Our Research

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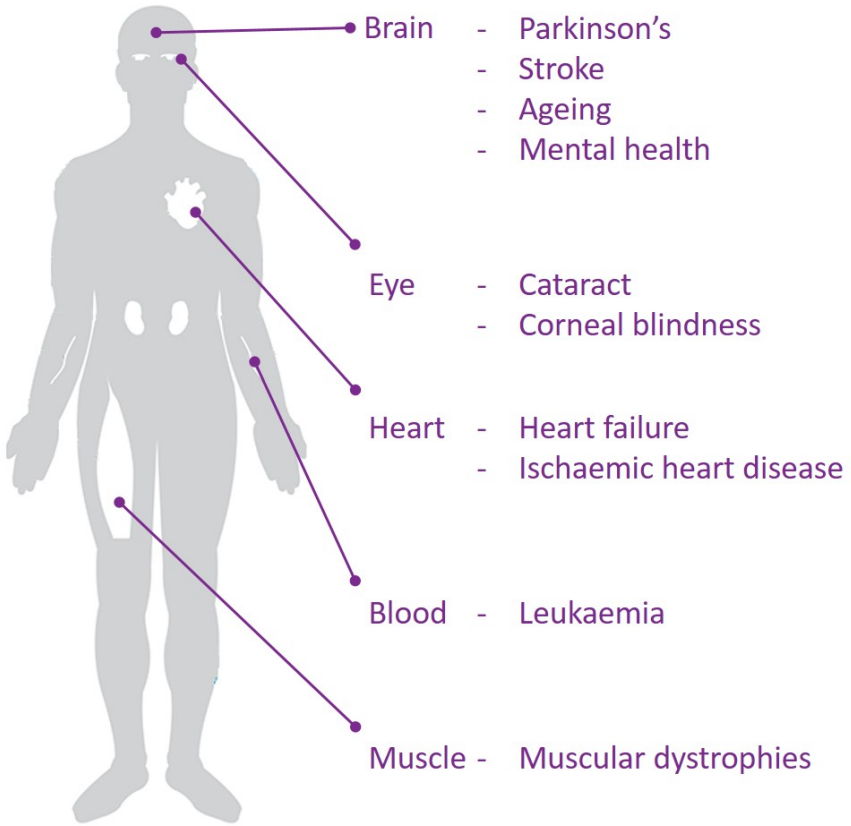
REGENERATIVE MEDICINE

Regenerative Medicine is one of three pillars of research in Stem Cells Australia.

The Regenerative Medicine program seeks to develop new therapies by either recruiting stem cells within organs to promote repair, or administering new cells and tissue made from stem cells to restore normal function after disease, illness or injury.

Current translational projects include research on diseases affecting the brain, eye, heart, blood and muscle.

Current research projects – Regenerative Medicine



1.1 Eye - Regenerative medicine for corneal and lens diseases

Nick Di Girolamo (University of New South Wales), Michael O'Connor (Western Sydney University), Stephanie Watson (University of Sydney)

Following a successful world-first phase I/II clinical trial for delivering autologous stem cells on contact lenses to treat patients with corneal blindness, this project will optimise materials to grow the stem cells on before transplant to enhance the efficiency of the treatment. In parallel, appropriate materials will be developed as a substrate for growing lens stem cells derived from human pluripotent stem cells, ready for clinical trials to treat lens-related blindness.

1.2 Heart – Activating endogenous cardiac stem and stromal cells in ischaemic heart disease

James Chong (University of Sydney), Richard Harvey (University of New South Wales/Victor Chang Cardiac Research Institute)

Growth factors that stimulate endogenous repair mechanism in the heart hold great promise as potential therapies

following a heart attack. Using a large animal model, this project will assess effective and safe doses of a growth factor (PDGF-AB), both alone and in combination with drugs that stimulate proliferation of cardiomyocytes. The results will provide necessary information for human clinical trials.

1.3 Skeletal muscle – Cell-mediated gene therapy in heritable muscle diseases

Christophe Marcelle (Monash University), Susie Nilsson (CSIRO/Monash University), Jose Polo (Monash University), Andrew Elefanty (Murdoch Children's Research Institute)

Cell therapies have been tested for decades in inherited muscle diseases such as muscular dystrophy, but with disappointing results. This project will assess a new approach – the potential of myeloid cells (blood cells) produced from patient-derived induced pluripotent stem cells to deliver corrected genes to patient muscle cells that have genetic defects, such as mutations in the dystrophin gene.

1.4 Brain – Stimulating endogenous neural stem/precursor cells to restore function in depression, anxiety and dementia

Dhanisha Jhavari (University of Queensland), Perry Bartlett (University of Queensland)

Adult neurogenesis (formation of new nerve cells) has emerged as a key player in the regulation and maintenance of fundamental brain functions, such as memory and mood. Neural precursor cells and true neural stem cells are present in the adult brain, but remain latent and dormant. This project will assess the ability of drugs that activate distinct populations of adult neural precursor cells to reverse mood and cognitive deficits in animal models of depression, anxiety and age-related cognitive impairment.

1.5 Brain – Biomaterials and gene therapy to support cellular therapy in Parkinson's disease and brain injury

Clare Parish (Florey Institute of Neuroscience and Mental Health), Lachlan Thompson (Florey Institute of Neuroscience and Mental Health), James Bourne (Monash University), Andrew Elefanty (Murdoch Children's Research Institute), Ed Stanley (Murdoch Children's Research Institute)

Progenitors of midbrain dopaminergic neurones derived human pluripotent stem cells are strong candidates for clinical trials in Parkinson's disease and similar strategies are under development to treat brain injury following stroke or trauma. Using human stem cells in an animal model, this project will develop better materials on which to grow and deliver cells for neural transplant, and assess whether genetically modifying the cells to express growth factors can enhance their effectiveness. It will also identify ways to enhance the survival and growth of such cells by delivering agents that affect the local environment into which cells are transplanted.

The research conducted by Stem Cells Australia is funded through an Australian Research Council Special Research Initiative which provides funding for new and emerging fields of research and builds capacity in strategically important areas.

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