

Casual Friday Series

# Spotting Stroke in a Natural Care Setting

A Biogenetix Clinical Presentation

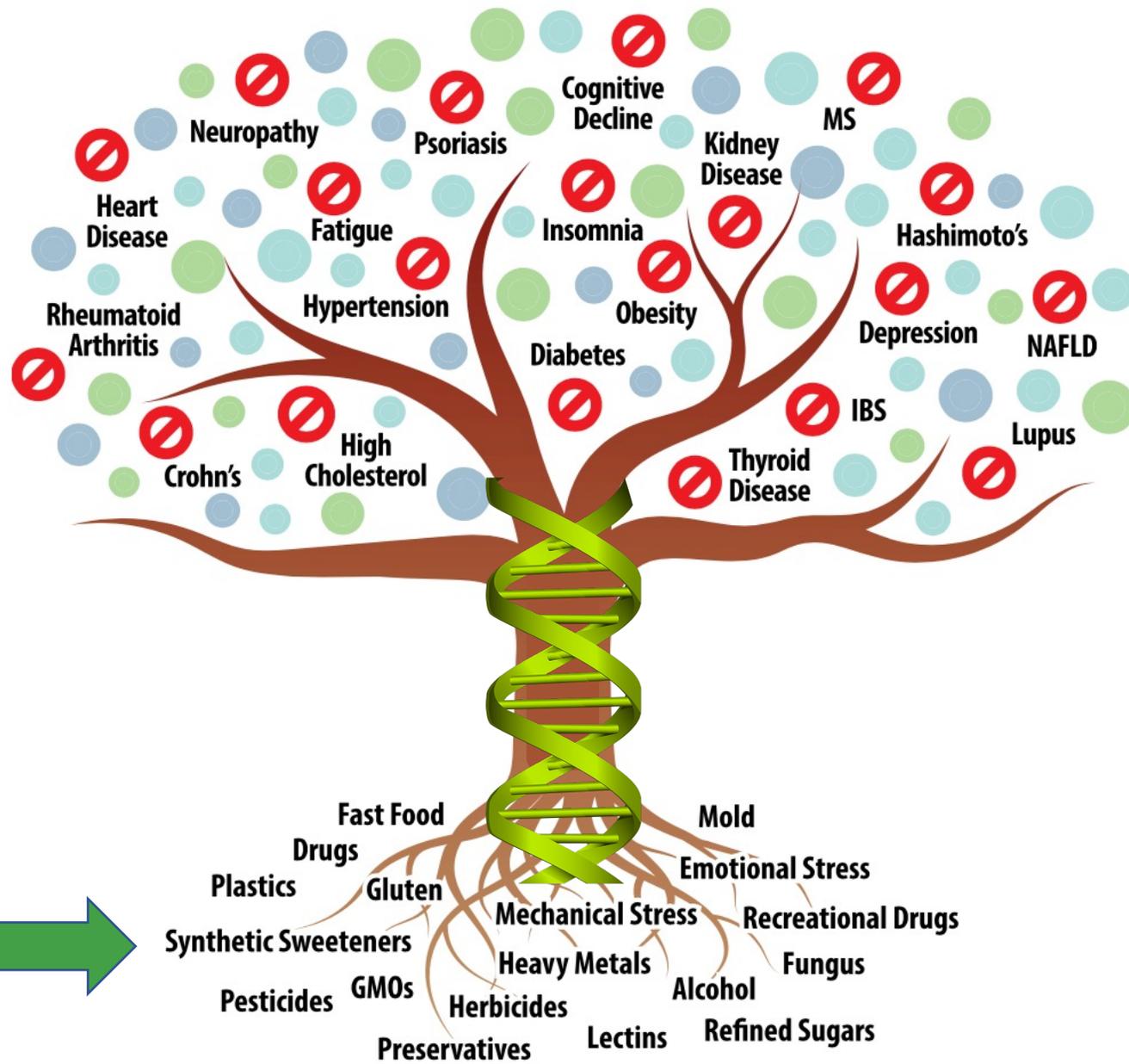
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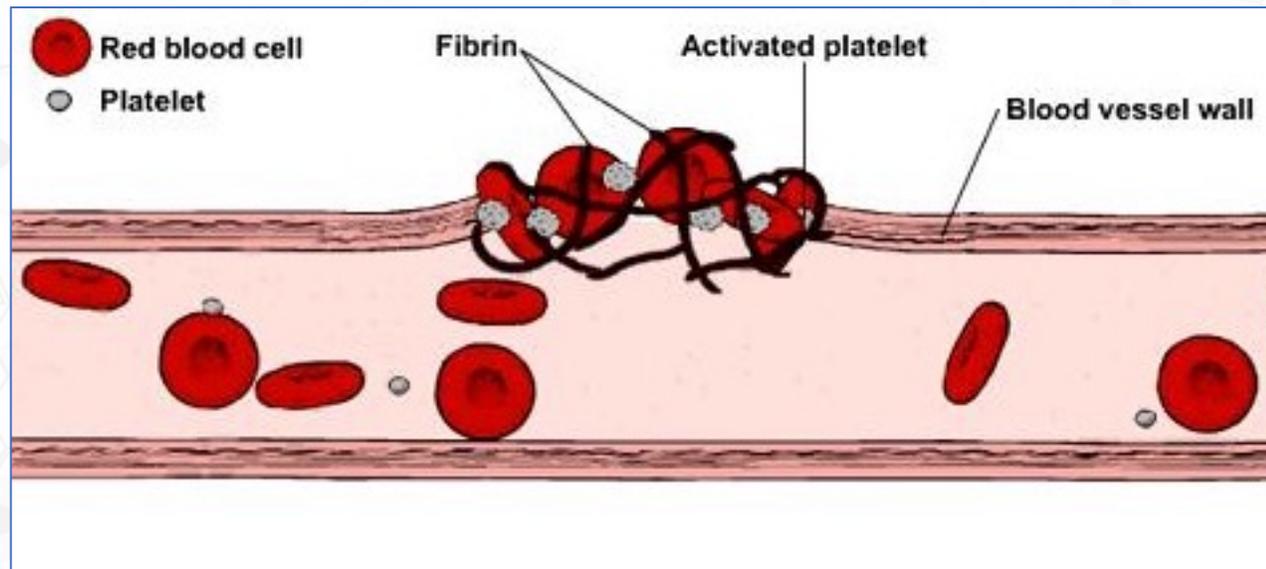


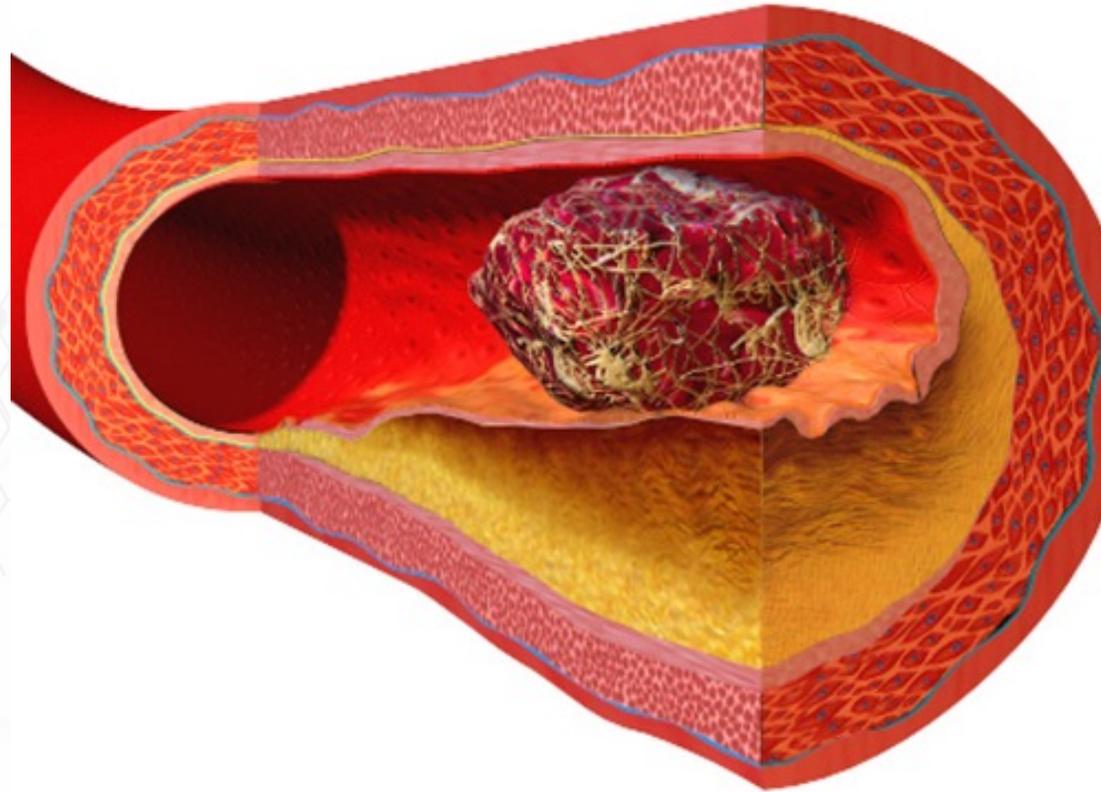
# Disclaimer

- *Information in this presentation is not intended, in itself, to diagnose, treat, reverse, cure, or prevent any disease. While this presentation is based on medical literature, findings, and text, The following statements have not been evaluated by the FDA.*
- *The information provided in this presentation is for your consideration only as a practicing health care provider. Ultimately you are responsible for exercising professional judgment in the care of your own patients.*









# Virchow's Triad

## Stasis

Abnormalities in blood flow such as: immobilization including lengthy bed rest or travel; obesity; pregnancy; paralysis; atrial fibrillation\*; tumors.

\* [www.ncbi.nlm.nih.gov/pubmed/2383498](http://www.ncbi.nlm.nih.gov/pubmed/2383498)

# Thrombosis

## Vessel Wall Injury

Injuries to vascular endothelium include: surgery and venipuncture; hypertension and atherosclerosis; chronic inflammation and infection; implants and medical devices.

## Hypercoagulability

Causes include: estrogens, birth control pills, pregnancy; post-operative, especially hip, knee, and urinary system procedures; cancer; inherited protein deficiencies.



## Pathophysiology and Treatment of Stroke: Present Status and Future Perspectives

[Diji Kuriakose](#) and [Zhicheng Xiao](#)\*

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Stroke is the second leading cause of death and a major contributor to disability worldwide. The prevalence of stroke is highest in developing countries, with ischemic stroke being the most common type.

Considerable progress has been made in our understanding of the pathophysiology of stroke and the underlying mechanisms leading to ischemic insult. Stroke therapy primarily focuses on restoring blood flow to the brain and treating stroke-induced neurological damage. Lack of success in recent clinical trials has led to significant refinement of animal models, focus-driven study design and use of new technologies in stroke research. Simultaneously, despite progress in stroke management, post-stroke care exerts a substantial impact on families, the healthcare system and the economy. Improvements in pre-clinical and clinical care are likely to underpin successful stroke treatment, recovery, rehabilitation and prevention. In this review, we focus on the pathophysiology of stroke, major advances in the identification of therapeutic targets and recent trends in stroke research.



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Stroke is a neurological disorder characterized by blockage of blood vessels. Clots form in the brain and interrupt blood flow, clogging arteries and causing blood vessels to break, leading to bleeding. Rupture of the arteries leading to the brain during stroke results in the sudden death of brain cells owing to a lack of oxygen. Stroke can also lead to depression and dementia.



## Pathophysiology and Treatment of Stroke: Present Status and Future Perspectives

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Stroke is the second leading cause of death globally. It affects roughly 13.7 million people and kills around 5.5 million annually. Approximately 87% of strokes are ischemic infarctions, a prevalence which increased substantially between 1990 and 2016, attributed to decreased mortality and improved clinical interventions. Primary (first-time) hemorrhages comprise the majority of strokes, with secondary (second-time) hemorrhages constituting an estimated 10–25% [2,3]. The incidence of stroke doubled in low-and-middle income countries over 1990–2016 but declined by 42% in high-income countries over the same period. According to the Global Burden of Disease Study (GBD), although the prevalence of stroke has decreased, the age of those affected, their sex and their geographic location mean that the socio-economic burden of stroke has increased over time [3].



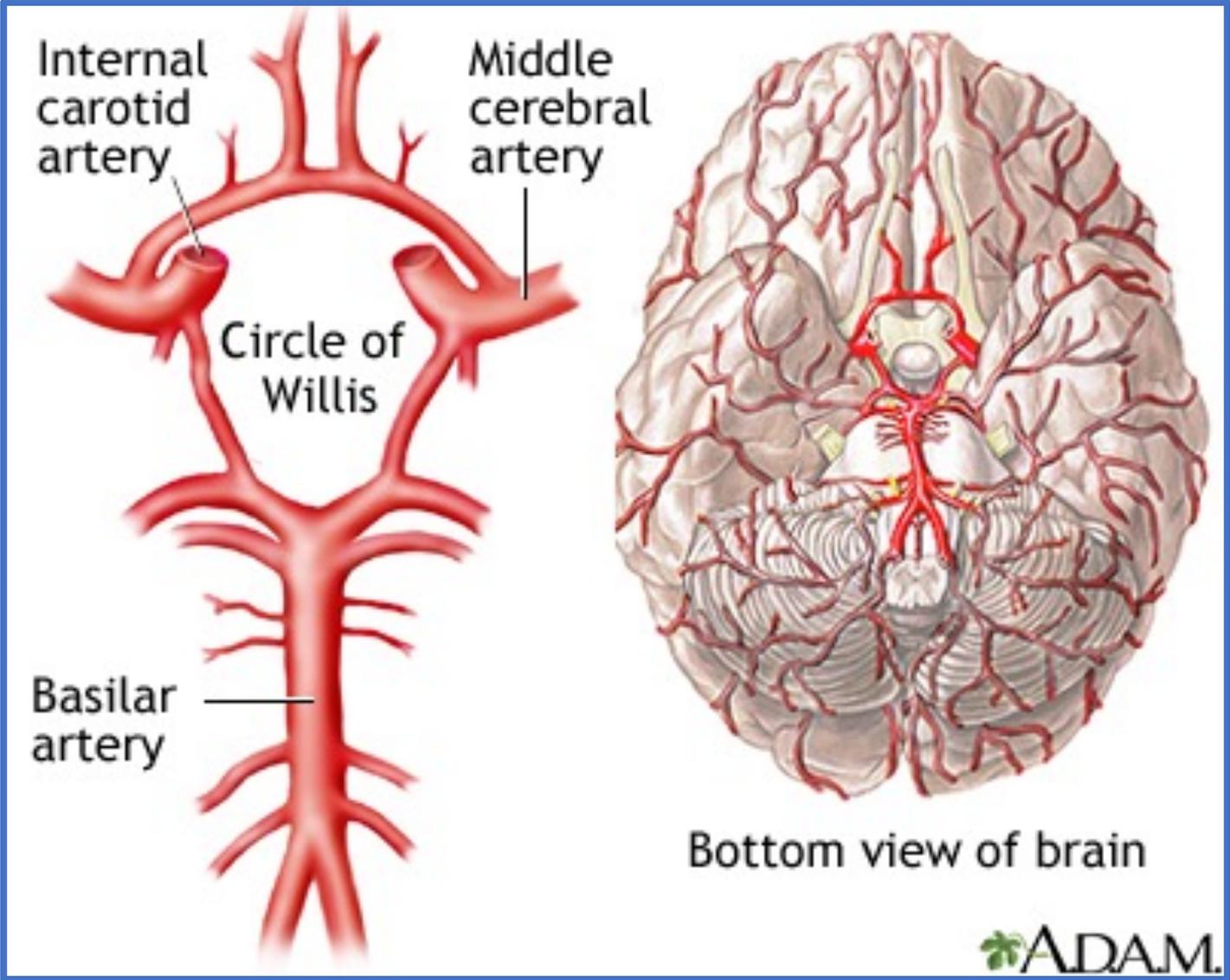
## Pathophysiology and Treatment of Stroke: Present Status and Future Perspectives

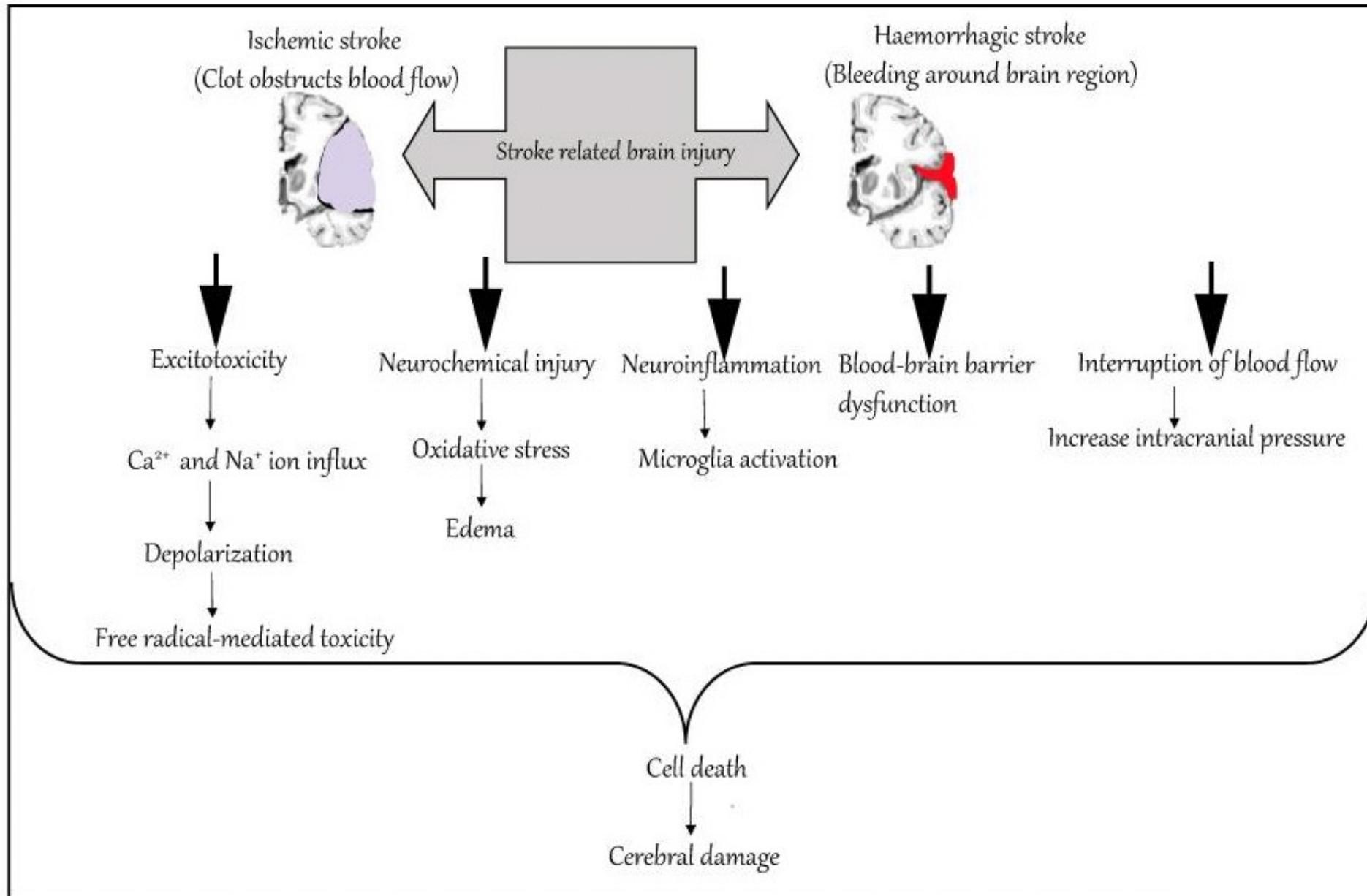
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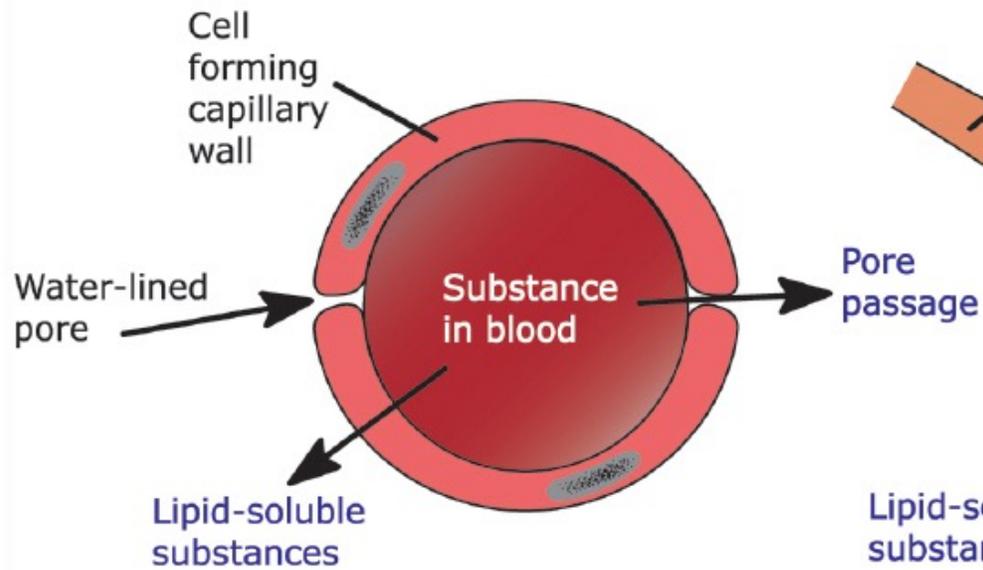
Stroke is defined as an abrupt neurological outburst caused by impaired perfusion through the blood vessels to the brain. It is important to understand the neurovascular anatomy to study the clinical manifestation of the stroke. The blood flow to the brain is managed by two internal carotids anteriorly and two vertebral arteries posteriorly (the circle of Willis). Ischemic stroke is caused by deficient blood and oxygen supply to the brain; hemorrhagic stroke is caused by bleeding or leaky blood vessels.



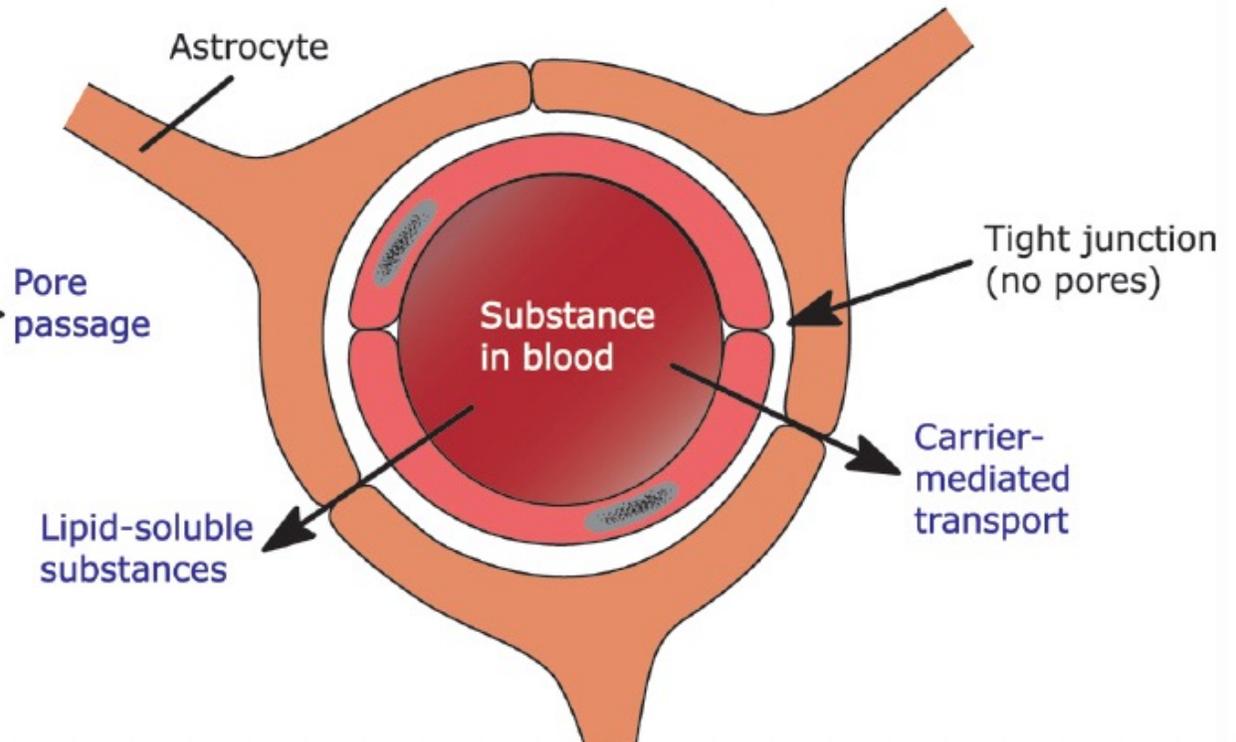




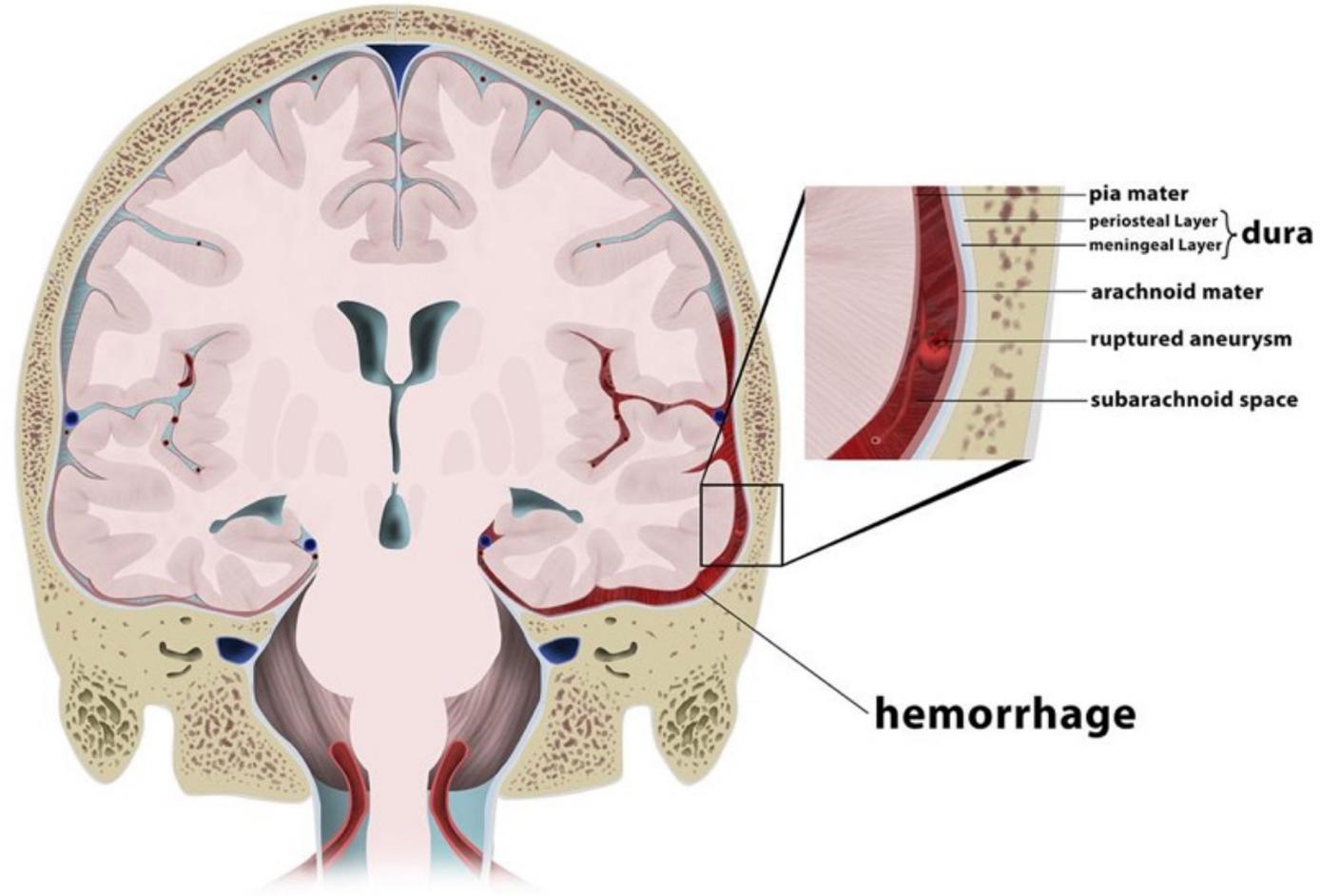
## Capillary (general)

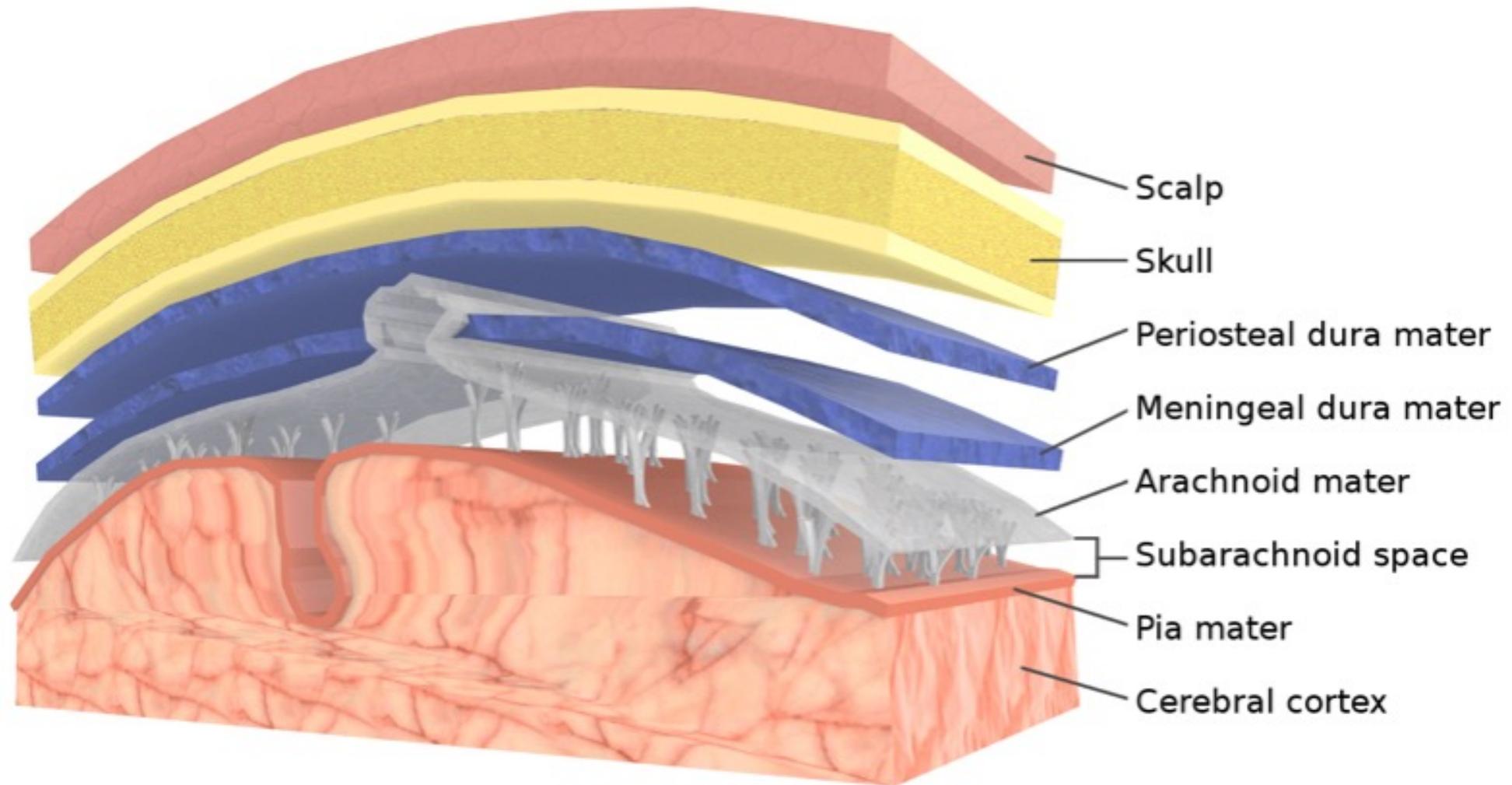


## Capillary (brain)



# Diagram Subarachnoid Hemorrhage





Scalp

Skull

Periosteal dura mater

Meningeal dura mater

Arachnoid mater

Subarachnoid space

Pia mater

Cerebral cortex



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Ischemic occlusions contribute to around 85% of casualties in stroke patients, with the remainder due to intracerebral bleeding. Ischemic occlusion generates thrombotic and embolic conditions in the brain [19]. In thrombosis, the blood flow is affected by narrowing of vessels due to atherosclerosis. The build-up of plaque will eventually constrict the vascular chamber and form clots, causing thrombotic stroke. In an embolic stroke, decreased blood flow to the brain region causes an embolism; the blood flow to the brain reduces, causing severe stress and untimely cell death (necrosis). Necrosis is followed by disruption of the plasma membrane, organelle swelling and leaking of cellular contents into extracellular space [20], and loss of neuronal function. Other key events contributing to stroke pathology are inflammation, energy failure,

Hemorrhagic stroke accounts for approximately 10–15% of all strokes and has a high mortality rate. In this condition, stress in the brain tissue and internal injury cause blood vessels to rupture. It produces toxic effects in the vascular system, resulting in infarction [26]. It is classified into intracerebral and subarachnoid hemorrhage. In ICH, blood vessels rupture and cause abnormal accumulation of blood within the brain. The main reasons for ICH are hypertension, disrupted vasculature, excessive use of anticoagulants and thrombolytic agents. In subarachnoid hemorrhage, blood accumulates in the subarachnoid space of the brain due to a head injury or cerebral aneurysm (Figure 1) [27,28].



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As noted earlier, the risk of stroke increases with age and doubles over the age of 55 years in both men and women. Risk is increased further when an individual has an existing medical condition like hypertension, coronary artery disease or hyperlipidemia. Nearly 60% of strokes are in patients with a history of transient ischemic attack (TIA). Some of the risk factors for stroke are modifiable, and some are non-modifiable ([Figure 2](#)).

Non-modifiable: Age, Sex, Race/ethnicity, TIA, Genetics

Modifiable: Hypertension, Smoking, Alcohol and drug abuse, Physical inactivity, Hyperlipidemia, Diet, Diabetes mellitus, Atrial fibrillation, GENETICS



# **BEFAST** to stop stroke in its tracks

If you think someone is having a stroke, BE FAST and do these simple tests:



**BALANCE**



**EYES**



**FACE**



**ARMS**

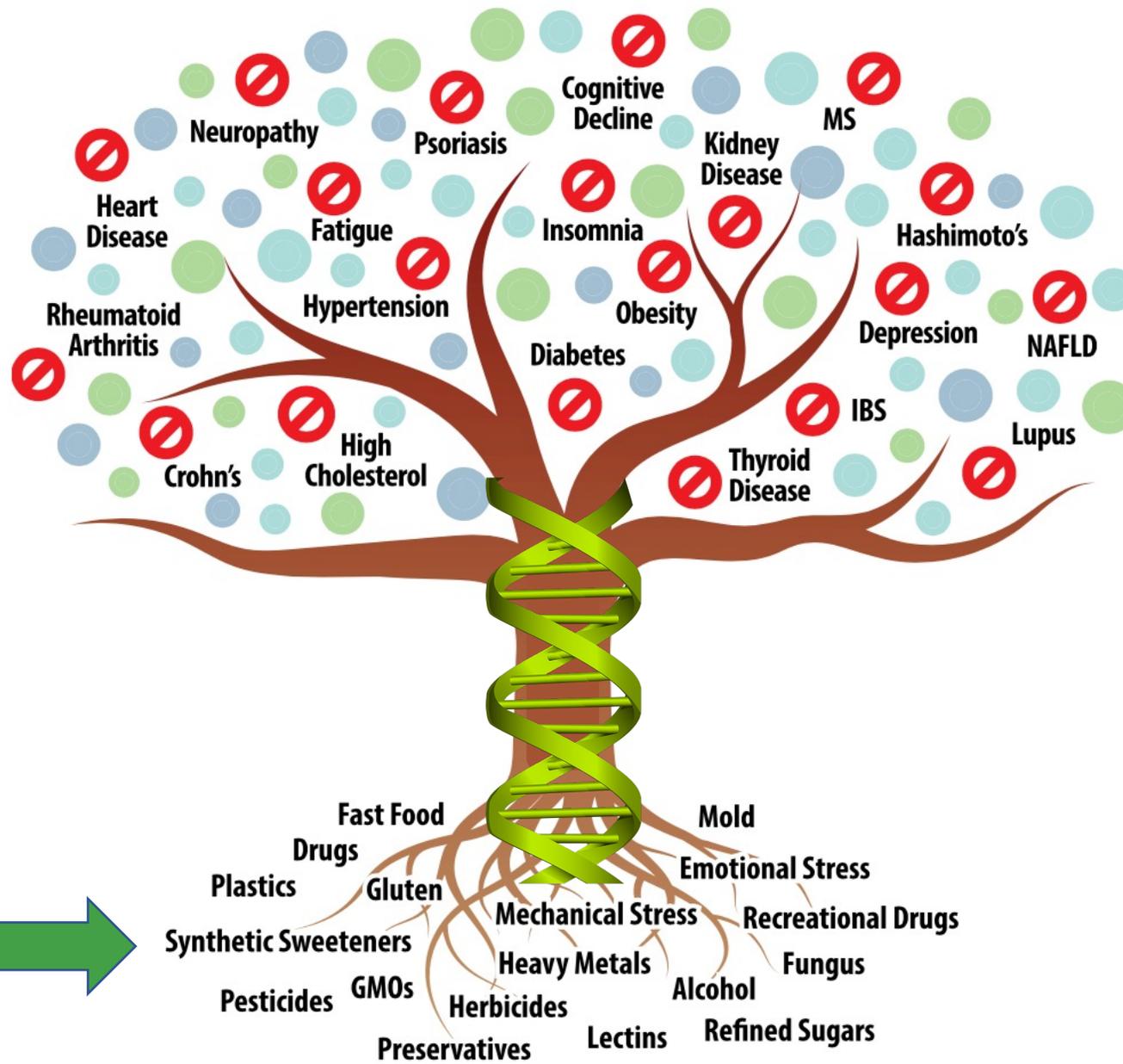


**SPEECH**

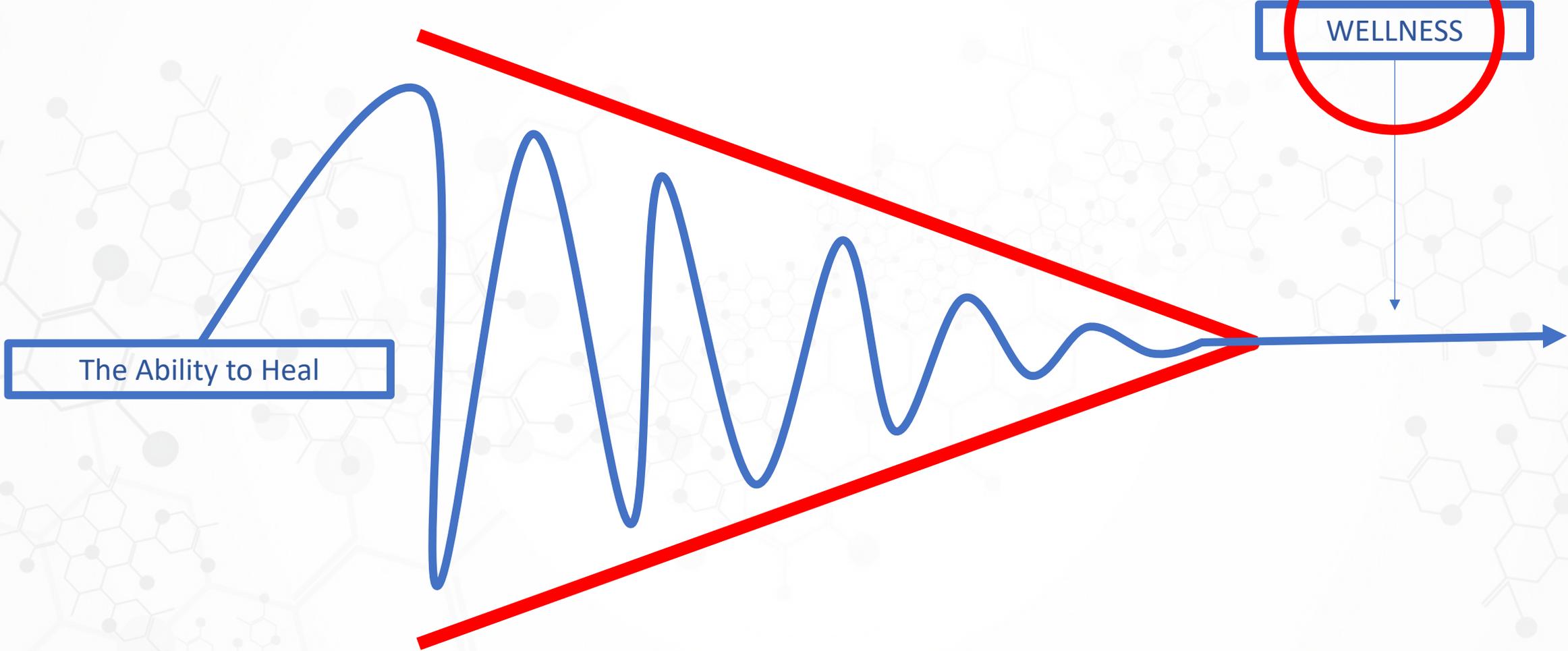


**TIME**





# The Wedge



# Biogenetix: 833-525-0001



[bruno@biogenetix.com](mailto:bruno@biogenetix.com)



[kim@biogenetix.com](mailto:kim@biogenetix.com)

