Translational Medicine: A Requirement for Effective Health Care in the Future

The importance of disseminating medical and scientific research within academic institutions to promote collaboration and multidisciplinary inputs for solving medical problems was the focus of the 2012/2013 Faculty Seminars. These were followed by the 2013/2014 Seminar series that discussed the challenges faced in delivering research and evidence-based health care regarding pain. In this latest issue of "Medical Principles and Practice", we advance this notion to discuss the importance of ‘Translational Medicine’ in health care. Although this term may mean many things to many people, the general consensus is that translational medicine is an interdisciplinary approach for the effective translation of new knowledge, mechanisms and techniques generated by advances in basic science research into new approaches for the prevention, diagnosis and treatment of diseases.

Translational medicine thus involves three main pillars: the benchside, the bedside and the community. Its primary aim is to translate basic biomedical research into clinical applications using a multidisciplinary, highly collaborative, ‘bench-to-bedside’ approach that will benefit patients and the community at large. In the USA and Europe, formal translational research centers promote such research and highlight its necessity in creating an effective health care system. In Kuwait, although no formal translational research center exists per se, active researchers are already involved in translational medicine. Four faculty seminars were selected to showcase the impact of basic science research and its likely translation into clinical practice.

In the first of these, Barakat and Redzic [this issue, pp. 3–14] highlight how basic science research into the underlying mechanisms of cerebral ischemia may lead to novel therapies for this potentially fatal condition. Cardiac arrest and strokes can lead to ischemia in the brain, either focal (limited to a small region of the brain) or global (widespread and covering large parts of the brain). However, the role of individual cells in response to ischemia and reperfusion injury in the brain is not clearly known. Barakat and Redzic review the role of microglia and resident macrophages in cerebral ischemia. It appears that transient ischemia leads to alterations in the phenotype of resting microglia/macrophages from the M1 to the M2 phenotype, which ultimately leads to anti-inflammatory and cerebro-protective effects. However, fine alterations in the balance of the number and phenotype of these cells appear to be critical in determining beneficial versus detrimental neurological outcomes. Thus, further basic research studies in this important aspect of cerebral ischemia may lead to novel treatment strategies in the future.

Diabetes and its complications are a major health and cost burden in Kuwait and the region. Advances in basic research in this field and their translation into the clinic could lead to important and much-needed new strategies for the treatment of diabetes, metabolic disorders and the resulting complications. Dr. Al-Sabah [this issue, pp. 15–21] suggests that understanding the molecular pharmacology of incretin hormones and their receptors could hold the key to producing a wave of novel therapies for
such conditions. Glucose-dependent insulinotropic polypeptide and glucagon-like peptide (GLP-1) are incretin hormones that appear to be important regulators of insulin and glucagon secretion as well as lipid metabolism and appetite, making them important targets for treating diabetes and obesity-related disorders. Indeed, GLP-1 receptor agonists and an inhibitor of the enzyme that breaks down GLP-1 in the body are already available in the clinic for the treatment of type 2 diabetes. Dr. Al-Sabah purports that further studies in the basic sciences of incretin receptors will likely improve on the clinical portfolio of currently available medicines from this important group of regulatory hormones. We await such advances with bated breath.

In his review, Dr. F.A. Babiker [this issue, pp. 22–28] highlights how a novel strategy for treating ischemic heart disease has entered clinical trials and could form the basis for future clinical therapy. Ischemia arising from hypoperfusion of the heart, such as in coronary artery disease, results in the deprivation of oxygen and vital nutrients, which leads to the death of cardiomyocytes and eventually myocardial infarction, a leading cause of death. Paradoxically, restoring the blood supply to the heart leads to more damage, termed reperfusion injury. In the past, preconditioning techniques were developed that would prevent reperfusion injury, but their translation into the clinic is limited as they require prior knowledge of a cardiac ischemic event. Dr. Babiker advocates the use of a technique that may have practical clinical application in that it can be implemented post-ischemically, such as after a heart attack. He describes the technique of pacing post-conditioning which involves subjecting the post-ischemic heart to brief episodes of mechanical dysynchrony that can be induced by ventricular pacing at a normal heart rate during the very early phase of reperfusion to afford cardioprotection. The practical utility of this technique has been studied in a recent clinical trial by one of Dr. Babiker’s previous laboratories, and the results appear promising for the translation of this technique into the clinic. Indeed, recent advances by his own group in understanding the underlying mechanisms by which pacing post-conditioning affords cardioprotection and the possible use of pharmacological agents to mimic pacing post-conditioning might lead to further clinical trials and applications.

Finally, Lakha et al. [this issue, pp. 29–42], in a bedside study of translational medicine, aimed to evaluate and improve health services for the management of chronic non-cancer pain. Chronic pain is universally debilitating, but its management can vary significantly depending on patient demographics and geography. The authors review the delivery of services for the management of chronic pain in Kuwait and identify the barriers to this delivery of services and patient compliance. They suggest the need for a holistic approach for the general well-being of the patient rather than focusing on the symptoms of pain alone. Furthermore, based on their findings, the authors have compiled a plan for improving integrative chronic pain management in Kuwait. If implemented, this would represent a significant step forward in translating basic biomedical research into bedside clinical practice.

In conclusion, we would like to thank all the authors for their important contributions that highlight the need for translational medicine in improving future health care in Kuwait and beyond. We hope that the selected articles serve as a stimulus for inducing greater multidisciplinary research activity in a ‘bench-to-bedside’ approach that will truly benefit patients and the community at large. After all, this is the essence of translational medicine.

Prof. Saghir Akhtar
Prof. Manuel John Albert
Guest Editors

Disclosure Statement

The authors declare that no conflicts of interest exist.