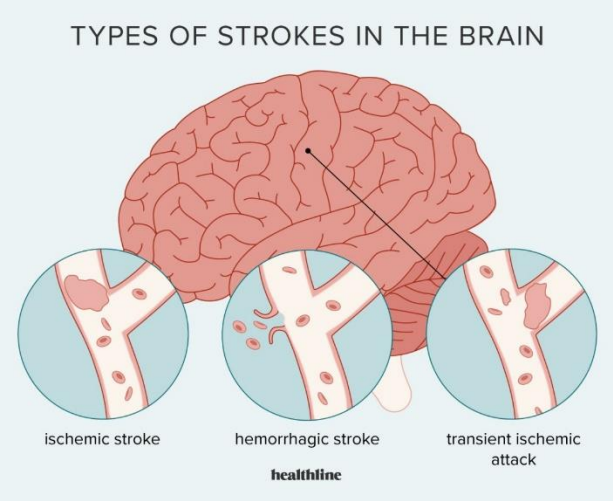
Stroke and Post-Stroke Recovery Protocol

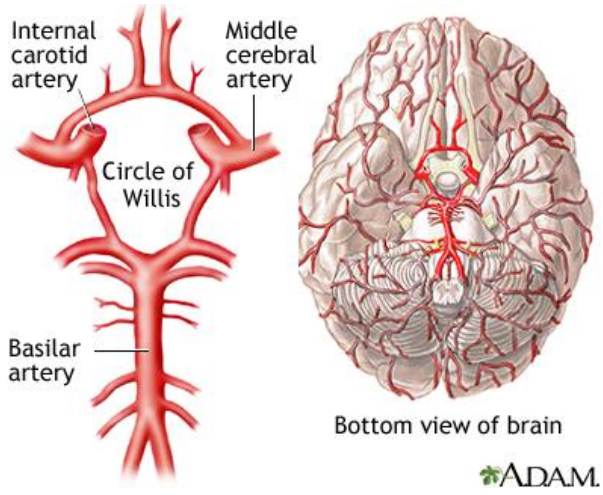
A stroke is an emergency medical condition that occurs when a blood vessel in the brain is blocked or ruptures resulting in interrupted blood supply to part of the brain. There are three major types of strokes: ischemic, hemorrhagic, and transient. Ischemic strokes, the most common type, occur when there is a blockage in blood flow to the brain. Ischemic occlusions contribute to around 85% of casualties in stroke patients. A hemorrhagic stroke leads to bleeding into and around the brain. Transient strokes or transient ischemic attack (TIA) occur when blood flow to the brain is briefly blocked.



Stroke is the second leading cause of death and a major contributor to disability worldwide. Symptoms include vomiting, dizziness, change in consciousness along with headache, numbness or weakness in the face, arm, or leg, especially on one side of the body, vision problems, and slurred speech. Even though stroke symptoms may come on suddenly, there are warning signs including a severe headache and TIA. Depending on the region of brain damage caused by the stroke, patients may also have problems with memory, perception, emotions, urination, and bowel movements.

Ischemic Stroke

The blood flow to the brain is managed by two internal carotids anteriorly and two vertebral arteries posteriorly (the circle of Willis). In an ischemic stroke, clots form in the brain blood vessels clog arteries, and interrupt blood flow, causing sudden damage to brain cells due to a lack of oxygen. Unless the blood flow is resumed within six hours, the brain cells can die.



Atherosclerosis is a major risk factor for an ischemic stroke. In atherosclerosis, the brain blood flow is affected by the narrowing of brain blood vessels and constriction of the vascular chamber due to the build-up of plaque. Sometimes, the build-up of plaque in the cerebral artery breaks triggering clot formation. If the clot is large, the blood flow in the brain can become reduced or blocked and stroke occurs. Such ischemic stroke is called thrombotic stroke.

Sometimes a rupture and a blood clot occur outside the brain. That wandering clot, an embolus, is circulating in the bloodstream. When it lodges, blocking blood flow in an artery leading to or in the brain, it results in ischemic attack. This type of ischemic stroke is called embolic stroke. Most embolic strokes are from blood clots that form and then enter the bloodstream due to atrial fibrillation.

Inflammation of the brain blood vessels plays a key role in the development of a stroke. A malfunctioning liver can cause increased response to stress hormones such as cortisol and epinephrine with over production of proinflammatory chemokines by the liver Kupffer cell. When proinflammatory chemokines reach the brain, they trigger microglia activation producing brain inflammatory chemokines causing brain inflammation and cerebral blood vessel inflammation which narrows the blood vessel lumen. Inflammation can also cause tightening or constriction of vascular smooth muscle further narrowing the blood vessel lumen. In addition, blood vessel inflammation destabilizes the atherosclerosis plaque and increases the risk of plaque rupturing and blood clot formation. Chronic activated microglia also release cytotoxic agents including reactive oxygen intermediates, proteinases and complement proteins damaging the lining of the blood vessels, causing blood clot formation leading to a stroke.

Transient Ischemic Attack (TIA)

A transient ischemic attack *(*TIA*)* is a temporary symptom similar to a regular stroke. Symptoms include numbness or weakness in the face, arm, or leg, especially on one side of the body, vision problems, and slurred speech. These symptoms are transient and will disappear within 24 hours. TIA is caused by the temporary blockage of the blood flow to the brain due to a blood clot that subsequently dissolves.

Similar to an ischemic stroke, the temporary blood vessel blockage in TIAs can be caused by pieces of fatty deposits, or atherosclerosis plaque that triggers formation of a blood clot in the cerebral artery or one of the branches that supply blood to the brain. The blood clot can also be formed elsewhere and travelled to the arteries supplying the brain. In most cases, the clot comes from the heart or the aorta due to atrial fibrillation. Inflammation of the brain and the brain blood vessels can also result in blood vessel narrowing, reducing or blocking blood flow, leading to TIA. Although TIA doesn't cause lasting symptoms, it is a serious warning sign of an impending stroke. About 40 percent of people who have had TIAs go on to have an actual stroke.

TIAs can also occur due to narrowing and closure of small blood vessels deep inside the brain. These vessels are frequently damaged by high blood pressure or diabetes if left untreated throughout a person's lifetime. Such small blood vessel blockage in the brain can be easily ignored. However, patients can develop symptoms such as depression, headache or forgetfulness, which may not be helped even with the use of antidepressants because of the restricted blood supply.

Ischemic Stroke and Aging

Strokes primarily affect the elderly population, and mortality after therapies is associated with advanced age. Atherosclerosis, the major risk factor of ischemic stroke is a disease of aging. Increasing age is an independent risk factor for the development of atherosclerosis. Systemic, chronic low-grade inflammation occurs during the aging process, termed as "inflammaging", aggravates stroke pathology. The human body generates over 150 billion deceased cells in a day. As people aged, their immune system can't clear them promptly. The accumulated deceased cells stimulate the innate immune system and drive the body towards a pro-inflammatory state. Aged cells secrete a complex set of pro-inflammatory cytokines, known as the senescence-associated secretory phenotype (SASP) which promote chronic inflammation. Persistently elevated inflammation levels destabilize the atherosclerosis plaque and aggravates the plaque rupture and blood clot formation, increasing risk of stroke.

Age also accounts for a dismal outcome of ischemic stroke. Increased post-stroke brain injury occurs in aged patient's due to age-related changes of immune response. Animal studies have shown that aged mice had increased neutrophil flux to the brain microvascular system following an ischemic stroke. Aged mice have an enhanced granulopoietic response to stroke which triggers rapid release of immature atypical neutrophil ($CD62L^{lo}$) from the bone marrow which migrate quickly to sites of injury. The accumulation of such neutrophils increases oxidative stress, phagocytosis and procoagulant features causing elevated blood viscosity, increased vascular resistance, and extended circulating time. Although blood circulation is resumed in the artery following acute attack, the microcirculation is still blocked with no-re-flow. The senescent neutrophils can aggravate thrombo-inflammation causing secondary injury in ischemic brain leading to increased mortality.[7,8]

Hemorrhagic Strokes

Hemorrhagic stroke happens when a blood vessel in the brain ruptures. It causes bleeding inside the brain, intracerebral hemorrhage (ICH) or into the subarachnoid space (between the brain and its outer covering) subarachnoid hemorrhage (SAH). The accumulated blood, a hematoma, puts pressure on the surrounding area, disrupting blood circulation and causing severe brain damage. A hematoma bigger than 3 cm^3 requires surgical removal as soon as possible. If the pressure is too high for too long, those brain cells can be permanently destroyed. This kind of stroke is life-threatening because it can worsen quickly.

A hematoma also induces neuroinflammation, oxidative brain damage, and blood-brain barrier damage causing post-stroke injury. Secondary injury can persist for an extended period and result in long-term neurological deficits. The volume of the initial hematoma correlates with morbidity and mortality, and hematoma expansion was associated with poor patient prognosis. Necrosis is followed with the disruption of the plasma membrane, organelle swelling and

leaking of cellular contents into the extracellular space. The dying brain tissue and resulting inflammation can cause scar tissue, known as a glial scar. The parts of the brain that become damaged can also be liquified. Brain liquefaction is toxic and can leak and damage healthy brain tissue in the surrounding area.[6]

Hemorrhagic stroke has a 40% to 50% mortality rate within 30 days, 2-fold that of ischemic stroke. High blood pressure is the most common cause of a hemorrhagic stroke, especially when a person's blood pressure stays high for a long period of time causing damage to the blood vessel. Other risk factors include cerebral amyloid angiopathy, advanced age, cigarette smoking, diabetes, alcohol abuse, drug abuse, Asian ethnicity, genetic factors, menopause, and oral anticoagulant treatment. Inflammation of the blood vessel also plays a key role as inflammation causes the blood vessel wall to weaken, stretch, thicken, and swell with scarring, which narrows the vessel and slows or completely stops the blood flow. The weakened vessel can burst and bleed into surrounding tissues leading to hemorrhagic stroke.

Hemorrhagic Stroke and Aging

Advanced age is an important factor for the development of hemorrhagic stroke and the higher death rate. As a person gets older, the risk of developing intracerebral hemorrhage increases. Elderly individuals have a fivefold higher risk as opposed to their younger counterparts. The chance of having high blood pressure increases as people get older, especially isolated systolic hypertension causing damage to the blood vessels. Age-related chronic brain blood vessel inflammation, the "inflammaging" causes weakening and scarring of the blood vessel walls which can burst and bleed leading to a hemorrhagic stroke.

Microglia and brain infiltrating macrophages regulate hematoma resolution and brain recovery due to their ability to phagocytose accumulated cellular debris after a brain injury. Timely removal of dying cells prevent the release of intracellular inflammatory agents. Microglial or macrophage mediated phagocytosis is important for recovery after intracerebral hemorrhage. Aged microglia exhibited reduced expression of genes associated with phagocytosis. TGFβ-induced phagocytosis was abolished in aged microglia compared to their younger counterparts. Age-related parenchymal degeneration and subsequent reduction in the structural integrity of the brain tissue is unable to restrict hematoma growth causing hematoma expansion with poor outcomes in elderly who had larger volume hematoma.

Post-Stroke

The types and degrees of disability following a stroke depend upon the area of the brain being damaged. Generally, a stroke can cause five types of disabilities including paralysis and motor control issues, sensory disturbances, aphasia (problem understanding language), problems with thinking and memory, and emotional disturbances. These can lead to symptoms of weakness, lack of coordination, problems walking, loss of sensation, problems with hand grasp, visual loss, or trouble speaking or understanding. Stroke can also lead to depression and dementia.

Wellness Recommendation

Post-Ischemic Stroke

The wellness recommendation for post-stroke patients to regain their functionality begins with 2-6 weeks of Brown, LC Balancer, Glia, and Xcel. Brown and LC Balancer help the liver improve lipid metabolism so that sufficient phospholipids are available to enhance brain recovery. LC Balancer improves microcirculation. Glia helps clear Heat in the brain's glymphatic system and enhance its Qi. It helps reduce the inflammation of the glymphatic system and enhances the brain's waste drainage function. This helps to clear the toxic liquid material in the damaged part of the brain. Xcel enhances kidney filtration to support toxin excretion.

Goji Berry, an herbal ingredient in Brown, has been shown to regulate lipid metabolism through supporting phospholipid synthesis. It also alleviates oxidative stress and prevents free radicals.[2] Reishi Mushroom and American Ginseng, two herbal ingredients in LC Balancer, have been shown to improve lipid metabolism, contain neuroprotective properties, and decrease neuronal damage.[3] Herbal ingredients in Glia have been shown to stimulate the expression of neurotrophic factors (such as glial cell lines!). These factors are vital for neuronal survival, growth, and differentiation, and the deficiency of which can cause neurological impairments.[1]

After 2-6 weeks, it is recommended to add Gold, Qi Booster, Gliagen, Anginen-R, and Sanguin. Glia can be taken

at a reduced dose. Gold helps break up scar tissue (glial scars) in the brain. Qi Booster helps enhance immunity and blood supply to the upper body to provide more nutrients to the brain. Angelica Rootlet, an herbal ingredient in Qi Booster, has been shown to enrich and enhance the blood through improving vasodilation as well as reducing inflammation through decreasing levels of proinflammatory cytokines.[4] Gliagen nurtures the Qi and Yin and clears the Wind from the brain. It helps repair the glial cell damage and reverse the degeneration of the glial cells to increase its drainage capacity and efficiency of the brain's glymphatic system. It also helps relieve the constriction and vasospasm of the perivascular network to reduce blood pressure and facilitate the transport of the waste drainage from the brain.

Anginen-R helps nurture the mind to repair the brain's microcapillary damage, resolve the cerebral microcirculation constriction, and enhance the re-perfusion to the affected area. It also helps remove neutrophil clogging of the brain microcirculation to reduce post-stroke secondary injury due to aging. Herbal ingredient, Red Halloysite in Anginen-R helps stop bleeding, and promote tissue regeneration and wound healing. Sanguin nurtures Qi and Blood to help counter the effect of immune aging to reduce immature neutrophil release and post-stroke secondary brain damage. The anti-aging effect of Sanguin also helps reduce inflammaging and improve circulation. Patients can experience symptom improvement in 2 weeks. 6 weeks to 3 months of treatment is required to have significant improvement and sustained results.

If patients still have brain inflammation with symptoms of tremors, Platinum and Hepavin are also required. Platinum helps remove brain heat and phlegm damp. It helps reduce brain inflammation and clear toxic molecules such as chemokines from the brain. Astragalus Root, an herbal ingredient in Platinum, has been shown to decrease levels of inflammatory cytokines, inhibit the expression of neuroinflammation markers, and attenuate mitochondrial dysfunction.[5] Patients can experience symptom improvement in 3 days. 4-6 weeks of treatment is required for significant improvement.

If patients have residual blockage of the small brain blood vessels with symptoms of depression, Resurgen and Surgenin are recommended. Resurgen helps clear damp and heat toxin from the brain blood vessel to help reduce small brain blood vessel inflammation. Surgenin helps remove blood stasis to help clear clots inside the small brain blood vessel to restore brain blood flow and improve circulation of the brain. Patients can experience symptom improvement in 1-3 days. 2 weeks of treatment is required for significant improvement.

<u>Ischemic Stroke Prevention</u>
Age-related atherosclerosis, inflammaging and immune aging are major risk factors of ischemic stroke. Sanguin, and CV are recommended for aged patients as preventative treatment. Sanguin exhibits anti-aging effects and addresses inflammaging and immune aging to improve circulation. CV removes Blood Stasis and nurtures heart Qi and Blood. It helps dissolve plaque from the artery and repair artery damage. CV-R is also recommended for patients who have developed atherosclerosis plaque in the brain artery by removing Blood Stasis and helps improve cerebral blood circulation. B-2 and Qi Booster are also required to help dispel the dissolved waste during the initial 4-6 weeks. LC Balancer, Brown and Xcel are also recommended to counter the aging effects on the liver and kidney and support liver and kidney function for proper waste processing and secretion.

<u>Transient Ischemic Attack (TIA)</u>
The recommended formulas depend on the cause of the TIA. If the TIA is caused by brain and cerebral blood vessel inflammation, Platinum, Hepavin, Resurgen and Surgenin are recommended. If the TIA is caused by hyperlipemia and atherosclerosis, CV and CV-R in combination with B-2 and Qi Booster are recommended. If the TIA is caused by the inflammaging due to aging, Sanguin and Anginen-R are recommended. LC Balancer, Brown and Xcel are also recommended to support toxin processing and secretion. If the TIA is caused by the clot due to A-Fib, PaceKeeping, King and Anginen are recommended.

<u>Post-Hemorrhagic Stroke</u>
The initial wellness recommendation for post-stroke includes Brown, LC Balancer, Glia, Xcel, Sona, Sona-R and Sanguin to clear the hematoma. Brown and LC Balancer help the liver improve lipid metabolism so that sufficient phospholipids are available to enhance brain recovery. Glia helps clear Heat in the brain's glymphatic system and

enhance its Qi. It helps reduce the inflammation of the glymphatic system and enhances the brain's waste drainage function. This helps to clear the toxic liquid material in the damaged part of the brain. Xcel enhances kidney filtration to support toxin secretion. Sona and Sona-R help clear blood stagnation and blood stasis to speed up the absorption and clearance of the blood clots in the brain. Sona-R also enhances the Qi and opens up the meridian in the brain. Sona-R helps repair the synaptic injury caused by the brain injury and improve neurological function.

Sanguin nurtures the Blood and Qi and help counter the aging effects to reduce inflammation, improve the microglial phagocytosis function, speed up the resolution of the hematoma and enhance circulation. Patients can experience symptom improvement in 2 weeks. 6 weeks to 3 months of treatment is required to have significant improvement and sustained results.

After 2-6 weeks, it is recommended to add Gold, Qi Booster, Gliagen, Peach-R, Karetin and Hemorrin. Glia can be taken at a reduced dose. Gold helps break up scar tissue (glial scars) in the brain and Qi Booster helps enhance immunity and blood supply to the upper body. Gliagen nurtures the Qi and Yin and clears the Wind from the brain's glymphatic system. It helps repair the glial cell damage and reverse the degeneration of the glial cells to increase its drainage capacity and efficiency. Peach-R helps enhance Brain Meridian Qi and helps repair Cerebral Blood Vessel Damage. Karetin nurtures the blood vessel Yin and improves the structural integrity of the blood vessel to help resume its elasticity. Hemorrin enhances brain blood vessels Yang and helps reduce brain blood vessel widening, bulging and aneurysm. Patients can experience further symptom improvement in 2 weeks. 6 weeks to 3 months of treatment is required to have significant improvement and sustained results.

Hemorrhagic Stroke Prevention

Age-related HBP and inflammaging are the major risk factors of hemorrhagic stroke. Sanguin, Breez, Brown, LC Balancer are recommended to address HBP and age-related inflammation. If patients HBP is also caused by atherosclerosis, CV together with B-2 and Qi Booster are recommended to help remove the atherosclerosis plaque and reduce the blood pressure.

Condition / Timeline	Recommended Products
Post-Ischemic Stroke	
First 2-6 weeks following stroke	Brown, LC Balancer, Glia, and Xcel
Following 6 weeks to 3 months, add in	Gold, Qi Booster, Gliagen, Anginen-R, and Sanguin
Excessive brain inflammation	Platinum, Hepavin
Small brain blood vessel blood clot blockage	Resurgen, Surgenin
Ischemic Stroke Prevention	
Atherosclerosis	CV, B-2 and Qi Booster or Vigorall
Aging	Sanguin
Transient Ischemic Attack (TIA)	
Brain blood vessel blood vessel inflammation	Platinum, Hepavin, Resurgen and Surgenin
Atherosclerosis	CV, B-2 and Qi Booster or Vigorall
Age-related chronic inflammation	Sanguin, Anginen-R
A-Fib	PaceKeeping, King, and Anginen
Post-Hemorrhagic Stroke	
First 2-6 weeks following stroke	Brown, LC Balancer, Glia, Xcel, Sona, Sona-R and Sanguin
Following 2-6 weeks, add in	Gold, Qi Booster, Gliagen, Peach-R, Keratin and Hemorrin
Hemorrhagic Stroke Prevention	
HBP	Breez, Brown, LC Balancer
HBP and Atherosclerosis	CV, Breez, Brown, LC Balancer
Aging	Sanguin

Selected Case Study:

Treatment of Post-Stroke Complications

Sheila LaPlante, TCM practitioner/LAC, MO

In August, a 71-year-old female patient came in for treatment for post-stroke health complications. This patient suffered a stroke after getting an angiogram. From the results of the angiogram, the patient's heart surgeon recommended 2 bypass surgeries to treat her condition. Since the patient did not want to get surgery, she came in to see Dr. LaPlante for alternative treatments. After suffering from the stroke, this patient lost her appetite and constantly vomited the foods she ate. She was also previously diagnosed with diabetes, high blood pressure, high cholesterol, and shortness of breath. As a result, the patient experienced occasional blackouts which caused her to fall down and injure herself. In addition, the patient's loss of appetite and vomiting caused her to lose 90 pounds and she eventually stopped taking her diabetic medications because her blood sugar returned to normal levels. Her primary physician and heart surgeon did not provide any treatments to this patient since they believed that nothing could be done for her health issues.

Dr. LaPlante gave this patient herbal formulas including Brown and LC Balancer from Wei Labs to address her appetite loss and shortness of breath. As soon as the patient started to take the herbs, she immediately noticed an improvement in her shortness of breath. During the first week of treatment, this patient consumed the herbal formulas without any food. As the patient's appetite improved, the nausea decreased, Dr. LaPlante advised the patient to start consuming food with the herbal remedies.

In the beginning, this patient reported that the food she ate tasted strange to her. However, after a few weeks of treatment, the patient had more energy, she was able to consume food without vomiting, and the food she ate began to taste normal again. After one month of treatment, this patient's shortness of breath had completely disappeared and she was able to gradually increase the amount of food she ate. After two months of treatment, this patient began to eat different varieties of foods and she is very pleased with the results of her treatment.

Successful Treatment of Post-Stroke Speech Difficulty

Janet Beach, RN, Grand Rapids, MN

An 88-year-old male patient was looking for help for his post-stroke recovery to improve his speech. He had ischemia in some parts of the brain recently. The patient is an attorney and is having difficulty in his speech after the stroke with difficulty to carry on a full sentence. He had a trans-ischemic attack a couple of years back. The patient also has some leg weakness and is depressed and withdrawn with some memory loss.

After evaluating the overall symptoms, a treatment with Wei Labs Brown Formula, LC Balancer, Gold and Qi Booster was recommended to help nurture the liver and clear the scar tissue in the brain which was caused by the stroke and may be affecting the patient's speech. Since the patient did not have significant musculoskeletal symptoms and was not bed ridden except some weakness in his leg, the Platinum and Hepavin were not recommended. An exercise program instead was recommended to help build muscle strength in his leg. Fish Oil and Antioxidant were recommended to absorb free radicals.

The patient took the four formulas at ½ dose and after 2.5 months, he can speak complete sentences and remember things better. There is something you can see in his eyes and he seems more alert and aware. Before, he was staring at the universe. The patient continued to see improvements and can carry on more sentences after 3 months of treatment. After 3.5 months, the patient's son commented that he is acting more like he used to. After 4 months, he is talking more and is no longer upset and withdrawn. However, the patient is still having difficulty to carry on a full conversation. Considering his age, the Xcel was recommended to enhance kidney function. Patient is still seeing further improvement.

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