



Cerebral Palsy and Regenerative Medicine

By David Steenblock, M.S., D.O.

"The obstacle is the path." Zen Proverb

Overview

Did you know that RIGHT NOW, about 10,000 babies and infants are diagnosed with Cerebral Palsy each year?

Amazing children are being born today in every country, in every race, in every religion, and in every condition; and it will take amazing parents, teachers and physicians to work with them to keep “pushing the envelope” of our concepts on human potential, repair and regeneration. If you want to work with one of these amazing physician’s that are pushing the envelope and is within the United States then call 1-800-300-1063 and schedule your consultation with Dr. David A. Steenblock. **If you can’t make it into his office that’s okay just forward your medical records to his office and the consultation can take place over the phone or via live web cam through Skype.** Further information can be found at WWW.STEMCELLMD.ORG

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About fifteen years ago, with the help of **Dr. Richard Neubauer**, physicians began to see that non-functioning neurons were NOT dead, but “dormant”, and that the right balance of oxygen and nutrients could help the neurons function again. SPECT Scans of the brain in Dr. Neubauer’s research, showed minimal glucose metabolism in injured areas before hyperbaric oxygen treatment and an increase in glucose metabolism after treatment.

Previous beliefs were that if a neuron was not functioning, there was very little that could be done and the patient would just have to “live with it.” We know that when the whole brain is functioning, our capacities are much greater than when only some parts of the brain are alive and well. What is true for the body may also be true for the planet. Each person, like the neuron, is important to the full functioning of the human race, and we need to do more to create equal access to quality health care for as many people as possible. Our next step in regenerative medicine is stem cell therapy, and we would like YOUR HELP in creating a network across the country and the world that helps support treatments in regenerative medicine (oxygen therapies and stem cell therapies) for those wanting it but unable to afford it.

Stem Cell Therapies, Inc. will contribute to this Vision by:

1. **LOWERING THE PRICE** of regenerative therapies as much as possible!

2. Creating a list of physicians interested in Regenerative Medicine.
3. Writing an IND for the FDA and an IRB with universities to begin a multicenter research program in stem cell and/or hyperbaric oxygen therapies for children with cerebral palsy.
4. Promoting financial contributions and fund raising resources to local non-profit organizations to assist local efforts in subsidizing families wanting regenerative therapies for their children.

What we need from you, you may have already begun. We would like to see non-profit organizations of, by and for parents of disabled children who wish to help promote Regenerative Medicine in their area and state. These can be chapters of MUMS and/or independent parent groups. We need parents who care about every child and who will work together with local nutritionists, physical therapists, educators, and physicians to meet the families' needs, one day at a time. If you have a nonprofit organization and would like to be listed on our website for donations to be through you for CP treatments, please write to us at chase@stemcell.md

We will start with cerebral palsy and gradually expand to include more and more human neurons who lay dormant, in need of oxygen and nutrients to fully function again. For those interested in Regenerative Medicine, the following is an outline for the Regenerative treatment of CP.

Cerebral Palsy and Hypoperfusion

Cerebral palsy is a disorder caused by damage to the brain during pregnancy, delivery or shortly after birth. It is often accompanied by seizures, hearing loss, difficulty speaking, blindness, lack of co-ordination and/or mental retardation. About **25%** of cases come from a prenatal cause such as anemia, improper nutrition, viruses, x-rays or premature delivery. About **40%** are caused by a lack of oxygen (hypoxia), and the remaining causes are unknown.

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In an unpublished manuscript, Dr. Philip James describes tissue hypoxia: AThe areas affected in CP are in the middle of the hemispheres of the brain and one side or both sides may be involved. These critical areas, called the internal capsules, are where the fibers from the controlling nerve cells in the grey matter of the brain pass down on their way to the spinal cord. In the spinal cord, they interconnect with the nerve cells whose fibers activate the muscles of the legs and arms...When any event causes lack of oxygen, the blood vessels leak, the tissues become swollen and there may even be leakage of blood. The increased water content, termed edema, reduces the transport of oxygen.©

Brain hypoperfusion in cerebral palsy has been demonstrated by two SPECT studies (Lee et al, 1998 and Yamada et al. 1995).

Hypoxia and Brain Injury

Without sufficient oxygen and nutrients, brain cells become injured and can die.

In discussing the causes and treatment for cerebral palsy, several terms will keep reappearing, such as mitochondria, oxyradical damage and apoptosis. The mitochondria produce energy in the form of ATP (adenosine triphosphate) for cell function. The cell carries on all of its work, including waste removal, metabolism, immune defense, protein synthesis, etc. with the energy produced by the mitochondria. In the process of creating ATP, the mitochondria also produce oxyradicals. These molecules have unpaired outer electrons and will break up the bonds of other molecules so the outer electron will be paired. This becomes a chain reaction of one molecule after another breaking the bonds of functioning “married” molecules. An excess of oxyradicals causes injury to the mitochondria. Less ATP is produced, and the cell has less energy for waste removal, immune function, protein synthesis and survival. If enough injury occurs, the mitochondria will signal a cascade of events that leads to the death of the cell (apoptosis – programmed cell death). Antioxidants protect the mitochondria from oxyradical damage by variety of methods, including bonding with the unpaired electron.

The Mitochondria and ATP

A reduction in blood circulation (ischemia) causes disruption in the energy producing mitochondria of the neurons. This disruption promotes free radicals such as hydrogen peroxide that can cause injury to the mitochondria and neuron.

The lack of oxygen also stimulates the release of excitatory neurotransmitters such as glutamate and aspartate that open the cell membranes to an influx of sodium. The struggling mitochondria, still deficient in oxygen and now accumulating free radical damage have to work harder to provide energy (ATP) to the cell to pump out the sodium.

The cell injury also invites an inflammatory immune response that increases the release of hydrogen peroxide, cell damage and swelling. As the mitochondria become depleted in energy, they trigger programmed cell death and calcium entry. The calcium triggers the release of proteases, which begin to devour the cell proteins. The cell is divided into smaller fragments so that phagocytes can then ingest the remains. This is the cascade of events that can result from the lack of cerebral blood flow and oxygen. The causes of this ischemia/hypoxia scenario can include traumatic brain injury and blood vessel break or blockage, chemical toxicity, nutritional deficiencies, atherosclerosis, infection, allergies and hypoglycemia (a deficit of glucose has similar effects on neurons as oxygen deficit).

MAXIMUM REPAIR AND REGENERATION FOR CEREBRAL PALSY PATIENTS SHOULD THEREFORE INCLUDE:

1. The treatment of any infections, chemical toxicities, heavy metal poisoning, etc.
2. Neurogenesis promotion to replace dead and injured neurons.
3. Oxygen therapies to reduce ischemia/hypoxia.
4. Neuroprotective diet and therapies that include antioxidants to protect new neurons from excitotoxins and oxyradicals.
5. An endogenous stem cell/stress reduction program that continues to promote repair and regeneration as a lifetime program of *Living in Balance*.

A. Preliminary Therapies

For maximum healing and regeneration, factors that are toxic to neurogenesis should be minimized. These include:

1. Infections and inflammatory sites throughout the system.
2. Heavy metals (lead, cadmium, mercury, arsenic, etc) are toxic to new neurons and should be reduced through oral or I.V. chelation to the point where no excess heavy metals can be identified after a DMSA challenge test.
3. Leaky gut syndrome and gut dysbiosis should be treated to prevent endotoxins from entering the body and destroying new neurons.
4. Cortisone, steroids, glutamate (MSG), and alcohol (read labels of medications) are toxic to new neurons and should be eliminated as much as possible.

B. Umbilical Cord-Derived Stem Cell Therapy

Bone marrow transplants that include stem cells have been used successfully since 1968 and are now used to treat patients diagnosed with leukemia, aplastic anemia, lymphomas such as Hodgkin's disease, multiple myeloma, immune deficiency disorders and some solid tumors such as breast and ovarian cancer. About 7,000 patients nationwide receive bone marrow transplants each year. However this amounts to only 30 percent of those needing this procedure, since a suitable bone marrow donor cannot be found for the remaining 70% (www.bmtnews.org). There is therefore great interest in shifting to the use of purified CD34+ stem cells since comparable results are obtained but without significant Graft versus Host complications. (Handgretinger, 2001).

Embryonic stem cells are capable of unlimited self-renewal and have the ability to give rise to all tissue types in the body. The use of human embryonic stem cells for tissue and cell therapies is under intense research but is clouded by the moral and ethical issues involved with the destruction of human embryos to obtain the cells. In addition, embryonic stem cell lines in the United States may have reduced viability and many of these stem cell lines have been exposed to mouse "feeder" cells and are no longer purely human stem cell lines.

Cord blood, like bone marrow, is enriched with CD 34+ stem cells, capable of self-renewal and differentiation into various cell lineages, including immune and haematopoietic progenitors. Unlike bone marrow transplants, cord blood is easier and less expensive to obtain. Umbilical cord cells have been demonstrated to function equally to, if not better than bone marrow derived stem cells for reconstitution of the haematopoietic system. Recent studies have demonstrated that umbilical cord derived stem cells, like bone marrow and embryonic stem cells, are multipotent and capable of differentiating into non-blood cell types, such as neurons (Rogers, 2003). Umbilical cord stem cells used in place of embryonic stem cells should soon become widespread both in research and clinical applications.

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There have been over 1,000 successful transplants in the U.S. (and over 3,000 transplants worldwide) using cord blood since 1988. The various disorders treated include leukemia (Wadhwa, 2002), solid tumors: breast cancer (Paquette, 2000), prostate cancer, ovarian cancer;

aplastic anemia (Meagher, 2002), Fanconi's anemia (Croop, 2001), immune disorders, storage diseases (Meagher, 2002), and bone marrow reconstruction after cancer irradiation (Stevens, 2002). There are additional animal and in vitro studies demonstrating the potential for cardiomyocyte regeneration in heart disease (Kao, 2001), viral-specific cytotoxic T-lymphocyte transplantation (Sun, 1999), gene insertion therapy (Meagher, 2002) and therapies for brain disorders and injuries (Chen, 2001, Ende, 2001).

Neurological Disorders

Ende and associates (Ende, 2001) demonstrated that umbilical cord blood could increase the life span in mice models for Huntington's Disease, Amyotrophic Lateral Sclerosis and Alzheimer's Disease. Chen and associates (Chen, 2001) used human umbilical cord blood cells on rat models for stroke. The cord blood cells were given intravenously to the rats and within 24 hours, there were significant improvements in function. These studies demonstrate that cord blood can enter the brain, survive, migrate and almost immediately improve functional recovery in brain injuries and cognitive disorders.

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Umbilical cord blood stem cells have the ability, when stimulated by neural growth factors, to produce neural and glial cells (Bicknese, 2002). Sanchez-Ramos and coworkers demonstrated that human umbilical cord blood cells treated with retinoic acid and nerve growth factor exhibited a change in phenotype and expressed molecular markers usually associated with neurons and glia. They conclude that umbilical cord blood appears to be more versatile than previously known and have therapeutic potential for neuronal replacement or gene delivery in neurodegenerative diseases, trauma, and genetic disorders. (Sanchez-Ramos, 2001).

The CD133 subset of CD34+ stem cells spontaneously transform to neural stem cells in vitro and are included (85%) in the stem cell injections used by physicians in Mexico.

Graft-versus Host Disease

While whole cord blood produces significantly less graft-versus-host disease (GVHD) than transplantations with bone marrow or adult hematopoietic cells (Rubinstein, 1998; Gluckman, 1997; Kurtzberg 1996; Wagner, 1996; Wadhwa, 2002), there is still some risk, though significantly reduced, of transfusion reactions in ABO blood group incompatibility (Pahwa, 1994). Because of this small risk when using whole umbilical cord blood, Stem Cell Therapies, Inc. has procured pure CD34+ cells for experimental use.

Purity

Stem Cell Therapies, Inc. has acquired extremely purified Umbilical Cord Stem Cells composed entirely of CD34+ cells, devoid of red and white blood cells. This freedom from more mature immune cells (especially CD47 – the “Self” immune defense cell) contributes to reduced risks of graft versus host complications, even with mismatched donors and recipients (Pettersen, 2000, Avicé, 2000).

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Augmentation

About 300,000 stem cells are generally isolated from one neonate’s umbilical cord and placenta blood. Injections used by Stem Cell Therapies, Inc. contain 1.5 million CD34+ cells. Studies with stem cell transplants demonstrate that increased numbers of CD34+ stem cells further promote successful and long term stem cell engrafting as well as little or no graft versus host disease complications (Handgriinger, 2001, Pecora, 2001).

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Stem Cell Therapies, Inc. uses a proprietary method to obtain a pure culture of CD34+ cells. These CD34+ cells are the active stem cells contained in umbilical cord blood that are able to reconstitute the chemotherapy and/or radiation depleted bone marrow and are multipotent for the growth of other tissues types.

After a review of the world literature, discussion with other research scientists, and reflection on our own clinical experience, it appears the best results to date appear to occur in those patients with acute damage, or that have an active disease process, while those patients who have waited for one or more years after their injury have less significant results with stem cell injections alone. This may be due to the fact that acute injuries are usually accompanied by damaged blood vessels, with subsequent shear stress, ischemia, upregulation of growth factors and permeability of the injured endothelium.

Acute Injury and Stem Cell Homing Mechanisms

Recent studies have clarified to a large degree the mechanisms underlying the normal residence of endogenous bone marrow stem cells in a quiescent state and their proliferation, mobilization and homing to injured tissues (Rabbany, 2003).

Endogenous stem cells are necessary for tissue revascularization, wound healing, and organ regeneration. Tissue specific stem cells reside in the bone marrow in specific niches where they are maintained in an undifferentiated and quiescent state.

When a tissue is injured, VEGF is produced and stimulates endothelial cells to move to the site of injury to begin the process of angiogenesis. Other chemokines such as granulocyte-monocyte colony stimulating factor, platelet derived growth factor, fibroblast growth factor, interleukin-8, etc. are also involved. At the site of injury the blood vessels have lost their endothelial cells, have disrupted basement membranes and express a number of chemical signals that attract and hold platelets, white blood cells and recently mobilized stem cells. Stromal derived Factor-1 is a cytokine that helps mobilize the stem cells and activates matrix proteinase-9 activity in the extracellular matrix to create a niche for stem cell proliferation (Hattori, 2003). E-selectin ligands in cooperation with alpha4 integrin or P-selectin ligands assist in Homing to the areas of inflammation (Katayama, 2003).

One of the strongest promoters of stem cell expansion in vitro is endothelial cells. Rosler demonstrated that when cord blood stem cells were mixed with endothelial cells, there was a 640-fold increase in the CD34+ progenitor cells (Rosler, 2000). This degree of proliferation is significantly higher than augmentation found with other growth factors. The release of endothelial cells into the blood stream and/or from the blood vessel walls at the time of injury are considered likely events in stimulating stem cell proliferation at the injured site.

The approximately 300,000 cells obtained from each placenta and cord unit are expanded to a standard injection of one million viable cells with a proprietary mix of various chemokines. In a study by Katayama, cord blood stem cells expanded ex vivo using stem cell growth factor, interleukin-3, interleukin-6, granulocyte colony stimulating factor and erythropoietin retained their normal chromosome arrangements, demonstrating that expansion of cord blood stem cells did not produce abnormal karyotypes (Katayama, 2001).

McKeena reported on his research experience with umbilical cord blood transplants in 2002, during which time 59 patients (age: mean 27 years, range, 4 months - 59 years) were transplanted with a total of 82 unrelated UCB units. Diagnoses included, AML (19), NHL (12), ALL (7), and 13 additional malignant and nonmalignant diseases. Infusion forms and patient medical records (through 1 week post-infusion) were reviewed. All patients received i.v. hydration and acetaminophen and diphenhydramine as premedication, and most were administered antiemetics. Some patients experienced a mild reaction. No moderate/severe reactions occurred. Reaction types and rates were as follows: hypertension (24%), nausea (10%), vomiting (5%), unusual taste/smell (5%), headache (5%), bradycardia (2%), cough (2%), back (2%) or abdominal (2%) pain, and transient, asymptomatic desaturation (2%). In several cases, similar symptoms were present in the days prior to and/or after infusion, making the association with UCB uncertain. No patients experienced fever, or chills, flushing, hives, dyspnea/bronchospasm, or chest pain. No clinical or laboratory evidence of hemolysis was apparent. **Overall, UCB infusions are safe and well-tolerated with all reported reactions being mild and easily managed (McKeena, 2003).** Because the stem cells in our research are separated from the blood, purified stem cell therapies have even less side effects than cord blood therapies.

For about the first month after stem cell therapy, the patient may need to sleep and rest a great deal. During this time, the stem cells are grafting into the extracellular matrix, creating a stable niche in which to grow and proliferate. Generally, sometime in the second month, there is an increase in energy, muscle tone and stamina. The stem cells move from their hypoxic niches and migrate through the bloodstream to areas of inflammation. Hypoxic niches adjacent to blood vessels are needed for stem cell growth but areas of normal oxygen concentrations are needed for stem cell differentiation. Specialized cell function requires oxygen, and mild hyperbaric treatments (1.2-1.5 ATA, breathing 21% oxygen) may be more stem cell friendly than higher pressures (2.0 ATA) and concentrations (100% oxygen).

C. Hyperbaric Oxygen Therapy

Because mild (1.2 ATA with 21% oxygen) hyperbaric oxygen may increase stem cell differentiation as well as promote new blood vessel growth, we are suggesting a new protocol to be tested out that includes an injection of 1.5 million umbilical cord derived stem cells followed two months later with mild hyperbaric oxygen therapy to assist the stem cells in differentiating into specialized cells such as neurons. Stem cells are multipotent and capable of self-renewal,

but differentiated cells are needed to perform a specific function within the body matrix, and differentiated cells, especially neurons, function effectively with 20.8% oxygen.



Oxygen is a natural element that is absolutely necessary for life and healing. Purified oxygen is defined as a drug but is the most natural of drugs. Oxygen under pressure is still the same element but is better able to penetrate into parts of the body where the arterial flow is hindered. Such hindrance produces ischemia (loss of blood flow) and hypoxia (lack of oxygen). When oxygen under pressure is inhaled by a patient in a sealed chamber, it is termed a hyperbaric oxygen treatment (HBOT). The treatment lasts for 60 minutes during which time

the person's body is surrounded by air pressure equivalent to the pressure produced by diving 16 feet underwater (7.35 pounds per square inch = 1.5 ATA). **During the treatment the patient breathes 100% medical grade oxygen.**

In addition to raising the arterial levels of oxygen 10 to 15 times higher than that produced by normal atmospheric pressure, the pressure exerted within the body can and does exert therapeutic benefits on acute and chronically traumatized and swollen tissues.

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The first suggestion that raised air pressures might be used in the treatment of human illness was made in 1664 by Henshaw in England. The first hyperbaric chamber to investigate the therapeutic action of compression of the air on the human body was described and built by Junod in 1834. Using 1 2 atmospheres of pressure, Junod was reported to have treated patients with paralysis with beneficial results. This pioneering work was not continued until 1965 when Ingevar and Lassen demonstrated positive results in 4 patients suffering from focal cerebral ischemia. Since then, numerous articles have been published demonstrating that hyperbaric oxygen is useful for the treatment of brain injury.

Injured brains are thought to have damaged blood vessels, which curtail oxygen from getting to the injured areas. The lack of adequate oxygen prevents those parts of the brain from functioning normally and can cause the loss of functions seen in cerebral palsy, traumatic brain injuries and strokes. It has been demonstrated that daily treatment with hyperbaric oxygen contributes to the formation of new blood vessels in those parts of the body that are not receiving enough oxygen. As new blood vessels slowly form, the injured tissues are able to repair themselves and to begin functioning more normally. This translates into better mental and physical performance.

Cerebral Palsy and HBOT

Dr. Pierre Marois from McGill University has investigated HBOT for the treatment of cerebral palsy in a pilot study of 25 children. In preliminary results, he has found statistically significant improvement in gross motor and fine motor functioning, and reductions in spasticity in hip adductors, hamstrings, and plantar flexors. Parent questionnaires showed significant improvements in walking and sitting.

Mild Hyperbaric Oxygen

There have been several hyperbaric oxygen studies in the past year that have reported negative findings, one involving cerebral palsy patients and the other, stroke patients. Both investigations used as controls, an increase in oxygen. The stroke placebo group was given oxygen under mild pressure of 1.14 ATA and showed better results than the 2.5 ATA group (2.5 ATA can be toxic). What is generally recommended is 1.5 ATA to avoid oxygen toxicity, a level that was closer to the “placebo” group. In Rusyniak’s study with stroke patients, he concludes that “There were no differences between the groups at 24 hours. At 3 months, however a larger percentage of the sham patients had a good outcome defined by their stroke scores compared with the HBO group.” (Rusyniak, 2003).

We agree that giving hyperbaric oxygen at levels of 2.5 ATA can result in oxygen toxicity. We also agree that oxygen at 1.14 ATA can be beneficial and should not be considered as a “sham” or control group. In fact, there is speculation that an oxygen pressure of 1.2 ATA using air (21% oxygen) may in fact promote stem cell differentiation. 1.2 ATA may be an oxygen pressure that promotes stem cell growth and differentiation from a set of growth factors, such as granulocyte-macrophage-colony stimulating factor, that work at normal oxygen levels (21% oxygen) as well as hypoxic levels of 7% oxygen (Muench, 1992).

The work of Heuser and associates (Heuser, 2002) supports the effectiveness of mild hyperbaric oxygen. Nine adults and one child with toxic encephalopathy and one child with autism were treated with 1.3 ATA, using 24% oxygen. All patients showed significant improvement on before and after SPECT brain scans.

D. Adjunct Therapies and Stem Cell Growth

For over twelve years, Dr. Steenblock at the Brain Therapeutics Medical Clinic has worked to create an effective, comprehensive program in brain repair utilizing hyperbaric oxygen and adjunct therapies. He found that various therapies worked synergistically to improve function in his patients. These same adjunct therapies have recently been shown to promote stem cell growth and/or differentiation. Electrical stimulation can promote neurite growth (Schmidt, 1997), electromagnetic therapies can promote differentiation (Sauer, 1999), acupuncture at the “Zusanli” point can promote cell proliferation in the dentate gyrus (Kim, 2002) and fairly intense physical therapy workouts that are comparable to exercise, which can increase the proliferation and number of new neurons (Palmer, 2001).

For over 12 years, Dr. Steenblock at the Brain Therapeutics Medical Clinic has worked to create an effective, comprehensive program in brain repair utilizing hyperbaric oxygen and adjunct therapies!

E. Endogenous Stem Cell Home Maintenance Programs

We are now in the process of creating low-tech home maintenance programs for brain repair and regeneration for those unable to afford many of these high tech therapies.

If stem cell injection costs are prohibitive, a less expensive alternative may be inducing endogenous stem cells with growth factors such as Granulocyte Macrophage Colony Stimulating Growth Factor (Buschmann, 2003), followed by External Counterpulsation to help promote blood vessel growth in the injured areas of the brain. This is theoretical and needs to be researched further.

If hyperbaric oxygen treatments at a facility are too expensive, groups of parents can create co-ops and share the use of portable chambers, making sure that safety procedures are maintained.

Additional factors that stimulate stem cell growth include:

1. **LEARNING** increases the number of new neurons (Palmer, 2001). It may be that new information and understanding the same information from different perspectives requires a new stem cell to hold that memory. Further research will expand our understanding of learning and neurogenesis.
2. **EXERCISE** increases the number of new neurons (Palmer, 2001). Exercise induces temporary hypoxia which can induce VEGF (Vascular Endothelial Growth Factor) and the promotion of new blood vessels to adapt to the greater energy demand and complicated movements such as gymnastics and dance promote a greater increase in learning and brain integration (Vuillerme, 2001).
3. The **absence of STRESS** promotes neurogenesis (Palmer, 2001). Stress can induce catecholamines and excitatory neurotransmitters that are toxic to new neurons. B complex foods and supplements, Vitamin C and E foods and supplements, and additional antioxidants can help protect against stress-induced neuronal injury.
4. Augmented levels of **SEROTONIN** increase the number of new neurons whereas serotonin deficiency is accompanied by a decrease in neural stem cell growth (Palmer, 2001). Foods that contain *tryptophan*, a precursor to serotonin and melatonin, can assist in mood elevation and parasympathetic nervous system maintenance and repair. Tryptophan is found in turkey, cottage cheese, and soybeans. Reduced levels of tryptophan can impact niacin levels which are required for complex I mitochondrial function. *Serotonin* promoting foods include brown rice, wild rice, barley, tabbouleh, couscous, oats, millet, corn, amaranth, squash, pumpkin, sweet potatoes, yams, carrots, onions, garlic, turnips, celery, and radishes. Serotonin is a precursor to Melatonin which is a hormone of the pineal gland that acts as an antioxidant and increases glutathione levels (Clarke, 2002).

Activities that promote serotonin, relaxation and parasympathetic maintenance and repair include guided imagery, meditation, massage, positive relations, etc. We are beginning to see common threads between stem cell research and wisdom practices of Eastern cultures and the benefits physiologically of love, gratitude, and enjoying each moment that life offers us.

4. A good night's **SLEEP** that begins before 10pm. *Growth hormone* stimulates maintenance and repair processes. The general sleep cycle shows increased secretion of growth hormone from 10pm to midnight, giving validity to the saying that the best sleep is before midnight. It is important that children not go to sleep emotionally upset, since that will promote excitatory neurotransmitters that destroy the new neurons.

Growth hormone can be enhanced by garlic and red grape seeds (pycnogenol). Phospholipids in soy lecithin, cabbage, cauliflower, Brussel Sprouts, and Savoy have also been found to increase growth hormone and Nerve Growth Factor and can be included in meals at dinnertime.

5. Regardless of obstacles, keep **HOPE** alive. Positive thinking and working towards a goal little by little, step by step produces greater vitality than waiting or thinking nothing can be done. Associate with upbeat friends, read inspiring books, and wherever possible, think outside the box. We are expanding our collective concept of human potential. Together, we can make a difference.

For further information on umbilical cord-derived stem cell therapies, visit our website at www.stemcelltherapies.org For questions about our referral program in Mexico, please call George at (949) 248-7034.

**PLEASE CONTACT US TODAY FOR FURTHER
INFORMATION AT 1-800-300-1063!**

FOR MORE INFORMATION, VISIT OUR FOLLOWING WEBSITES:

WWW.STEMCELLMD.ORG
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