



Royal College of Physicians

Alan Mackay-Sim Biography

Alan Mackay-Sim is Professor Emeritus at Griffith Institute for Drug Discovery, Griffith University, Brisbane, Australia. He is a neuroscientist and stem cell scientist. After graduating with a PhD from Macquarie University in Sydney he worked at Universities of Sydney, Pennsylvania, Wyoming and Adelaide before taking up a position at Griffith University in 1987. His research has focussed the human sense of smell and how the olfactory sensory neurons in the nose get regenerated throughout life. He identified the olfactory stem cell in the nose that is responsible for the regeneration of the sense of smell and uses these “adult” stem cells and other olfactory cells from the nose for therapeutic purposes. To this end he established the National Centre for Adult Stem Cell Research in 2006 and built a unique resource: a bank of neural stem cells from over 300 people, healthy controls and from patients with neurological conditions including schizophrenia, Parkinson’s disease, mitochondrial mutation disorders, Hereditary Spastic Paraplegia, ataxia telangiectasia and motor neuron disease. These are used for understanding the biological bases of neurological diseases and for drug discovery. In another therapeutic application, Professor Mackay-Sim led a Phase I trial a world-first clinical trial in which the patient’s own olfactory glial cells were transplanted into the injured spinal cord to treat human paraplegia. This proved safe and was recently followed by demonstration of the efficacy of olfactory glial transplantation by a Polish team that showed a man could walk again after two years as a paraplegic with a stab wound to the thoracic spinal cord. Professor Mackay-Sim was named 2017 Australian of the Year in public recognition of his research.

Presentation Blurb

The achievement of making human embryonic stem (ES) cells in 1998 led to great excitement for biologists and clinicians because of these cells’ ability to make all cells of the body. Then, in 2007, induced pluripotent stem (iPS) cells opened the way for patient-derived stem cells for potential cell transplantation and disease models. Embryonic stem cell research was limited mainly to IVF clinics and those interested in early human development, whereas iPS cell research has boomed as they have fewer ethical issues associated with them than ES cells and can be derived from patients with known clinical features. Also booming is research on ‘adult stem cells’ that provide a reservoir of cells for tissue replacement; those with which we are most familiar are the haematopoietic stem cells at the base of blood formation. In my lab, we work on very accessible neural stem cells found in the olfactory organ of the nose, which normally regenerate the olfactory sensory cells. We have found that they reflect disease biology in neurological conditions including schizophrenia, Parkinson’s disease, and hereditary spastic paraplegia and ataxia telangiectasia. This has led to a drug that we are taking to a phase II clinical trial in hereditary spastic paraplegia. We have also used the glial cells from the olfactory nerve for repair of the spinal cord, including a phase I trial of the safety of their transplantation in human paraplegia. In this talk I will discuss where we are now and how the future will unfold for clinical applications of stem cells. How far are we from cell and tissue replacement? When can we expect new drug treatments for other diseases using the patient-derived ‘disease-in-a-dish’ models?