



Stem Cell Therapies

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Trevor Sherwin

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Sources of stem cells

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induced Pluripotent Stem Cells

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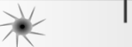
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Potency of Stem Cells


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Properties of Stem Cells


Characteristic	ESCs	iPSCs	Adult SCs
Proliferation	Very High	Very High	Limited
Potency	Pluripotent	Pluripotent	Oligopotent
Clinical use	Require Induction	Require Induction	Direct transplant
Tumorigenicity	Yes	Yes	No
Ethical issue	Yes	No	No
Autologous	No	Yes	Yes

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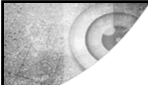
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Barriers to Clinic

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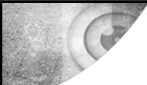
The NEW ENGLAND JOURNAL of MEDICINE

BRIEF REPORT



Vision Loss after Intravitreal Injection of Autologous “Stem Cells” for AMD

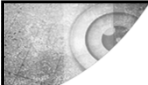
Ajay E. Kuriyan, M.D., Thomas A. Albini, M.D., Justin H. Townsend, M.D.,
Marianeli Rodriguez, M.D., Ph.D., Hemang K. Pandya, M.D.,
Robert E. Leonard II, M.D., M. Brandon Parrott, M.D., Ph.D.,
Philip J. Rosenfeld, M.D., Ph.D., Harry W. Flynn, Jr., M.D.,
and Jeffrey L. Goldberg, M.D., Ph.D.

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- Adipose tissue derived stem cells used by “stem cell clinics” in US
- 3 patients presented with severe visual loss after intravitreal injection of autologous adipose stem cells.
- Vision ranged from 20/30 to 20/200 prior to treatment
- 1 year post treatment, vision is 20/200 to light perception

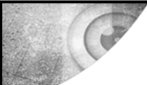
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“If it looks like a crook



- Clinic had no research track record
- Patients were charged for treatment
- Both eyes were treated

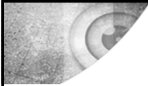
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Stem Cell Therapy Principles



- Research
- Academic led
- Evidence based medicine
- ‘Primum non nocere’

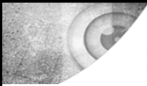
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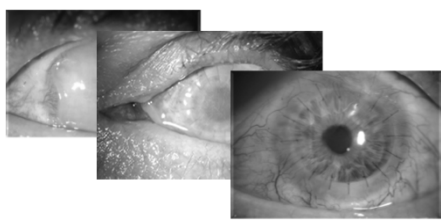
Regenerating the Cornea with Stem Cells



1. Expanded Stem Cells
2. Induced Pluripotent Stem Cells
3. Umbilical Stem Cells

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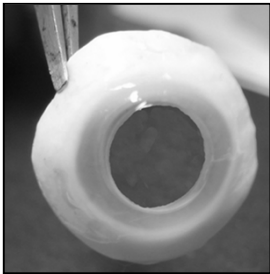
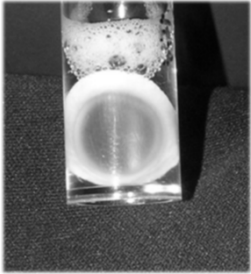




1. Expanded stem cell transplant



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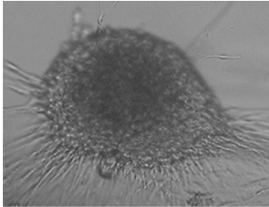
Human Corneal Stem Cells



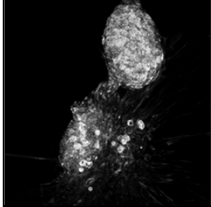
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Stem Cell Sphere Formation

Isolated cells form spheres

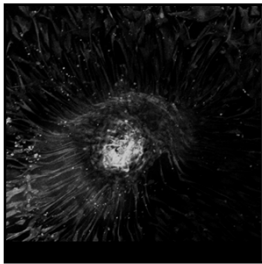
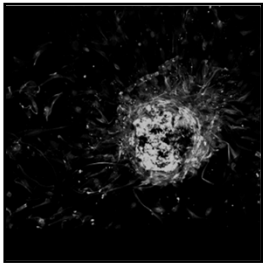


Spheres Label with p63





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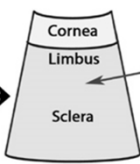
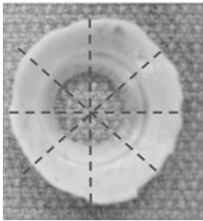
Spheres Produce Corneal Cells





Epithelium Cytokeratin 3/12 Keratocytes Vimentin

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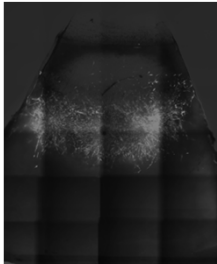
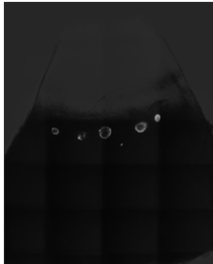
Repopulation of the stroma





Cornea
Limbus
Sclera seeded with Stem Cell Spheres

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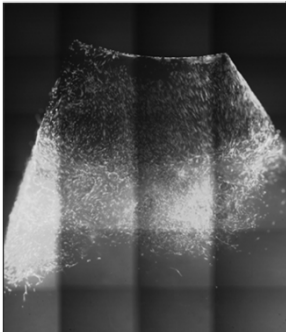
Sphere Cells Repopulate Limbus





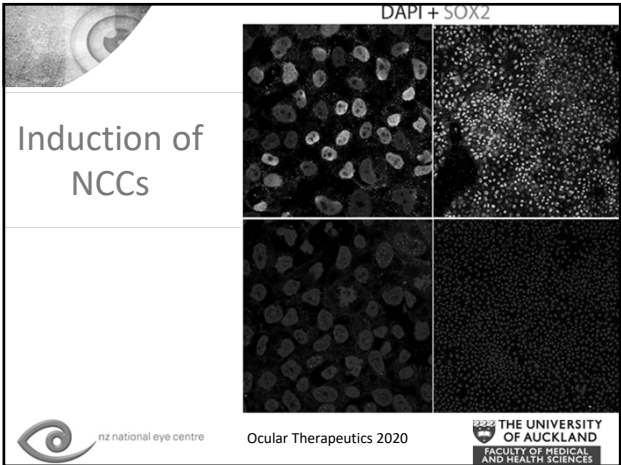
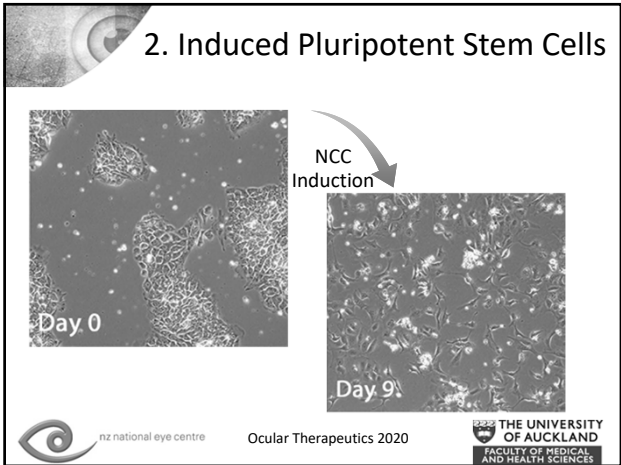
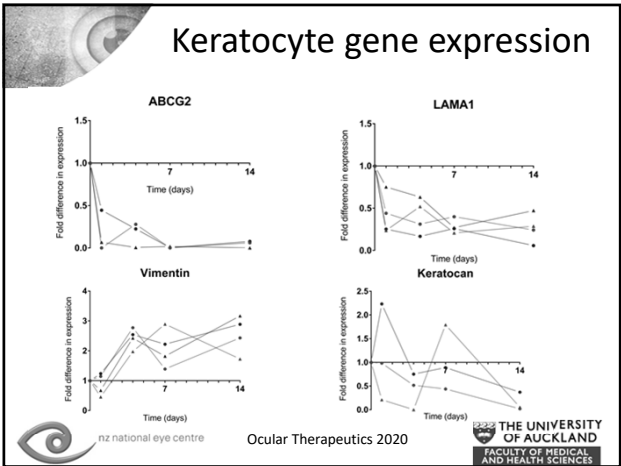
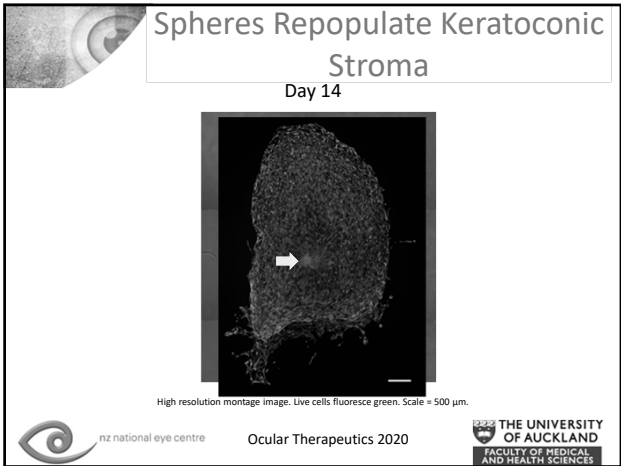
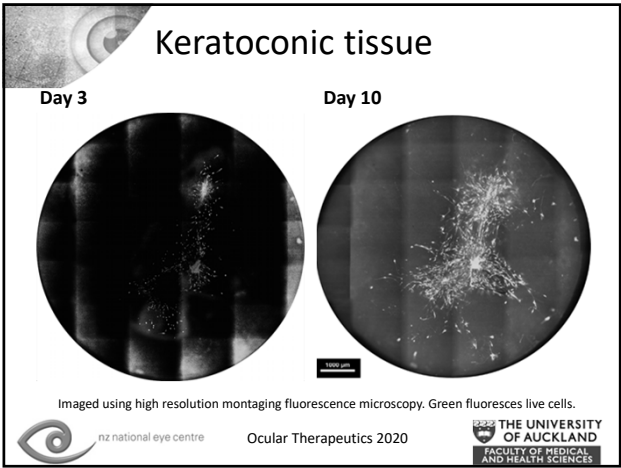
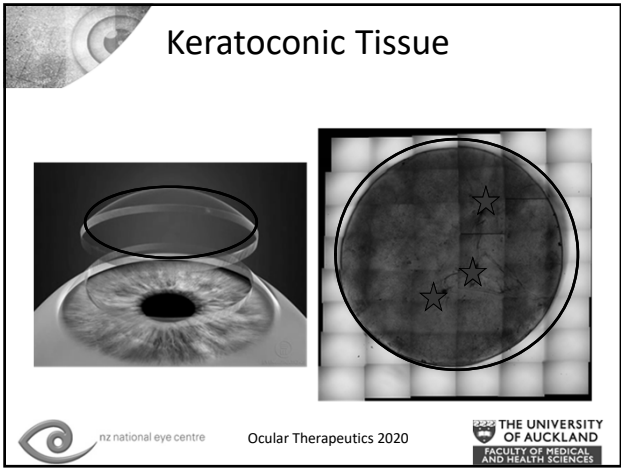
Spheres implanted in tissue ...are able to provide cells Which migrate extensively

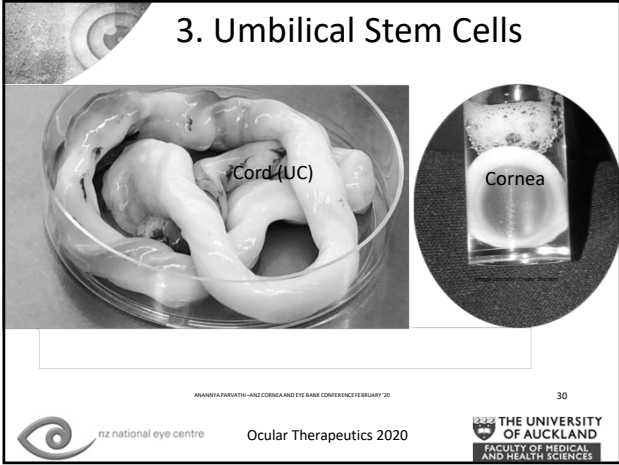
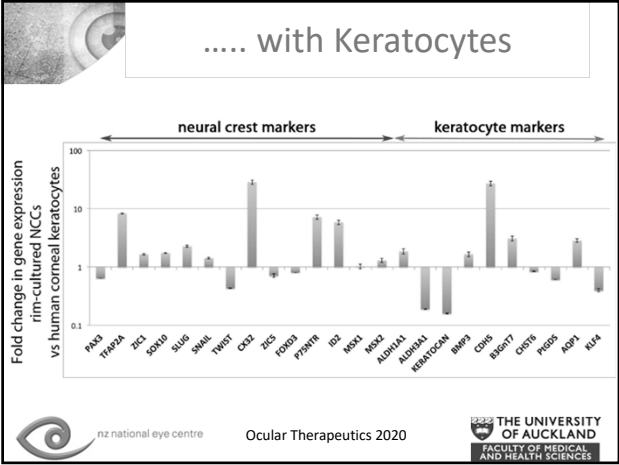
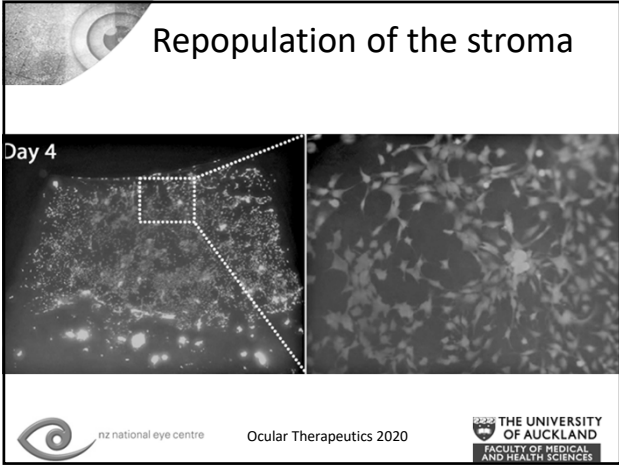
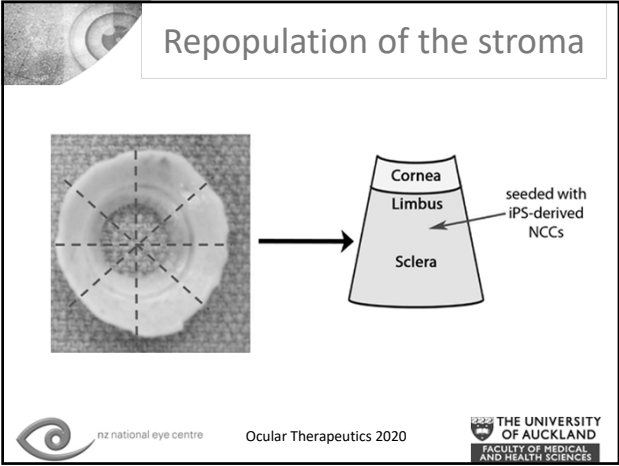
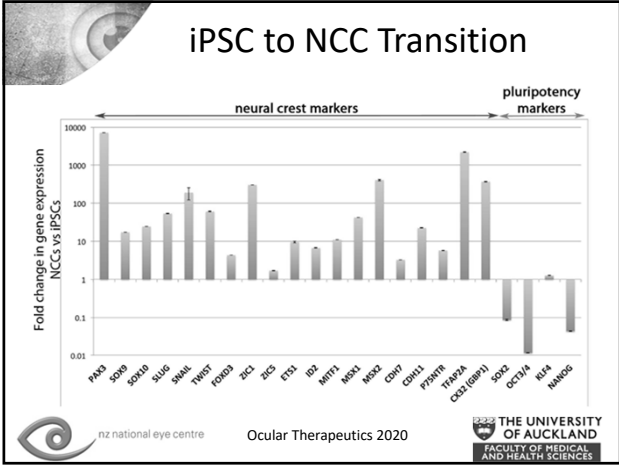
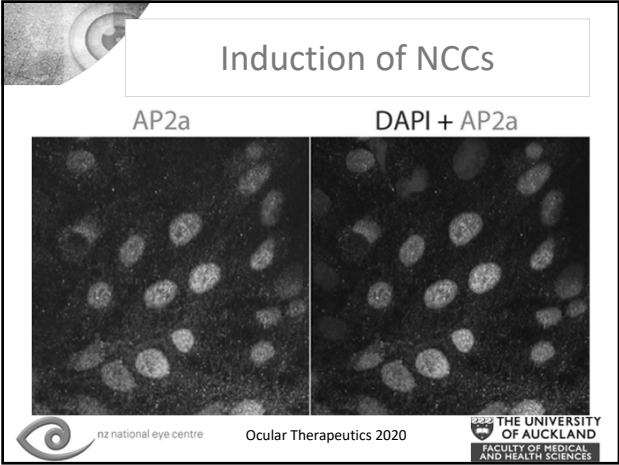
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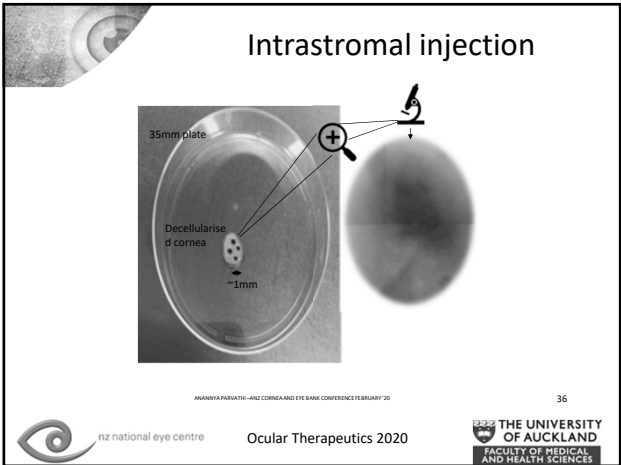
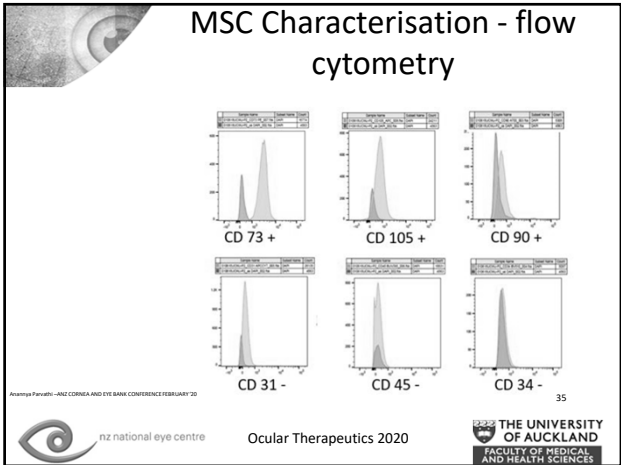
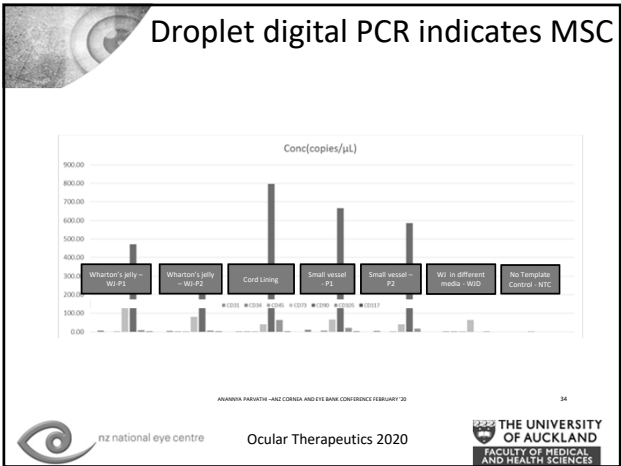
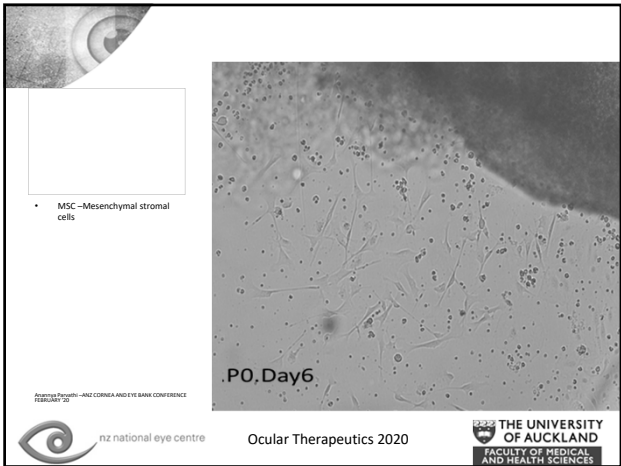
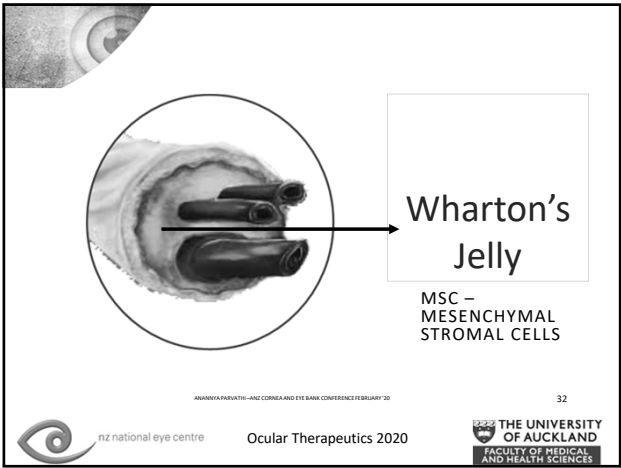
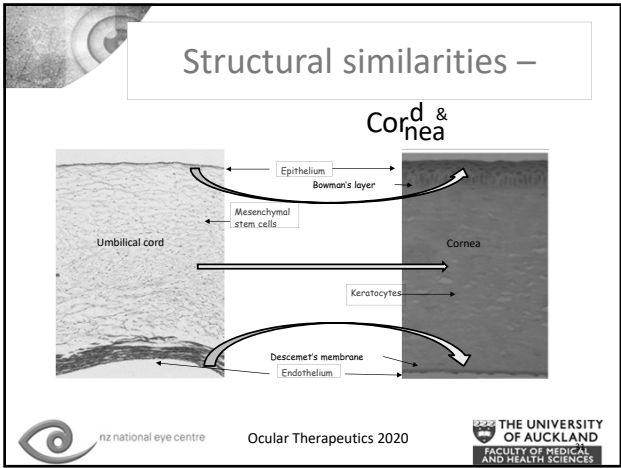
... and Repopulate the Stroma



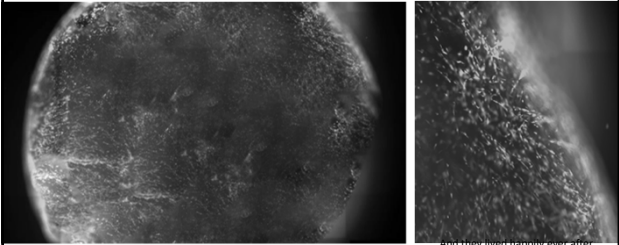
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Recellularised cornea with umbilical cells




ANANNYA PAVARTHI - ANZ CORNEA AND EYE BANK CONFERENCE FEBRUARY 20

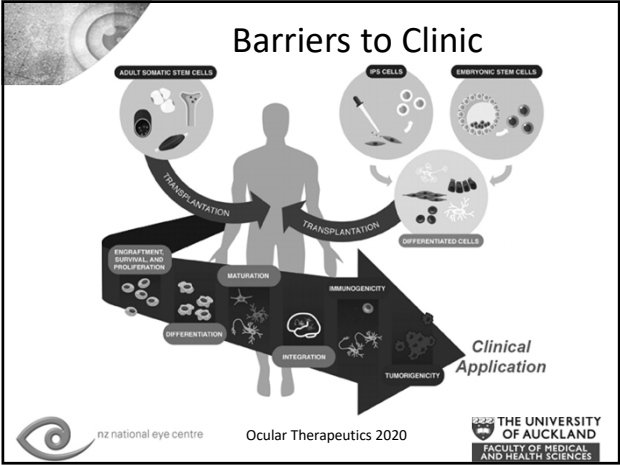
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Thank you

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