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INCREASED STROKE RISK IN PATIENTS WITH HYPERTENSION

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Abstract Arterial hypertension is one of the most common cardiovascular conditions worldwide and remains the leading modifiable risk factor for stroke. Prolonged high blood pressure causes both structural and functional changes in the brain's blood vessels, significantly raising the likelihood of a cerebrovascular event. According to the INTERSTROKE study, hypertension accounts for approximately 48% of the population-attributable risk of stroke globally. This article explores the pathophysiological link between hypertension and stroke, highlights key risk factors, and emphasizes the critical role of prevention strategies.

Keywords: stroke, hypertension, cardiovascular, prevention, brain,

Introduction Arterial hypertension is one of the most pressing challenges in modern medicine. Millions of people around the world live with this condition, and its complications — particularly stroke — continue to be a major cause of death and long-term disability. Epidemiological studies, including the large-scale INTERSTROKE project, show that hypertension is present in a vast majority of stroke cases and contributes to nearly half of all strokes worldwide. Even modest elevations in blood pressure can harm cerebral circulation and substantially increase stroke risk. Recent Global Burden of Disease analyses indicate that high systolic blood pressure is responsible for about 55–58% of stroke-related deaths and disability-adjusted life years (DALYs). Understanding this strong relationship is therefore essential for effective clinical practice and public health strategies.

Long-standing hypertension places continuous mechanical and hemodynamic stress on the cerebral blood vessels. Over time, the vessel walls thicken, lose their elasticity, and the lumen narrows. These changes impair blood supply to brain tissue. In addition, hypertension accelerates atherosclerosis, promoting plaque formation inside the arteries. These plaques can rupture or trigger thrombosis or embolism, paving the way for ischemic stroke.

Ischemic stroke is the most common type, accounting for roughly 80–85% of all strokes. Hypertension-driven atherosclerosis is a primary driver. When blood flow is disrupted, brain cells are deprived of oxygen and nutrients, leading to irreversible damage.

Hemorrhagic stroke, though less common (about 15–20% of cases), is often more severe and is even more closely linked to hypertension. Sudden spikes in blood pressure weaken vessel walls, leading to microaneurysms that can rupture and cause bleeding into the brain tissue. This raises intracranial pressure and causes extensive damage.

The underlying mechanisms are multifaceted. Hypertension induces endothelial dysfunction, heightened oxidative stress, chronic inflammation, and a pro-thrombotic state. These processes collectively impair cerebral perfusion and expose neurons to hypoxia.

Patients with hypertension face a markedly elevated stroke risk — often **2 to 4 times higher** than those with normal blood pressure, with some studies showing an odds ratio as high as 3–6 depending on age and duration. The risk rises progressively with blood pressure levels: for every

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10 mmHg increase in systolic blood pressure, overall stroke risk increases by approximately **20–30%**, while the risk of hemorrhagic stroke rises even more sharply (up to 31% per 10 mmHg in some analyses). Longer duration of hypertension further compounds the danger; individuals with hypertension for over 20 years have a 67% higher stroke risk compared to those without the condition.

This risk is amplified by co-existing factors such as smoking, diabetes, dyslipidemia, obesity, physical inactivity, and chronic psychological stress. In hypertensive patients, strokes tend to be more severe, with higher rates of recurrence and greater disability. Early identification and ongoing monitoring are therefore vital.

Prevention remains the most powerful tool. Effective blood pressure control can reduce stroke risk by 30–40% or more. First-line antihypertensive medications — including ACE inhibitors, angiotensin receptor blockers, beta-blockers, calcium channel blockers, and diuretics — are highly effective when used appropriately. Lifestyle changes are equally important: limiting salt intake to less than 5 g per day, following a heart-healthy diet, engaging in at least 150 minutes of moderate physical activity weekly, maintaining a healthy weight, and eliminating smoking and excessive alcohol use can dramatically lower the overall burden.

Conclusion Arterial hypertension is the single most important modifiable risk factor for stroke, contributing to nearly half (and in some recent estimates over 55%) of the global stroke burden. By achieving and maintaining good blood pressure control — ideally below 130/80 mmHg in most high-risk individuals — a large proportion of strokes can be prevented. Early detection, comprehensive treatment, and broad implementation of both pharmacological and lifestyle preventive measures should remain top priorities in modern medicine. With concerted effort, millions of strokes and related disabilities can be avoided worldwide.

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