Stem cell transplantation fact sheet

February 2012

'Our goal is to make sure the cornea heals. The best part of it is that it begins to clear and sight is restored.'

Sheraz Daya

Introduction

Since 2000, through close collaboration with the Blond McIndoe Research Centre, Corneo Plastic Unit and Eye Bank and the Centre for Sight have performed Ex-vivo (laboratory cultured) limbal stem cell allograft transplantation. This research project was initiated in 1997 under ethics approval and the first treatments took place in 1999. The treatment has been considered by the National Institute of Clinical Excellence (NICE) who have indicated that the procedure does appear worthwhile and should be regularly audited. Outcomes have been published and results have been presented Nationally and Internationally.

What did we do?

Donor rims (the remaining eye tissue) discarded following corneal transplantation are used to procure stem cells and stem cell sheets are cultured in the laboratory at the Queen Victoria Hospital NHS Trust.

These sheets take 2 weeks to grow and if suitable in terms of quality are transplanted to suitable recipients who have STEM CELL DEFICIENCY as a result of injury or congenital (inherited from birth) deficiency. The eye is prepared surgically and the sheets are secured on the eye with Amniotic Membrane (protective lining that surrounds babies while developing in the womb).

What did we find?

Our work is not unique and similar ex-vivo transplantation is performed at other centres in Italy, Japan, Taiwan, USA and more recently India at last Audit, 74% of eyes treated had an improvement in the condition of their ocular surface. That is not to say the surfaces completely normalised. Patients did improve over time and after between 5 and 18 months some had to have corneal grafts to rehabilitate vision. The "breakthrough" that has been generated from our group relates to DNA fingerprinting findings on our patients who have had successful restoration of their ocular surfaces. We found that there was no donor DNA on the surfaces of the eye, which suggests that the patient's own body has played a part in restoration of the surface and continues to maintain a normal surface. This has TWO implications 1) there is no need for long-term immune suppression (strong anti-rejection drugs) and 2) these findings may play a part in regeneration of tissue elsewhere, an area that needs further investigation by our colleagues in other fields.

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Is this treatment available to NHS patients?

Yes – due to the complex nature of the diseases involved, patients are typically treated in a specialty centre within the NHS. Patients can also be treated privately at the Centre for Sight.

Who can be treated?

Only those with problems involving the EYE SURFACE in particular those patients who have LIMBAL STEM CELL DEFICIENCY. These include those who have had chemical (acid or alkali), thermal injuries or Stevens Johnsons Syndrome, which have resulted in damage to the limbus. There are also a group of patients who have congenital deficiency of stem cells, including those with Aniridia and ectodermal dysplasia.

Who cannot be treated by ex-vivo stem cell transplantation?

Eye problems that do not involve the eye surface and cornea.
Examples of conditions that CANNOT be treated include:

- **Age related macular degeneration**
- **Retinitis pigmentosa**
- **Glaucoma**
- **Optic neuritis and other problems of the optic nerve**
- **Severe eye injuries involving the retina (back of the eye)**
- **Keratoconus**
- **Fuchs corneal dystrophy**

‘But after three weeks I started to see results. I’d seen a lot of progress with my scars, but my sight was the one injury I’d say to myself was permanent and least expected to change. I do feel like I’m winning.’

Katie Piper

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