



(from left to right)

Professor Donald Tan

Professor Roger Beuerman

Associate Professor Aung Tin

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"For their innovative breakthroughs in "bench-to-bedside" medical research in blinding corneal diseases, leading to major advancements in scientific knowledge and treatment of corneal blindness"

Over the last decade, Professor Donald Tan, Professor Roger Beuerman and Associate Professor Aung Tin have solved many mysteries of corneal diseases, and invented treatment modalities which are now mainstream approaches adopted world-wide. The trio has spearheaded pivotal corneal research programmes that span the range of fundamental research from clinical innovations to public health interventions. This is a true "bench to bedside to population" approach which has direct impact on reducing corneal blindness and has placed Singapore at the forefront of corneal research.

At the Bench, the team's efforts have led to new insights into corneal and ocular surface stem cell biology and the causes of inherited corneal diseases. Their Ocular Surface Stem Cell Research Programme has succeeded in growing adult ocular stem cells in the laboratory. They have patented a novel serum-free technique to culture conjunctival stem cells, thus reducing the risk of disease transmission by eliminating the use of animal cells or serum. The team also discovered the gene responsible for congenital hereditary endothelial dystrophy (CHED), a severe form of blindness occurring in children. They found that this same gene is also mutated in the commonest form of age-related corneal degeneration, Fuch's endothelial dystrophy, which opens up opportunities for gene therapy for this disorder.

At the Bedside, they were the first in the world to perform a series of bioengineered human conjunctival stem cell transplants in patients with chemical and burn injuries, Stevens Johnson syndrome and pterygium. The team has also transformed the field of corneal transplantation and artificial cornea surgery. The innovations in transplantation, in which only partial layers of the cornea are surgically replaced, have led to reduced rates of graft rejection and improved graft survival. The Tan EndoGlide, a patented surgical device invented at SERI, is used by surgeons around the world to perform keyhole, sutureless corneal transplantation, also known as Endothelial Keratoplasty (EK). Where corneal or stem cell transplantation would not be successful, the team have turned to the Artificial Cornea, and pioneered the first Asian series of Osteo-Odonto Keratoprosthesis (OOKP) procedures in which the patient's own tooth is removed and used to implant an artificial cornea into the eye.

Finally, the group's research at the Population level prevented a major outbreak of blinding corneal infections on a global scale. In 2006, through a nation-wide epidemiological study, the group was the first to identify that a major outbreak of Fusarium Keratitis, a severe fungal corneal infections, was due to contamination of a well known contact lens cleaning solution.

For their outstanding contributions in translational, clinical and epidemiological corneal research leading to the discovery of new knowledge and the pioneering of novel medical and surgical therapies for improved outcomes for patients suffering from blinding corneal diseases, the SERI team made up of Professor Donald Tan, Professor Roger Beuerman and Associate Professor Aung Tin is awarded the 2009 President's Science Award.