



Stroke

July 26, 2020 · Volume and Issue: S(1) · Original Research

Samir Mustafa Smisim

Director of Training programs, Saudi Red Crescent Authority, Riyadh, Saudi Arabia

Article Citation: Samir Mustafa Smisim. Stroke. J Exp Stroke Transl Med. 2020 August. Online access at www.jestm.com

Correspondence should be sent to: Samir Mustafa Smisim, Email: samismi2@hotmail.com, Phone No: +966 503475409

ABSTRACT: Over the past decade there was one study which reported that the crude incidence rate for first-ever incidence of stroke in Saudi Arabia was 29.8/100,000/year. They also reported that ischemic strokes (69%) predominated and Sub-Arachnoid Hemorrhage (SAH) was extremely rare (1.4%). Stroke is a significant cerebrovascular ailment bringing about high mortality and tireless handicap in grown-ups over the world. Other than coronary illness and disease, stroke is the commonest reason for death in most industrialized nations. Overcomers of stroke are frequently left with serious mental and physical incapacities, which make a significant social and financial weight, positioning as the second most regular reason for death worldwide and a significant wellspring of horribleness. The Kingdom of Saudi Arabia (KSA) is the biggest nation in the Middle East involving around four-fifths of the Arabian Peninsula supporting a populace of in excess of 28 million. Stroke is turning into a quickly expanding issue and a significant reason for disease and passings in Saudi Arabia. Be that as it may, contrasted and the created nations, research with respect to the rate, pervasiveness and their socio-segment properties of stroke is as yet deficient because of absence of fitting examinations being directed in these predetermined regions. This audit plans to talk about the scope of the part of stroke in Saudi Arabia from the writing distributed.

Key Words: acute ischemic stroke; ischemic attack; stroke rehabilitation;

INTRODUCTION

Definition:

A stroke occurs when the blood supply to part of the brain is interrupted or reduced, preventing brain tissue from getting oxygen and nutrients. Brain cells begin to die in minutes. A stroke is a medical emergency, and prompt treatment is crucial. Early action can reduce brain damage and other complications.

Sings & Symptoms:

Signs and symptoms of stroke include:

- Trouble speaking and understanding what others are saying. Confusion, slur words or difficulty understanding speech.
- Paralysis or numbness of the face, arm or leg. May develop sudden numbness, weakness or paralysis in the face, arm or leg. This often affects just one side of the body. If one arm begins to fall, maybe have stroke. Also, one side of the mouth droop when try to smile.
- Problems seeing in one or both eyes. Suddenly have blurred or blackened vision in one or both eyes, or you may see double.
- Headache. A sudden, severe headache, which may be accompanied by vomiting, dizziness or altered consciousness, may indicate that you're having a stroke.
- Trouble walking. Stumble or lose balance. May also have sudden dizziness or a loss of coordination.

Seek immediate medical attention if any signs or symptoms of a stroke, even if they seem to come and go or they disappear completely. Think "FAST" and do the following:

- **Face.** Ask the person to smile. Does one side of the face droop?
- **Arms.** Ask the person to raise both arms. Does one arm drift downward? Or is one arm unable to rise?
- **Speech.** Ask the person to repeat a simple phrase. Is his or her speech slurred or strange?
- **Time.** If you observe any of these signs, call emergency medical help immediately.

Call emergency number right away. Don't wait to see if symptoms stop. Every minute counts. The longer a stroke goes untreated, the greater the potential for brain damage and disability.

Causes: There are two main causes of stroke:

1. a blocked artery (ischemic stroke)
2. leaking or bursting of a blood vessel (hemorrhagic stroke).
3. Some people may have only a temporary disruption of blood flow to the brain, known as a transient ischemic attack (TIA), that doesn't cause lasting symptoms.

Ischemic stroke:

Keep Image 1 Here from Article Folder

This is the most common type of stroke 87% . It happens when the brain's blood vessels become narrowed or blocked, causing severely reduced blood flow (ischemia). Blocked or narrowed blood vessels are caused by fatty deposits that build up in blood vessels or by blood clots or

other debris that travel through your bloodstream and lodge in the blood vessels in your brain.

Some initial research shows that COVID-19 infection may be a possible cause of ischemic stroke, but more study is needed.

Hemorrhagic stroke:

Hemorrhagic stroke occurs when a blood vessel in your brain leaks or ruptures¹³. Brain hemorrhages can result from many conditions that affect your blood vessels. Factors related to hemorrhagic stroke include:

- Uncontrolled high blood pressure
- Overtreatment with blood thinners (anticoagulants)
- Bulges at weak spots in your blood vessel walls (aneurysms)
- Trauma (such as a car accident)
- Protein deposits in blood vessel walls that lead to weakness in the vessel wall (cerebral amyloid angiopathy)
- Ischemic stroke leading to hemorrhage

A less common cause of bleeding in the brain is the rupture of an abnormal tangle of thin-walled blood vessels (arteriovenous malformation).

Transient ischemic attack (TIA)

A transient ischemic attack (TIA) — sometimes known as a ministroke — is a temporary period of symptoms similar to those you'd have in a stroke. A TIA doesn't cause permanent damage. They're caused by a temporary decrease in blood supply to part of your brain, which may last as little as five minutes.

Like an ischemic stroke, a TIA occurs when a clot or debris reduces or blocks blood flow to part of your nervous system.

Risk factors : Many factors can increase your stroke risk. Potentially treatable stroke risk factors include:

Lifestyle risk factors

- Being overweight or obese
- Physical inactivity
- Heavy or binge drinking
- Use of illegal drugs such as cocaine and methamphetamine

Medical risk factors

- High blood pressure
- Cigarette smoking or secondhand smoke exposure
- High cholesterol
- Diabetes
- Obstructive sleep apnea
- Cardiovascular disease, including heart failure, heart defects, heart infection or abnormal heart rhythm, such as atrial fibrillation
- Personal or family history of stroke, heart attack or transient ischemic attack
- COVID-19 infection

Other factors associated with a higher risk of stroke include:

- Age — People age 55 or older have a higher risk of stroke than do younger people.
- Race — African Americans have a higher risk of stroke than do people of other races.
- Sex — Men have a higher risk of stroke than women. Women are usually older when they have strokes, and they're more likely to die of strokes than are men.
- Hormones — Use of birth control pills or hormone therapies that include estrogen increases risk.

Complications

A stroke can sometimes cause temporary or permanent disabilities, depending on how long the brain lacks blood flow and which part was affected. Complications may include:

- Paralysis or loss of muscle movement. You may become paralyzed on one side of your body, or lose control of certain muscles, such as those on one side of your face or one arm.
- Difficulty talking or swallowing. A stroke might affect control of the muscles in your mouth and throat, making it difficult for you to talk clearly, swallow or eat. You also may have difficulty with language, including speaking or understanding speech, reading, or writing.
- Memory loss or thinking difficulties. Many people who have had strokes experience some memory loss. Others may have difficulty thinking, reasoning, making judgments and understanding concepts.
- Emotional problems. People who have had strokes may have more difficulty controlling their emotions, or they may develop depression.

- Pain. Pain, numbness or other unusual sensations may occur in the parts of the body affected by stroke. For example, if a stroke causes you to lose feeling in your left arm, you may develop an uncomfortable tingling sensation in that arm.
- Changes in behavior and self-care ability. People who have had strokes may become more withdrawn. They may need help with grooming and daily chores.

Prevention

Knowing your stroke risk factors, following your doctor's recommendations and adopting a healthy lifestyle are the best steps you can take to prevent a stroke. If you've had a stroke or a transient ischemic attack (TIA), these measures might help prevent another stroke. The follow-up care you receive in the hospital and afterward also may play a role.

Many stroke prevention strategies are the same as strategies to prevent heart disease. In general, healthy lifestyle recommendations include:

- Controlling high blood pressure (hypertension). This is one of the most important things you can do to reduce your stroke risk. If you've had a stroke, lowering your blood pressure can help prevent a subsequent TIA or stroke. Healthy lifestyle changes and medications are often used to treat high blood pressure.
- Lowering the amount of cholesterol and saturated fat in your diet. Eating less cholesterol and fat, especially saturated fat and trans fats, may reduce the buildup in your arteries. If you can't control your cholesterol through dietary changes alone, your doctor may prescribe a cholesterol-lowering medication.
- Quitting tobacco use. Smoking raises the risk of stroke for smokers and nonsmokers exposed to secondhand smoke. Quitting tobacco use reduces your risk of stroke.
- Managing diabetes. Diet, exercise and losing weight can help you keep your blood sugar in a healthy range. If lifestyle factors don't seem to be enough to control your diabetes, your doctor may prescribe diabetes medication.
- Maintaining a healthy weight. Being overweight contributes to other stroke risk factors, such as high blood pressure, cardiovascular disease and diabetes.
- Eating a diet rich in fruits and vegetables. A diet containing five or more daily servings of fruits or vegetables may reduce your risk of stroke. The Mediterranean diet, which emphasizes olive oil, fruit, nuts, vegetables and whole grains, may be helpful.
- Exercising regularly. Aerobic exercise reduces your risk of stroke in many ways. Exercise can lower your blood pressure, increase your levels of good cholesterol, and improve the overall health of your blood vessels and heart. It also helps you lose weight, control diabetes and reduce stress. Gradually work up to at least 30 minutes of moderate physical activity — such as walking, jogging, swimming or bicycling — on most, if not all, days of the week.
- Drinking alcohol in moderation, if at all. Heavy alcohol consumption increases your risk of high blood pressure, ischemic strokes and hemorrhagic strokes. Alcohol may also interact with other drugs you're taking. However, drinking small to moderate amounts of alcohol, such as one drink a day, may help prevent ischemic stroke and decrease your blood's clotting tendency. Talk to your doctor about what's appropriate for you.
- Treating obstructive sleep apnea (OSA). Your doctor may recommend a sleep study if you have symptoms of OSA — a sleep disorder that causes you to stop breathing for short periods repeatedly during sleep. Treatment for OSA includes a device that delivers positive airway pressure through a mask to keep your airway open while you sleep.
- Avoiding illegal drugs. Certain street drugs, such as cocaine and methamphetamine, are established risk factors for a TIA or a stroke.

Preventive medications

If the pt has had an ischemic stroke or TIA, the doctor may recommend medications to help reduce the risk of having another stroke. These include:

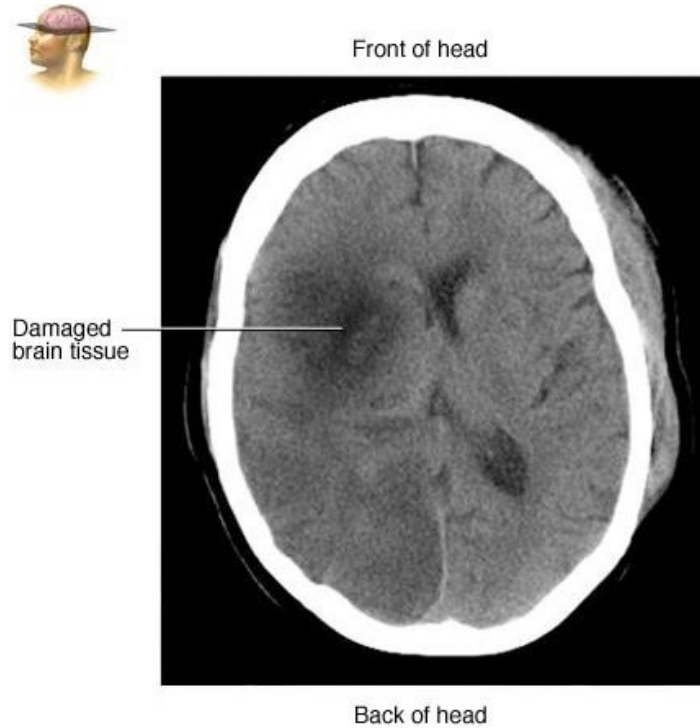
- Anti-platelet drugs. Anti-platelet drugs make these cells less sticky and less likely to clot. The most commonly used anti-platelet medication is aspirin.
- The doctor might also consider prescribing Aggrenox, a combination of low-dose aspirin and the anti-platelet drug dipyridamole to reduce the risk of blood clotting. After a TIA or minor stroke, doctor may give aspirin and an anti-platelet drug such as clopidogrel (Plavix) for a period of time to reduce the risk of another stroke. If pt can't take aspirin, doctor may prescribe clopidogrel alone.
- Anticoagulants. These drugs reduce blood clotting. Heparin is fast acting and may be used short-term in the hospital.

Slower-acting warfarin (Coumadin, Jantoven) may be used over a longer term. Warfarin is a powerful blood-thinning drug ,pt also need to have regular blood tests to monitor warfarin's effects.

Several newer blood-thinning medications (anticoagulants) are available for preventing strokes in people who have a high risk. These medications include dabigatran (Pradaxa), rivaroxaban (Xarelto), apixaban (Eliquis) and edoxaban (Savaysa). They're shorter acting than warfarin and usually don't require regular blood tests or monitoring by your doctor. These drugs are also associated with a lower risk of bleeding complications.

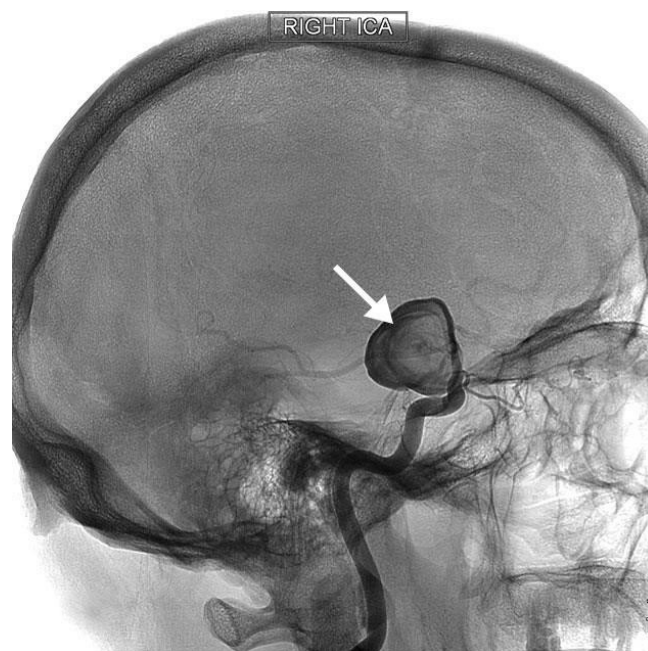
Diagnosis

The emergency team tries to determine what type of stroke . That means pt will have a CT scan or other imaging test soon after arrival. Doctors also need to rule out other possible causes of your symptoms, such as a brain tumor or a drug reaction.



© MAYO FOUNDATION FOR MEDICAL EDUCATION AND RESEARCH. ALL RIGHTS RESERVED.

CT scan of brain tissue damaged by stroke [Open pop-up dialog box](#)



Cerebral angiogram [Open pop-up dialog box](#)

Some of the tests you may have include:

- A physical exam. Doctor will do a number of tests you're, such as listening heart and checking blood pressure. Also have a neurological exam to see how a potential stroke is affecting nervous system.
- Blood tests. Several blood tests, including tests to check how fast blood clots, whether your blood sugar is too high or low, and whether you have an infection.
- Computerized tomography (CT) scan. A CT scan uses a series of X- rays to create a detailed image of your brain. A CT scan can show bleeding in the brain, an ischemic stroke, a tumor or other conditions. Doctors may inject a dye into your bloodstream to view your blood vessels in your neck and brain in greater detail (computerized tomography angiography).
- Magnetic resonance imaging (MRI). An MRI uses powerful radio waves and magnets to create a detailed view of your brain. An MRI can

detect brain tissue damaged by an ischemic stroke and brain hemorrhages. Your doctor may inject a dye into a blood vessel to view the arteries and veins and highlight blood flow (magnetic resonance angiography or magnetic resonance venography).

- Carotid ultrasound. In this test, sound waves create detailed images of the inside of the carotid arteries in your neck. This test shows buildup of fatty deposits (plaques) and blood flow in your carotid arteries.
- Cerebral angiogram. In this uncommonly used test, your doctor inserts a thin, flexible tube (catheter) through a small incision, usually in your groin, and guides it through your major arteries and into your carotid or vertebral artery. Then your doctor injects a dye into your blood vessels to make them visible under X-ray imaging. This procedure gives a detailed view of arteries in your brain and neck.
- Echocardiogram. An echocardiogram uses sound waves to create detailed images of your heart. An echocardiogram can find a source of clots in your heart that may have traveled from your heart to your brain and caused your stroke.

Treatment

Emergency treatment for stroke depends on whether you're having an ischemic stroke or a stroke that involves bleeding into the brain (hemorrhagic).

Ischemic stroke

To treat an ischemic stroke, doctors must quickly restore blood flow to your brain. This may be done with:

- Emergency IV medication. Therapy with drugs that can break up a clot has to be given within 4.5 hours from when symptoms first started if given intravenously. The sooner these drugs are given, the better. Quick treatment not only improves your chances of survival but also may reduce complications.

An IV injection of recombinant tissue plasminogen activator (tPA) — also called alteplase (Activase) — is the gold standard treatment for ischemic stroke. An injection of tPA is usually given through a vein in the arm with the first three hours. Sometimes, tPA can be given up to 4.5 hours after stroke symptoms started.

This drug restores blood flow by dissolving the blood clot causing your stroke. By quickly removing the cause of the stroke, it may help people recover more fully from a stroke. Your doctor will consider certain risks, such as potential bleeding in the brain, to determine if tPA is appropriate for you.

- Emergency endovascular procedures. Doctors sometimes treat ischemic strokes directly inside the blocked blood vessel. Endovascular therapy has been shown to significantly improve outcomes and reduce long-term disability after ischemic stroke. These procedures must be performed as soon as possible:
- Medications delivered directly to the brain. Doctors insert a long, thin tube (catheter) through an artery in your groin and thread it to your brain to deliver tPA directly where the stroke is happening. The time window for this treatment is somewhat longer than for injected tPA, but is still limited.
- Removing the clot with a stent retriever. Doctors can use a device attached to a catheter to directly remove the clot from the blocked blood vessel in your brain. This procedure is particularly beneficial for people with large clots that can't be completely dissolved with tPA. This procedure is often performed in combination with injected tPA.

The time window when these procedures can be considered has been expanding due to newer imaging technology. Doctors may order perfusion imaging tests (done with CT or MRI) to help determine how likely it is that someone can benefit from endovascular therapy.

Other procedures: To decrease your risk of having another stroke or transient ischemic attack, your doctor may recommend a procedure to open up an artery that's narrowed by plaque. Options vary depending on your situation, but include:

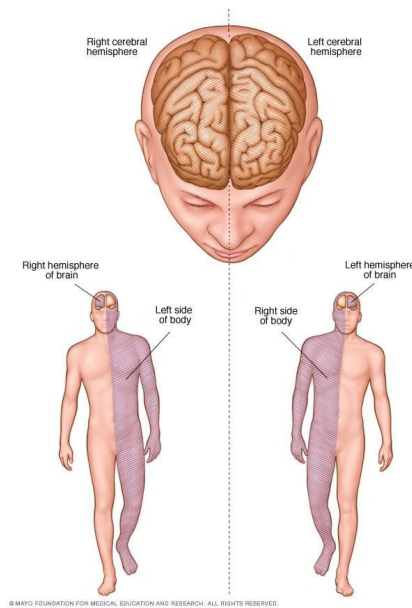
- Carotid endarterectomy. Carotid arteries are the blood vessels that run along each side of your neck, supplying your brain (carotid arteries) with blood. This surgery removes the plaque blocking a carotid artery, and may reduce your risk of ischemic stroke. A carotid endarterectomy also involves risks, especially for people with heart disease or other medical conditions.
- Angioplasty and stents. In an angioplasty, a surgeon threads a catheter to your carotid arteries through an artery in your groin. A balloon is then inflated to expand the narrowed artery. Then a stent can be inserted to support the opened artery.

Hemorrhagic stroke:

Emergency treatment of hemorrhagic stroke focuses on controlling the bleeding and reducing pressure in your brain caused by the excess fluid. Treatment options include:

- Emergency measures. If you take blood-thinning medications to prevent blood clots, you may be given drugs or transfusions of blood products to counteract the blood thinners' effects. You may also be given drugs to lower the pressure in your brain (intracranial pressure), lower your blood pressure, prevent spasms of your blood vessels and prevent seizures.
- Surgery. If the area of bleeding is large, your doctor may perform surgery to remove the blood and relieve pressure on your brain. Surgery may also be used to repair blood vessel problems associated with hemorrhagic strokes. Your doctor may recommend one of these procedures after a stroke or if an aneurysm, arteriovenous malformation (AVM) or other type of blood vessel problem caused your hemorrhagic stroke:
- Surgical clipping. A surgeon places a tiny clamp at the base of the aneurysm, to stop blood flow to it. This clamp can keep the aneurysm from bursting, or it can keep an aneurysm that has recently hemorrhaged from bleeding again.
- Coiling (endovascular embolization). Using a catheter inserted into an artery in your groin and guided to your brain, your surgeon will place tiny detachable coils into the aneurysm to fill it. This blocks blood flow into the aneurysm and causes blood to clot.
- Surgical AVM removal. Surgeons may remove a smaller AVM if it's located in an accessible area of your brain. This eliminates the risk of rupture and lowers the risk of hemorrhagic stroke. However, it's not always possible to remove an AVM if it's located deep within the brain, it's large, or its removal would cause too much of an impact on brain function.

Stroke recovery and rehabilitation



Brain hemisphere connections Open pop-up dialog box

After emergency treatment, patient should be closely monitored for at least a day. After that, stroke care focuses on helping recover as much function as possible and return to independent living. The impact of stroke depends on the area of the brain involved and the amount of tissue damaged.

If your stroke affected the right side of your brain, the movement and sensation on the left side of the body may be affected. If the stroke damaged the brain tissue on the left side of your brain, your movement and sensation on the right side of the body may be affected. Brain damage to the left side of the brain may cause speech and language disorders.

Rehabilitation may begin before patient leave the hospital. After discharge, might continue program in a rehabilitation unit of the same hospital, another rehabilitation unit or skilled nursing facility, as an outpatient, or at home.

Every person's stroke recovery is different. Depending on the condition, your treatment team may include:

- Doctor trained in brain conditions (neurologist)
- Rehabilitation doctor (physiatrist)
- Rehabilitation nurse
- Dietitian
- Physical therapist
- Occupational therapist
- Recreational therapist
- Speech pathologist
- Social worker or case manager
- Psychologist or psychiatrist
- Chaplain
- Speech therapy is often a part of stroke rehabilitation.

LITERATURE CITED:

Garcia JH, Wagner S, Liu KF, Hu XJ (1995) Neurological deficit and extent of neuronal necrosis attributable to middle cerebral artery occlusion in rats. Statistical validation. *Stroke* 26(4): 627-35

Hamm RJ, Pike BR, O'Dell DM, Lyeth BG, Jenkins LW (1994) The rotarod test: an evaluation of its effectiveness in assessing motor deficits following traumatic brain injury. *J Neurotrauma* 11(2): 187-96.

Kim YH, You SH, Ko MH, Park JW, Lee KH, et al. (2006) Repetitive transcranial magnetic stimulation-induced corticomotor excitability and associated motor skill acquisition in chronic stroke. *Stroke* 37(6): 1471-76.

Kole MH, Fuchs E, Ziemann U, Paulus W, Ebert U (1999) Changes in 5-HT1A and NMDA binding sites by a single rapid transcranial magnetic stimulation procedure in rats. *Brain Res* 826(2): 309-12.

Kwon SK, Ahn M, Song HJ, Kang SK, Jung SB, et al. (2015) Nafamostat mesilate attenuates transient focal ischemia/reperfusion-induced brain injury via the inhibition of endoplasmic reticulum stress. *Brain Res* 1627: 12-20.

- Lee SU, Kim DY, Park SH, Choi DH, Park HW, et al. (2009) Mild to moderate early exercise promotes recovery from cerebral ischemia in rats. *Can J Neurol Sci* 36(4): 443-49
- Loftus JP, Cavatorta D, Bushey JJ., Levine CB, Sevier CS, et al. (2014) The 5-lipoxygenase inhibitor tepoxalin induces oxidative damage and altered PTEN status prior to apoptosis in canine osteosarcoma cell lines. *Vet Comp Oncol.* 14(2): e17-30.
- Longa EZ, Weinstein PR, Carlson S, Cummins R (1989) Reversible middle cerebral artery occlusion without craniectomy in rats. *Stroke* 20(1): 84-91.
- Luft AR, Kaelin-Lang A, Hauser TK, Cohen LG, Thakor NV, et al. (2001) Transcranial magnetic stimulation in the rat. *Exp Brain Res* 140(1): 112-21.
- Maeda F, Keenan JP, Tormos JM, Topka H, Pascual-Leone A (2000) Interindividual variability of the modulatory effects of repetitive transcranial magnetic stimulation on cortical excitability. *Exp Brain Res* 133(4): 425-30.
- Martin PI, Naeser MA, Theoret H, Tormos JM, Nicholas M, et al. (2004) Transcranial magnetic stimulation as a complementary treatment for aphasia. *Semin Speech Lang* 25(2): 181-91.
- Mosteller M, Condreay LD, Harris EC, Ambery C, Beerah M, et al. (2014) Exploring the roles of UGT1A1 and UGT1A3 in oral clearance of GSK2190915, a 5-lipoxygenase-activating protein inhibitor. *Pharmacogenet Genomics* 24(12): 618-21.