Young GI angle: A young point of view to Translational Medicine

Unravelling the concept of Translational Medicine

The term 'Translational Medicine' (TM), often used interchangeably with 'Translational Research' (TR), has gained momentum in recent years. The European Society for Translational Medicine (EUSTM) defines it as "an interdisciplinary branch of the biomedical field supported by three main pillars: benchside, bedside and community".

The main goal of TM is to bridge the gap between scientific research been developed in the lab bench and its possible future application at the clinical beside. This area of research is rapidly developing with the aim of accelerating the progression of a scientific discovery or finding into a diagnostic tool and/or therapy applied to human diseases to improve human health. In another words, TM acts as an umbrella bringing together basic and clinical research and encompasses numerous disciplines such as preclinical and clinical trial studies, intellectual property or regulation.

The relevance of scientific collaborations: bridging the translational gap

Whilst the importance and benefits of TM seem clear, significant challenges are also well-recognised. One challenge in health care is that only few results are safely translated into effective clinical interventions. This lag between scientific discovery, and the translation of those discoveries into clinical practice, is known as the "translational gap".

An effective and open-minded scientific collaboration between basic scientists and clinicians is crucial to progress in TM. However, this is often a challenge due to the lack of communication, differences in education and training, and different goals and reward mechanisms between both professional groups.

The work of basic scientists helps to understand biological processes and mechanisms of disease pathogenesis and progression. On the other side, clinical medicine is key to move results from clinical studies into clinical practice and to finally understand the efficacy and impact of the clinical product. But research does not proceed linearly and to improve the clinical relevance of the scientific findings, researchers should consider implementation at the initial steps of their research. Interdisciplinary teams formed by members with diverse professional backgrounds, would clearly minimise the translational gap whilst having a greater potential to benefit patients. Direct collaboration with pharmaceutical industry is also key to accelerate this progress.

Academic health science centres, national societies and research institutes, have been aimed at encouraging qualified doctors to engage in research providing clinical scientists with the knowledge and tools needed to translate research discoveries into improved patient care. In the last years, some attention has been also given to support basic scientists performing translational research. Despite there are diverse national and European initiatives trying to speed clinical translation, many challenges and limitations still remain. Some barriers to TR are related to lack of sustained funding, regulatory issues such as ethics involved in human research, tissue banking or material transfer regulations and intellectual property rights, among others.

This complex situation highlights the urgent need for a TR integrative platform which would serve to reduce the translational gap by promoting cutting-edge research with a clear focus on patient benefit.

Ways to promote and improve a collaborative research: steps for Translational Medicine

TR should create an educational, developmental and collaborative playground where scientists could design experimental approaches, while maintaining a view of their implications and how their work may help in the discovery of new therapies to achieve a public benefit. This fact alone initiates a positive dynamic with transformational potential that mobilises basic scientists, technologists, researchers and clinicians along the same axis of inquiry, creating a space for cooperation and collaboration. It is a disruptive idea indeed, because traditionally, scientists and clinicians have developed their work in disconnected departments as a result of their differences

in professional language and culture, priorities and perspectives, preventing them from occupying a common space.

The basis for TR support will come from several sources: Nationals Health Systems, industry, foundations, universities or medical centres, among others. It is important for hospitals and medical centres to build the necessary infrastructure that promotes TR locally, regionally, and nationally. Some centres may provide expertise in a given area that can be used by other centres. This may serve as a catalyst for investigator-initiated TR as well.

Although the necessity for such an integration may seem obvious, it is anathema in most countries. The reality in most nations is that there are strict separations of revenue streams for hospitals on the one hand and for research resources that fund biomedical science on the other. The traditionally strict separation of both creates hurdles in the development pathway and often means that the translation from scientific discovery to marketable product and revenue generation is more time-consuming than necessary.

Historically, the financial support of the pharmaceutical industry for academic institutions has taken the form of investigator-driven research grants. Industry has now realised the obsolescence of this strategy and is seeking to establish new models in which academic institutions are true partners in the drug-discovery process.

To strengthen the foundations of TR in the near-term, companies could take actions such as defining metrics to assess TR impact, optimizing their governance to enable collaboration among TM, research, and development (pre-proof of concept and post-proof of concept), fostering knowledge-sharing across therapeutic areas, and finding and retaining the right talent.

TR practices will integrate scientific (for example, biomarkers), technological (for example, *in vitro* testing modalities) and methodological (for example, in silico trials) advances to both, enabling more effective decision-making in R&D and enhancing coordination not only among functions within a biopharma company but also within industry, academic and government players.

Impact

The reclassification of pathological processes through the identification of molecular signatures creates a new classification of the human diseasome that is breaking down conceptual barriers and redefining how we understand disease. The repositioning of hierarchical classifications of diseases to molecular profiles, and not phenotypic manifestations, can only be strengthened if the biological information management systems are robust and efficient. With this in mind, the concept of FAIR data (Findable, Accessible, Interoperable, Reusable) has been developed, which should be a catalyst in the acceleration of outcome applicability. Future developments in TM should be built on this strategy, where biological data is managed in a meaningful way to support a fast-track development process. This is particularly important in the pre-implementation phase where technological outcomes from different experimental models will determine the successful implementation of health care interventions.

Furthermore, the concept of TR extends beyond the domains of laboratory, not only to patients but to the community as a whole, necessitating health systems and operational research involving disciplines of epidemiology, behavior and social sciences, to incorporate the leads from the new research and technology in formulating public health policy and delivery strategy.

In this way, the main impact of TR will be to translate the basic finding in clinical practice, but it will also generate publications, patents, spin out companies and new jobs, reported products and clinical trials, and more and more funding.

There is no doubt that TM is key to accelerate scientific development and improve patient outcomes. Academic health science centres should promote the formation of complex interdisciplinary groups by facilitating the communication between professionals with different academic backgrounds. Translational researchers share a common goal: to combine disciplines, expertise, resources and techniques to promote enhancements in prevention, diagnosis, and therapies contributing to the improvement of patient care.

Pilar Acedo[1] and Francesco Paolo Russo[2]
[1]University College London, Institute for Liver & Digestive Health, Division of Medicine, London, United Kingdom (Junior Contributor). [2]University Hospital Padova, Gastroenterology and Multivisceral Transplant Unit, Padova, Italy (Senior Contributor).