EDITORIAL COMMENT

Marina Pinheiro[1,2,3], João Rocha-Neves [4,5]

[1] LAQV, REQUIMTE, Department of Chemistry, Faculdade de Farmácia, Universidade do Porto, Portugal
[2] ICVS, Life and Health Sciences Research Institute, School of Medicine, University of Minho, Portugal
[3] ARS Norte. ACES Cávado III. Public Health Unit. Barcelos, Portugal.
[4] Department of Angiology and Vascular Surgery, Centro Hospitalar Universitário de São João, Porto, Portugal
[5] Department of Biomedicine – Unity of Anatomy, Faculdade de Medicina da Universidade do Porto, Portugal

From bench to bedside: translating medicine from the lab to the clinic

The origin of "translational" stems from the ancient Latin "translatio", which means "to carry over." Translational research aims to create new therapies, medical procedures, and diagnostics from scientific research in patients' benefit [1]. The motto "from bench to bedside" sums up the objective of translational research, i.e., to improve people´s health outcomes using science and research. The concept of translational medicine emerged in medicine in the late 1990 but historically we can find in the literature evidence of Louis Pasteur's dream of a science that 'immediately finds practical applications [2, 3]. Translational research describes the process of applying observations and scientific discoveries made in the laboratory to clinical applications that can improve the health of individual patients.

Cardiology is an area of medicine particularly fascinated by the translational concept of medicine. In this context, in 2007 it was created the International Society for Cardiovascular Translational Research (http://www.isctr.org/) coordinated the basic and clinical researchers, regulatory authorities, and the medical industry to improve the process of transferring new scientific evidence into clinical applications, promote translational research, and divulge new scientific results to the scientific community, and develop guidelines for conducting translational research studies. Some exciting fields of cardiovascular translational research are the discovery of new biomarkers that could be useful for the diagnosis, therapeutics, and prognostic of specific cardiac diseases, the elucidation of the genetic basis of cardiovascular diseases, and the clarification of genetic predisposition to cardiovascular illnesses. Moreover, other vital areas include the discovery of new therapies to reduce the amount of myocardial death during an acute myocardial infarction and cardiac regeneration, i.e., the possibility of physicians repairing a failing heart with stem cells or applying tissue-engineered myocardial infarction patches [1].

The translation research aims to overcome the obstacles and limitations of basic biomedical research, and the realization of tangible health benefits. The first step involves the transfer of new understandings of disease mechanisms gained in the laboratory into the development of new methods for prevention, diagnosis, and therapy, and their first testing in humans. The final stage involves the translation of results from clinical studies into everyday clinical practice and health decision making

Despite the obstacles translational medicine encounters, the future seems promising. A significant

impediment to knowledge transfer is the funding since developing new drugs, and new diagnostics require substantial investments, subject to rigorous regulatory requirements. Thus, it is essential to close the gap between laboratory results and patient care and increase the system's sustainability, as resources invested in research will be recovered in the form of economic and medical benefits. In the future, translational medicine is expected to continue to have more success with the creation of centers of excellence where basic and clinical scientists and stakeholders, including government, academia, industry, entrepreneurs, and investors, can meet and integrate their ideas for the benefit of the community and its businesses.

Moreover, health databases are expected to be created in the following years to prevent diseases and improve patient outcomes. Mandatory clinical health registries are paramount in the identification of relationships between factors that can lead to adverse health outcomes. The big data will compile information about the patients, health, previous diagnoses, hospitalizations, and exams results, including x-rays, vital signs, blood tests, and clinical examinations. In addition, the data will be an overview of the patient's previous medication and lifestyle in terms of diet, exercise, and alcohol use. In addition, having the data of the population will enable a more precise characterization, which will allow studying data patterns and predicting the necessities of the populations.

The authors of this editorial envisage a future with highly collaborative and multidisciplinary teams of basic science researchers, clinicians, statisticians, and research coordinators to design safe and effective trials centered on the patient, which will contribute to advancing the current knowledge of prevention, diagnosis, management, and prognosis of diseases, creating optimized opportunities for academia to commercialize their discoveries and catalyze an increase in the efficiency and safety of their innovations.

REFERENCES

1. F. Giacomo, B. Umberto, B.-Z. Giuseppe, S. Sebastiano, Bridging the Gap between Translational and Outcome Research in Cardiovascular Disease., Biomedical Research International 454680 (2015).
2. R.J. Cohrs, T. Martin, P. Ghahramani, L. Bidaut, P.J. Higgins, A. Shahzad, Translational Medicine definition by the European Society for Translational Medicine, New Horizons in Translational Medicine 2(3) (2015) 86-88.
3. E. Engebretsen, G. Fraas Henrichsen, J. Odemark, Towards a translational medical humanities: introducing the cultural crossings of care, Med Humanit 46(2) (2020).
4. B.H. Littman, L. Di Mario, M. Plebani, F.M. Marincola, What's next in translational medicine? Clin Sci (Lond) 112(4) (2007) 217-27.