Humans can’t regenerate large sections of their bodies in the way salamanders or flatworms can. But the discovery of multipotent stem cells in many adult tissues has enervated scientists worldwide with the promise of stem cell-based therapies for a wide range of conditions.

Stem cells have the potential to differentiate into various different cell types. Whilst cells derived from an early embryo have the potential to differentiate into any type of adult cell (pluripotency), the ethical implications of their isolation, as well as our understanding of differentiation processes, has so far limited their use.

However, stem cells derived from adult tissues such as bone marrow, umbilical cord blood and tissue, and placenta have been found to have great differentiation potential. Storing cord blood at birth may, for future generations, provide an individual repository of stem cells with a wide range of therapeutic uses.

The most well-established therapeutic use of stem cells so far is the transplantation of haematopoietic stem cells from bone marrow or cord blood to re-establish the immune system in patients with haematological cancers such as leukaemia or immunodeficiency disorders. However, it can be hard to find suitable bone marrow donors.

In Saudi Arabia, 30 per cent of adult patients and 60 per cent of paediatrics patients cannot find a matching family donor. So in 2011 KAIMRC established the Saudi Stem Cell Donor Registry (SSCDR) with the aim of recruiting 100,000 donors in their first five years. This is no easy feat, however, as many people are not aware of stem cell donation and may find it intimidating. SSCDR launches nationwide public awareness and educational campaigns to recruit donors to reach its target.

Along with the foundation of the Umbilical Cord Blood Bank (UCBB), finding a match for people in need of stem cell transplantation will become markedly easier.

KAIMRC has also established a major research programme into regenerative medicine. The foundation of the Stem Cells and Regenerative Medicine Unit (KSCRMU) integrates the UCBB and SSCDR into a wide programme of basic and clinical research. Seven different research programmes aim to understand the biology of stem cells, their in vivo interactions, and how they can provide the bases for novel therapies.

“We have already seen the benefit of this investment,” says Dr Mohamed Abumaree, who leads KSCRMU. “However, much work needs to be performed in the laboratory and in the clinic to achieve our aim of developing stem cell-based therapies for human diseases.”

Governmental healthcare services buy billions of riyals-worth of brand name drugs every year, explains Al Fadhel. If they can be assured of the efficacy of equivalent generic drugs, through bioequivalence studies, it could cut costs significantly, allowing funds to be utilized for other healthcare services. “Patient care is the priority of this project,” Al Fadhel says.

“The Saudi Arabian government and the private sector will save billions of riyals annually based on our information.”

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The centre’s bianalytical section is now fully operational. The section comes prepared with validated methods for the analysis of 150 drugs in their labs, and the team is now focused on revalidating and optimising these methods. The centre is also in the process of formalising an arrangement with King Fahad National Guard Hospital in Riyadh to admit volunteers for clinical trials and to standardize the processes necessary for adherence.

Local analysis for generic drugs

Saudi Arabia looks set to become the first Gulf country to conduct bioequivalence studies, on genetic drugs used in the Kingdom, at the standard demanded by the Saudi and United States’ FDA regulations.

KAIMRC established its bioequivalence studies centre in 2009 after a year of feasibility studies to assess the regional pharmaceutical market. Now, with cutting-edge instruments and complete documentation describing standardized operating procedures, KAIMRC’s bioequivalence studies centre is preparing for Saudi FDA certification and expects to have access to the market soon.

Dr Salman Al Fadhel, the centre’s head, laid out its mission, saying it aims to improve healthcare access to effective and affordable medication by evaluating locally and regionally available generic drugs, ensuring they have the same active ingredients, concentration and efficacy as their branded counterparts. “The demand for this kind of service in Saudi Arabia is very high.”

Local need

Currently, pharmaceutical companies in the region must go to neighbouring countries, the European Union, or the United States for bioequivalence studies to be done to allow local FDA approval. KAIMRC’s new centre plans to fill this gap.

Exploring human tissue regeneration

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KAIMRC has the region’s first stem cell donor registry