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Healing Cells: Use What the Almighty Created to Heal Thyself

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Abstract

The adult human body is composed of trillions and trillions of cells. These cells can be divided into three categories: functional [parenchyma and stroma] cells comprising 50%, maintenance [progenitor] cells comprising 40%, and healing [stem] cells comprising 10% of the cells of the body. Healing cells were discovered in 1975 residing within the connective tissue stroma of adult terrestrial salamanders undergoing complete limb regeneration. Healing cells were shown to form all damaged or lost tissues of an amputated limb, thereby restoring function to the limb. Since 1975, healing cells have been extensively characterized, four animal models generated, and 32 human clinical studies undertaken to test and validate healing cells for their ability to reverse signs and symptoms of traumatic injuries, chronic (terminal) diseases, and orthopedic disorders. Two methodologies were developed to activate the healing cells. Ex vivo activation occurred after healing cells were removed from the body, activated, and then returned to the body in selected locations. In vivo activation occurred by ingestion of a nutraceutical to activate the normally quiescent healing cells in situ. Clinical studies proved that both methodologies were 100% safe for human use. Fresh isolates have demonstrated 83% efficacy and the nutraceutical 100% efficacy at reversing signs and symptoms of traumatic injuries, chronic diseases, and disorders, with minimal to no side effects. Stem cells are considered the “holy grail” for regenerative medicine. We propose that adult healing cells be used in regenerative medicine.

Keywords: adult; chronic diseases; telomerase; pluripotent; severe trauma

INTRODUCTION

The human body is composed of trillions and trillions of cells. These cells can be divided into three categories: functional cells, maintenance cells, and healing cells (1).

Functional (differentiated) cells comprise 50% of all cells of the body. Functional cells are composed of parenchyma and stroma and are represented by 220+ distinct differentiated cell types (1). Examples of parenchyma are signal transmitting neurons, gas exchanging lung cells, and cardiac muscle cells that pump blood throughout the body. Examples of stroma are the fibrocytes forming the connective tissue structural framework of the body. Functional cells are absent the telomerase enzyme(2), whose function is to renew telomeres at the ends of the chromosomes after each cell division. Hence, functional cells have a finite lifespan [70 population doublings in humans (3-6)] before they are pre-programmed to senesce and die when they become worn out (1-3).

Maintenance (progenitor) cells comprise 40% of all the cells of the body and are the immediate replacement cells for the functional cells (1). Examples of maintenance cells are neuroblasts, lung alveolar-blasts, cardiac myoblasts, fibroblasts, and mesenchymal progenitor (stem) cells (1). Like functional cells, maintenance cells have lost the telomerase enzyme and therefore have a finite lifespan of 70 population doublings before they are pre-programmed to senesce and die (2-6). Progenitor cells decrease in number with the increasing age of the individual (1).

Healing (stem) cells comprise 10% of all cells of the body. They are the "true" stem cells and are ubiquitously located throughout all connective tissue stroma in the body. The pre-programmed function of healing cells is to repair and restore all damaged or missing cells of the body (7). Examples of healing cells are cells in the adult that retain the telomerase enzyme after birth, such as the adult telomerase positive stem cells(7). While low in number, healing cells can be activated to proliferate prior to forming maintenance cells. By retaining the telomerase enzyme, they have an unlimited proliferation potential, and therefore unlimited lifespan if they remain in their respective naïve state(3-7). Healing cells remain constant in number throughout the life of the individual from birth to death and will form every cell type of the body (7).

Discovery of healing cells occurred in 1975 while studying limb regeneration in the adult terrestrial salamander, *Ambystoma annulatum* (7). Previous studies reported that juvenile aquatic versions of this species were quite capable of regenerating a limb within a time frame of 30-45 days (8-12). However, the significantly larger adult terrestrial form had lost the ability to regenerate an appendage [limb or tail] (13). I wanted to know why there was this discrepancy between aquatic and terrestrial versions of the same species, *Ambystoma.* My first attempt failed miserably because the salamanders became emaciated and died before I even began my experiments. My graduate school mentor [Dr. P.M. Johnston] asked "what might have happened to cause them to die". I said I was using adult terrestrial salamanders, but following the methods reported in the scientific literature for the aquatic version. Dr. (14-18). Johnston suggested "know your model system" and "tissue never lies".

I began my research by understanding the model system that I was using. The studies claiming that the terrestrial version would not regenerate a limb were keeping juvenile salamanders in an aquatic environment at 4^{o}C, feeding them beef liver during

the day, and assaying morphological changes at 5-day time points for 30-45 days (14-18). I discovered that when terrestrial adult salamanders are placed into an aquatic environment at 4°C [similar conditions for their breeding cycle] they would not eat, rather they have copulation/procreation on their minds, and will starve themselves to death (19). The terrestrial salamanders, in a terrestrial environment, are nocturnal animals, sleeping during the day and foraging for food at night. Their preferred food sources are nightcrawlers followed by cockroaches. When their conditions were changed to their preferred environment, they became fat, and "apparently happy" for the limb regeneration studies to commence (19). My studies demonstrated that adult terrestrial salamanders were quite capable of regenerating an appendage, but that they required an extended amount of time [up to 370 days] for complete success. I repeated the study in four species of terrestrial salamanders, e.g., *Ambystoma: maculatum, texanum, tigranum,* and *annulatum* to validate the results. All species demonstrated the ability to completely regenerate a limb from 155-370 days post amputation (20). The original studies with the aquatic juvenile salamander used five-day intervals to assess changes in morphology during the regeneration process, for a total of 6-9 time points, depending on the species (16,17). I used a similar five-day period for 1+ years, amounting to 31-74 time points, dependent on species, for assessment of their morphology. That is when the discovery was made of the adult telomerase positive healing cells, 1975 (20). The normally hibernating quiescent (and invisible) healing cells were located throughout all the structural connective tissue frameworks of the limb, e.g., dermis, periosteum, perichondrium, epineurium, perineurium, and endoneurium, epimysium, perimysium, endomysium, and tunica adventitia of blood vessels (7,20). When cellular damage (limb amputation) occurred, the healing cells became activated, were visible as unique cell types, and were seen migrating towards the site of damage [distal end of the transected limb] (7,20). During this same time, macrophages appeared proximal to and at the wound site, debrided, and removed all the dead and dying tissue at the amputation sites so only healthy tissue remained. Once the amputation site was completely debrided, the healing cells would migrate into the area and form a mass of undifferentiated cells. Occurring parallel to debridement and migration of stem cells, the epidermis along the periphery closed off the wound (7,20). A ridge within the distal epidermis formed at the distal tip of the transected limb (21). The base of the epidermal ridge, just distal to the mass of undifferentiated healing cells, began secreting glycoproteins [periodic-Schiff-positive acellular material] into the mass of undifferentiated cells (22). These undifferentiated cells began to proliferate outward in a unidirectional distal direction towards the epidermis at the distal tip of the limb. Once elongation of the undifferentiated mass of cells occurred between intact tissues proximal to the amputation site and the ridge of epidermis distal to the amputation site, formation of new tissues began. There was a continuum between intact functional cells [proximal to the wound site], newly formed functional cells [at the wound site], to newly forming progenitor cells [just distal to wound site], to the undifferentiated mass of cells further distal to the wound site, and finally to the base of the epidermis. This progression of cell types

eventually replaced all the missing cells of the limb, functional cells, maintenance cells, and healing cells, thus restoring function to the individual (23-28). This observational study proved that adult terrestrial salamanders can completely regenerate a limb, although requiring a longer amount of time. The actual cause of inability to regenerate a limb in terrestrial salamanders was due to the environmental conditions in which they were kept as previously reported, rather than something inherent to the salamander itself (7,19,20,28).

Characterization of adult healing cells was then undertaken to understand the potential of these healing cells to affect a positive repair response (29). Clones of healing cells, derived by repetitive single cell clonogenic analysis, were examined for unique attributes, e.g., size, cell surface markers, and expressed genes; growth characteristics in cell culture, e.g., nutrition requirements, freeze-thaw, individual lifespans; differentiation potential using functional cell expression markers; reactivity to inductive factors; reactivity to tissue specific exosomes, progression agents, inhibitory agents; physiological function; presence throughout the life span of the individual; and location in multiple organs of 15 species of animals including humans, e.g., amphibians (adult terrestrial salamanders), reptile (Komodo Dragon), avians (*Gallus domesticatus*, Wedel Crane), mice, rats, rabbits, cats, dogs, sheep, goats, pigs, cows, horses, and humans (29-59).

Why is this important to you? There are several categories of cells used routinely in the field of regenerative medicine to replace damaged cells and restore function, e.g., embryonic stem cells [ESCs], the induced pluripotent stem cells [iPSCs], and mesenchymal stem cells [MSCs] (60-72). Embryonic stem cells are derived from embryonic tissue (60-62), while induced pluripotent stem cells (iPSCs) are derived from adult functional cells after insertion of the Yamanaka factors [Oct-3/4, SOX-2, c-Myc, and Klf4] (63,67). Both ESCs and iPSCs contain the enzyme telomerase, thus they have an unlimited proliferation potential until they begin differentiation (64). When ESCs and iPSCs are grown in cell culture in the absence of an external inhibitor, such as leukemia inhibitory factor [LIF] (62,65,66), they will spontaneously form every cell type of the body in an unregulated manner (66). When naïve ESCs or iPSCS are implanted into an animal or human, they will spontaneously differentiate into a mass of cancerous cells, known as a teratoma (66). Only when either ESCs or iPSCs are pre-committed to a specific cell lineage will they not spontaneously differentiate, either in cell culture or implanted into an individual (67).

The adult mesenchymal stem cell (68) is a tripotent maintenance cell (69) that has been isolated from bone marrow, adipose tissue, umbilical cords, placenta, dental pulp, etc.(68-72). Clones of MSCs have shown a capacity to form only three cell types, e.g., fat, cartilage, and bone (29,69). Healing cells have been widely reported by others NOT to exist in adults and therefore have not been readily used outside my research group for studies in the field of regenerative medicine.

My research group has been studying adult healing cells since their initial discovery in 1975 (7,20,28,29). We discovered that adult healing cells

are similar yet different from ESCs and adult iPSCs. ESCs, iPSCs, and healing cells share the ability to form all the cells of the body (29,33,60,61). Since ESCs, iPSCs, and healing cells have the telomerase enzyme, they also have an unlimited lifespan when kept in their naïve state (3-6,33,36,60,61). However, in the 48+ years that I have been studying adult healing cells (both outside the body in cell culture (2,7,29,36) and naïve cells transplanted into animals and humans (31,36,54-59,73-76,78-90) adult healing cells have never formed cancers of any kind. This contrasts with ESCs and iPSCs that spontaneously form all body cell types when cultured and routinely form cancerous tissue (teratomas) when implanted into an animal or human in their naïve state (62,64-67).

Animal models of chronic diseases. To answer the hypothesis of whether healing cells have a positive impact in chronic diseases, three animal models of chronic diseases in adult rats were developed, e.g., Parkinson's Disease [neural, ectoderm lineage] (55,73,74), Myocardial Infarction [heart, mesoderm lineage] (4,31,53,56), and Pulmonary Fibrosis [lung, endoderm lineage] (4,31,54,57,58). These three models were used to test, validate, and potentially demonstrate that implanted naïve adult healing cells would reverse the signs and symptoms in models of chronic disease. A Lac-Z genomically labeled naïve healing cell clone, Scl-40β (31), with demonstrated pluripotent capabilities, was utilized to tract the implanted healing cells in vivo in all three animal models to evaluate two issues. First, whether a pluripotent healing cell could form cells from ectodermal, mesodermal, and endodermal lineages, proving beyond a shadow of a doubt that pluripotent stem cells do exist in adult animals. And second, whether healing cells would heal damaged tissues in the correct histoarchitecture for regain of function.

A **Parkinson's model** (55,73,74) [approved by the IACUC] was created by stereotactically injecting of the neurotoxin, 6-hydroxydopamine [6-OHDA], into the substantia nigra of the ventral midbrain of adult rats. Two weeks after injection of 6-OHDA, the injected region was void of dopaminergic neurons and their associated neural networks (Fig. 1A and Fig. 1B). The animals were then stereotactically reinjected with either sterile saline (Fig. 1C) or the pluripotent healing cell clone, Scl-40β (Fig. 1D), into an area void of tyrosine hydroxylase activity due to previous injection of neurotoxin. Animals were monitored for an additional six weeks, euthanized, and processed histochemically for tyrosine hydroxylase activity, an indicator of dopamine synthesis and secretion. Sterile saline injected animals demonstrated a glial scar along the needle tract for the sterile saline injection (Fig. 1C). Animals injected with the pluripotent healing cell clone, Scl-40β, demonstrated formation of tyrosine hydroxylase-positive cells along the needle tract with adjacent formation of tyrosine hydroxylase-positive neural networks (Fig. 1D). This data suggests the potential that healing cells can restore missing or damaged tissues and return function to the individual with Parkinson's disease.

Figure 1. Adult rat model of Parkinson's disease created by stereotactically injecting a dopaminergic neurotoxin, 6-hydroxydopamine (6-OHDA), into substantia nigra pars compacta of the adult rat ventral midbrain.

Figure 1A, Control section two weeks after injection of saline only. Note dark brown reaction product indicating tyrosine hydroxylase activity in area of midbrain, indicating presence of dopaminergic neurons and their associated dopaminergic neural networks.

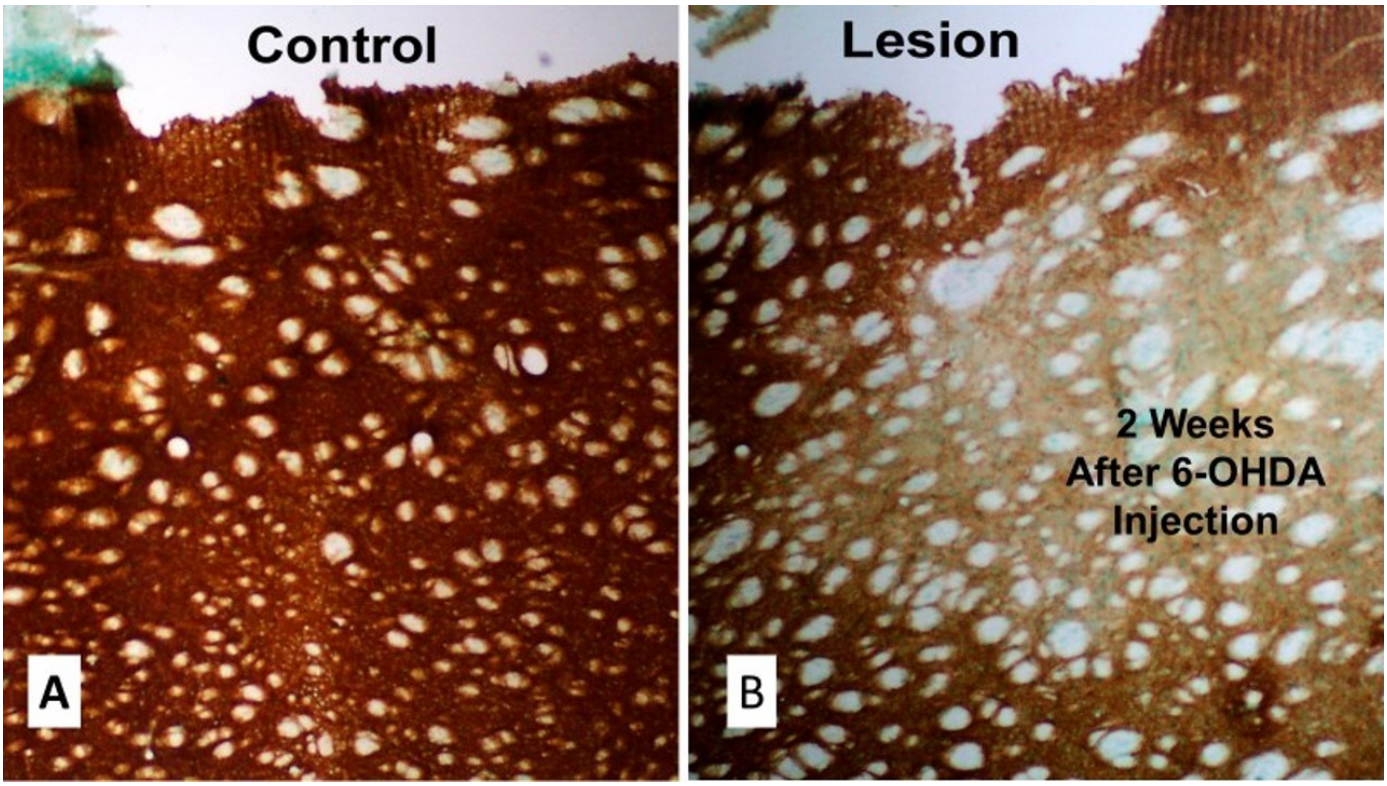


Figure 1B, Experimental section two weeks after injection 6-OHDA, note loss of tyrosine hydroxylase staining at injection site, indicating loss of both dopaminergic neurons and their associated neural networks.

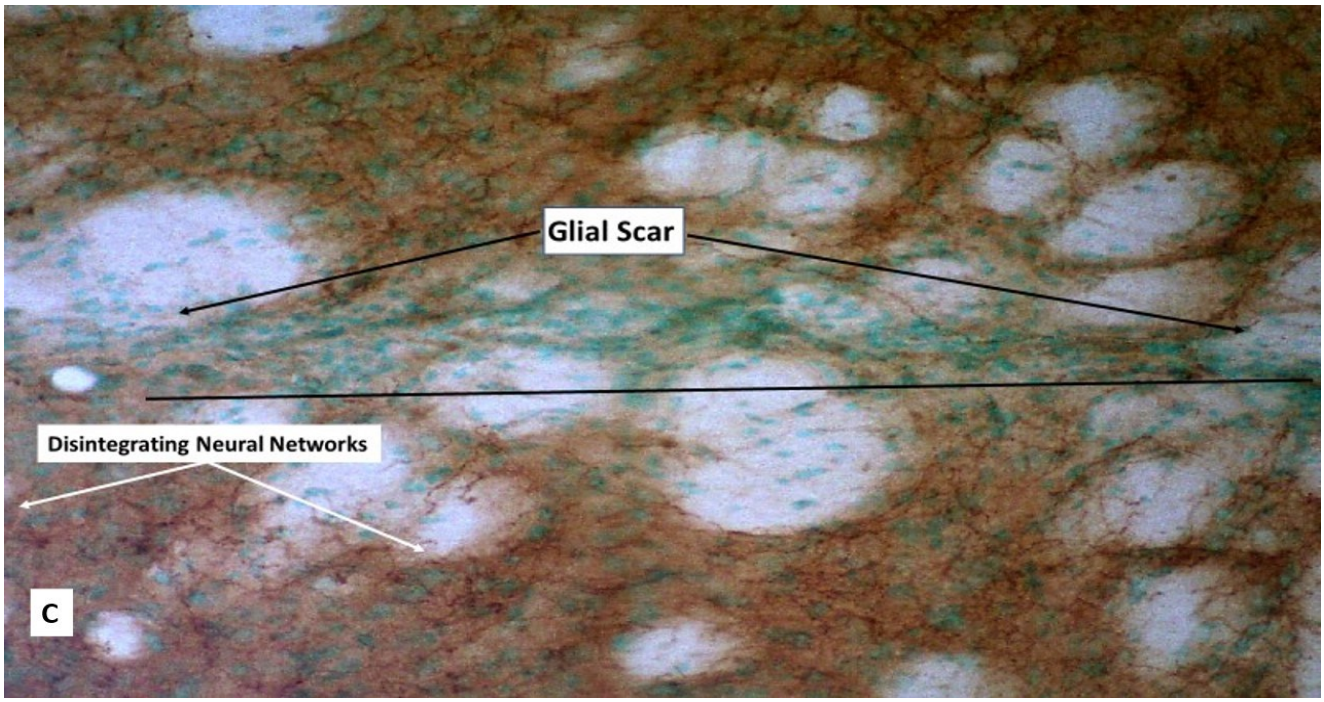


Figure 1C. Adult rat model of Parkinson's Disease injected stereotactically with neurotoxin 6-OHDA to create zone devoid of tyrosine hydroxylase activity (staining) indicative of lost dopaminergic neurons and disintegration of neural networks. Section depicts experimental animal (Fig. 1C) six weeks after injection with sterile saline into area void of tyrosine hydroxylase activity. Sections stained histochemically for tyrosine hydroxylase activity and counterstained with methyl green to denote host cells (neurons and glial cells). Note line of green-stained glial cells in needle track, indicating a glial scar, along with disintegrating dopaminergic neural networks.

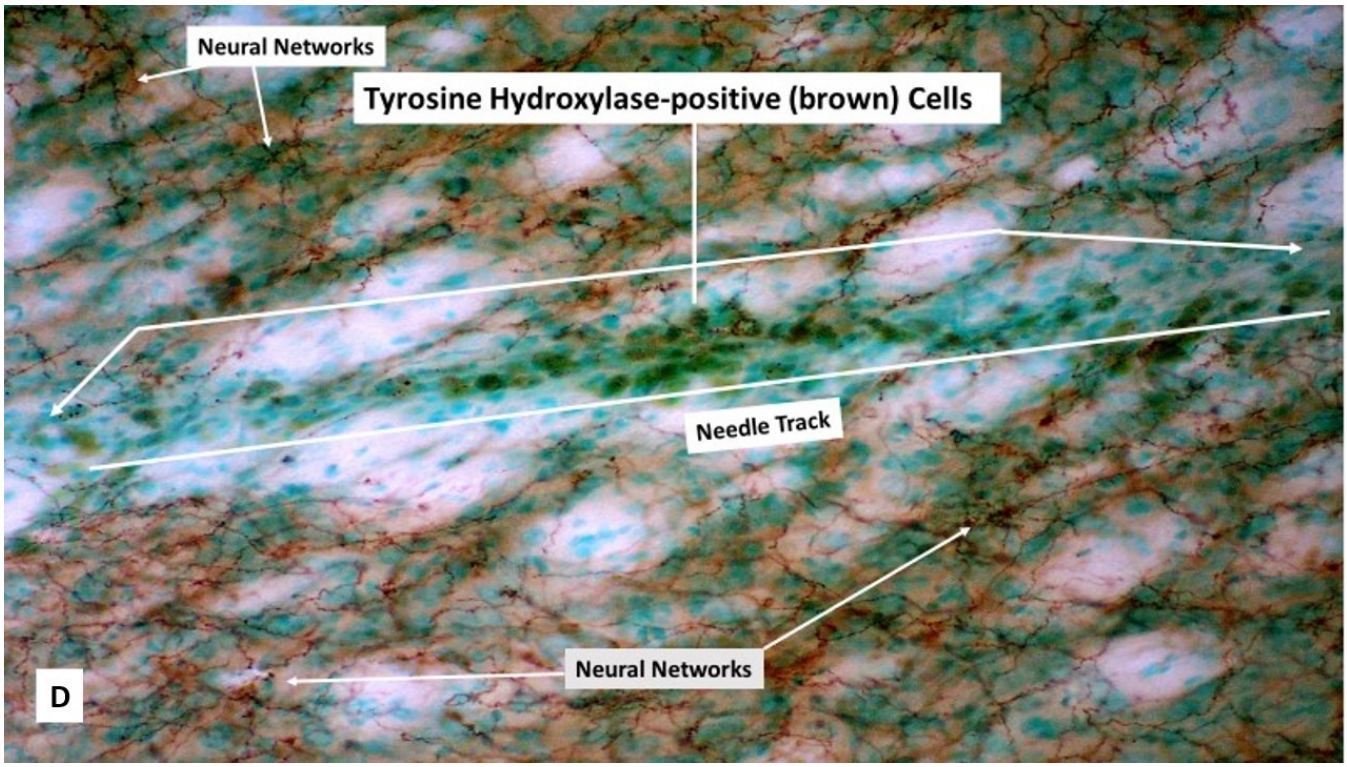
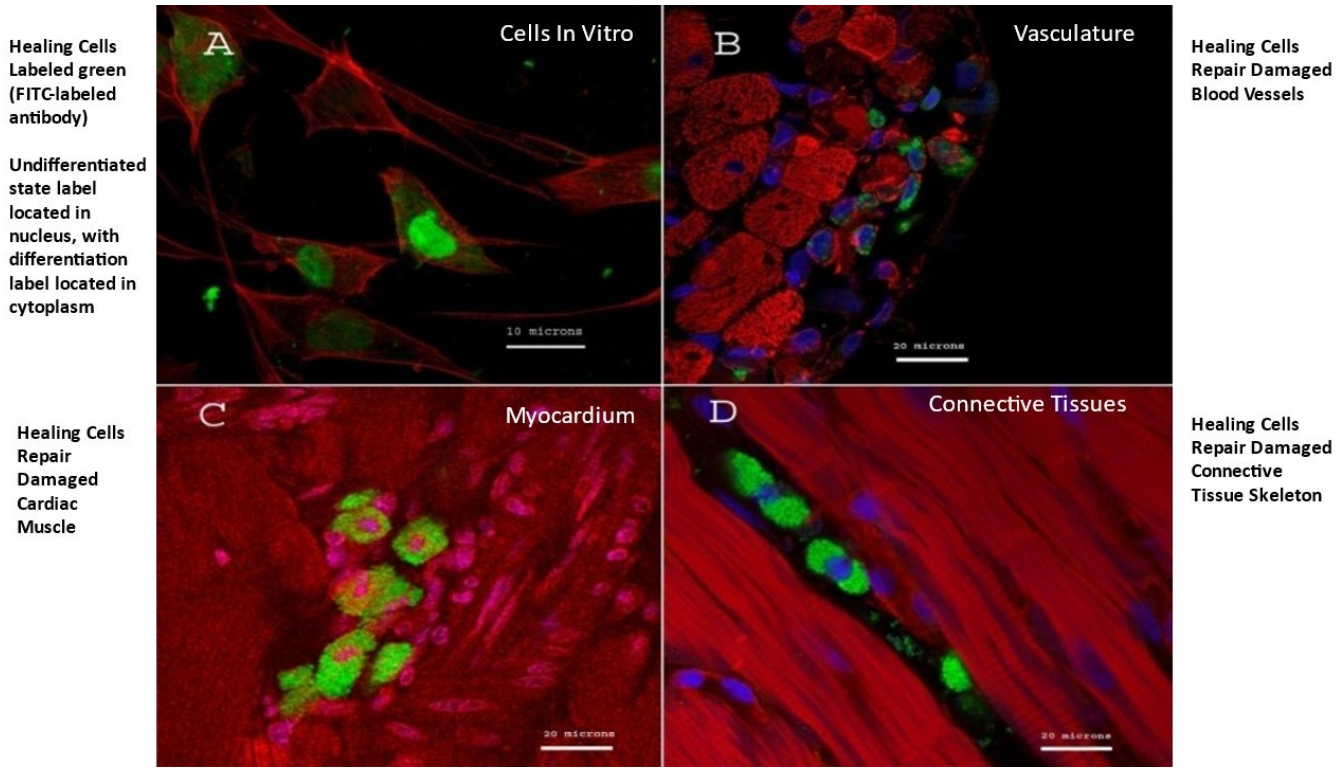


Figure 1D, Adult rat model of Parkinson's Disease injected stereotactically with neurotoxin 6-OHDA to create zone devoid of tyrosine hydroxylase activity (staining) indicative of lost dopaminergic neurons and disintegration of neural networks. Section depicts experimental animal (Fig. 1D) six weeks after injection with genomically-labeled naïve pluripotent aTPSC clone, Scl-40β into area void of tyrosine hydroxylase activity. Section stained histochemically for tyrosine hydroxylase activity (brown) and counterstained with methyl green to denote host cells (neurons and glial cells). Note tyrosine hydroxylase-positive cells within needle track of experimental animal and development of dopaminergic neural networks along all sides of the tyrosine hydroxylase-positive cells. *Reprinted with permission from Young et al., Adult-denervated stem cells and their potential for tissue repair and molecular medicine. J Cell Molec Med. 2005; 9:753-769 (55).*

A **myocardial infarction** model (7,31,41,56) [approved by the IACUC] was created by two methods. The first method was to freeze the apex of the heart with liquid nitrogen. The second method utilized transient

ligation of the left coronary descending coronary artery. A genomically labeled pluripotent healing cell clone, Scl-40β (31), was either injected directly into the damaged heart muscle [liquid nitrogen model] or delivered systemically by tail vein infusion [transient ligation model], to determine the effectiveness of healing cells to affect a positive response in heart muscle and coronary arteries after damage. Besides repairing damaged heart muscle (Fig. 2), Scl-40β was also involved in repairing damaged blood vessels (Fig. 2B, Fig. 3) and damaged connective tissue of the cardiac skeleton, that forms the structural framework of the heart (Fig. 2D) as shown by the green label residing in the cytoplasm of these respective regenerating cells.

Figure 2. Adult rat myocardial infarction model created by freezing apex of left ventricle with liquid nitrogen. A genomically labeled naïve pluripotent healing cell clone, Scl-40β, was then injected directly into the damaged heart muscle.



A, Genomically labeled naïve pluripotent healing cell clone, Scl-40b, in culture. In the undifferentiated state, the genomic label (green) is in the nucleus of the cell. With differentiation the genomic label (green) relocates to the cytoplasm of the cell (B,C,D).

B, Pluripotent healing cell clone, Scl-40β, was involved in the repair of damaged vasculature. Note the presence of the genomic label in the cytoplasm of regenerating blood vessels.

C, Pluripotent healing cell clone, Scl-40β, was involved in the repair of damaged cardiac muscle. Note the presence of the genomic label in the cytoplasm of cardiac myocytes.

D, Pluripotent healing cell clone, Scl-40β, was involved in the repair of damaged cardiac connective tissue skeleton. Note presence of the genomic label in the cytoplasm of fibrocytes of the connective tissue skeleton of the heart. *Reprinted with permission from Young et al. Clonogenic analysis reveals reserve stem cells in postnatal mammals. II. Pluripotent epiblastic-like stem cells. Anat Rec. 2004; 277A:178-203 (31).*

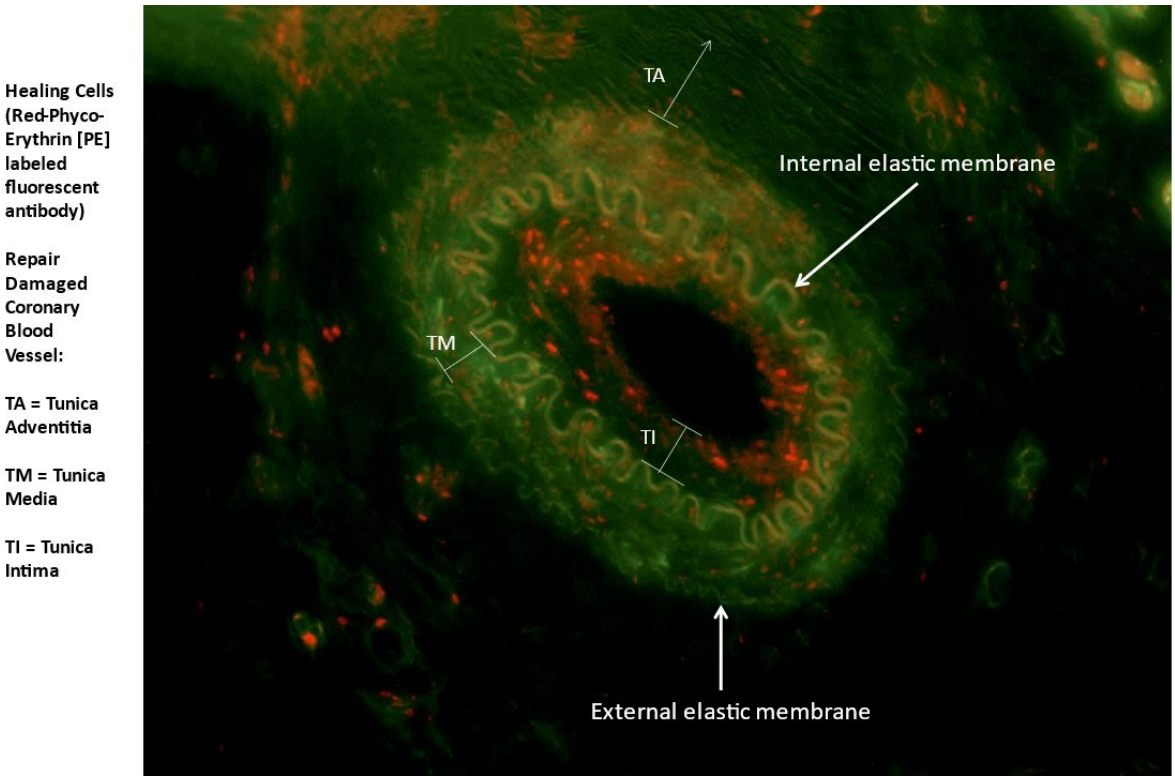
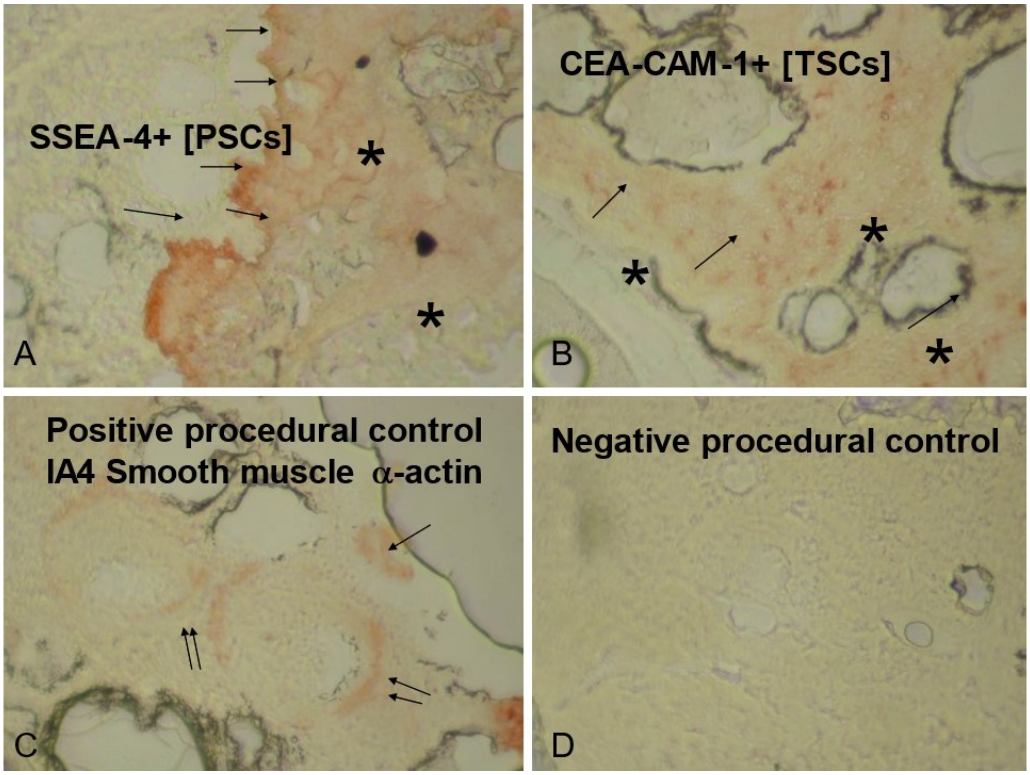


Figure 3. Systemic infusion of genomically labeled pluripotent healing cell clone, Scl-40β, into the tail vein of an adult rat after transient ligation of the left anterior descending coronary artery. Note repair of damaged coronary artery. Phycoerythrin (red) labeled healing cells located in all three connective tissue layers of the coronary blood vessel, tunica intima (TI), tunica media (TM), and tunica adventitia (TA), although they were most prominent in the tunica intima. *Reprinted with permission from Young et al, Cardiovascular disease and adult healing cells: From bench top to bedside. J Stem Cell Res. 2017; 1(3) 002:1-8* (56).

A **pulmonary fibrosis model** (57,58) [approved by the IACUC] was created by ingestion of the chemotherapeutic drug busulfan. One of the serious adverse side effects of busulfan for treating ovarian cancer is the formation of pulmonary fibrosis in the lungs. Adult rats were challenged with the ovarian chemotherapeutic drug, busulfan. At six weeks post ingestion, animals were sacrificed and processed for immunocytochemistry using cell surface marker antibodies, e.g., stage specific embryonic antigen-4 [SSEA-4] to identify pluripotent healing cells and carcinoembryonic antigen-cell adhesion molecule-1 [CEA-CAM-1] to identify totipotent healing cells within the tissue (29,36). SSEA-4 and CEA-CAM-1 antibodies were visualized in damaged tissues undergoing repair (Fig. 4), as well as in peripheral areas of the lungs regenerating new

structures of the broncho-pulmonary tree, e.g., bronchi, bronchioles, alveolar ducts, and alveolar sacs (Fig. 5).

Figure 4. Regenerating lung tissue six weeks post ingestion of busulfan.



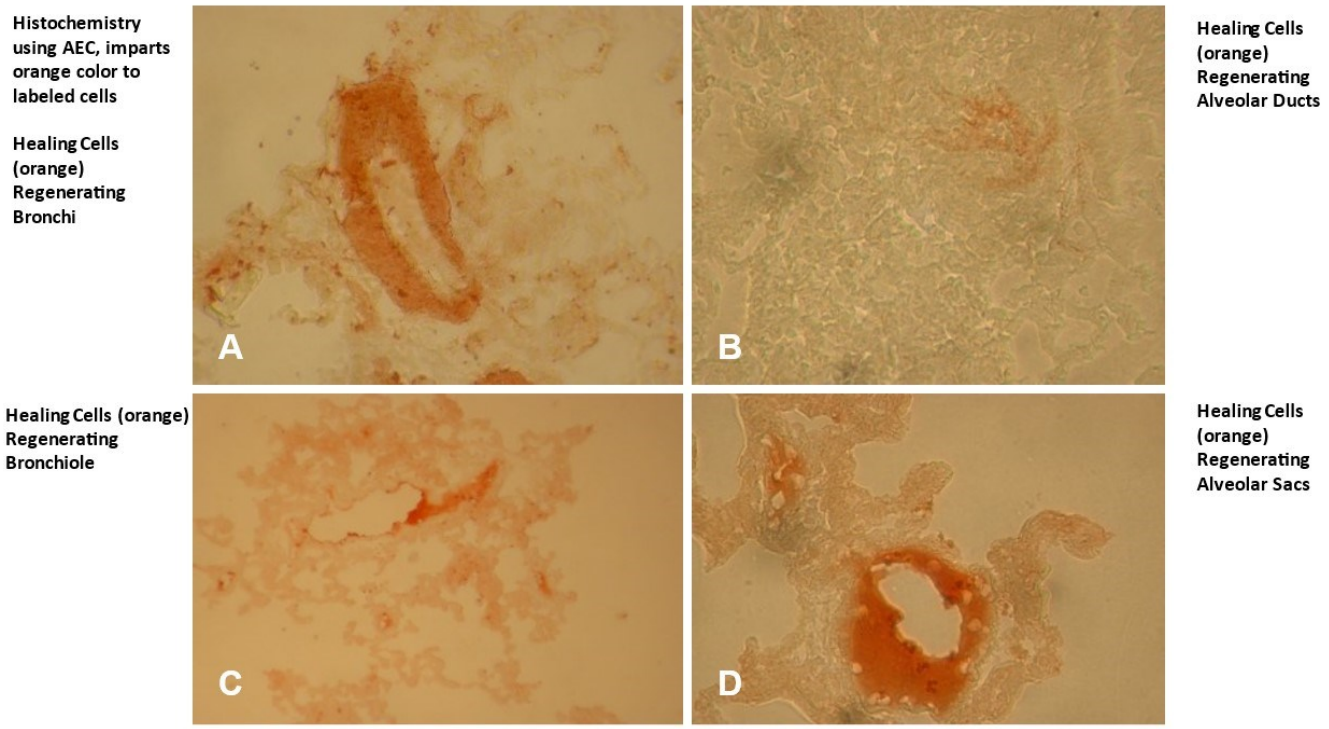
A, Cells labeled with SSEA-4 [PSCs] are located at the periphery of a damaged bronchopulmonary segment.

B, Cells labeled with CEA-CAM-1 [TSCs] are in the interstitial tissues between forming blood vessels, alveolar ducts, and alveolar sacs.

C, Smooth muscle cells in the walls of forming blood vessels are labeled with antibody, IA4 for smooth muscle alpha-actin. Also used as positive procedural control for immunocytochemistry.

D, Negative procedural control for immunocytochemistry tested whether there was any non-specific binding of reagents to the tissue. There was no non-specific binding as shown by the absence of staining of the tissue. *Reprinted with permission from Young et al. Pulmonary diseases and adult healing cells: from bench top to bedside. J Stem Cell Res. 2017; 1(2) 003:1-9 (58).*

Figure 5. Newly regenerated healing cells in post-busulfan-treated rat lung fibrosis .



A, Regeneration of new bronchi.

B, Regeneration of new alveolar ducts.

C, Regeneration of bronchi.

D, Regenerating alveolar sacs.

Reprinted with permission from Young et al. Pulmonary diseases and adult healing cells: from bench top to bedside. J Stem Cell Res. 2017; 1(2) 003:1-9

Harvesting of human healing cells. When site-specific locations were compared, the number of adult healing cells per unit volume was far less than functional cells or maintenance cells (29,33,36). And their numbers are further reduced at any given site due to their ubiquitous location in all connective tissue stroma throughout the body (35-39,41-53). Instead of harvesting a specific site for healing cells, a proliferation agent was ingested to stimulate proliferation of the healing cells in situ. After a two-month interval, a mobilization agent was ingested to move the newly formed daughter healing cells into the blood stream. Four hundred-ml of blood (containing blood elements and healing cells) was removed from the median cubital vein using venipuncture (75). The healing cells were then isolated from all cellular blood elements (e.g., RBCs, WBCs, platelet), and segregated into their respective categories. This was performed using time, temperature, zeta potential, and differential density gradient centrifugation with serum, saline, and sterile water (76). Various methods were devised using minimally manipulative procedures to transplant selected healing cells into specific sites throughout the body. This healing cell placement was based on the disorder being treated, the inherent sizes of the cells, and differentiation organ involved, all within a single 24-hour period (77).

Human Clinical Studies. The initial studies included harvesting healing cells from patients using their own autologous healing cells coupled with diseases affecting the nervous system [Parkinson's Disease] (55,73,74), the heart [Myocardial Infarction] (4,31,54,55,57), and the lungs [Pulmonary Fibrosis] (4,31,54,57,58). Results showed 100% safety for transplant methods and 100% efficacy for reversing signs and symptoms. Subsequent studies were expanded to include other diseases and trauma. We used both autologous (self) healing cells and allogeneic healing cells (as donor cells from adults matched for gender and ABO blood group). Chronic diseases of the nervous system studied were Alzheimer's disease (75), Age-related Dry Macular Degeneration (76), Traumatic Blindness (78), Traumatic Spinal Cord Injury (79), Traumatic Brain Injury (80), Stroke (81), Multiple Sclerosis (82), Chronic Inflammatory Demyelinating Polyneuropathy (83), Sciatica, Neuropathies, and Amyotrophic Lateral Sclerosis (84). Cardiovascualr Diseases included congestive heart failure and myocardial infarction (85). The lung diseases examined were Idiopathic Pulmonary Fibrosis (86) and Chronic Obstructive Pulmonary Disease (87). Autoimmune diseases examined were Systemic Lupus Erythematosus (88), Allergies, Celiac Disease (89), and Inflammatory Nephritis leading to Chronic Kidney Disease (90). Orthopedic problems were addressed with respect to osteoarthritis of hip, knee, and ankle joints (51) and rheumatoid arthritis. Cumulative results demonstrated a 100% safety record for transplantation of freshly isolated healing cells, from both autologous and matched allogeneic donors, and an 83% efficacy for reversing signs and symptoms in 97 individuals.

Throughout the clinical studies, we noted recurring themes that would greatly affect the efficacy of the results, e.g., local anesthetics utilized (91), failure to follow informed consent guidelines (92), separating small healing cells from exosomes during isolation (93), and donor selection criteria (94).

Combinatorial Nutraceutical Supplement Pill (CNSP) Some individuals attempting to gain access to the fresh isolate open access open enrollment clinical studies were too fragile to undergo the fresh isolate harvest procedures and therefore excluded from the fresh isolate studies. For these individuals, I developed CNSP to mimic the in vivo activity of ex vivo-activated transplanted healing cells for those individuals too fragile to undergo the fresh isolate harvesting procedures. CNSP was designed to 1. Stimulate proliferation of healing cells within their connective tissue niches in situ. 2. Mobilize healing cells from their connective tissue niches into the blood stream, 3. Increase circulation throughout all organs of the body. 4. Activate cell surface receptors on healing cells to migrate towards sites of tissue damage. 5. Activate cell surface receptors on healing cells to respond to local environmental cues (tissue-specific exosomes). 6. Support a strong innate immune system (key critical for successful wound healing). And 7. Prevent tissue overgrowth.

We currently have 20 people in the IRB-approved CNSP open enrollment open access clinical study, some for as long as 3-4 years, with most starting their study during the initial Covid lockdowns. The results so far show a 100% safety record and 100% efficacy at reversing signs and symptoms of their respective aliments. In addition, these individuals

independently and unanimously reported unforeseen side effects of CNSP. These side effects included increased color acuity (colors were brighter and sharper), a decrease in systemic pain, decreased depression, decreased brain fog, increased energy, increased cognition, and a better outlook on life, leading to a better quality of life.

What Does This Mean for You? Contrary to popularly held beliefs, healing cells are present in adult animals, including humans. Methods have been developed to isolate and purify populations of healing cells to be used for regenerative medicine. Healing cells and CNSP have been tested and validated for their ability to reverse signs and symptoms of chronic (terminal) diseases, severe trauma, and orthopedic disorders. Fresh isolate healing cells activated outside the body are 100% safe and demonstrate an efficacy of 83% at reversing signs and symptoms of certain diseases. Healing cells activated inside the body with CNSP are 100% safe and 100% effective at reversing signs and symptoms of certain diseases leading to a better outlook on life and a better quality of life. Currently, the fresh isolated healing cells and CNSP technologies are treatments, and not cures for these aliments. Healing cells, their isolation and transplantation technologies, and CNSP have not yet been approved by the FDA. We are continuing, under IRB-oversight, with open enrollment and open access clinical studies. We are enrolling more patients to boost numbers of participants before application for FDA R-MAT approval, and subsequent general use of these technologies.

Due Diligence. 1. Google Henry E. Young PhD. 2. I have posted lectures to You Tube discussing the ethics of using various types of stem cells for regenerative medicine [http://www.youtube.com/ watch?v=wj5zXVRfU2c &feature=channel_page] and [http://www.youtube.com/watch?v=tLpkIBCWlAY&feature=channel_page]. 3. ALL my research with adult healing cells has been posted to an open access website called ResearchGate.net. You can download my materials free of charge at https://www.researchgate.net/profile/Henry_Young/publications/?page=1. 4. If you would like to learn more about healing cells and their ability to affect a positive repair and restorative response, and/or apply for acceptance into our IRB-approved open access open enrollment Phase-0 (everyone gets treated) clinical studies for either fresh isolates and/or CNSP, you can email Dr. Henry E. Young PhD at young.hey1@yahoo.com. In the Subject line of the email state your interest.

Conclusion. Adult autologous healing cells and/or gender-matched and ABO blood group-matched allogeneic healing cells offer HOPE for the reversal of signs and symptoms that indicate repair of damaged tissues, reduction in pain, and restoration of function in individuals with severe trauma and/or chronic diseases having no known cure. Healing cells and CNSP have done this with demonstrated minimal to no adverse side effects.

Conflict of Interest. There is a conflict of interest with respect to enrolling participants in our IRB-approved open access open enrollment Phase-0 (everyone gets treated) clinical studies for either fresh isolates and/or CNSP.

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