



Cover Story

# From Being to Paralyzed

**Hualien Tzu Chi Hospital  
Stem Cells Treatment,  
Traditional Chinese &  
Western Medicine Integration  
for Brain Injury**



Hualien Tzu Chi Hospital integrated granulocyte-colony stimulating factor (G-SCF) therapy in neurosurgery, acupuncture and herbal therapy in Traditional Chinese Medicine (TCM), hyperbaric oxygen therapy in plastic surgery, and physical and occupational therapy in rehabilitation to bring a chance of recovery for patients with traumatic brain or spinal cord injury; this combination can even apply to patients with cerebrovascular disease (CVS), craniocerebral injury, or malignant tumor.

# Walk Again

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**By Peng Wei-Yun**

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In Jan. 2017, Hualien Tzu Chi Hospital launched in sequence a series of human trials such as the treatment of chronic stroke with transplantation of adipose derived stromal cells (ADSC) into the brain, the treatment of acute stroke with human umbilical cord blood mononuclear cells and more. The drive behind these human trials is neurosurgery expert Supt. Lin Shinn-Zong, who has faced countless patients with traumatic brain injuries over the years, and with laser-focused attention he formulated a goal, “For coma patients to wake up, bedridden patients to stand up, and incapacitated patients to run!” To achieve

this goal, an integrative medical team of TCM and Western Medicine from Hualien Tzu Chi Hospital was assembled, committed to save every patient that comes their way, and to research new technology and approaches for brain injury treatment that would bring hope to the desperate families.

What drives Supt. Lin forward are the countless regrets that took place in front of his very own eyes. There was a male patient in his 50s underwent a magnetic resonance imaging (MRI) after experiencing dizziness only to discover severe basilar artery stenosis in his brain. Supt. Lin recommended surgery. The patient, in fear of surgical complications, rejected his advice. Less than half a year later, the patient experienced a brainstem infarction that left him paralyzed. He was unable to speak or swallow, and drooled constantly. The patient expressed his willingness to have a go at surgery through his family. However, by that time half of the patient's brainstem cells were already dead...

Mr. Wang, a 51 year-old patient, had a small brainstem stroke. He experienced frequent dizziness while receiving treatment in another hospital. According to his MRI he was suffering from vertebrobasilar insufficiency, or insufficient blood flow to his basilar artery. His doctor advised him to go to ER if he has another stroke. Supt. Lin thought otherwise.



**At Hualien Tzu Chi Hospital, for stroke, surgery comes first, follow by stem cell therapy, rehabilitation and TCM depending on patients' conditions. The team works their best for patients to recover. The photo shows Supt. Lin Shinn-Zong and his team performing a cerebral neurosurgery.**

“When he came to our hospital, our team believes that waiting for another stroke would be too late. Moreover, once stroke hits, all the medical treatments are led by the state of stroke patients' conditions. It'd be hard to organize a planned strategy to tackle the disease,” he explained.

CVS often leads to physical disabilities, bedridden, or death. Patients suffer, and so do their families. This is the most recurrent regrets we see in neurosurgery.

### **Shedding Light on Spinal Cord and Brain Injury—Integrative Stem Cells and TCM treatment**

Patients seating in the waiting area outside the inpatient clinic are either local Taiwanese, or brain injury patients traveling from Singapore, Malaysia, the Philippines, Macao, Tibet, Shanghai, Jiangxi and so on. They sit, or lay down, waiting. Their families eagerly hope for a miracle with desperation in their eyes. They have flew all this way to Taiwan just for the integrative TCM and Western

Medicine treatment in Hualien Tzu Chi Hospital.

Mr. Chan from Macao, 62 years old, fell in the bathroom at home about a year ago, resulting in cervical injury that paralyzed him from waist down. The hospital in Hong Kong took a conservative approach to his injury, which showed no improvement. While searching online for relevant information, Mr. Chan's son came across Hualien Tzu Chi Hospital earlier this year and, after a discussion with neurosurgeon Supt. Lin, decided to fly to Hualien for the integrative G-CSF and acupuncture treatment.

When Mr. Chan first arrived at the hospital, his excessive muscle tone caused his arm and leg muscles to involuntarily contract, preventing him from bending or walking. He had to rely on a wheelchair to move about. With the help of the neurofunctional team, he underwent G-CSF treatment, PG2 injection that is an injectable drug extracted, isolated and highly purified from the plant Huang Qi, and intrathecal Baclofen therapy (ITB), which is the implant of an intrathecal baclofen pump under the skin of the patient's waist that is connected to a catheter inserted into the spinal canal, injecting muscle relaxer Baclofen at fixed dose at regular interval, relaxing his entire muscle. With these treatments, he could finally start with his rehabilitation.

After receiving the integrative



**G-CSF primarily utilizes the principle of stem cell proliferation, principle of stem cell proliferation and inject G-CSF, a type of growth factor that stimulates the production of white blood cells, to stimulate nerve conduction velocity and activate patients' stem cell proliferation, repairing the damaged nerve cells.**





treatment, together with acupuncture therapy and rehabilitation, for just a month, his rigid body grew soft and flexible, and his legs could gradually bend. He could even stand unassisted for a minute, and then two minutes. It was a giant leap ever since his injury a year ago.

About five years ago, Mr. Lao, a brain injury patient from Zhejiang, China, was in a coma for three days due to hypertensive intracerebral hemorrhage (HICH), bleeding in the brain caused by high blood pressure. After he work up, the left side of his body was paralyzed, and his left hand remained a fist and could not open. He endured the immensely painful eight-month rehabilitation with incredible determination, which effectively restored his overall body functions, however the excess muscle tone in his left palm prevented him from straightening his fingers to retrieve objects, and that troubled him considerably. He was later referred by Suzhou Tzu Chi Clinic Platform to Hualien Tzu Chi Hospital to undergo G-CSF and integrative TCM and Western Medicine Treatment.

With a glimpse of hope, Mr. Lao came to Hualien. After the evaluation of Supt. Lin and General Neurosurgery Dir. Chiu Tsung-Lang, he underwent G-CSF therapy, PG2, hyperbaric oxygen therapy, and TCM acupuncture and rehabilitation therapy. Thanks to the treatment plan, Mr. Lao managed to regain control of his left

hand and was able to drink water out of a cup on his own.

During the treatment period, Mr. Lao encouraged the inpatient next to him non-stop with his personal experience. This Taiwanese inpatient, who had been paralyzed for years after a stroke and had refused rehabilitation, started to practice standing again without the assistance of walking cane or wheelchair. They even arranged to meet again in Zhejiang one day.

### **G-CSF Treatment Brings New Hope to Brain Injury**

In the recent years, Hualien Tzu Chi Hospital's integrative treatment of G-SCF therapy and TCM acupuncture, added with hyperbaric oxygen therapy in plastic surgery and physical and occupational therapy in rehabilitation, brought new hope to brain injury patients. This treatment combination not only allow spinal cord injury patients who were paralyzed from waist down a chance to stand up, allow stroke patients who could not control his left hand due to excess muscle tone to regain control and retrieve objects, drink water in a cup, it can also be extensively applied to cerebrovascular disease (CVS), craniocerebral injury, or malignant tumor patients experiencing sequelae of surgery, radiation therapy, or chemotherapy.



**TCM Department Dr. Wu Hsin-Chieh, Nurse Chang You-Hsun, Dr. Yang Cheng-Chan, Dr. Lin Chung-Shun, Dr. Lin Ching-Wei, Dir. Ko Chien-Hsin, Tzu Chi Foundation Vice CEO Lin Pi-Yu, Supt. Lin Shinn-Zong, Rehabilitation Division Dir. Liang Chung-Chao, Tzu Chi Medical Mission CEO Lin Chin-Lon, Vice Supt. Chen Chung-Ying.**

March this year, Cho, a 11 year old female patient, fell unconscious in a classroom, and was soon taken to a local hospital in Taichung for testing. She was found to have a rare disease - moyamoya disease. It was evident from her MRI that the arteries in her brain had constricted to a degree that it appeared on the image as a “puff of smoke”. The blood supply to her left brain was insufficient, causing a stroke that paralyzed her left arm and leg, leaving her in need of vascular bypass surgery. Cho’s family was shocked when they heard the result. They thought stroke only happens to old people, unaware that children may have stroke as well.

“Moyamoya disease, which is Japanese for ‘puff of smoke’.” Supt. Lin explained. It is a chronic cerebrovascular infarction, a blockage of blood vessels in the brain, that leads to increased collateral circulation and neurological symptoms, which mostly occurs during childhood. The reason being that the junction of intracranial carotid artery and middle brain artery is constricted for unknown reason, causing small, weak collateral vessels to develop, appearing like a puff of smoke. The symptoms of moyamoya disease are similar to that of a stroke, causing hemiparesis, which is weaknesses in one side of the body. The

cerebrovascular infarction would continue to adulthood and even induce cerebral hemorrhage.

A “stroke” without warning caused the left hand of this sunshine little girl so tensed that she was unable to move freely. Her writing became illegible; her chopsticks tends of fall from her hands during meals; and her right leg was so weak that she had to drag it along. These symptoms frightened Cho. When she finally arrived at Hualien Tzu Chi Hospital, Supt. Lin and General Neurosurgery Dir. Chiu Tsung-Lang took over her treatment. After reviewing the MRI, they realized the severity of the constrictions in the arteries on both side of her brain, in particular the collateral vessels on the left were like “puff of smoke”, a clear indication of insufficient blood circulation. They arranged a vascular bypass surgery right away.

To accelerate the healing of the attached blood vessels, Supt. Lin took over and performed G-CSF therapy for Cho, in combination with the integrative TCM and Western Medicine treatment. In regards to the Western Medicine, G-CSF was injected to promote the activation of stem cell proliferation, in collaboration with TCM acupuncture stimulating pressure points and herbal medicine that promotes blood circulation and removing blood stasis, facilitating the repair of damaged nerves. During this 6-month treatment period, Cho revisited Hualien Tzu Chi



**Cho, the girl who developed moyamoya disease, underwent G-CSF therapy and the integrative TCM and Western Medicine treatment after Supt. Lin Shinn-Zong and General Neurosurgery Dir. Chiu Chung-Lang performed a vascular bypass surgery, and began to recover after a 6-month treatment. Cho even sent a hand-written thank you card to the team.**





Hospital monthly for her treatment. During Supt. Lin's ward round, he would work with Cho on simple rehabilitation exercises like hand swing, bending over, and head turning.

"Thank you doctors and nurses for taking care of me," Cho hand wrote a card she prepared for the medical team, in the illegible writing were her sincere appreciation. The team members were moved by her thoughtfulness. Supt. Lin also shared Cho's recent progress with Dir. Chiu, "Cho is making progress with her recovery. She even won 4th place in a running contest!" The entire medical team

cheered for the girl.

Stem cells possess renewing and regenerative properties for tissues and organs, and that makes stem cell medicine a last thread of hope for many untreatable traumatic brain injuries. "Chasing stem cells to brain with stroke has two effects: One is saving brain cells that are on the verge of death, and two is regenerating dead nerve cells and blood vessels and save our patients from paralysis."

G-CSF therapy is built upon the principle of stem cell proliferation. By injecting G-CSF, a type of growth factor



**With the hope to effectively treat patients with brain injury or spinal cord injury, under the leadership of Supt. Lin Shinn-Zong, Hualien Tzu Chi Hospital, vigorously pursued the implementation of human trails. The photo shows the contact signing on the treatment of chronic stroke with transplantation of adipose derived stromal cells (ADSC) into the brain. Photo/ Yang Kuo-Ping**

that stimulates the production of white blood cells, nerve conduction velocity is stimulated, which then activates patients' stem cell proliferation to repair damaged nerve cells. Followed by acupuncture and herbal medicine that promotes blood circulation and removing blood stasis, allowing the damaged nerve tissues to restore their functions at a rapid rate.

Supt. Lin stated that G-CSF therapy could increase stem cell proliferation at ten times the normal rate, and the magnetic effect would attract stem cells to the brain and repair the injuries by differentiating into cranial nerves and blood vessels. It would accelerate the recovery of brain injury patients and protect their cranial nerves from damage caused by insufficient blood flow as result of stroke, and its anti-inflammatory function could inhibit inflamed tissues and cells at the site of blood vessel ruptures.

### **Western Medicine and TCM — Revival and Recuperation**

In the face of brain injury patients, “For coma patients to wake up, bedridden patients to stand up, and incapacitated patients to run” is the goal of the integrative TCM and Western treatment program.

Dr. Ho Tsung-Jung, Vice Supt. and director of Chinese Medicine Dept. of Hualien Tzu Chi Hospital, described the

clinical application of TCM using stroke patients as an example. According to Vice Supt. Ho, rehabilitation with acupuncture and other Traditional Chinese Medicine therapies can enhance recovery by many folds; and according to statistics, acupuncture therapy can significantly reduce stroke patients from relapse. As for cancer patients, they are generally weaker after electrotherapy and chemotherapy. TCM intervention can help these patients by fortifying their energy and regulating their bodily functions.

Supt. Lin also strongly acknowledged the contribution of TCM practitioners in the integrative effort. He pointed out that patients who are experiencing sequelae of cerebrovascular disease (CVS), craniocerebral injury, or the sequelae of malignant tumor surgery, radiotherapy and chemotherapy, can consult with TCM practitioners to evaluate a cooperative care that would significantly reduce patients' recovery time and enhance the effect of rehabilitation.

In Sept. 2016, Integrative TCM and Western Medicine Inpatient Care Center officially inaugurated. Dr. Lin Ching-Wei in charge of the center pointed out that the TCM practitioners of the center integrate traditional TCM diagnosis—observation, auscultation and olfaction, interrogation, and pulse feeling and palpation—with technological innovation—meridian diagnostic device—for patient diagnosis,



provide a range of treatment options including herbal medicine, acupuncture and herbal patches, massage therapy or meridian cupping, and complement with characteristic TCM therapies such as five element of music therapy, TCM aromatherapy, auriculotherapy (ear acupuncture), and meridian massage. The center also set up regimen rehabilitation and health education basing on the constitution of individual patients and offer the best inpatient care to brain injury patients.

### **Forward Base for Stem Cell Therapy Clinical Trial**

“As long as our patients are healthy!” Supt. Lin is a doctor, a superintendent, and with the responsibility of researching and developing new drugs and technology on his shoulder, he also accepts the role as the president of research and development in the Tzu Chi Medical Mission Innovation Research and Development Center. Even though involved in clinical medicine, research, education, and administrative work, Supt. Lin has never forgotten his duty as a doctor—treating diseases and saving patients. Everything he does aims to improve the conditions of his patients, and the application of stem cell medicine can bring new treatment options to modern medicine.

As a global leader in the application of stem cell therapy for cranial neuropathy, Supt. Lin has been spearheading the clinical application of stem cells in Taiwan. Not only is he the first in Taiwan to successfully transplanted embryonic stem cells and neural stem cells into a Parkinson's disease patient, He is also the first neurologist in the world to apply autologous peripheral blood stem cells (APBSC) in the treatment of stroke in a clinical trial. He awarded the American Society for Neural Therapy & Repair, Bernard Sanberg Memorial Award, and named a Charter Fellow of U.S.-based National Academy of Inventors and American Association for the Advancement of Science (AAAS). The research team led by him has received international recognition in the field of stem cell therapy.

Supt. Lin went deeper into the importance of research and development using stroke as an example. Patients who are rushed to a hospital for thrombolytic agent injection within three hours of stroke occupy only 5% among all the patients with acute ischemic stroke, which is only a small portion, he said. Furthermore, he added, in stroke patients with thrombolytic therapy 6% to 10% would experience bleeding complications. It is therefore imperative to use regenerative medicine as a foundation to search for new treatment options



**Rehabilitation plays a crucial role in the treatment of brain injury. The photo shows Dir. Chiu Chung-Lang (left) and nursing specialist Tseng Pao-Hui (right) checking up on the patient's condition.**

with new technology and new drugs for diseases like malignant tumor, dementia, Parkinson's, brain injury, chronic stroke, ischemic stroke and more. And that is precisely the goal of Supt. Lin, his team in Tzu Chi Medical Mission Innovation Research and Development Center, and the team of Department of Medical Research, Hualien Tzu Chi Hospital have been working towards.

There are two primary applications of stem cell in medicine: Regenerative medicine and cancer medicine. Hualien Tzu Chi Hospital signed contracts with Guo Xi Stem Cell Applied Technology,

Everfront Biotech, Taiwan Mitochondrion Applied Technology, and StemCyt In 2017 to initiate human trails on the treatment of chronic stroke with transplantation of adipose derived stromal cells (ADSC) into the brain, treatment of Parkinson's disease with autologous adipose stem cell therapy and the treatment of acute stroke with human umbilical cord blood mononuclear cells. The new drug trials on the treatment of brain malignant glioma, which began to close in June, hopes to effectively treat patients with brain injury or spinal cord injury.