer research questions that arise in the context of providing medical care to patients and communities with noncommunicable chronic diseases, and to disseminate our results for the benefit of patients and communities.

We are going to contribute to the construction of a better University and the training of better professionals through the production of knowledge. We want to favor scientific progress and development of researchers in these areas through training.

At the same time, we will work toward defining the populations at risk of suffering from noncommunicable chronic diseases that should be targets of public health campaigns based on predictive and prognostic biomarkers. We will also characterize the behavior of each noncommunicable chronic disease and we will develop strategies for interinstitutional collaboration with local, national, and international centers.

Who is part of the Institute?

MA: In this initial phase, four centers of high-level research at the School of Medi-

4

research
centers

33

high-level
researchers

309

publications
2006-2017

Source: Scopus, 2017

cine and Health Sciences make up the Institute: CREA; the Research Center on Genetics and Genomics (CIGGUR); the Center for the Study of Highly Prevalent Neurological Disorders, Neurodegenerative Diseases, and Neuropsychiatric Disorders (NEUROS); and the Center for the Study of Communicable and Metabolic Diseases (BIO-BIO).

The scientists who work at all these centers and groups produce excellent work; we have international authorities in every specialty.

Argentine neuroendocrine immunologist Claudio Mastronardi came with me from the Australian National University. Dr. Mastronardi has a Ph.D. in the development and function of the hypothalamic-pituitary-adrenal axis and its implications for the appearance of autoimmune and psychiatric diseases. Our work consists of sharing and optimizing the knowledge of these research centers and the scientists who work there, as well as the use of the resources available to us. It is of the utmost importance that we have processes for the storage, analysis, and processing of shared bioinformatic and biostatistical data.

What are the greatest challenges?

MA: We have an initial five-year plan. The



great challenge is to begin to collaboratively produce shared knowledge through transversal and coherent research projects across the centers. In addition, we want to impact on treatments provided to patients. We aim to have products to offer to the community in no more than two years from now.

These great challenges include increasing the number and impact of publications, improving the performance of some groups that have not reached level A1 in Colciencias, integrating more doctoral and master's students, generating more exchanges of high-level scientists, students, and interns, increasing the application of our work to large international projects, and generating more agreements for collaboration with entities that provide clinical health care services.

Improving people's health is not something that can be done alone, so we should make our work interinstitutional. All of us should work toward this goal. We want to convince the State to develop collateral policies from this perspective and we want to involve service providers and producers of medical and robotic products and instruments. ■

IMTUR

Dr. Mauricio Arcos Burgos



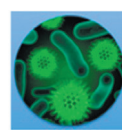
Center for the Study of Autoimmune Diseases
Dr. Juan Manuel Anaya



Center for Research on Genetics and Genomics
Dr. Paul Laissue



NEUROS
Dr. Alberto Vélez



BIO-BIO
Dra. Beatriz Gómez

CORE FACILITIES

Proteomics – Genomics – Transcriptomics
Microscopies – Metabolomics – Bioinformatics
Biostatistics – Cell Culture

↑ The high-level research centers that make up the Institute of Translational Medicine at the Universidad del Rosario are: The Center for the Study of Autoimmune Diseases (CREA), the research Center on Genetics and Genomics (CIGGUR), the Center for the Study of Highly Prevalent Neurological Disorders, Neurodegenerative Diseases, and Neuropsychiatric Disorders (NEUROS), and the Center for the Study of Communicable and Metabolic Diseases (BIO-BIO).

SHARED INSTRUMENT

Core Facilities is the instrument that enables the philosophy of coherence, collaboration, and maximization of IMTUR's cutting-edge scientific and technical resources. All the centers and groups that benefit from this collaborative mechanism for the highest quality of scientific production will reduce their costs and have access to state of the art instruments in microscopies, genomics, transcriptomics, metabolomics, and bioinformatics.

In addition, the state-of-the-art strategy will seek to produce induced pluripotent stem cells (stem cells that can generate most tissues) and these will play a critical role in the study of personalized medicine, pharmacoresistance, and genome editing.