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While stem cell therapies may seem to have appeared overnight, they have been practiced for some time prior to the recent burst in new applications and stem cell sources. The most recent developments in stem cell medicine have brought exciting new opportunities and shown great potential for improving patient outcomes – especially over the long-term.

**What Are Stem Cells?**

Stem cells are primitive cells in our body serving as a reservoir, able to replenish itself and differentiate into a wide range of specialized cells, in order to replace damaged cells and regenerate tissue. They have innate intelligence, able to home in to areas of hypoxia and inflammation, secrete bioactive molecules that exert local and systemic effects, reduce inflammation, and recruit local cells to assist in the reparative process.

Every cell in our body can trace its origin to the ultimate stem cell – a fertilized egg. Each cell division moves the cells down a path to their final cell type such as cells of muscle, nerve, and various organs. All along this journey cells make commitments that are typically irreversible. This implies that any cell type or tissue in our body may require stem cells for regeneration. Properly harnessed, stem cells have the potential to repair or reverse an incredibly broad range of diseases, conditions, injuries and more. To name a few, injectable stem cell products have been used to successfully treat joint problems, muscle and tendon conditions, neurological diseases such as Parkinson’s or stroke, autoimmune diseases, wounds such as diabetic ulcers or burns, hair loss, wrinkles, lung conditions and heart disease. In treating an astonishing number of debilitating conditions, stem cells truly change lives – often permanently.

**Where Are These Stem Cells?**

Stem cells exist in varying forms in numerous places throughout the body, although with a tendency to decline in number throughout our life cycle. Our own natural wound repair system employs stem cells in regenerating a variety of tissues. Stem cells are more abundant in bone marrow, fat tissue, and circulating blood; it is from these sources the body often recruits stem cells when they are needed. Stem cells are especially abundant at birth, in tissues present in umbilical cords and placenta, which is why many parents choose to privately store umbilical cord tissue and cord blood when their babies are born. Membranes from placenta have been used to treat burns and other wounds for over a century and bone marrow transplants have been routine for decades as well.

# Adult Tissue as Stem Cell Source

More recently, stem cells from a patient’s own fat, bone marrow, and circulating blood have been used to treat a variety of common conditions. For example, in the case of joint problems that require replacement or repair of cartilage, concentrated and directed doses of one’s own stem cells have been shown to be more effective and long-lasting than widely practiced alternatives using PRP (platelet rich plasma) or cortisol injections. Acquiring stem cells from an adult’s blood requires many sessions and expensive processing, to harvest a useful number of therapeutic cells. Using bone marrow increases yield and requires only one session. Harvesting stem cells from fat has exciting applications and has shown efficacy for treating a variety of conditions.

# Birth Tissue as Stem Cell Source

Stem cells harvested from tissues typically discarded at birth (e.g. placenta, umbilical cord) is another rich source of stem cells that boast some unique properties that set them apart from adult stem cells. While adult stem cells need to be a match (much like blood transfusions) to avoid rejection by the recipient’s immune system, stem cells of umbilical cord and placental origin do not need to be matched. This is because the young cells present in these birth tissues have not fully developed the surface proteins (“HLA markers”) found on the outer membranes of adult cells, and thus are able to “fly under the radar” of the recipient’s immune system. This immune-privileged status makes the transplant an easier task in a number of ways and can speed up the stem cell therapy: instead of harvesting the cells from the patient, the doctor is able to open the stem cell medicine cabinet to administer the dose that is needed. This also removes some of the limitations for increasing the dosage of stem cells. These tissue transplant products are not classified as drugs by the FDA as long as they are “minimally manipulated.” Stem cells harvested from birth tissues have another unique advantage: These cells are young and have been shown to be more therapeutically active. While all of the mechanisms by which stem cells benefit the healing and regeneration processes are not fully known, we do know that the cells produce and secrete cytokines and growth factors. When younger stem cells are compared to adult stem cells, they show a significant increase in the secretion of growth factors, speed of differentiation, the total number of future cell divisions before eventual cell death, and other cell activity benchmarks. All of these factors likely contribute to the observed greater plasticity of younger stem cells (i.e. the ability to differentiate into a more diverse range of cell types).

# Birth Tissue - Amniotic Membrane

Injectable amniotic membrane products have been rapidly advancing in quality and number of uses in the last five years, and show greater long-term efficacy than PRP (platelet rich plasma) or cortisol injections. Products made from membranes (excised from placenta that are properly tested and harvested from C-section births from mothers undergoing the recommended blood-borne pathogen panel) can be ordered for overnight delivery from a number of distributors. Using these stem cells does not require matching because, while the chorionic (maternally facing) membrane presents HLA markers, the fetal-facing membrane (amnion) is immune privileged and can be used in allogeneic applications (transplantation from a different individual).

# Birth Tissue - Umbilical Cord

Blood Cord blood contain hematopoietic CD34+ cells that have for decades been used to treat the same panel of conditions for which bone marrow has been used, and they have more mature HLA presentation than the cells from the cord tissue. There is evidence, however of a more naïve progenitor cell present exclusively in cord blood. The hematopoietic cells will also help with angiogenesis (generating blood vessels) thus help with blood supply to the repaired tissue.

# Birth Tissue - Umbilical Cord

Tissue The newest stem cell product derived from birth products is from umbilical cord tissue. The umbilical cord is a dense source of MSCs. MSCs (mesenchymal stem cells) have the capability to differentiate into bone, cartilage, fat, cardiac muscle cells, skeletal muscle fibers, renal cells, and have even been shown to differentiate into cells of ectodermal origin (e.g. neurons) and endodermal origin (e.g. hepatocytes and pancreatic cells). Because the stem cell rich Wharton’s Jelly in the umbilical cord is protected by a sheath, the cord can be obtained from vaginal deliveries and subsequently sterilized, processed, and tested.

**\*All donated cords are the by-products of normal, healthy births. Each cord is carefully screened for sterility and infectious diseases under American Association of Blood Bank standards.**

# In Conclusion

Adult stem cells (i.e. “non-embryonic” in origin) can be harvested from various sources including bone marrow, adipose tissue, amniotic fluid, placenta and umbilical cord. Among these, umbilical cord-derived cells offer many advantages, including abundance, youthfulness, easy harvesting, no need for HLA matching, excellent safety record, exceptional ability for replication and differentiation, and robust angiogenic potential. Although autologous stem cell transplantation (using a person’s own stem cells) is currently the most utilized form of stem cell therapy, as it avoids the risk of graft vs. host immune response, this method has significant drawbacks in the aging and chronically ill populations, because in this population, both the number and quality of stem cells have declined, limiting their regenerative capabilities. Even among the young and healthy adult population, stem cells obtained from bone marrow or adipose tissue will have lower differentiation potential, shorter telomeres (end sequences that protects the chromosomes), and less generations of offspring’s compared to the stem cells of umbilical cord origin.

# Choosing Stem Cells

And as one can see, stem cell products available to physicians for treating patients can be obtained from a variety of sources and manufacturers. There are differences in quality of the source material and the manufacturing process. It is important to investigate the purity, quality, and viability of the stem cell product to achieve the best results. While some products like amniotic membranes used for dressing burns can benefit a patient even when there are no living cells present (due to the scaffolding effect) other products like injectable stem cells used for treating joints or stroke are more effective when the donor cells are living and healthy. Some stem cell companies provide cell assay results that define the product and verify the presence of healthy living cells. Some products that have been freeze-dried, are stored at room temperature, or are suspended in solutions that aren’t conducive to cell stability may contain scaffolding, growth factors, and other things but are less likely to provide any living cells.

Your doctor is likely to have more information about the emerging stem cell therapies and can guide you in your search for the best that modern medicine has to offer. More developments and more successes are being reported every day in this rapidly progressing area of medicine. It is a wonderful time to be alive when so many of the things that could rob us of our vitality can now be treated in effective and often lasting ways. For further info please contact :

info@stemcellscience.net

# Frequently Asked Questions

**Where do these stem cells come from?**

We only choose to work with stem cell laboratories that are US-based, and are leaders in the industry, who strictly follow FDA guidelines. We believe that the best source of stem cells as of date are of umbilical cord origin, thus we provide treatment using cells derived from **Human Umbilical Cords.**

While in the mother's womb, a fetus receives nourishment and oxygen from the mother's blood. These essential substances pass to the fetus through the placenta and umbilical cord, which connect the mother and fetus. The blood found within the umbilical cord is the baby's, not the mother’s. Typically, the umbilical cord, placenta, and any blood still in the cord are thrown away. But researchers have discovered that umbilical cord tissue and blood are rich in stem cells, such as mesenchymal stem cells and hematopoietic progenitor cells, and they are the best source of stem cells when comparing various factors, such as the youth of the cells, safety, convenience, low potential for adverse immune rejection, not requiring enzymatic manipulations, high cell viability and differentiation potential, and low potential to cause tumors, and lack of ethical controversy. We also believe that the stem cells derived from a combination of umbilical cord tissue and cord blood offer the most complete array of therapeutic cell types, and we only work with companies of high integrity, with the strictest screening procedures and the most cutting-edge processing techniques.

**How are the stem cells collected?**

Umbilical cord tissue collection – Cords are donated by healthy mothers after giving birth to a normal healthy baby in a US hospital. Donors sign a consent form, fill out a highly comprehensive health questionnaire, and give a blood sample. The mothers’ blood and the umbilical cords undergo extensive testing for HIV, STD’s, hepatitis, etc. Once the cords are ensured to be free of all infectious diseases and meets all American Association of Tissue Bank standards, the tissue is allowed to be donated. When the umbilical cord and mother’s blood arrive at the laboratory, they would undergo further stringent testing, and all cells are obtained through minimal manipulation, and no chemical reagents are used.

**Which kinds of cells are included?**

**Mesenchymal Stem Cells (MSC’s)** are multipotent stem cells that can differentiate into a variety of cell types, including: osteoblasts (bone cells), chondrocytes (cartilage cells), myocytes (muscle cells), adipocytes (fat cells), and also trans differentiate into many other vitally important tissues of human body, even neurons. They are ideally suited for treating systemic autoimmune and inflammatory conditions, and play a significant role in regenerating injured tissues. They help prevent premature cell death, rescue damaged cells, stimulate local dormant stem cells, modulate the immune system, have antimicrobial properties, and have been approved internationally (Australia, South Korea, Canada, Japan, etc.) for treating bone damage, coronary heart disease, arthritic conditions, Crohn’s disease, graft vs. host disease, etc.

**Hematopoietic Progenitor Cells** are immature blood-forming cells also found in blood and bone marrow, and are highly suited for tissue regeneration. They contain CD34+ cells that have revascularization capabilities, and provide synergistic benefits in concert with the tissue-repairing function of the mesenchymal stem cells. The are able to replenish all cells in the circulatory systems such as white blood cells, red blood cells, and platelets.

**T-regulatory cells** – play an important role in immune system modulation

**How do stem cells help us fight aging?**

# Regenerate Neurons & Improve Brain Function

When we enter adult years, we lose brain cells, by 0.8% each year.

By the time we are 70 years old, we only have 55% of our brain cells left. As a result of this reduced number and declined function the cells, older adults often notice memory decline, slowed and dulled cognition, insomnia, or even dementia.

In our natural state, neurons have very limited ability to regenerate, thus the trend of brain aging seems irreversible. However, stem cell research has brought hope, as stem cells can trigger local brain cells to repair and regenerate, and can also differentiate into neurons themselves.

There has been significant advancements in treating Parkinson’s Disease using stem cells, as well as treating stroke victims, traumatic brain injury, spinal injury, brain atrophy and Alzheimer’s Dementia. Research have found that stem cells given through IV infusion can cross bloodbrain barrier, reverse degenerative changes, repair vascular ischemia and hemorrhage, modify calcified vasculature, thus restore balance and youthful state of the central nervous system.

Stem cells can help regenerate new blood vessels, improve brain blood supply, thus supply adequate nutrients and oxygen and remove waste. Studies have shown that the improvement of memory and cognition in Alzheimer’s dementia after stem cell treatment are stable and sustained.

# Improve Metabolism

Only through metabolism, can an organism obtain nutrients and energy to conduct all necessary cellular functions. Stem cells are the source of tissue regeneration, and the quantity and quality of stem cells can directly affect our metabolic function. Research have shown that stem cells can improve our metabolism of lipoproteins, effectively lowering total cholesterol, triglyceride,

LDL levels, and reduce atherosclerosis. Stem cell treatment can significantly improve our body’s ability for carbohydrate metabolism, lower blood sugar levels, improve the balance between energy intake and expenditure, thus lower excess body weight in combination with exercise.

# Rejuvenate Skin & Hair

Healthy skin are smooth, elastic, and with very active metabolism. New skin cells are generated by the stem cells at the base of skin layer, and hair by the stem cells in the hair follicles. Stem cells from the blood is an important source of stem cells in both skin and hair.

Stem cells can help tighten skin, improve collagen production, improve elasticity, reduce wrinkles and age spots. Studies have found plenty of cases of grey hair turning back into its origin color. The improvement of skin and hair, is not only a result of skin and hair regeneration, but also a result of overall health improvement in many of our organ systems, thus serving as an outer manifestation of our inner health.

# Improve Immune Function

Our immune system is our main defense again bacteria, virus, parasites, and cancer cells. Older adults have reduced number and function of these immune cells, thus they have lowered ability to fight off infections, cancer, and other diseases. Lower immune function is another hallmark of aging.

The direct evidence that stem cells can improve immune function comes from the treatment of leukemia through transfusion of healthy stem cells into leukemic patients.

Stem cells are also particularly helpful in modulating and keeping the immune system in balance, especially in the case of mesenchymal stem cells, which have been shown as a powerful tool in treating a multitude of autoimmune disorders.

Recently, stem cells have been used in the treatment of immune deficiency diseases, AIDS, and solid tumors, through their ability to manufacture blood cells, restore immune function, and destroy invading pathogens and cancerous cells.

# Restore Digestive Function

Our digestive system is made of multiple organs, and also requires an equilibrium between cell death and cell regeneration. As we become older or ill, the stem cells in our digestive system can be reduced in number and function, leading to more sluggish peristalsis, impaired nutrient absorption, lowered ability for the liver to detoxify, and dwindled digestive tract enzyme secretion, resulting in reduced appetite, bloating, malabsorption and constipation. Stem cells can significantly improve the function of our digestive system, and studies have shown that stem cells can help restore digestive function, and promote healing in the digestive tract.

# Improve Sexual Function

Stem cells have been shown to significantly improve and rejuvenate sexual function, leading to improved libido, sexual frequency, and sex life satisfaction. Many men notice improved erection (both firmness and duration), as a result of sexual organ rejuvenation and revitalization.

**Will stem cells help my condition?**

Currently stem cells have been shown to have clinical benefits in the following conditions:

Osteoarthritis  Autoimmune Disorders (122 known, including Rheumatoid Arthritis, Lupus, Crohn’s Disease, Hashimoto’s Thyroiditis)

Neurological Diseases (Parkinson’s, Alzheimer, Multiple Sclerosis, ALS, etc.)

Type II Diabetes

Heart Diseases

Erectile Dysfunction

Dermatological Disorders

Lung Diseases (COPD, asthma, etc.)

Athletic Injuries

Autism

Pain Management

Spinal Cord Injuries

Wound Care, Limb Salvage

Anti-Aging (such as skin, hair, energy improvement, etc.)

 **What are the potential side effects?**

The safety of umbilical cord-derived stem cell therapy has been well-established from numerous studies, and rarely, some mild flu-like symptoms have been noted after transfusion, which can last from hours to a few days to approx. 2% of the patients. This was considered a reaction due to the immunomodulatory effects of the stem cells.

**Can stem cells cause cancer?**

There have never been any documented cases that show umbilical cord-derived stem cells to cause or promote cancer. These cells are further differentiated enough that they do not have the potential for disorderly growth (which results in teratomas), such as what had been seen with embryonic stem cells. There has actually been evidence that stem cells of umbilical cord origin have anti-cancer properties. The potential for teratomas fuels part of the controversy for the use of embryonic stem cells, in addition to its obvious ethical implications. Stem cell therapy has been investigated as a form of treatment for cancer, with some encouraging results. Historically, stem cell transplant (in the form of bone marrow transplant) has been used as a treatment for leukemia (blood cancer) since the 1960’s.

**\***Please note: The statements above have not been evaluated by the FDA. Stem Cells are NOT considered Food or Drugs. They are considered body parts, like blood, skin, heart, lungs, muscles, stem cells, etc. They are regulated by Tissue Bank Dept. which is under the FDA, USA.