TRANSCELL BIOLOGICS

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Stem cells vs Druggable molecules in modern medicine

KEYWORDS

Stem cells

Multiple Sclerosis

Hematopoietic stem cell transplant

Induced pluripotent stem cells

Thromboangiitis obliterans

Allogenic transplantation

Stem cells remain a hot topic in academia and industry alike, and with the potential to cause a paradigm shift where many believe in their ability to differentiate into a variety of valuable cell types to use for treating diseases. *Stem cells* have in the past and continue to capture the imagination of biologists, tissue engineers, pharmaceutical company scientists, and indeed the general public, largely because of the prospects, it seems to offer of manipulating cell fate to treat disorders for which there is no other effective therapy/management. The initial focus was on diseases like type I diabetes and Parkinson's disease (PD), in which attempts had already been made to treat patients with donor cells. But it was quickly realized that the use of embryonic stem cells may pose a problem owing to their behavior. This triggered a race to utilize adult stem cells as products that are safe for use in treating certain conditions.

In the current issue of Transcomm, we will be focusing on how human pluripotent stem cells in culture could be used as therapeutic agents as opposed to small molecules/biologics for treating various medical conditions. We derive our motivation from the widespread recognition that the drug discovery process in practice in most pharmaceutical companies is inefficient, at best, and, in the past decade or so, has been struggling to meet the need for new druggable formulations. This coupled with many famous cases wherein already marketed drugs have been found either ineffective or shown to have unanticipated side effects is what drives us to advocate the use of stem cells in treating various conditions with clinical evidence, where conventional drugs have failed to show any or little effects. Cult Transcell strongly believes that the reader while appreciating the effectiveness of stem cells in treating various conditions would consider storing their loved ones' stem cells for the future. A small investment in your loved ones' future now would definitely go a long way.of stem cells. All the stakeholders here at Transcell strongly believe in the power of these super cells and constantly strive towards educating the general public about the same.

Anand Ram Soorneedi
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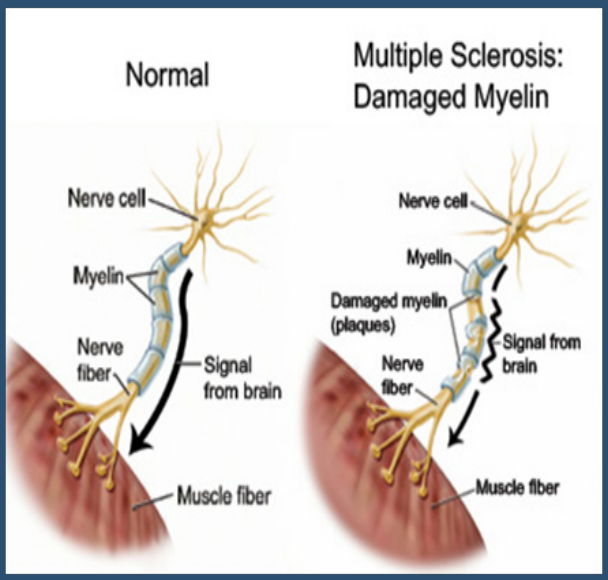
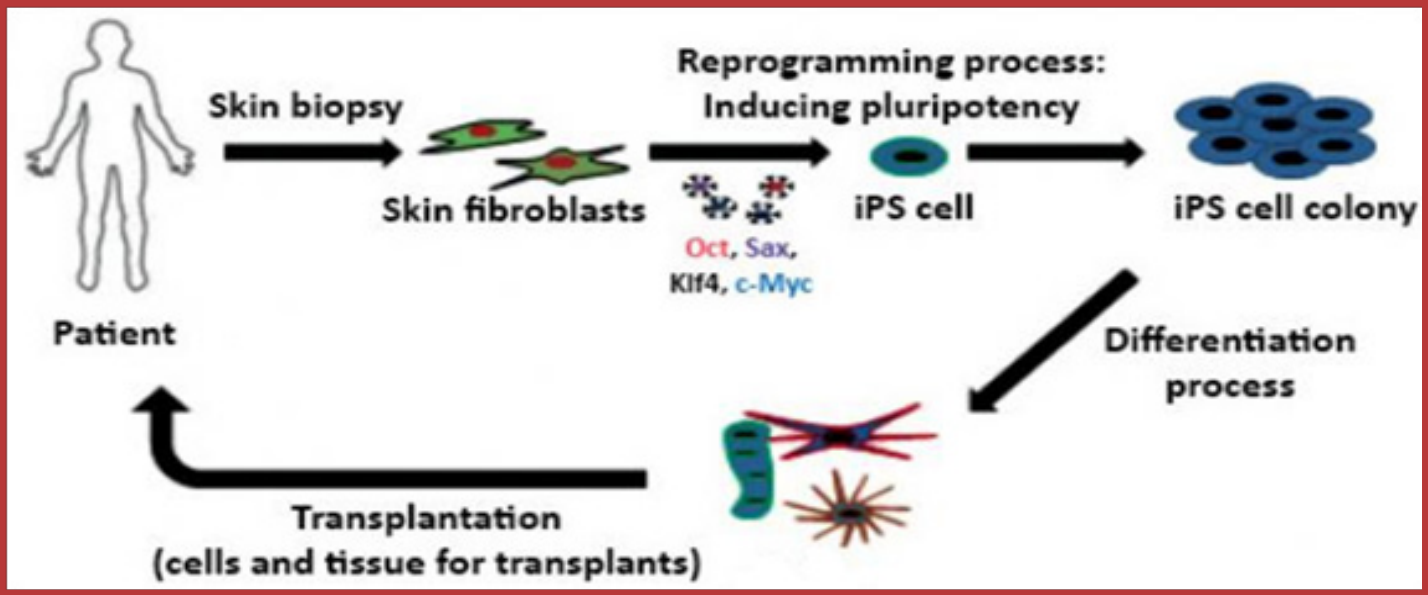
Case studies:

Stem cell transplantation in people with relapsing and progressive MS

In Northwestern University over the course of about 10 years, 123 people with relapsing-remitting *Multiple sclerosis (MS)* and 28 with secondary-progressive Multiple sclerosis received a stem cell based treatment, wherein they received a non-myeloblative *hematopoietic stem cell transplantation*. Their immune system was suppressed, but not completely depleted before the HSC transplantation. Out of the total number of patients the 145 available for follow up showed remarkable improvements in terms of their disability score in comparison with their pretreatment score. The score improved by one point or more. Relapses and MRI-detected disease activity were also significantly reduced. Unfortunately people with secondary-progressive MS didn't show any improvement on their disability scores, proving the need for stem cell intervention at the earlier stages of the disease

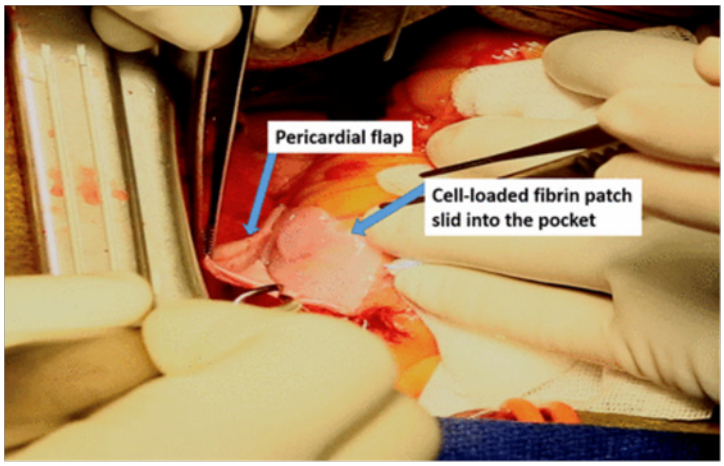


The Association for Research in Vision and Ophthalmology (ARVO) reported about a patient suffering from advanced wet age-related macular degeneration (AMD) and who was not responding to standard treatments and so underwent stem cell transplantation. A small piece of skin from the patient's arm was collected and modified into *induced pluripotent stem cells (iPSC)*, these iPSCs were then transformed into retinal cells, which were transplanted into the patient's eye. The transplanted cells survived without any adverse events for over a year and an improvement in vision was observed.



A study was carried out where in twenty-five patients suffering from grade III and grade IV steroid-refractory acute graft-versus-host disease were transfused with Bone marrow-derived mesenchymal stem cells along with no additional immunosuppressant. Remarkably, 4 weeks post MSC infusion, almost 60 % of the patients responded to the treatment and showed an absolute decrease in the disease progression while the average survival rate increased drastically. There were no adverse effects observed with the treatment, further reinforcing the potential of using stem cell as a possible cure.

A 68-year-old patient suffering from severe heart failure- left ventricular ejection fraction (LVEF) was treated with help of transplanted embryonic stem cells transformed into cardiac progenitor cells. The Isl-1+ SSEA-1+ cells were embedded into a fibrin scaffold which was surgically delivered into the patient via a coronary artery bypass which was performed in a non-infarcted area. After 3 months, the patient is symptomatically improved; the disease condition progressed from NYHA functional Class III to NYHA functional Class I and no new complications such as arrhythmias, tumour formation, or immunosuppression-related adverse events was observed. This study demonstrates the potential of generating a clinical-grade population of human ESC-derived cardiac progenitors.



Intraoperative view of the progenitor cell-loaded fibrin patch that has been slid into the pocket between an autologous pericardial flap and the epicardial surface of the infarct area

In another case study, stem cell therapy was carried out for HIV positive patients .The human immunodeficiency virus (HIV) is a lentivirus that causes HIV infection and over time acquired immunodeficiency syndrome (AIDS). A study was carried out wherein HIV positive patients underwent *allogenic hematopoietic* stem cell transplantation in order to reduce the HIV-1 reservoir. The hematopoietic stem cell transplantation led to a loss of detectable HIV-1 from blood and gut tissue and thus reduction of the HIV-1 reservoir and also for a brief period of time antiretroviral-free HIV-1 remission was recorded, along with the reduction in the intensity of the symptoms.

The world's 1st stem cell treatment for Parkinson's disease: A ground-breaking study, was undertaken by researchers in the year 2016 at The Royal Melbourne Hospital (RMH) in Australia, where in as a part of Phase I clinical trial, neural stem cells derived from unfertilized eggs were inserted into the brains of 12 patients with moderate to severe Parkinson's. This phase was to standardize the dosage of neural stem cells required per surgery. The 1st surgery was performed successfully in a 64 year old Parkinson's patient. The hope is that the neural cells will transform into dopaminergic neurons and boost the level of dopamine. These studies will be carried out throughout 2017 and the definitive results will be obtained by 2019.

A Clinic in Europe, the Swiss Medica Clinic, which treats diseases such as diabetes, liver cirrhosis, osteoarthritis, Lyme disease, Chron's disease etc has had a successful case report with a patient suffering from Autism. The patient, Yu Wanhuai during the first 3 years of his life was developing quite normally, But by the age of 4 the disease onset led to a series of behavioral changes; for example the patient started being antisocial, had a ritualistic behavior and soon was diagnosed with Autism. The patient was injected with his own adipose-derived mesenchymal stem cells and the symptoms have reported to gradually reduce over time. The child seems less restricted and more open to interaction, is open to socializing and making new friends.

Technically, the FDA calls stem cells "biologics", but the FDA regulates stem cell products with the goal of ensuring safety and efficacy much the same as traditionally defined chemical "drugs". Unlike conventional drug regimens wherein a patient is treated with chemical drugs often with undesirable side effects, stem cell based therapies are free from any undesired side effects mainly due to their biological origin. Moreover, stem cells have been reported not to raise any observable immune response which makes them all the more desirable as "biological drugs" for the treatment of various ailments.

Leonie Grace Fernandes
Junior Research Fellow

If anybody wants to treat, must treat with therapeutic adult Stem cells.....
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