TRANSCELL BIOLOGICS

# TRANSCOMM

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## INSIDE



## CREDITS

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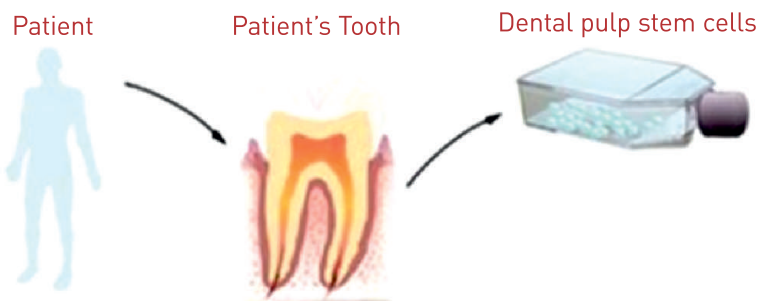
## HIGHLIGHTS

DPSCs, Diabetes, Cleft lip/palate, Processing and Collection of DPSCs, History of DPSCs

## FROM THE EDITOR

All along the human history the question of staying young without diseases is getting slowly deciphered, and the answer is to look into ourselves. We are source of our own medicine in the form of stem cells. Regenerating, Rejuvenating and Reactivating. Today there are a variety of clinical and cosmetic products with factors derived from stem cells and it is an observation that they are very efficient. Many countries around the world have approved stem cell derived products in clinical treatment regimen. Scientific knowledge available in abundance in our country makes it all the more promising for healthcare specialists to delve more into the subject. This month's newsletter features latest discoveries in the field of stem cells with a specific focus on the Dental pulp derived stem cells. These cells with high proliferation potential and long maintenance of stemness have caught all the attention of global scientists. Some believe they are glial and neural in origin and others say they are embryonic like stem cells, regardless of which they are a gift to the modern medicine. I have met many parents who have not stored their stem cells via umbilical cord during delivery of baby. For all of them, Transcell has a gift: Dental pulp offers a second chance and a lucky chance, unlike one time cord blood stem cells during child's delivery; dental pulp can be isolated from milk tooth and wisdom tooth. You have 10+10 nearly 20 milk teeth to score for. DO NOT MISS YOUR OPPURTUNITY TO STORE DENTAL PULP STEM CELLS NOW.

**Govardhan.K.S.**, Ph D
(govardhan@tran-scell.com)



# DPSCs:

## a. Brief history

The revolutionary and path breaking discovery of dental pulp stem cells happened in NIH, USA. These stem cells have pluripotent stem cells like properties and were extensively used for studying their capacity for treating bone regeneration, heart related disorders, muscular dystrophies and brain related disorders. In 2010, the First human trial was conducted for Eye disorder wherein cornea replacement was done with the help of dental pulp stem cells. Recently scientists from Karolinska Institute (Noble prize awarding Institute) have found glial or neurogenic origin of dental pulp stem cells and they have reported the same in Nature Journal.

Please follow the hyperlink (http://www.nature.com/nature/journal/v513/n7519/full/nature13536.html).

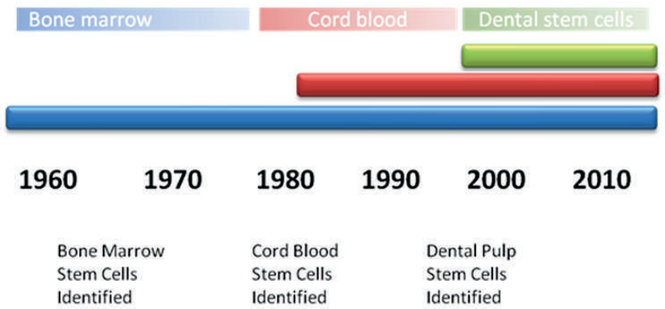



Figure:
The brief history of clinical sources of adult stem cell.

## b. What are DPSCs

Dental pulp stem cells are unique kind of stem cells which are embryonic in origin and possess huge regeneration and replication potential. They are present in our teeth and are believed to be better than umbilical cord or bone marrow derived stem cells in terms of their replication potential and stemness. Many scientists argue that these cells are pluripotent (capable of regenerating 220 kinds of bodily tissue cells) while other sources are just multipotent (limited in source and capability to differentiate into several tissue cells).

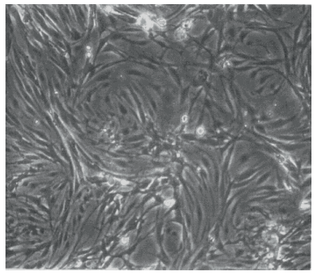


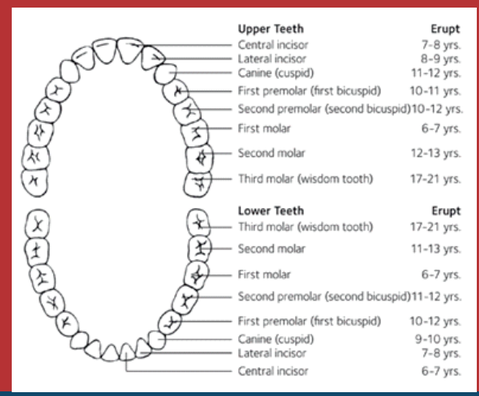
Figure: Mesenchymal stem cells isolated from dental pulp of Milk teeth.



## C. Where they are present

The best clinical sources of dental pulp stem cells are milk teeth from incisors and canines of kids (5-11years of age) and Molar teeth of adults. The teeth should not have caries and plaque formation, with ½ or 1/3rd root and without any external damage. We suggest identifying the milk teeth of kids early by taking them to doctor who would advise you to get an Orthopantogram or an OPG in short (X ray of teeth).

(Image courtesy- http://www.mouthhealthy.org/)

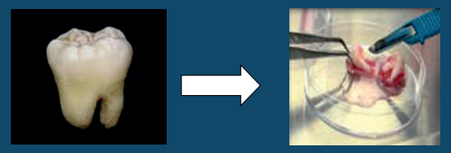



Based on the report the doctor would further assist in collection of teeth and placing it in the solution provided in the ToothscellTM kit box. After which the tooth is sent to Transcell lab, where it is processed and stem cells are isolated for culture and cryo-storage.

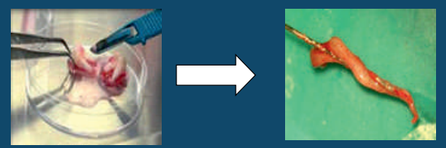
# PROCESS AND COLLECTION OF DPSCS @ TRANSCELL:

The teeth received in laboratory are inspected further for any damage or infection, after which the laboratory procedure followed is listed below:

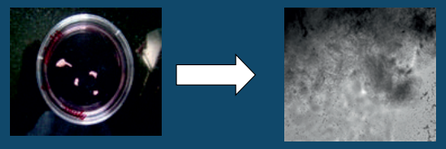
**1.Dissection of Tooth-** The tooth is dissected in order to visualize the pulp content and this is shown in the figure below.



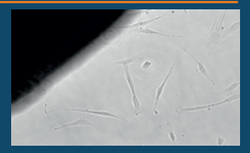
**2.Pulp harvest-** The pulp is extracted by gentle pulling of the tissue inside the teeth.



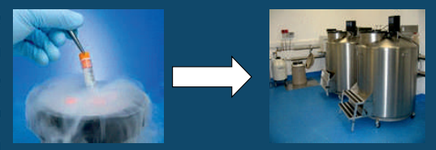
**3.Stem cell explants culture-** The remaining tooth explants along with the pulp is cut into fine pieces and put in culture dish with nutrient media which allows for the cells to grow.



4.Expansion- The cells start dividing and forming new cells, they are cultured until they reach a desired number (usually 100-500 million cells/ml).



5.Cryopreservation- The cells after expansion are cryopreserved when cells are in dividing phase which ensures cells preserved are alive and viable. The cells are stored in vapor phase of liquid nitrogen (-150 to -170°C), to enable cells preserved in tubes to be devoid of contact with each other. This method prevents cross contamination of sample vials in the liquid nitrogen tank.



Thus dental pulp stem cells are stored under continuous stream of liquid nitrogen for any number of days, if required they can be cultured again and stored back to ensure lifetime storages. The cryo-tubes are bar-coded and labeled. Row and column numbers are mentioned and these numbers are given in the certificate after storage. Transcell has unique patents that allows for expansion of initial stage cells and culture them into multiple doses, which is also the reason we claim about unique processing and turnaround time to deliver is considerably less.

## 4.Case studies:

Thus dental pulp stem cells are stored under continuous stream of liquid nitrogen for any number of days, if required they can be cultured again and stored back to ensure lifetime storages. The cryo-tubes are bar-coded and labeled. Row and column numbers are mentioned and these numbers are given in the certificate after storage. Transcell has unique patents that allows for expansion of initial stage cells and culture them into multiple doses, which is also the reason we claim about unique processing and turnaround time to deliver is considerably less.

### Cleft Lip Palate-Alveolar Bone Regeneration

(Image courtesy: Wikipedia)

**Introduction:** The cleft lip or palate is condition seen in kids with issues in carnio-facial development (skull and face bones and tissues), it is a great challenge for plastic surgeon to seal the growth gap defects. The following was a study conducted in Hospital Infantile, Spain wherein dental pulp stem cells were embedded in biomaterial made up of hydroxyl apatite and collagen and a series of alveolar graft were prepared for cranio-facial reconstruction surgery.

**Symptoms:** Difficulty in breathing and feeding the baby due to improper palate, speech problem, socialization issues, and ear related disease.

**Causes:** Not known

**Mechanism of Disease:** It is a birth defect with some known risk factors including smoking during pregnancy, diabetes, older mother, obesity and genetic disorders. It is affects 2 in 1000 live births worldwide and is common in male births.

**Diagnosis:** By physical examination and genetic test.

**Stem cell approach:** Traditionally plastic surgeon would isolate to be inserted bone forming tissue from baby's skull, iliac crest , ribs or other region of the body, which is invasive and may also be cause unknown infection and death. Mesenchymal stem cells are known to differentiate into bone forming tissue, which became the principal thought of many scientists and doctors to pursue use of these cells for cleft palate. The bone formation is also called as osteogenesis and can be induced by usage of Mesenchymal stem cells, for which the best available source is the kid's dental pulp rather than risky, invasive and painful bone marrow aspiration. . Please follow these hyperlinks for further reference-

(https://www.ncbi.nlm.nih.gov/pubmed/16584868?dopt=Abstract)
(https://clinicaltrials.gov/ct2/show/NCT01932164)
(http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3073041/)





### Diabetes Type II and Dental Pulp Stem Cells

(Image courtesy-http://www.thelatestnews.com/)

**Introduction:** Diabetes is said to be sugar disease, as it has uncontrollable glucose levels in blood. In technical terms we call it as Hyperglycemia (rise of blood sugar levels) it is a multifactorial disease (causative agents are many) and has high morbidity rate (death rate) as age advances. The blood glucose is controlled by a hormone secreted by pancreatic beta cells and is called as Insulin. In type II diabetes Insulin is non-functional to control glucose level in blood and eventually beta cells loose the capacity to make enough insulin for the body. This condition leads rise in co-morbid situations like Cardio-vascular disorder, Kidney failure, Muscle weakness, Eye and Retinal disorders, Diabetic foot ulcer- limb amputation and eventually to death.

**Symptoms:** Polyuria (frequent urination), Polydypsia (increase thirst) and Polyphagia (increase in hunger).

**Causes:** Rise in blood glucose levels, Underlying cause unknown

**Mechanism of Disease:** The type II Diabetes is associated with lot of co-morbid conditions (in simple terms it is the reason of increase in deaths of many other diseases). The source for rise of blood glucose is both external (the food we eat) and internal (Glycogen in liver, Fat in adipose and Muscle proteins). Insulin plays critical role by directing the glucose from external sources to internal sources for storage and reuse when we are in need of glucose. When Insulin becomes non-functional there will be rise in blood glucose after having our food since glucose is not directed for storage, hence blood glucose levels are high. This blood glucose is filtered and secreted by kidneys via urine out of the body, and person become hunger again due to low blood glucose. These physiological changes eventually results in polyuria, polyphagia and polydypsia. The cycle continues leading to irreparable damage to multiple organs and death.

**Diagnosis:** Random blood glucose levels (normal 110 mg/dL) and Oral glucose tolerance test (OGTT- Normal 140mg/dL).

**Stem cell approach:** Although there are less human studies with stem cell transplantation for type II diabetes; there are ample numbers of studies done in animal models. The Mesenchymal stem cells have three important factors, 1) Anti-inflammatory, 2) Secretion of growth factors and 3) Differentiation into region specific tissue cells. The principle effect stem cells therapy has already been demonstrated in animal model form research work done in India. The report concludes that dental stem cells reverse chemical agent induced diabetes in mice models; they are known to form pancreatic beta cells and prevent death of the same cells. The report also highlights three step generation of islet like cells clusters from dental pulp stem cells. This approach seems very promising and in future would work in humans also. The hope for diabetes treatment has breathed a fresh air again. Please follow these hyperlinks for further reference-

(http://www.ncbi.nlm.nih.gov/pubmed/23845187)

(http://www.ncbi.nlm.nih.gov/pubmed/21335539)

## DPSC @ Transcell

Transcell Biologics is proud to be India's family dental stem cell bank. Path breaking in-house advances in stem cell activities has made it possible to extract valuable and optimum yield from lower passages itself; from the milk teeth of children and wisdom teeth of adults. These stem cells are carefully preserved at our stem cell centre at Hyderabad in a special dedicated controlled cryogenic storage facility, thus facilitating for a healthy and prosperous future of your children.

A tiny investment like banking dental pulp stem cells of your loved ones will help you and your family in the future by giving you the potential to be prepared from critical health concerns that may rise in the future such as Neurological Disorders, Cancer and Diabetes to name a few.

By pioneering the Dental Pulp Stem Cell Banking in India, Transcell helps in building an entire generation that is prepared to face their future healthcare.

## Doctors opinion

"Stem cell banking is a way of ensuring the health of children as it promises to avail current and future therapies. Many of us are unaware of benefits of stem cells and usually discard the umbilical cord after childbirth. Have you also done the same? You need not worry! If your children are below 10 years, their milk teeth are a good source of stem cells, and they can be stored through the ToothScell banking program of Transcell", says Pediatric Dentist Dr. Srinivas namineni, Hyderabad.

## Inside Talk

Dental Pulp Stem Cell banking is a golden opportunity for the parents to save the mesenchymal stem cells of their loved ones for the entire lifetime. These cells have the potential to address many disorders like Neurological, Diabetes, Cancer to name a few which have no treatment regimen when it comes to conventional use of medicine.

Since 2010, I've been actively evangelizing the banking practice and witnessed the magnificent change in perception of understanding about stem cells in eligible families. Many parents are worried to have missed storing their newborn's cord blood stem cells, but dental pulp stem cells storage offers them second chance and is not limited to one tooth as there are many milk teeth present in kids that have to fall out naturally.

I am also overwhelmed at the commitment shown by the company in introducing Bajaj Finance option to avail the service, so that everyone can afford to store their children's dental stem cells.

**Mr. S R Madireddy**
Founder,
ReBirth Biosciences, India

I believe dental pulp stem cells application in integrated disease management like diabetes, periodontal diseases, and autism holds lot of promise, as research is progressing at a rapid pace towards clinics. These dental pulp stem cells are unique cell therapeutic tools as they are Mesenchymal in nature; not of blood origin and I strongly recommend and request the families who have stored cord blood stem cells also to store dental stem cells that are different.

Not all stem cells are the same and dental stem cells are different from cord blood, bone marrow with their strong inclination towards neurological and angiogenic repair and regeneration.

## Transcell, Your Complete Family Stem Cell Bank - A BioBank

With our Competencies built around addressing an End-To-End facilitation in Stem Cells, Transcell extends its pioneering and innovative BioBanking Solutions and Services to the most discerning customers in India.

**Mr. P.V.S. Balasubramanyam**
Chief Marketing Officer(CMO),
Transcell Biologics Pvt. Ltd.

BioBanking solutions and services deliver cutting edge treatment facilitations through clinicians in addressing specific diseases and disorders concerning the society. With clinical trials poised for a major leap during the current year and the next 5 years to come, Transcell is ready now with the Pervasive Stem Cell Option (PESCO) to find a lasting treatment option to few of the dreaded diseases.

PESCO targets both the perspectives of Source and the Disease or the disorder, to supply packaged stem cell products that are ready for applications. BioBanking derives its strength by leveraging the regenerative strength of Stem Cells derived from various sources, Viz., Adipose Tissue, Dental Pulp of Milk Teeth or Wisdom Teeth, Umbilical Cord Blood, Umbilical Cord Tissue and Bone Marrow.

Transcell has the uniqueness of being one of the leading global organizations to have the capabilities to deliver a concoction of stem cells to facilitate treatments for a particular disease or a disorder.

We invite Clinicians from a variety of specializations, Cell Biologists, Specialists, Parents, Palliative support providers, Pregnant Woman and parents of Milking Tooth children to get connected with us to have the knowledge of BioBanking and PESCO options.

Bank Stem Cells with us. We offer the supplies when need be. They are processed and packaged for various diseases and disorders.

Please visit us on Facebook and Twitter and you are always welcome to land on our portal www.transcell.in to explore the much needed information on Stem Cells Banking.

Upgraded Lab facility at ALEAP industrial area, Near JNTU Kukatpally, Hyderabad

Recent Dental pulp stem cell knowledge session held in Kotak Salesain school, Vishakapatanam.

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