INDIANA POLYCLINIC

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What are Stem Cells?

- Stem cells are special cells that can transform into many different cell types.
- In many areas of the body stem cells act as a repair system and can divide and produce more stem cells over and over again.
- When a stem cell divides it can remain a stem cell or become another type of cell, like a heart cell, a nerve cell, or a cell from the skin, or the lungs, etc.
- In children, stem cells are available in large supply, ready to provide repair.
- As we age, our supply of stem cells begins to diminish.
- In addition, as people age, their stem cells can undergo genetic mutations, which reduce their quality and effectiveness at renovating and repairing the body.
- It is possible to extract and concentrate your own adult stem cells from places like your adipose (or fat) tissue; however, these cells are fewer in number and have undergone mutations.
- Many scientists and physicians now prefer to obtain stem cells from the placenta or umbilical cord.
- These stem cells are available in large supply and are undamaged because they are from a newborn.
- These live stem cells can be injected into joints or via IV depending on one's needs.
- You can think of these stem cells as chemical factories generating vital growth factors that can help to reduce inflammation, fight autoimmune disease, increase muscle mass, repair joints, and even revitalize skin and grow hair.

Future of Stem Cell Therapeutics

Here are the top areas in the space to watch out for:

1. **Tissue engineering:** Tissue engineering using the body's own stem cells to repair, replace or augment diseased tissue is a rapidly evolving field. Patients with a variety of diseases may be treated with transplanted tissues and organs. However, we face a shortage of donor tissues and organs, which is worsening yearly because of the aging population. Scientists in the field of tissue engineering are applying the principles of cell transplantation, material science, and bioengineering to construct biological substitutes that will restore and maintain normal function in diseased and injured tissues. The stem cell field is also advancing rapidly, opening new options for cellular therapy and tissue engineering. Use of postnatal stem cells has the potential to significantly alter the perspective of tissue engineering.
2. **Stem cell banking:** "At your moment of birth, you are probably at the point of biological perfection," says Dr. Bob Hariri. "Your system hasn't been exposed to all of those injurious stimuli, like electromagnetic radiation, chemicals, etc., and your biological software is uncorrupted." Stem cell banking allows us to capture stem cells with your original, uncorrupted DNA at birth, replicate them into a large number of future dosages and then

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freeze those doses. Hariri discovered that in addition to cord blood (the blood found in the umbilical cord of a newborn), the placenta of a newborn is an organ very rich in stem cells. Rather than discard the leftovers of birth, placentas, if saved, may hold the key to a longer and healthier life. Through his work, Hariri isolates, processes and cryopreserves cells (putting them into a deep freeze, about minus 180 degrees Celsius), keeping them in suspended animation at the most pristine state of their existence.

3. **Clinical applications of MSCs:** Mesenchymal stem cells, the major stem cells for cell therapy, have been used around the world over approximately 10 years. Currently, 344 registered clinical trials in different clinical trial phases are aimed at evaluating the potential of MSC-based cell therapy worldwide. From animal models to clinical trials, MSCs have afforded promise in the treatment of numerous diseases. The ability of MSCs to differentiate into osteoblasts, tenocytes and chondrocytes has attracted interest for their use in orthopedic settings. First, MSCs have been shown to be beneficial in treating bone disorders, such as osteogenesis imperfecta (OI) and hypophosphatasia. Other promising therapeutic avenues for MSCs include, but are not limited to, the treatment of autoimmune diseases, cardiovascular diseases, liver diseases and cancer. Tissue repair after trauma or injury is used more and more in athletics.

Recent Stem Cell Success Stories

Below are three stories demonstrating the incredible research and implications for stem cells:

1. **Stem Cells Able to Grow New Human Eyes**: Biologists led by Kohji Nishida at Osaka University in Japan have discovered a new way to nurture and grow the tissues that make up the human eyeball. The scientists are able to grow retinas, corneas, the eye's lens, and more using only a small sample of adult skin.
2. **Stem Cell Injections Help Stroke Victims Walk Again:** In a study out of Stanford, of 18 stroke victims who agreed to stem cells treatments, seven of them showed remarkable motor function improvements. This treatment could work for other neurodegenerative conditions such as Alzheimer's disease, Parkinson's and Lou Gehrig's Disease.
3. **Stem Cells Help Paralyzed Victim Gain Use of Arms:** Doctors from the USC Neurorestoration Center and Keck Medicine of USC injected stem cells into the damaged cervical spine of a recently paralyzed 21-year-old man. Three months later, he showed dramatic improvement in sensation and movement of both arms.

In Conclusion

As humans, we've just come to accept the notion that we are going to die.
However, the keys to our longevity and health may lie in our source code.
In the next two decades, stem cells are going to change medicine forever, extend life, and potentially save your life. We truly live during the most exciting time ever in human history.

Credit:
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