

Adult Stem Cells and Autism

Dr. Gene Anthony, HMD, PhD
Executive Director, Regen Center



Adult Stem Cell Therapy~

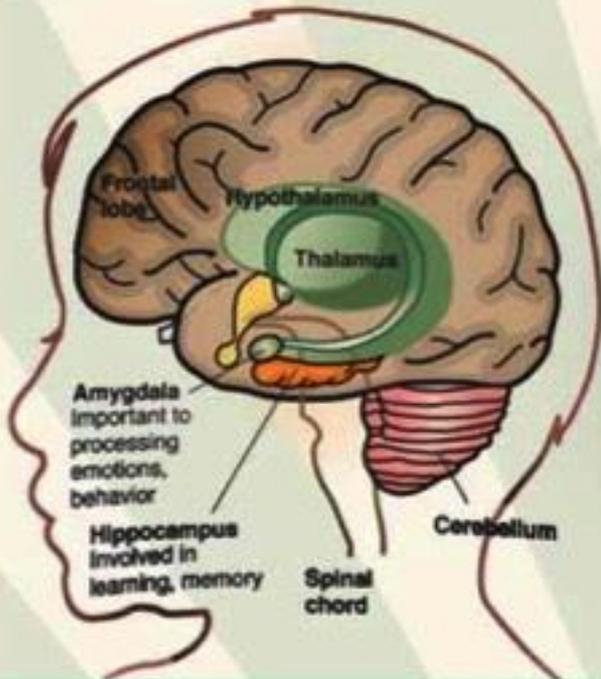
The Future is Now

The Future is Now

Therapy~

Stem Cells

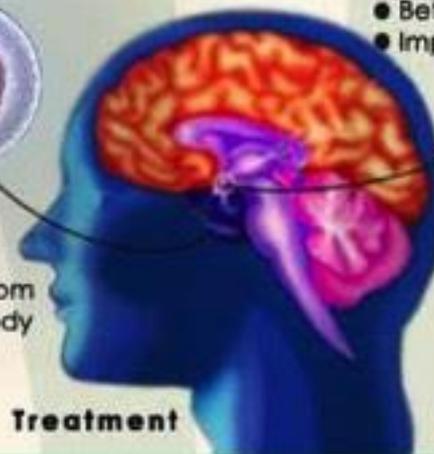
Affected areas of the brain, stemming from **abnormal neural development**



Stem Cell Treatment **AUTISM**



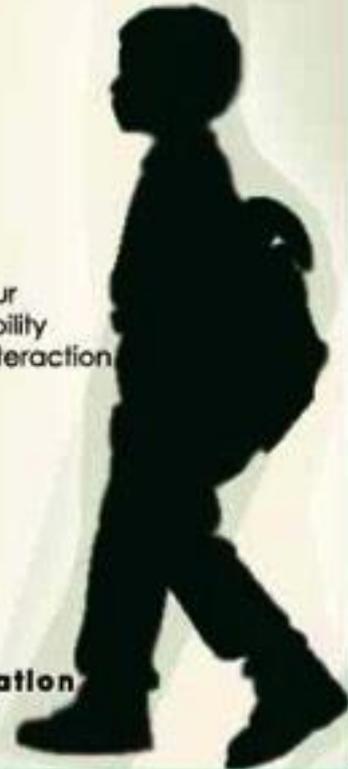
Stem Cells from your own body



Treatment

- Improved Behaviour
- Better Cognitive ability
- Improved Social Interaction

Rehabilitation



Autologous stem cells, i.e., those derived from the patient's own body, can have a profound impact in healing autism.

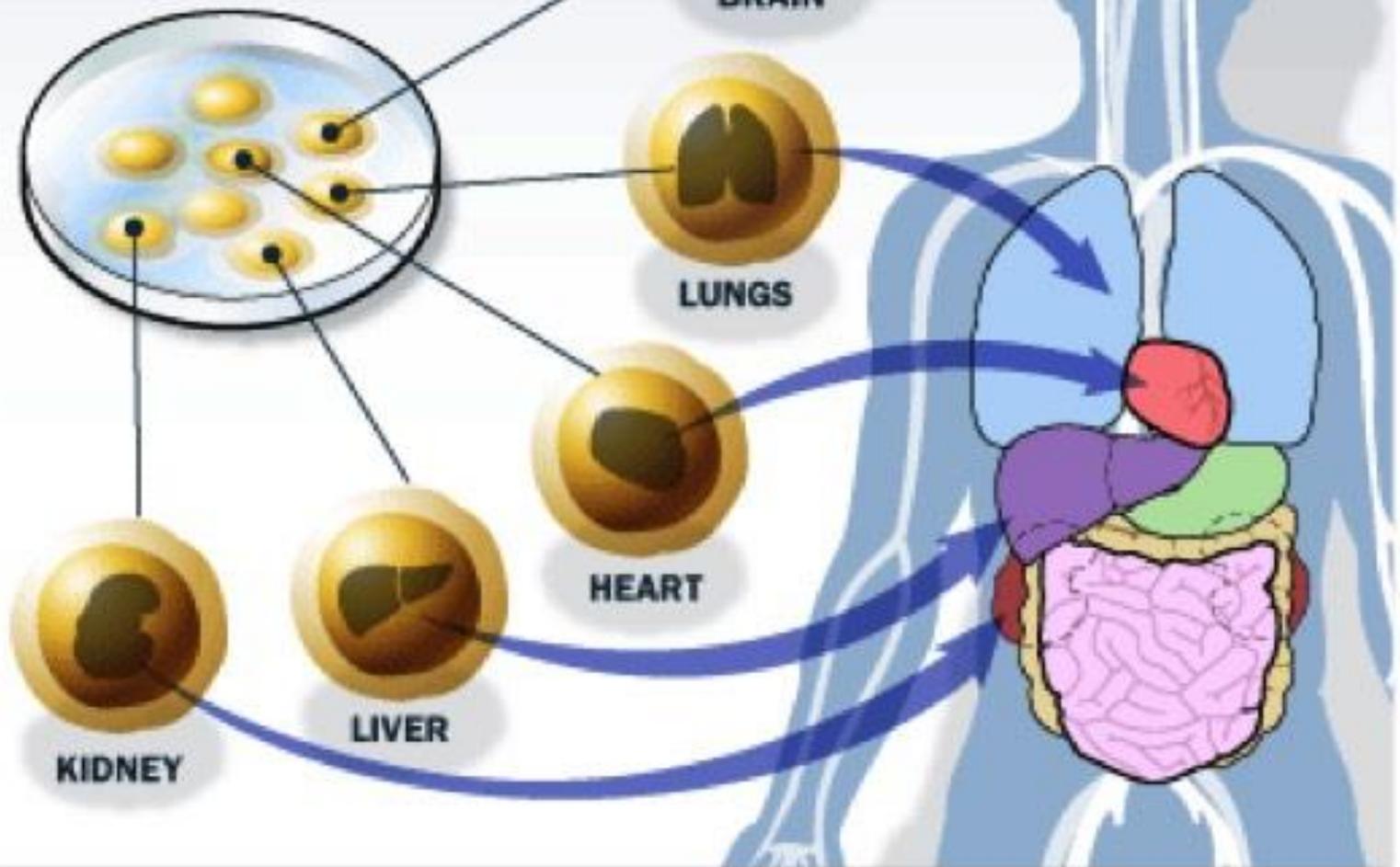
Regenerative Medicine

Field of medicine dedicated to healing the body from within using holistic natural medicine and procedures such as autologous stem cells.

Stem Cell Possibilities

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A stem cell can become any one of the 220 different cells in the body.



Stem Cells

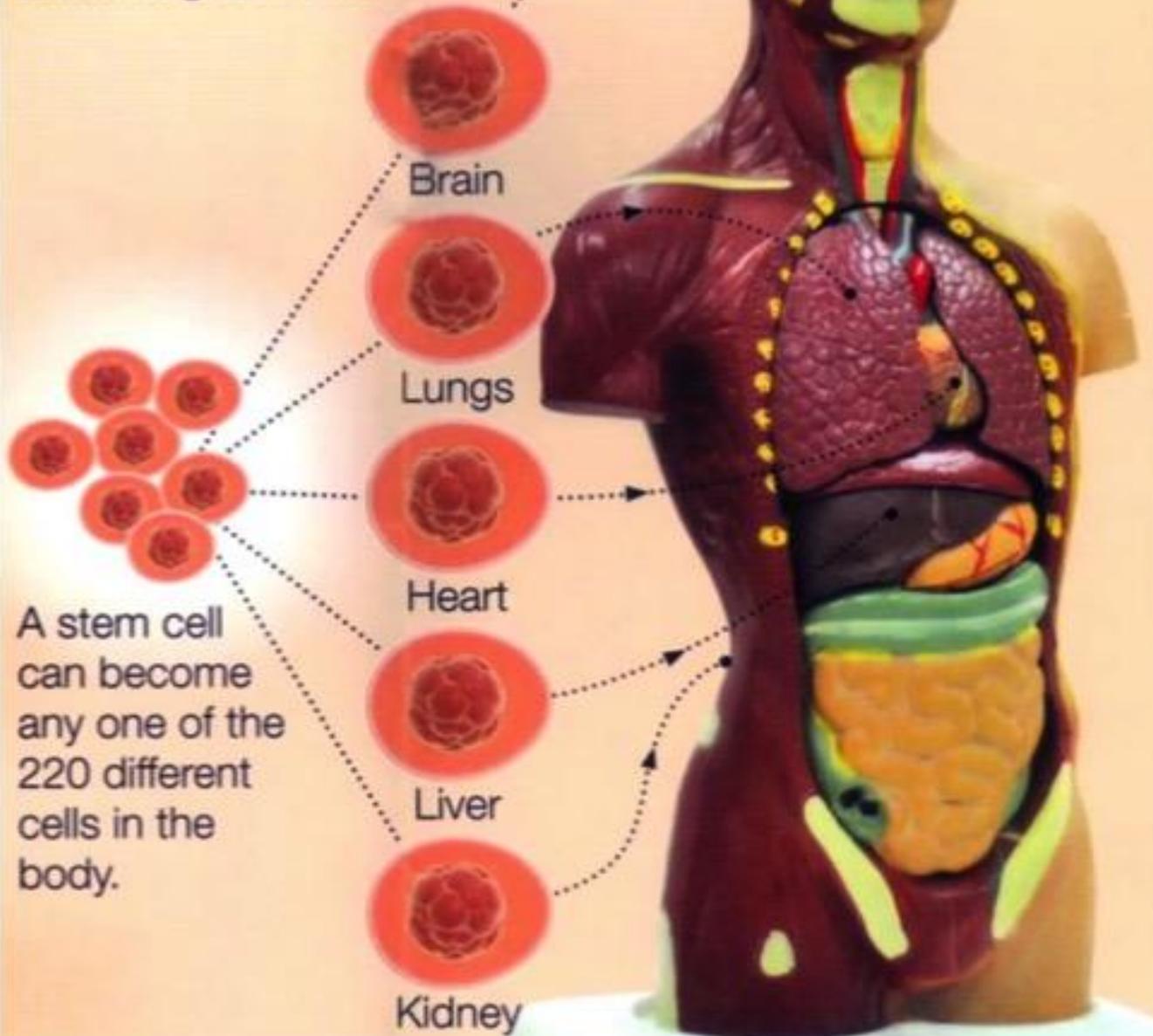
The human body's master cells, having the ability to grow into any one of the body's more than 200 cell types. Stem cells are unspecialized (undifferentiated) cells that are characteristically of the same family type (lineage).

Stem Cells

- ability to divide throughout life
- and give rise to cells that can become highly specialized and
- take the place of cells that die or are lost.

Stem cells contribute to the body's ability to renew and repair its tissues

How Stem Cells Work: Building Blocks



Unlike mature cells, which are permanently committed to their fate, stem cells can both renew themselves and create new cells of whatever tissue they belong to (and other tissues).

Bone marrow stem cells, for example, are the most primitive cells in the marrow. From them all the various types of blood cells are descended.

Bone marrow stem cell transfusions (or transplants) were originally given to replace various types of blood cells.



Embryonic or fetal stem cells

Embryonic Stem Cells/Fetal Stem Cells

Due to the political issues involved, some crucial aspects of the use of this type of pre-natal stem cells have been ignored. For example, **so-called embryonic stem cells are defined by their ability to produce teratomas.**

Little Publicized Aspects Of “Fetal” Stem Cells

Apart from the profound moral issues involved with these types of cells, there are various other points to consider.

Little Publicized Aspects Of “Fetal” Stem Cells

1. So called fetal stem cells are derived from infants of 3-4 months gestation, in which they very much formed.
2. The cells have to be removed when the infant is alive and crying or the stem cells will be dead.

It requires several aborted infants (up to nine) to collect sufficient stem cells for each procedure.

Stem cells derived prior to birth tend to run wild, producing serious side effects.

Pre-natal (embryonic/fetal) stem cells can produce ugly dangerous tumors known as teratomas which need to be surgically removed.



Pre-natal stem cells can cause severe exacerbations (worsening) of the person's condition. For example, after receiving pre-natal SCs, a Parkinson's patient tremors got much worse and uncontrollable.

Pre-natal stem cells have not been shown to be beneficial.

There is a potential risk of contamination and infection, e.g., HIV, HBV, CMV and other viruses.

The use of so-called embryonic or fetal stem cells is an outdated, antiquated method which has been long surpassed by the safe cutting technology of autologous adult stem cell therapy.

Adult Stem Cells - stem cells taken from a person's own body any time after birth, regardless of age.

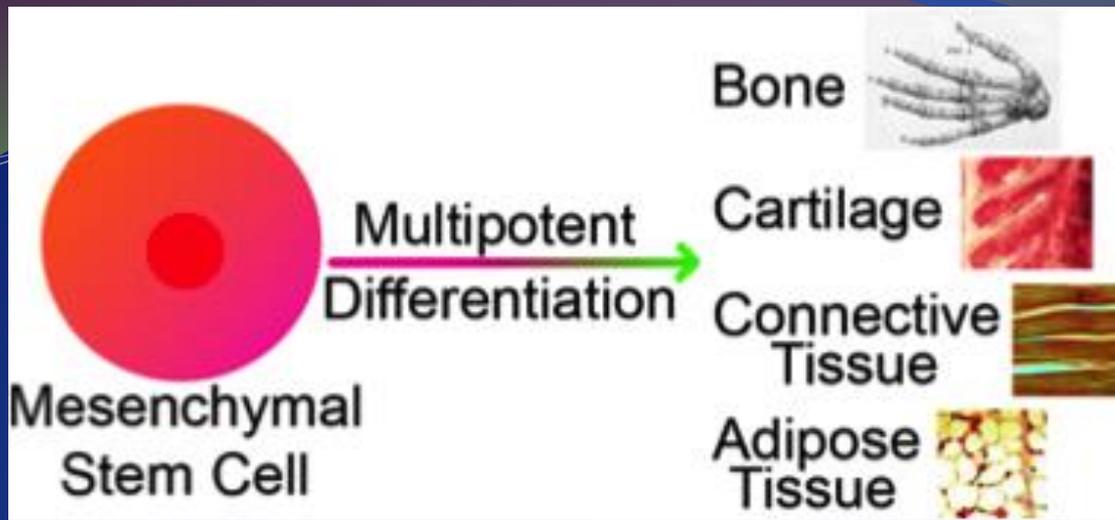
Autologous Adult Stem Cells: stem cells derived from the patient's own body. Unlike pre-natal stem cells, autologous stem cells:

Autologous Stem Cells:

- Do not carry the risk of rejection, because they are not considered foreign by the body's immune system.
- Do not carry risk of tumor formation.
- Do not carry the risk of transmission of infection which might be present in another person.

Can be quite effective for a number of chronic degenerative conditions such as:

- Alzheimer's
- Anti-Aging
- Autism
- Arthritis
- CHF (Congestive Heart Failure)
- COPD
- CP
- Dementia
- Lupus
- MS
- Seizure disorders
- Parkinson's
- Stroke
- Traumatic Brain Injury
- and many more.



Multipotent Stem Cells

Cells which have the potential to transform themselves into cells in multi (many) organs and tissues in the body: brain, nerves, muscles, kidneys, liver, eyes, cartilage and others. Autologous adult stem cells derived from bone marrow and adipose tissue are multipotent.

Multipotent Stem Cells

Autologous bone marrow stem cells – Stem cells derived from a patient's own bone marrow.

Growth Factors - Bone marrow contains a rich cocktail of components known as growth factors. **These growth factors reduce inflammation, promote the formation of new blood vessels, help to activate stem cells and promote healing.**

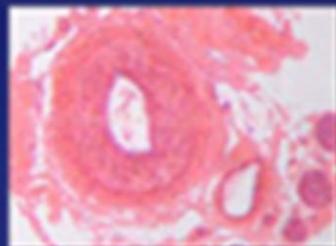
Adipose Stem Cells

Stem cells derived from a patient's own fat.

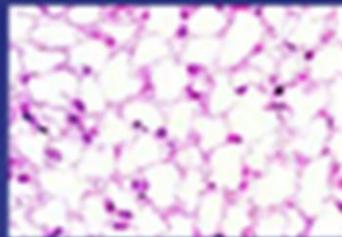
Mesenchymal Stem Cells (MSCs)– Stem cells which repair and replace damaged tissue. Also known as repair stem cells. These are found in both Bone Marrow and Adipose Tissue (Fat).

Capabilities of Adipose Stem Cells

Adipose-Derived Mesenchymal Stem Cells



Endothelium



Adipose



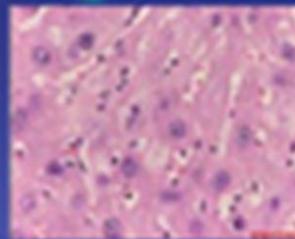
Muscle



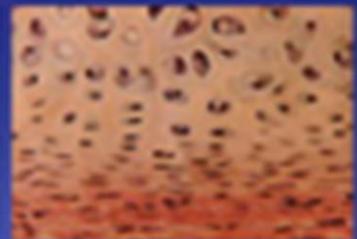
Bone



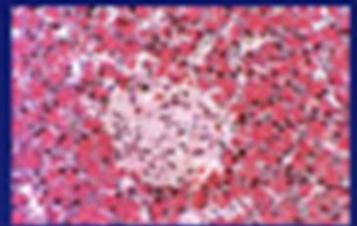
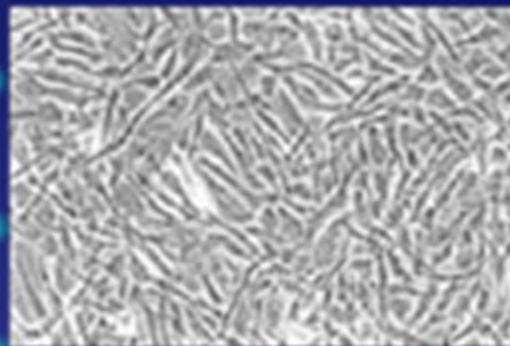
Myocardium



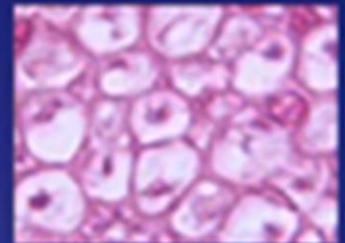
Liver



Cartilage



Pancreas



Neuron

Properties of Mesenchymal Stem Cells (MSCs):

- 1) Self-renewal and
 - 2) Multi-lineage differentiation
- make stem cells attractive candidates for use in cellular reparative therapy, particularly in neurological diseases where there is a paucity of treatment options.

Properties of Mesenchymal Stem Cells (MSCs):

Recent findings show that the major underlying pathogenic mechanisms of autism are hypo-perfusion and immune alterations in the brain. So conceptually, cellular therapy which facilitates counteractive processes of improving perfusion by:

- 1) Angiogenesis (growing new blood vessels) and
- 2) Balancing inflammation by immune regulation would exhibit beneficial clinical effects in patients with autism.

Stem Cells Int. 2013;2013:623875. doi: 10.1155/2013/623875. Epub 2013 Aug 25. Sharma A, et al. “Autologous bone marrow mononuclear cell therapy for autism: an open label proof of concept study.”

The Bible talked about the life giving property of blood thousands of years before the time of the Lord Jesus Christ:



“The life of the flesh is in the blood, and I have given it as an atonement for your souls.” Leviticus 17:11

We now know that blood is formed in the bone marrow, which is where we obtain Bone Marrow Stem cells. Science has proven the reality that indeed the life of a human being is in the blood.

Benefits of Bone Marrow Stem Cells And Growth Factors

“Hematopoietic stem cells (HSCs) are pivotal in controlling chronic inflammation and in the restoration of immunological balance.”

Therapeutic role of hematopoietic stem cells in autism spectrum disorder-related inflammation:

:

1. **Mesenchymal Stem Cells** – Although they are present in lesser numbers than in adipose tissue, they are still present and can be used to reduce inflammation and repair damaged tissue.
2. **Hematopoietic Stem Cells** – transform themselves into blood forming cells. There is also evidence that they have plasticity, meaning they may be able to transform themselves into other types of cells.
3. **Restores Immune Balance** – resets the body's immune response

4. Control Chronic inflammation

– this produces an overall calming effect in autism.

5. Restores Immune Balance –

resets the body's immune response

Bone Marrow Stem Cells in Autistic Children – 96% Show Global Improvement

“Out of 32 patients, a total of 29 (91%) patients improved on total CGI and 20 patients (62%) showed decreased severity on CGI-I. On Clinical Global improvement -II 96% of patients showed global improvement.”

-Stem Cells International, Volume 2013 (2013), Article ID 623875, 13 pages
<http://dx.doi.org/10.1155/2013/623875>

Clinical Study

Autologous Bone Marrow Mononuclear Cell Therapy for Autism: An Open Label Proof of Concept Study

Alok Sharma,¹ Nandini Gokulchandran,¹ Hemangi Sane,² Anjana Nagrajan,³ Amruta Paranjape,³ Pooja Kulkarni,² Akshata Shetty,³ Priti Mishra,³ Mrudula Kali,³ Hema Biju,³ and Prerna Badhe

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American Journal of Medical Case Reports

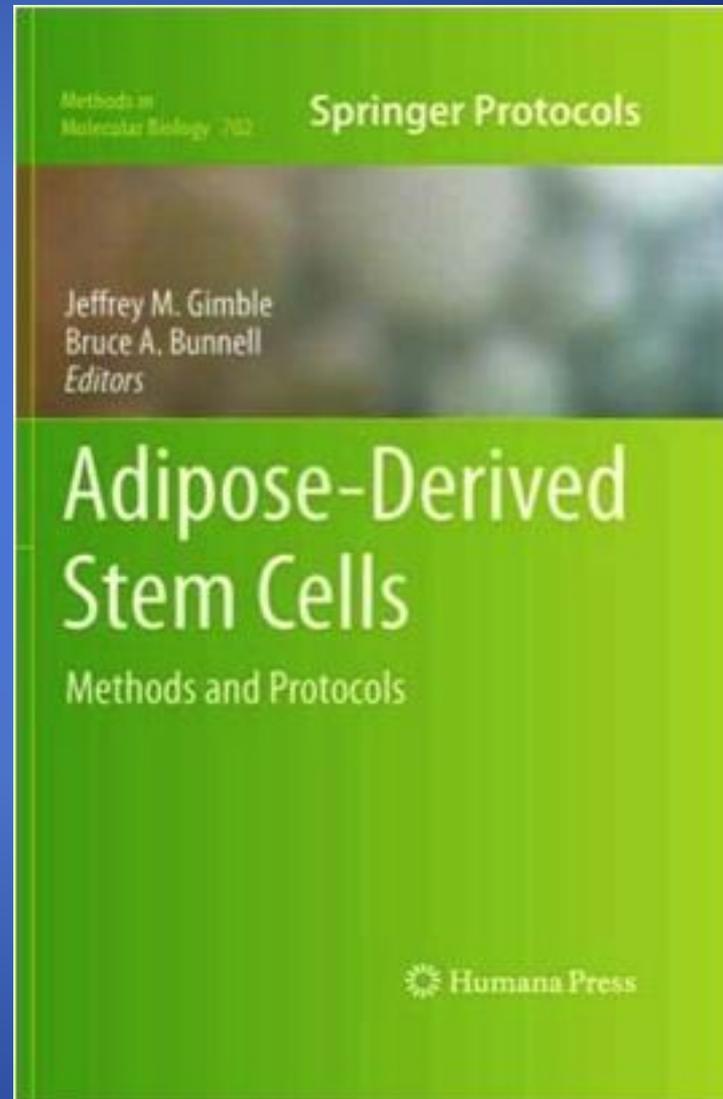
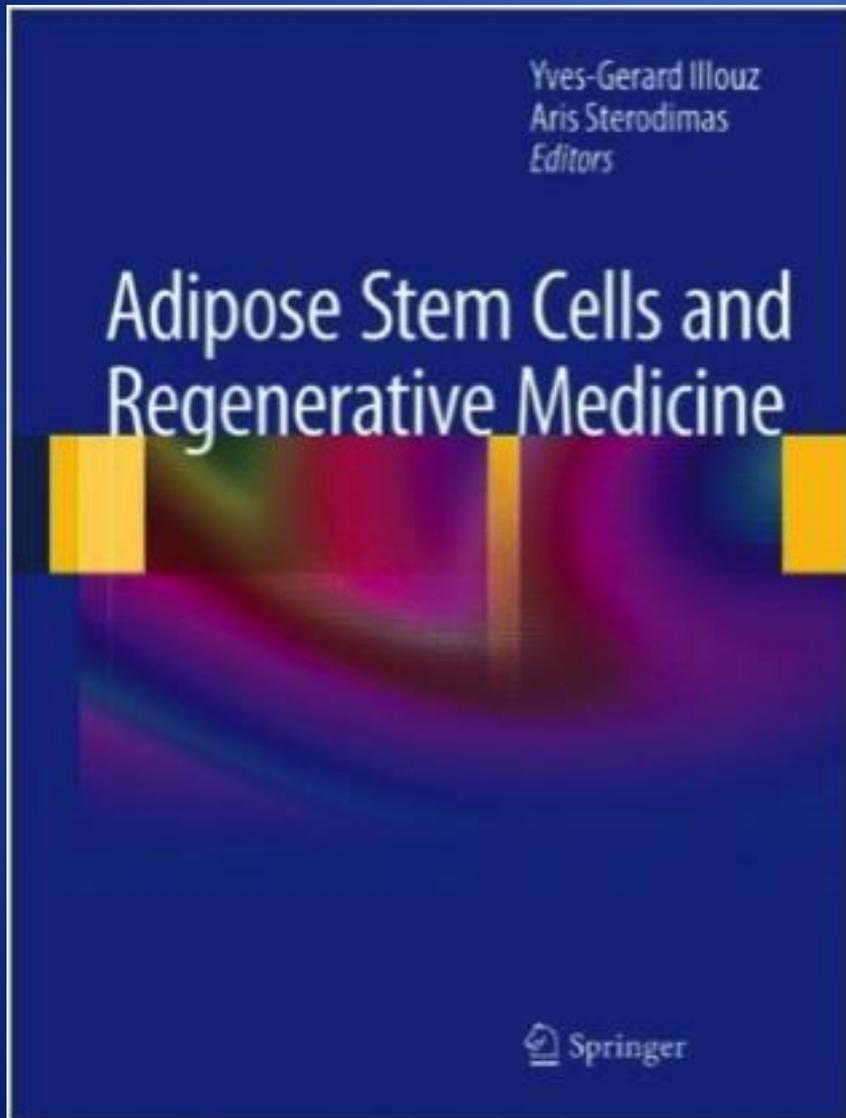
Vol. 3, No. 10, 2015, pp 304-309. doi: 10.12691/ajmcr-3-10-1 | Case Report

Amelioration of Autism by Autologous Bone Marrow Mononuclear Cells and Neurorehabilitation: A Case Report

Alok Sharma, Nandini Gokulchandran, et al. Department of Medical Services & Clinical Research, NeuroGen Brain and Spine Institute, Navi Mumbai, India
²Department of Research & Development, NeuroGen Brain and Spine Institute, Navi Mumbai, India,³Department of NeuroRehabilitation, NeuroGen Brain and Spine Institute, Navi Mumbai, India

“Through this case report, we demonstrate that treatment with autologous BMMNCs is safe, feasible and has the potential to ameliorate autism.”

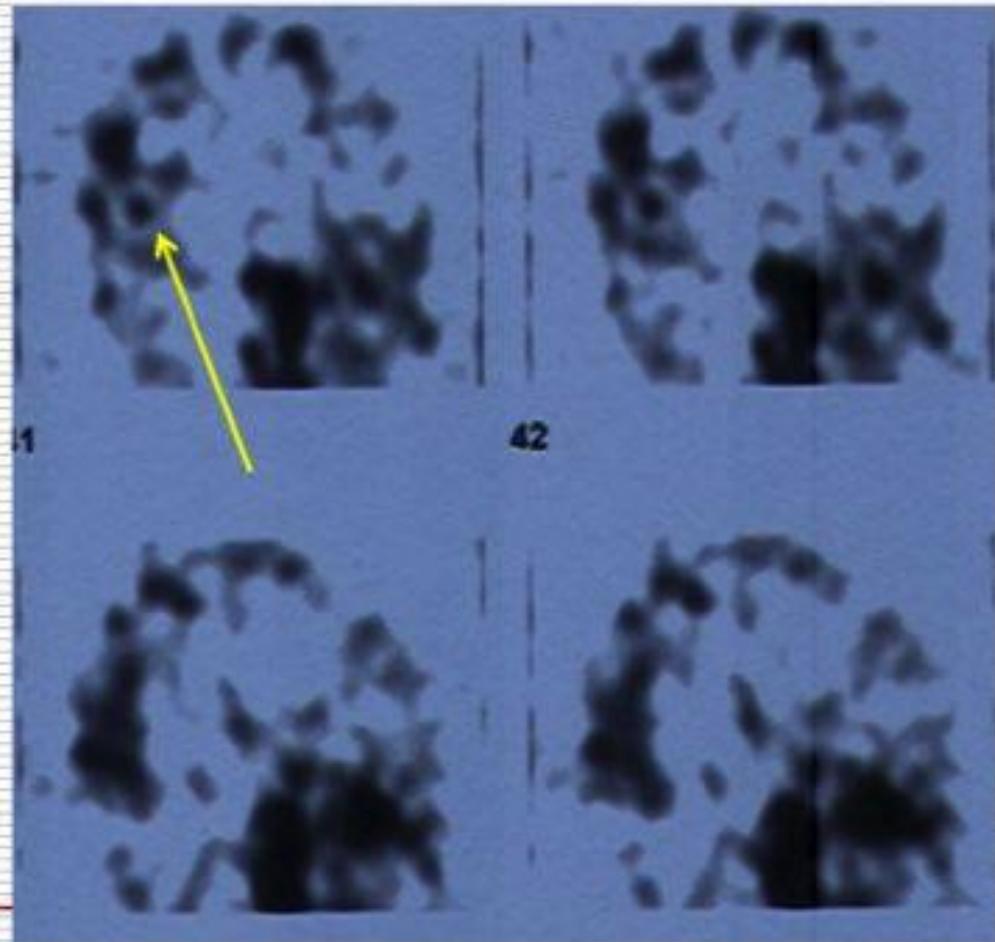
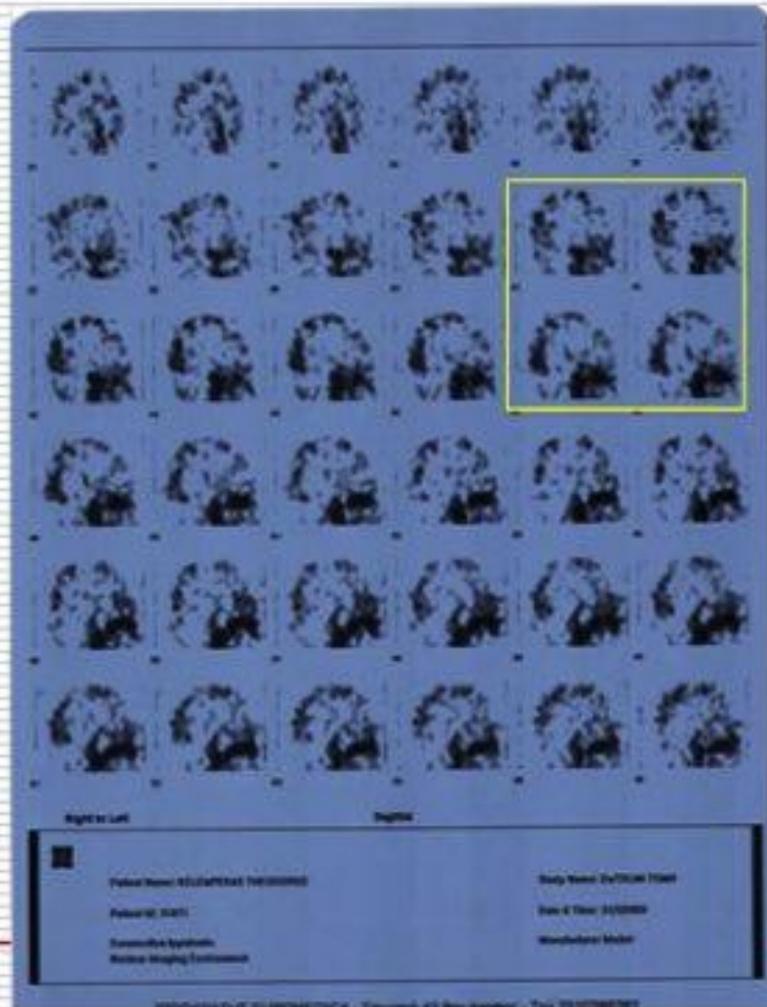
Benefits of Adipose Stem Cells



Case Study: Brain Injury

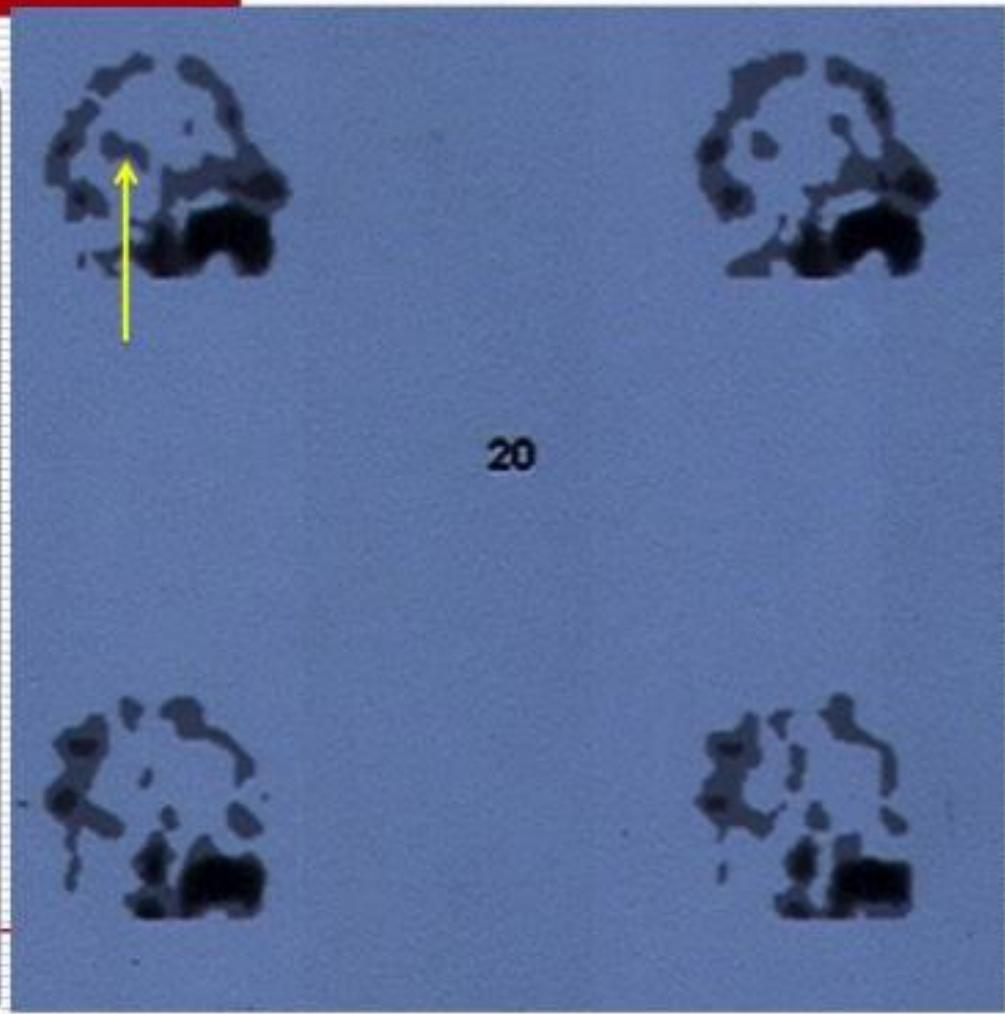
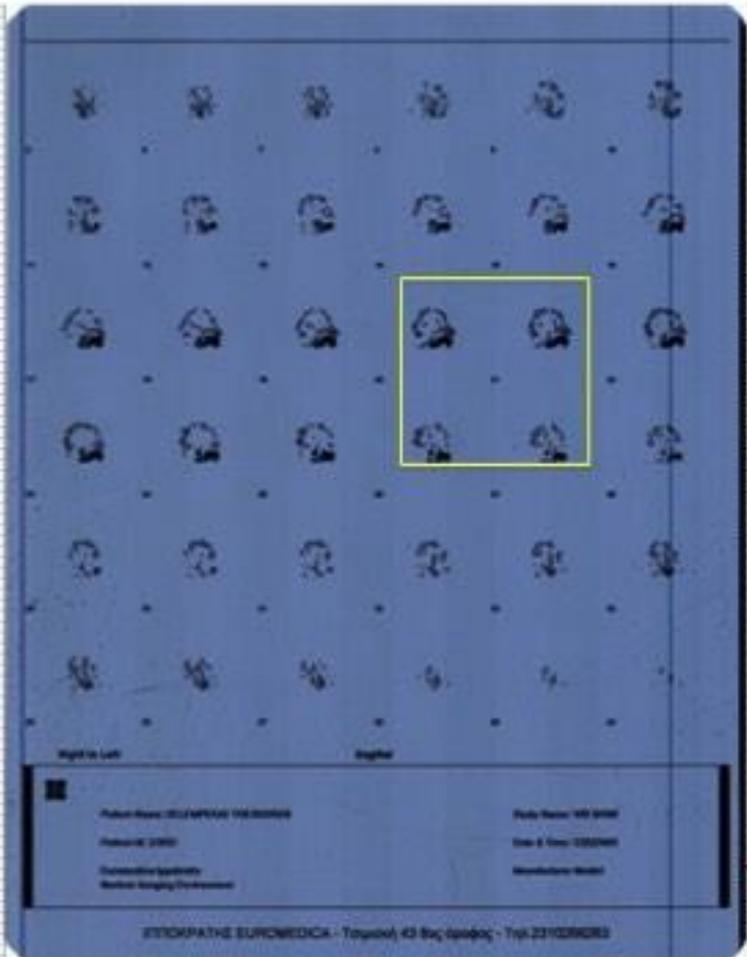
When stem cells were injected via IV drip after activation using AdiStem technology, the activated stem cells went to the site of the injury.

Activated Stem Cells- ^{99m}Tc -HMPAO-labeled ADSCs administered by i.v. after activation (PRP+laser)



Unactivated Stem Cells- 99mTC-HMPAO labeled

ADSCs administered by i.v. with no activation)

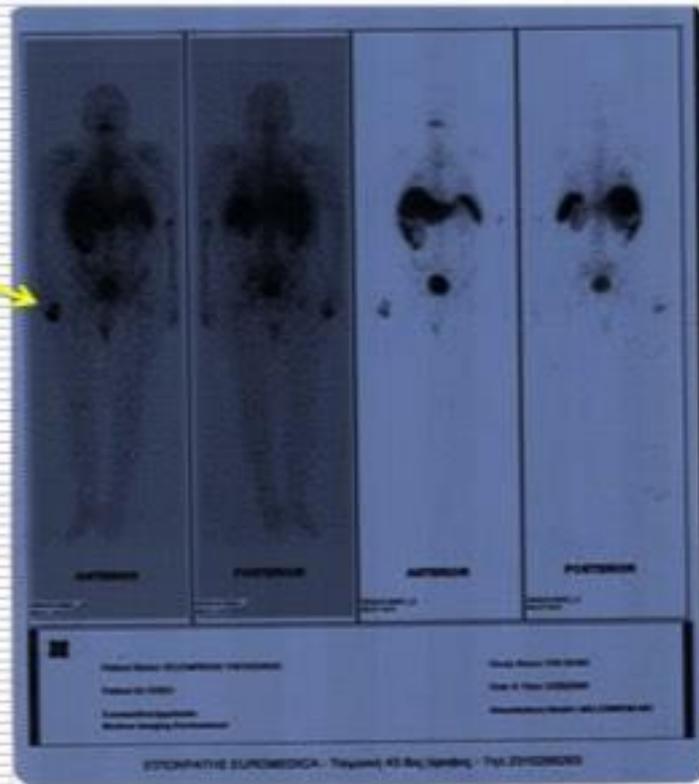


Case Study: Homing Ability of Stem Cells

The activated stem cells were administered via IV drip into the left arm. The stem cells went to the site of the arthritic right wrist. Reverse image show the same result. There were no visible stem cells in the left wrist.

Clinical Evidence – FDA approved 99mTC Radio tagging

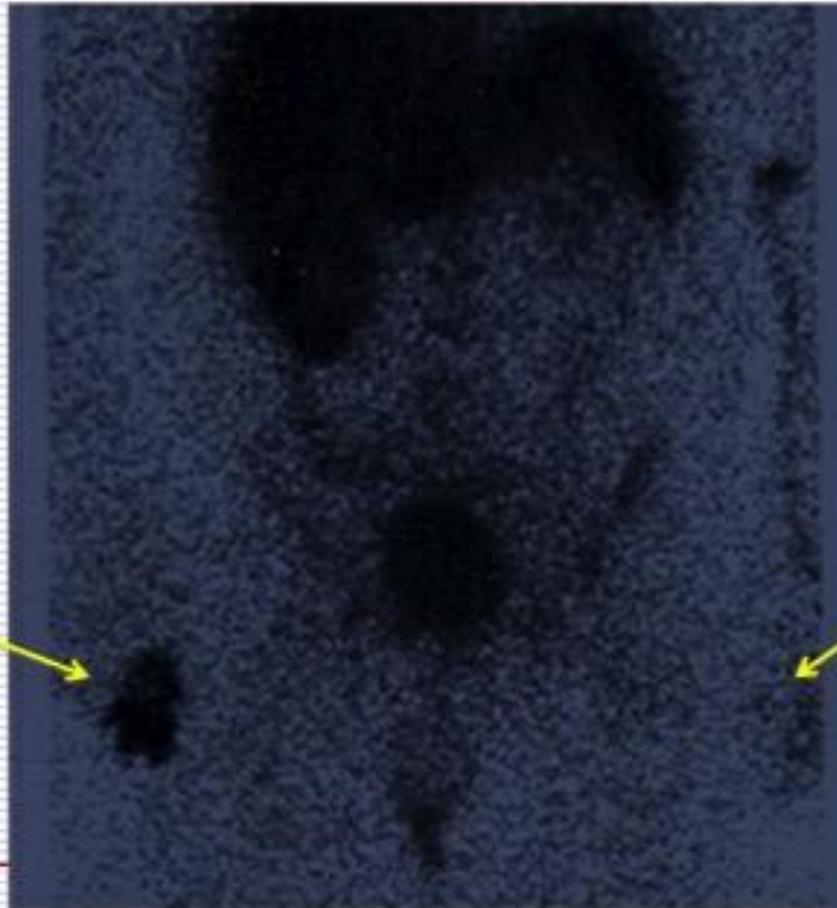
99mTC-HMPAO
labeled ADSCs
administered
by i.v. (hand)



FDA-Approved 99mTC Radio Tagging

Stem Cells- home on arthritic hand

Dark area -
stem cells
that were
tagged



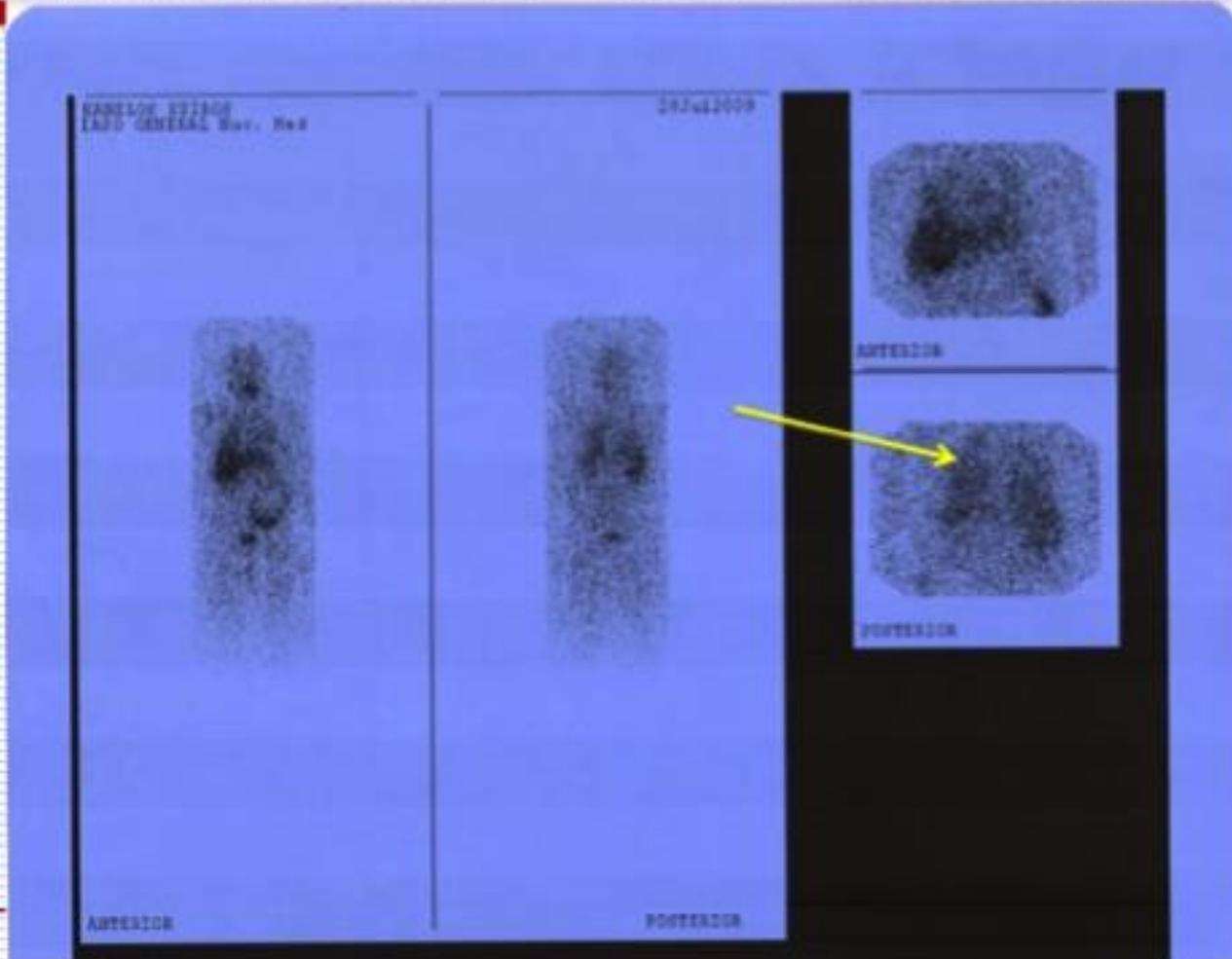
No stem
cells in other
hand

Activated Stem Cells are attracted to injury in right
(arthritic) hand only.

Case Study: Lung Disease

When activated stem cells were administered via IV drip into the left arm, the stem cells went directly to the site of the inflammation in the lungs. Scan was taken 24 hours after stem cells were activated and radio tagged.

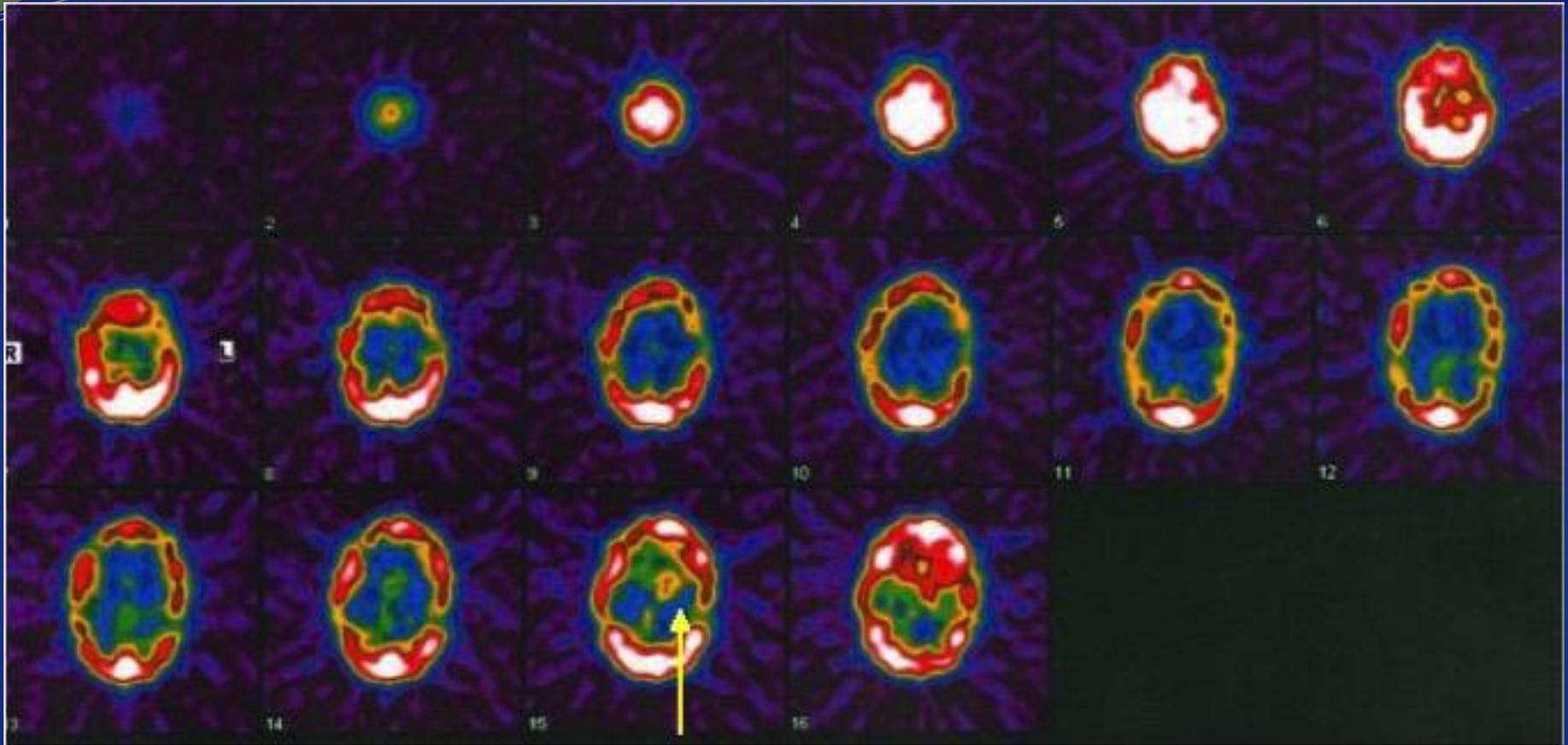
Gamma-camera scan of whole body of male with severe emphysema



Gamma-Camera Scan of Whole Body of Male With Severe Emphysema

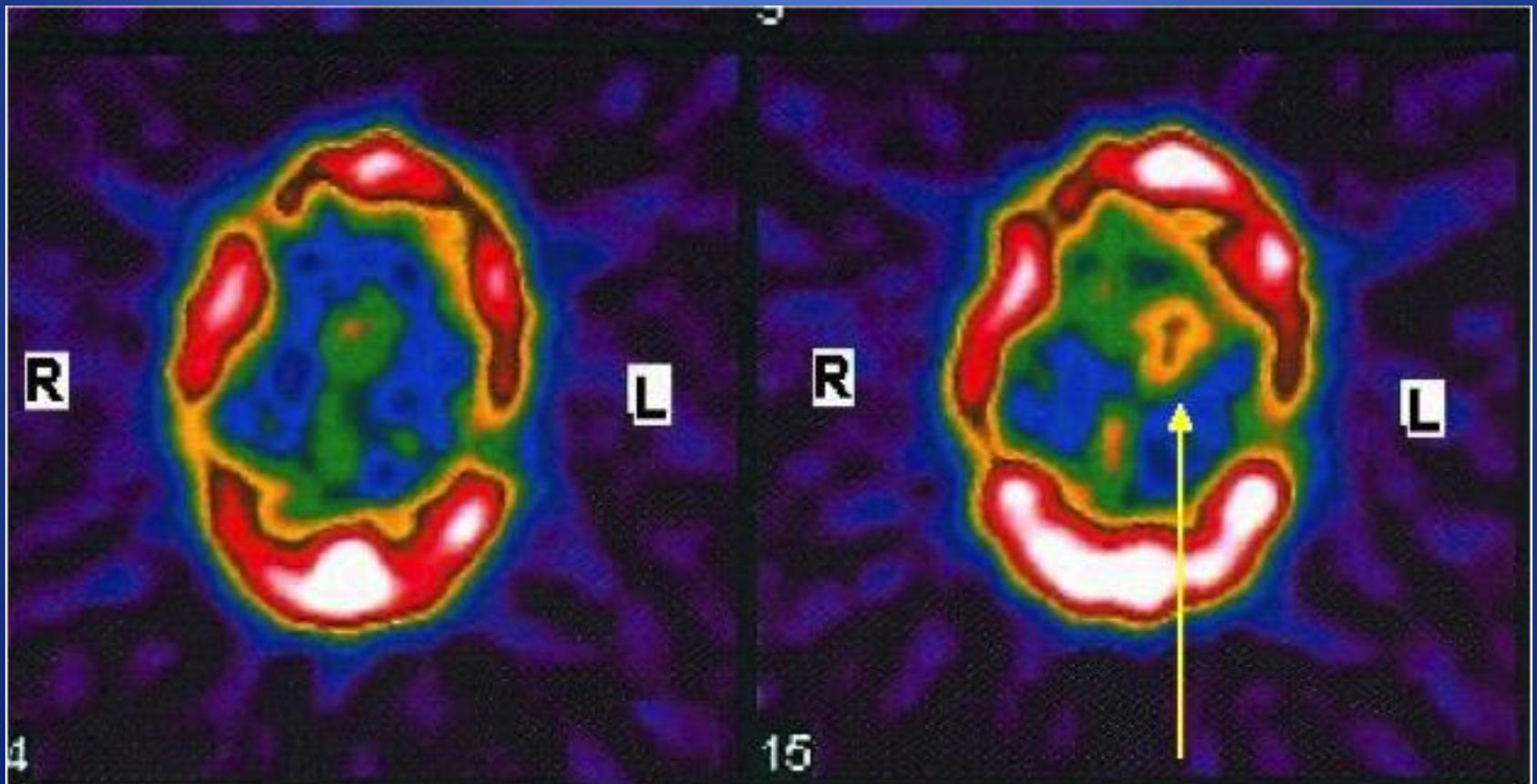
Case Study: Cerebral Palsy

Below is an Indium scan of a 9-year old male diagnosed with Cerebral Palsy. The patient's own stem cells were harvested and activated. They were then tagged with Indium and returned the same day through an intravenous drip. A scan was taken and activated stem cells are clearly present in the brain on slide 15.



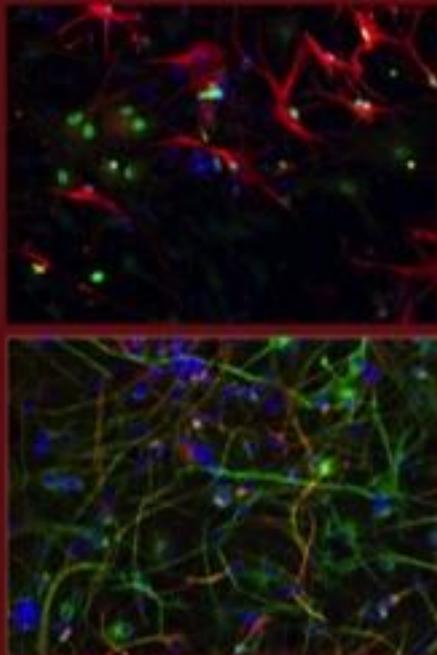
See Slide 15 above. Yellow-orange area indicates "hot spot" indium tagged stem cells.

Below is a close up of slide 15. The yellow-orange color represents tagged stem cells that have homed on the area of the brain dysfunction.



Stem Cells & The Injured Brain

Stem Cells and Neurodegenerative Diseases



Editors

Laurent Lescaudron
Julien Rossignol
Gary L. Dunbar

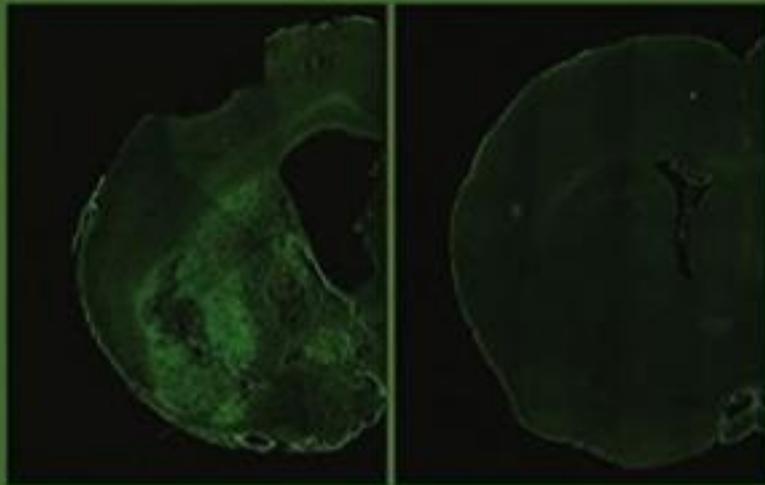
 CRC Press
Taylor & Francis Group
A SCIENCE PUBLISHERS BOOK

David C. Hess *Editor*

Cell Therapy for Brain Injury

 Springer

Stroke Recovery with Cellular Therapies



Edited by

Sean I. Savitz, MD

Daniel M. Rosenbaum, MD

 HUMANA PRESS

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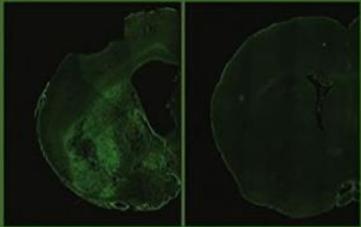
Cell Therapy for Brain Injury

 Springer

Bone Marrow Stromal Cells:

- 1) Selectively target damaged tissue, (home in on damaged tissue)
- 2) Promote neurological functional recovery (improve brain function) and
- 3) Remodel brain architecture (re-make and re-create the brain).“

Stroke Recovery
with Cellular Therapies



Edited by

Sean I. Savitz, MD

Daniel M. Rosenbaum, MD

 HUMANA PRESS

- *Stroke Recovery with Cellular Therapies*, (Humana Press, New Jersey, 2008) Edited by Sean I. Savitz, MD, Daniel M. Rosenbaum, MD

At Regen Center, when dealing with brain injury and various neurological conditions, we can utilize the most advanced delivery system of delivering bone marrow derived stem cells directly into the brain via the femoral artery in the leg, gently threading the wire through the chest and then infusing the stem cells through the carotid arteries on either side of the neck.



Benefit of doing both bone marrow and adipose stem cell transplant at the same time.

Why doing two distinct stem cell transplants is better than one:

MEDICAL RATIONALE: Each source of stem cells contains its own unique cocktail of healing components. When combined, BM and AD SCs can have a powerful synergistic effect which intensifies the healing process. This has been shown to be the case in heart disease; when combined, the two types of stem cells exert a powerful synergistic effect.

Synergistic effect of adipose-derived stem cell therapy and bone marrow progenitor recruitment in ischemic heart.

Lab Invest. 2011 Apr;91(4):539-52.

doi: 10.1038/labinvest.2010.191.

Epub 2010 Dec 6. Li M¹, Horii M,

Yokoyama A, Shoji T, et al.

We have found both bone marrow SC transplant and adipose SC transplant can work as a stand alone procedure. Each can work well by itself. Initially, we did not have the technology to do bone marrow stem cell transplants. So we only did adipose and overall saw good results with autistic children. However, there were many children who did not have any fat at all so we could not do the procedure. We had a line of lean kids waiting to get stem cells.

Fortunately, we were able to acquire the technology for extracting stem cells from bone marrow. We then did dozens of BM only SC procedures and saw very promising results. Then, we had patients with enough fat to do adipose SC procedures and we decided to try doing both procedures at the same time. The results were superior doing two different stem cell procedures then doing only one. Therefore, whenever possible we do both procedures at the same time.

Benefits of Doing Combination Bone Marrow - Adipose Stem Transplants

- **Rapid results**
- **Comprehensive double
barrel approach**

Low Risks of Autologous Bone Marrow Stem Cell Transplant

- 1) Low risk – minimally invasive.
- 2) No risk of rejection—comes from patient's own body
- 3) Performed by MD specialists in sterile OR in a hospital
- 4) Painless - done under iv anesthesia

- 5) Bone marrow is taken out with a syringe, looks like a blood draw.
- 6) All materials used are sterile disposables
- 7) Area is cleansed with anti-bacterial agent, betadyne
- 8) Pressure is applied manually and with elastic bandage
- 9) Patient is kept under observation for several hours after the procedure

How Safe Are The Double Stem Cell Procedures?

Both bone marrow aspiration and the mini-liposuction for adipose tissue are considered minimally invasive procedures. The material is not cut out or carved out. It is gently removed with a syringe not a scalpel.



Are The Procedures Painful?

All procedures need to be done in a fully equipped hospital with a highly qualified anesthesiologist and plastic surgeon under IV anesthesia, not gas, as the use of general gas anesthesia is more risky and has the potential for side effects. Under the IV protocol there is no pain involved during the procedure. There is minimal discomfort afterwards. Most autistic kids who undergo the procedure come bounding back within a day or two.

Can Autologous Stem Cells Make My Child Worse?

Since the stem cells are only derived from the patient's own body (autologous stem cells), there is no risk of producing exacerbations. On the contrary, both types of stem cells have the property of reducing inflammation, which is one of the crucial elements in improving the symptoms of autism.

Human Cord Blood Derived Stem Cells

Umbilical cord blood-derived stem cells and brain repair.
[Sanberg PR](#)¹, [Willing AE](#), et al. [Ann N Y Acad Sci.](#) 2005
May;1049:67-83.

Human umbilical cord blood (HUCB) is now considered a valuable source for stem cell-based therapies.

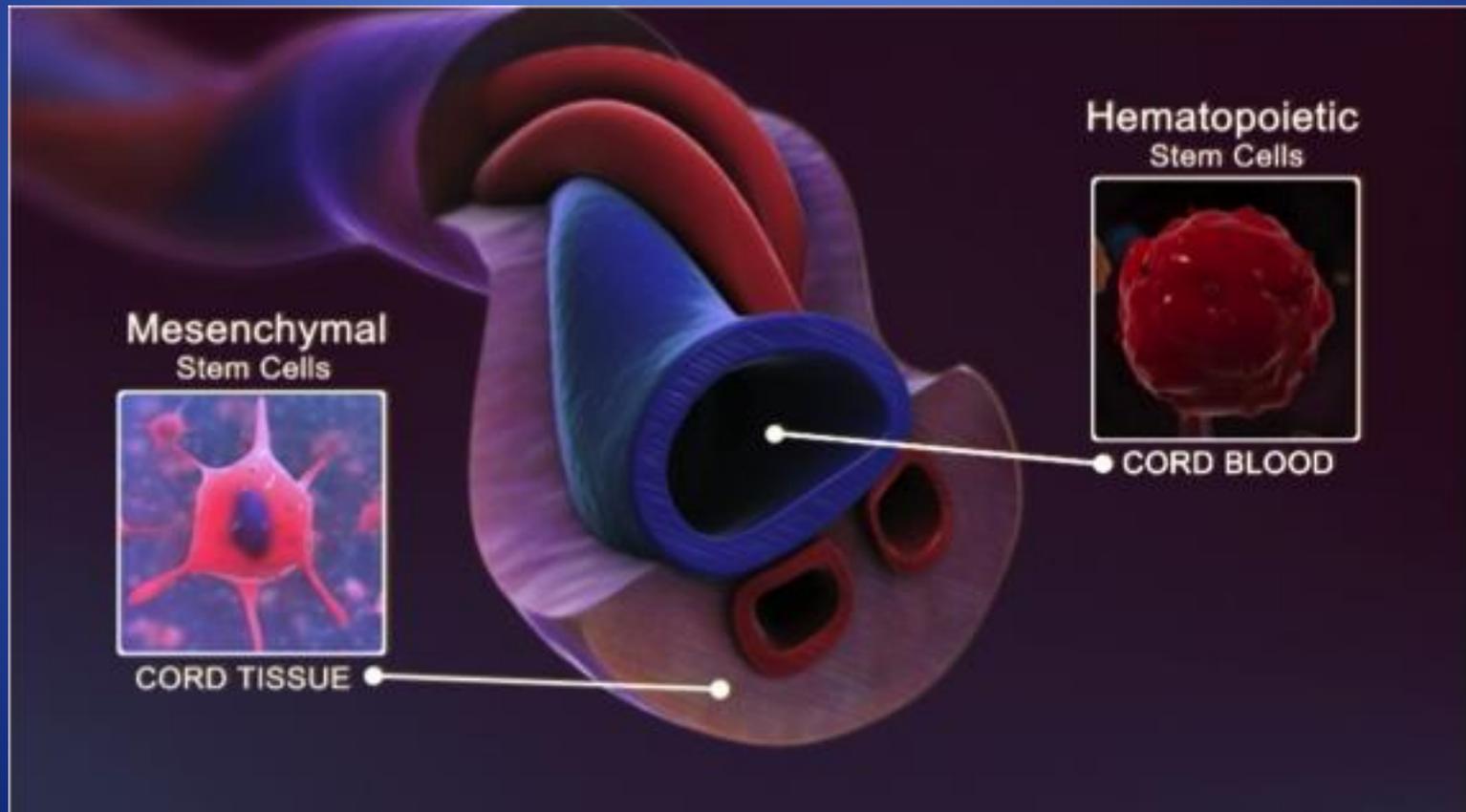
In a major study at Duke University using cord blood for autism showed encouraging results:

In addition to evidence of efficacy, the cord blood transplants were reported to be safe.

Reported improvements included:

- ❖ Decreased sensory sensitivity
- ❖ Increased social communication
- ❖ Decreased repetitive behavior (reduction in stimming)
- ❖ A decrease in social withdrawal (slight)

Human umbilical cord blood is derived from babies which are born normally. There are basically two sources.

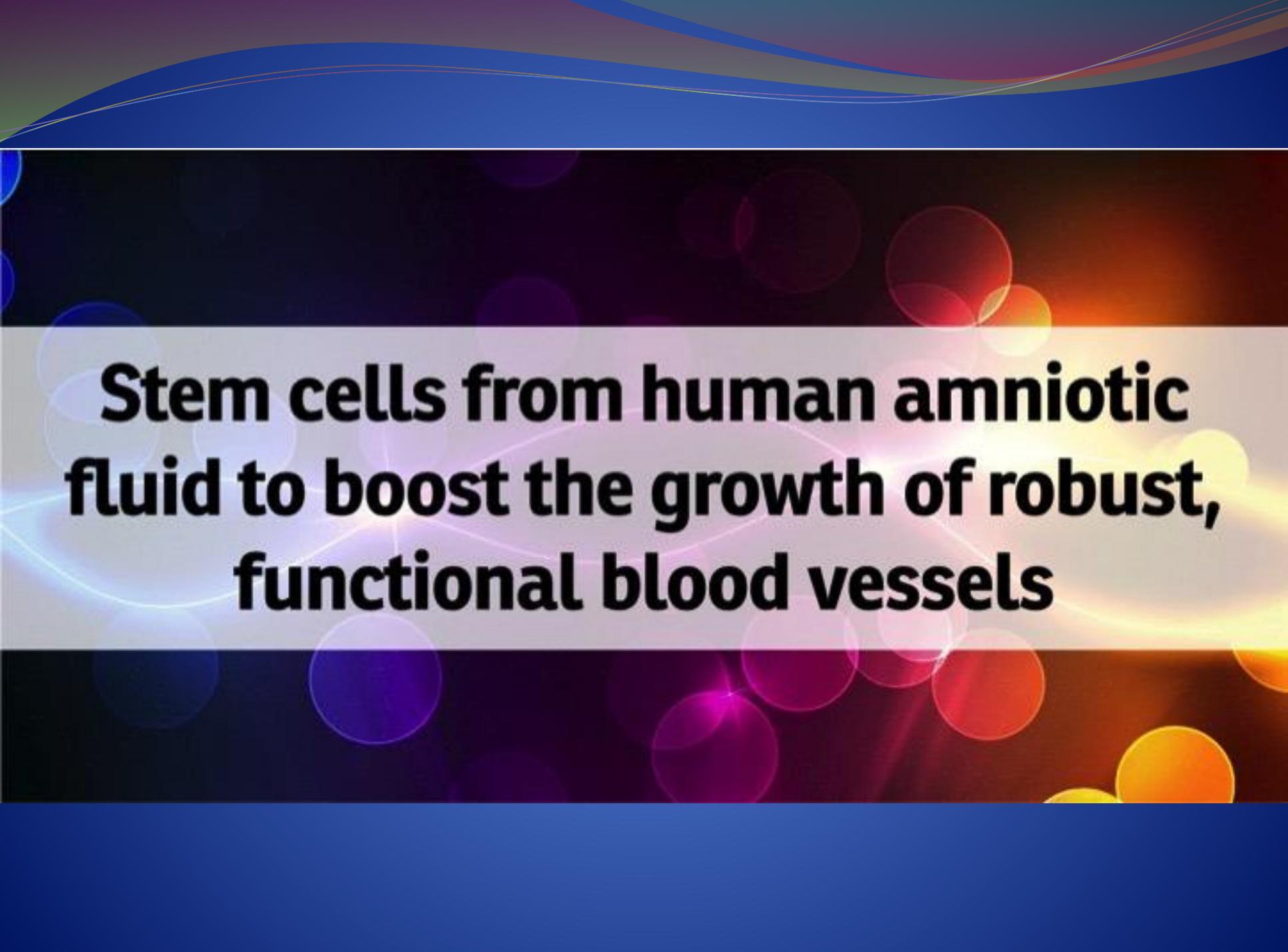


The first option is using the child's own cord blood that has been saved at birth.

The problem is making sure the storage center will release the sample to you. Policy in this regard has apparently gotten more liberal in releasing the cord blood sample to the parents. The other difficulty is finding a place which will actually agree to infuse the child's cord blood, and do so at a reasonable cost.

There are sometimes patient paid clinical trials, but they may be difficult to get into and can be expensive (\$10,000+). There is one place outside the United States which will infuse the child's own cord blood for a mere \$15,000. At our facility, we will infuse the child's own cord blood for a nominal charge when it is combined with the patient's own bone marrow and where feasible, adipose stem cells. The reason we will not infuse the child's own cord blood alone is because it is uncertain if the gains will be sufficient as a stand alone infusion.

AMNIOTIC STEM CELLS – These are taken from amniotic fluid taken at birth from various donor mothers. If the center does proper screening for infection it can be done safely. This needs to be verified. I have not spoken to any parents who have used amniotic stem cells with autistic children, so I cannot comment on its efficacy. Various preliminary studies suggest that amniotic SCs could have a positive role in treating autism by reducing inflammation. The use of amniotic stem cells in the treatment of autism appears to be an avenue that merits further investigation.



Stem cells from human amniotic fluid to boost the growth of robust, functional blood vessels

HYPERBARIC OXYGEN THERAPY (HBOT) AND STEM CELL THERAPY



Numerous studies as well as the experience of countless parents have shown that HBOT can be of significant value in children with autism.



If your child can tolerate HBOT and logistics and finances permit, it might be worth your while to do some sessions before and after to boost stem cell production and enhance the overall internal environment. However, it is not imperative for stem cell therapy.

Could autologous stem cells make my child worse?

To my knowledge, there never has been a report in the medical literature or anecdotal of autologous stem cells causing exacerbations in an autistic child or adolescent.

The reason for this is two-fold. Since they come from the child's own body, there is no risk of rejection. Secondly, it is in the intrinsic nature of autologous stem cells derived from bone marrow or fat to reduce inflammation not to increase it. In our personal experience in working with autistic children from all over the world, we have never seen a child get worse.

What Type of Improvements Have Been Seen In Autistic Children Who Have Received Autologous Stem Cells?

Parents of autistic children have reported such gains as:

Anger control, end of meltdowns

Reduced stimming

A great reduction in self-injurious behaviors

Reduction in bizarre behaviors

Bladder and bowel awareness and control

Easing of obsessive compulsive behaviors

Control of sexual acting out in front of others

Normal appetite control

Less picky eating

Increased sociability

New self-awareness

**Better comprehension of other's
spoken language**

Increased Vocabulary and Speech

**New “presence”— they are here with
you**

Autistic Children And Adolescents Who Received Autologous Stem Cells

Male, Age 11

Before Stem Cells:

- ❖ Severely autistic
- ❖ Missed flight to stem cell center due to severe prolonged meltdown at the airport in spite of being on heavy medication
- ❖ No eye contact at all
- ❖ No verbal
- ❖ Non-stop hyperactivity
- ❖ Spinning, flapping
- ❖ Violent, aggressive behavior
- ❖ Incessant uncontrollable meltdowns

After Stem Cells

- ❖ Much more normal appearance
- ❖ Good eye contact, new “presence”
- ❖ New coherent language
- ❖ Calm, no longer hyperactive
- ❖ No more spinning or flapping
- ❖ No more violent, aggressive behavior
- ❖ Meltdowns vastly reduced in intensity and frequency
- ❖ Able to function at school
- ❖ Totally calm on return flight w/o meds

Before Stem Cells

- ❖ Severe Autism
- ❖ Very hyperactive, agitated
- ❖ No speech, only grunting
- ❖ No bowel control, adult diapers only
- ❖ Aggressive
- ❖ Sexual acting out
- ❖ Generally un-cooperative
- ❖ No eye contact, other world look
- ❖ Ripped out intravenous line during SC infusion

After Stem Cells

- ❖ Autistic symptoms greatly improved, more normal appearance
- ❖ Much more peaceful
- ❖ New speech, phrases, sentences
- ❖ Complete Bowel Control, Using Potty Only
- ❖ Far less aggressive
- ❖ No public sexual acting out
- ❖ Compliant most of the time
- ❖ Meaningful eye contact, new “presence”
- ❖ Able to do basic schoolwork
- ❖ Much more livable with

Male, Age 12

Before Stem Cells

- ❖ Moderate autism
- ❖ Spoke in one to three word phrases
- ❖ Not sociable
- ❖ CP/6-70 convulsions per day

After Stem Cells

- ❖ Mild autism
- ❖ Speaks in full sentences, great improvement in language
- ❖ Asks questions
- ❖ Convulsions greatly reduced

**May God guide and direct
you as you strive to help
your child on the road to
recovery.**

**“As you have done it for the least
of my brethren, you have done it
unto Me.”**