Stem cells in Dental Tissues and Their Regenerative Potential

Dr. Ikhlas Awad Elkarim

Faculty of Dentistry University of Khartoum.

Stem cells provide an attractive novel therapeutic approach for repair and replacement of pathologically damaged tissues. Adult stem cells are becoming largely recognised as potential source of stem cells for future therapy given the controversy around embryonic stem cells. Dental tissues are readily available source of adult stem cells following teeth extraction. Within teeth Stem cells reside in the dental pulp, the periodontal ligament and the apical papilla. These cells are multipotent stem cells of mesenchymal origin that can be successfully differentiated into various specialised cells. Using explants culture and magentic beads separation methods we isolated stem cells form dental pulp and periodontal ligament. We developed a protocol for in-vitro differentiation of dental pulp stem cells into functional neurons and odontoblasts. The osteogenic potential of periodontal ligament stem cells is also explored in addition to the effect of inflammation on renewal and regenerative capacity of these cells. We are particularly interested in the factors that determine fate and terminal differentiation of stem cells to help develop mechanisms for directed differentiation of stem cells for future tissue engineering and regenerative medicine.

Podoconiosis

Prof. Melanie Jane Newport

Brighton and Sussex Medical School and Brighton and Sussex University Hospitals Trust, Brighton

Podoconiosis is a non-infectious geochemical disease that results in swelling of the lower legs. It is caused by long term exposure of bare feet to red clay soil derived from volcanic rock. In southern Ethiopia, where much of our research has been conducted, and north-western Cameroon, it affects 5-8% of the population and is more common than HIV, TB or malaria. Podoconiosis imposes immense economic burdens (the estimated cost to Ethiopia’s economy is $208 million per year) and severe social stigma. Very little research on disease aetiology or pathogenesis has been done, yet such research is needed for rational deployment of limited resources towards prevention, treatment and ultimately eradication of the disease. There is convincing evidence that an area of the genome commonly involved in human responses to infectious and environmental challenges plays a major role in susceptibility to podoconiosis. In this talk I will discuss the work we have undertaken to identify the genetic variation that predisposes to podoconiosis and how this work could have impact on the lives of people affected by the condition. For example, establishing the importance of genetic susceptibility has justified the use of a family history tool in determining which children should be offered shoes for prevention of disease, when shoes are a scarce resource.