

TRANSCCOMM

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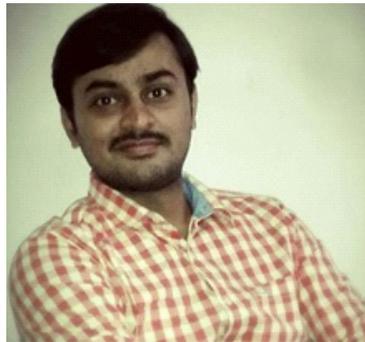
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HIGHLIGHTS

Diabetic foot ulcers case study, Age related macular degeneration (AMD), Clinician desk- Dr. Himanshu, Radiation induced brain damage rescue by stem cells.

FROM THE EDITOR



Right kind of information dissemination and meta-analysis of the clinical data published in the public domain play significant role in bridging the gaps to discover the unknown. Our newsletter will keep the users of banking facilities with the latest developments. Transcomm will forward the developments and innovations to reflect translations focused on applications to seamlessly integrate Users, Clinicians, scientists and researchers and most importantly, patients. Stem cell research and applications were surrounded with many controversies in the past. Political and religious opinions on human embryos as the source material also added to these controversies. However, these tides of uncertainty seem to settle down and a clear path is emerging towards the use of clinical grade stem cells. The hope and promise of stem cell based therapies is getting stronger with protocol based standard clinical procedures. In the first phase the said procedures have successfully demonstrated treatments targeted at Diabetic Foot Ulcers and Blood related Cancers. I wish reading this newsletter brings you closer to understand recent developments in the field of stem cell therapeutics and The day is not very far when your doctor asks a question: **HAVE YOU STORED YOUR STEM CELLS?** to address the condition that you go to him/her for treatment.

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SUMMARY

The first issue of Transcomm – only Transcell newsletter brings in new reports in the column of happenings which cover teeth stem cells helping brain neuronal growth, stem cell relation to theory of aging and stem cell rescuing radiation induced brain damage. The next section In the research and innovations section, we bring you developments covering age related macular degeneration. We have two important case studies covering the Rheumatoid Arthritis and Diabetic foot ulcers. Also included is a special column as from clinician's desk by **Dr Himanshu Bansal**.



HAPPENINGS

Teeth Stem Cells Stimulate Growth and Formation of Brain Cells

Dental pulp is a rich source of adult Mesenchymal stem cells, which have the ability to regenerate and form different kinds of cells. Earlier reports of dental pulp stem cells aiding for dental pulp regeneration and cleft palate closure are well known in the clinician community. Dr. Anthony Chan from Emory School of medicine and his team have transplanted teeth stem cells into the hippocampal areas of mice brain. These cells were shown to induce growth of new neural cells which further formed neurons. Dental stem cells can be isolated from kids at the age of 5-12 years from their milk teeth and wisdom teeth of elders by a dentist and can be stored and used when required.



To know more: <http://whsc.emory.edu/home/news/releases/2008/11/monkey-teeth-stimulate-brain-cells.html>

Mechanism of stem cell self renewing deciphered

Adult stem cells undergo self renewing divisions, but their offsprings do not. These stem cells replenish and replace the dead and damaged cells of our body tissue, maintaining tissue homeostasis throughout the life of an organism. Dr. Buszczak from UT southwestern University and Dr. Yamashita from University of Michigan have reported an important discovery in this field: stem cell secretes certain signal which acts over a short range, so that only stem cells but not their progeny become the recipient of these events.

To know more: <http://www.utsouthwestern.edu/newsroom/news-releases/year-2015/july/stem-cell-buszczak.html>

“You are as old as your stem cell”

One of the significant hallmarks of the aging is the functional decline of stem cells, which is what prompted many scientists to call ‘you are as old as your stem cells’. This theory has been found many proponents like Norman E. Sharpless, Ronald A. DePinho, Karl Lenhard Rudolph, Huber Warner, Alessandro Testori and others. As we age, we tend to accumulate lot of genetic lesions in the DNA which will eventually lead to loss of function of stem cells; this situation can be aggravated by exposure to harmful chemicals and radiations, which why also many scientists and physicians recommend to store your stem cells “Now” for a possible usage in future.

To know more: <http://www.jci.org/articles/view/20761>

Human stem cell repairs the damage due to radiation-therapy for brain cancer.

Radiation therapy of brain cancer is harmful to cancer as well as normal neural tissues, which is why many people who undergo such treatment have huge side effects related to neuro-motor functions. Stem cells usage has been hypothesized to replace and repair the damaged tissue; following the same principle, the preclinical experiments conducted in rats by researchers from

Memorial Sloan Kettering Cancer Center have reported a method to turn human stem cells into cells that are instructed to repair the damage in the brain. “Being able to repair radiation damage could imply two important things: improving the quality of life of survivors and potentially expanding the therapeutic window of radiation,” says Dr. Tabar.

To know more: [http://www.cell.com/cell-stem-cell/abstract/S1934-5909\(15\)00005-3](http://www.cell.com/cell-stem-cell/abstract/S1934-5909(15)00005-3)

RESEARCH AND INNOVATIONS

Age Related Macular Degeneration (AMD): Soon a single stem cell injection may reduce the progressive loss of vision in AMD. Shaomei Wang, MD., PhD. the lead author of the study from Cedar-Sinai Medical Center in Los Angeles had reported in Stem cell journal that, one injection of adult derived human stem cells showed significant reduction in loss of vision in rat model of AMD.

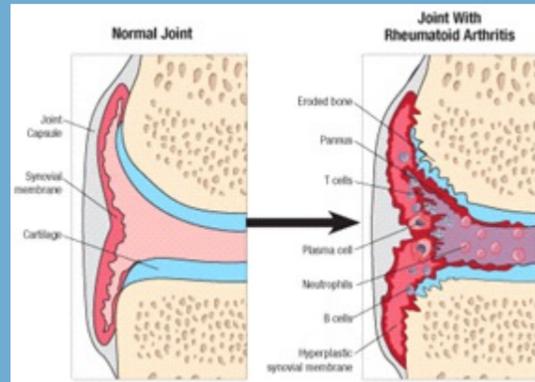
The study involved conversion of skin derived cells into induced pluripotent cells (iPSCs), and then differentiate them into lineage specific neural progenitor cells. When these cells were injected in rat models of AMD, they found the formation of a protective layer which stops degeneration of retina and brought back the vision for 130 days in AMD rat model, which is equivalent to 16 years in human life.

AMD affects around 30-50 million people globally, and it is result of gradual degeneration of macula part of the retina. Usually there is no treatment option available for this disease at present. But adaptive devices such as magnifying glasses, lenses, electronic vision aids are used to adjust the peripheral vision. (Image courtesy: <http://www.kellogg.umich.edu/patientcare/conditions/ATE.dietary.supplements.html>)

To know more: <http://onlinelibrary.wiley.com/doi/10.1002/stem.2032/abstract>



CASE STUDIES



Rheumatoid Arthritis (RA) Management by Therapeutic Stem Cells

Introduction: It is a progressive autoimmune disorder which primarily is found to manifest itself on joints, which become stiff, swollen and painful. Other symptoms include general inflammation to heart and lungs to fever. The underlying mechanism is said to be associated with body's own immune system attacking the joints that results in inflammation and thickening of joints. The diagnosis of the disease is made based on

symptoms and X ray of joints; although there is no treatment or cure available but symptoms like pain and inflammation can be decreased to improve the functional aspects of a person's life. Often the pain becomes unbearable and steroids, high doses of pain killers are administered, surgical intervention to repair joints in rare cases had helped to decrease the symptoms temporarily.

Symptoms: Joints are swollen, warm and stiffness is observed with uneasiness of movements; multiple joints can be affected, as the inflammatory response progresses the joint surface is tissue damage and degeneration which leads to complete deformity; other symptoms include plural effusion of lungs; also the disease affects kidneys, heart and blood vessels.

Causes: RA causative factor is yet to be deciphered. It runs through families and thus family background becomes the biggest risk factor. Smoking is the non-genetic risk factor and other factors include viral infection, nutritional deficiency of vitamin D.

Manifestation: The various phases of RA are 1) Initial phase- Nonspecific inflammation, regional, 2) Amplification phase, proliferation of T cells and its activation, systemic, 3) Chronic inflammatory phase, Release of inflammatory cytokines and tissue injury, both regional and systemic.

Management: There is no cure for RA but there are treatments to decrease symptoms of pain and swelling temporary. Traditional treatments include analgesics and steroids which address pain relief and lifestyle management which have rarely been shown to improve muscle strength and physical function. Other approaches include surgery, alternative medicines, change in dietary supplements and stem cell therapy, integrated disease management with allogenic stem cells.

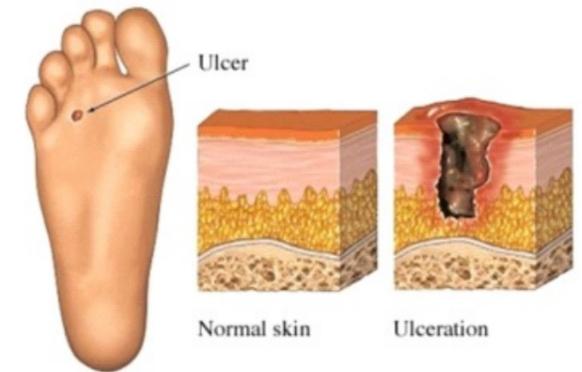
Stem cell approach: Case studies have shown results which are promising, where Mesenchymal Stem cells (MSCs) from allogenic cord tissue were administered. The primary role these MSCs are thought to be to repair the cartilage tissue which is subject to daily wear and tear. Also, these MSCs were proven to possess unique immuno-modulatory properties inhibiting T cell and B cell proliferation bringing down the magnitude of inflammatory response which is the main pathophysiology in the disease expression. Additionally MSCs were shown to be inducing differentiation of regulatory T cells and maintain their inhibitory activity upon infusion to treat

the disease. The immunosuppressive and anti-inflammatory actions of cultured MSCs were the strong features that had mediated this approach to pass the preclinical testing in inflammatory diseases like RA.

To know more: <http://www.arthritis-research.com/content/17/1/113>

Diabetic Foot Ulcer Management by Dental Pulp Stem Cells

Introduction: It is one of the most deadly complications of diabetes, which is due to development of vascular complications and insufficient transport of body fluids to particular tissue which in this case is foot. The wound healing process occurs normally in our body and here is said to become non-functional in diabetes. The ulceration of foot is progressive which will eventually lead to amputation of limbs. Often these foot ulcers are first treated with extracellular matrix, growth factors, negative pressure wound therapy, moist wound therapy and bioengineered tissue or skin substitute. None of these therapies are helpful in long run and as the diabetic symptoms progress, the complication associated with foot ulcers also grow.



Symptoms: Improper wound healing in feet, ulcers and gangrene formation.

Causes: Poor glycemic control, loss of blood and nerve supply to a part of body, peripheral neuropathy which means loss of pain or touch sensation in toes, feet, legs and arms, blisters, sores, ulcers with bacterial infection.

Mechanism of Disease: High levels of glucose are said to alter rate of turnover of the cell/proliferation, hence wound healing gets delayed; coupled with localized inflammation and bacterial infection the process becomes an irreparable cycle of events which leads to the disease manifestation.

Diagnosis: Visually identification of foot ulcers which do not disappear even with high antibiotic treatments.

Stem cell approach in disease management: In a recent report of 2012 by Dr Shankaranarayana, a clinical activity of dental pulp derived stem cells (DPSCs) for treating diabetic foot ulcers was reported. It has been documented by researchers that DPSCs have high neurogenic potential, hence are currently tested for their effectiveness in neurological disorders. The patient age was 72 years, suffering from diabetes for 18years, suffering from peripheral neuritis (damage to nerves and loss of sensation) for 5 years. DPSCs, passage 2 were injected intralesional to the site of injury, the wound started healing in 2 months and has taken up 70% of skin graft.

To know more: <http://www.mrcindia.com/posterpresentations/DentalPulpStemCellsforCLI-encrypt.pdf>

CLINICIAN DESK

Dr Himanshu Bansal, from Dr Himanshu Bansal Foundation is a trained clinician and has been addressing diseases that have no either treatment or cure option in the lifetime of the patient with therapeutic stem cell integration in disease management to improve the quality of life. As a practitioner, he opines that the efficiency of the available stem cells for treatment should be on par with the freshly cultured batch to see any desired treatment endpoints. This is possible only when the sourcing of the sample and processing of the stem cells is done to keep the viability and efficacy of the stem cells high without compromising on the steps and operating procedures of the banking activity.

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