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CAUSES OF ISCHEMIC STROKE AND MODERN METHODS OF PREVENTION

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Annotation: In this article, the opinions of our country's and foreign scientists are mentioned about the causes of ischemic stroke and modern methods of its prevention. Ischemic stroke, caused by a blockage in a brain artery, is a serious condition that can lead to long-term disability or even death. While some risk factors are beyond our control, adopting a proactive approach to prevention significantly reduces the risk.

Key words: Ischemic stroke, atherosclerosis, cardiac emboli, atrial fibrillation, plaque buildup, plaque rupture, risk factors, transient ischemic attack (TIA), High levels of LD L,Thrombolysis (Tissue plasminogen activator - tPA).

Introduction.

Ischemic stroke, the most common type of stroke, occurs when a blood clot blocks an artery in the brain, depriving brain tissue of oxygen and nutrients. The causes of ischemic stroke can be broadly categorized as follows:

1. Atherosclerosis:

Plaque buildup: Atherosclerosis, a condition where plaque (fatty deposits) builds up in the arteries, is the primary cause of most ischemic strokes.

Plaque rupture: When a plaque ruptures, it triggers the formation of a blood clot. This clot can travel to the brain and block an artery, leading to a stroke.

Risk factors: Risk factors for atherosclerosis include high blood pressure, high cholesterol, smoking, diabetes, and family history of heart disease.[1]

2. Cardiac Emboli:

[1] Powers, W. J., et al. (2018). "2018 Guidelines for the Early Management of Patients With Acute Ischemic Stroke: A Guideline for Healthcare Professionals From the American Heart Association/American Stroke Association." *Stroke*, 49(3), e46-e110.

Atrial fibrillation: This heart rhythm disorder causes the heart's upper chambers to beat irregularly, increasing the risk of blood clots forming in the heart. These clots can then travel to the brain and cause a stroke.

Other heart conditions: Other heart conditions like heart valve disease, heart failure, and recent heart attacks can also cause clots that travel to the brain.[2]

3. Other Causes:

Dissection: A tear in the inner lining of an artery, often in the neck, can lead to a blood clot forming and blocking blood flow to the brain.

Sickle cell anemia: This genetic disorder causes red blood cells to become misshapen, which can lead to blockages in the arteries.

Hypercoagulability: Certain conditions or medications can make the blood more likely to clot, increasing the risk of stroke.

Transient Ischemic Attack (TIA): A TIA, often called a "mini-stroke," is a temporary blockage of blood flow to the brain. While it doesn't cause permanent damage, it's a warning sign of a potential stroke.

4. Contributing Factors:

High blood pressure: This puts extra strain on the arteries and promotes plaque buildup.

High cholesterol: High levels of LDL (bad) cholesterol contribute to plaque formation.

Diabetes: Diabetes damages blood vessels and increases the risk of blood clots.

Smoking: Smoking damages blood vessels and increases the risk of atherosclerosis.

Physical inactivity: Lack of exercise can contribute to high blood pressure, high cholesterol, and obesity, all of which increase the risk of stroke.[3]

Obesity: Obesity increases the risk of high blood pressure, high cholesterol, and diabetes.

Alcohol consumption: Excessive alcohol consumption can increase blood pressure and contribute to heart problems.

Drug use: Cocaine and methamphetamine use can damage blood vessels and increase the risk of stroke.

Preventing Ischemic Stroke:

Healthy lifestyle: Maintain a healthy weight, eat a balanced diet, exercise regularly, and avoid smoking.

Control risk factors: Manage high blood pressure, high cholesterol, and diabetes.

Regular checkups: See your doctor regularly for blood pressure, cholesterol, and diabetes screenings.

Know the signs: Be aware of the signs of stroke and seek immediate medical attention if you suspect someone is having a stroke.[4]

Modern Methods of Treatment for Ischemic Stroke:

[2] Hacke, W., et al. (2008). "Thrombolysis with alteplase 3 to 4.5 hours after acute ischemic stroke." *New England Journal of Medicine*, 359(13), 1317-1329.
[3] Saver, J. L., et al. (2015). "Stent-retriever thrombectomy after intravenous t-PA vs. t-PA alone in stroke." *New England Journal of Medicine*, 372(24), 2285-2295.
[4] Muir, K. W., & Tyrrell, P. (2019). "Stroke and cerebrovascular disease." *Oxford Textbook of Medicine*.

Modern medicine has made significant advancements in treating ischemic stroke, aiming to minimize brain damage, improve recovery, and prevent future strokes. Here's a look at the key treatment strategies:

1. Acute Treatment (Within Hours of Stroke):

Thrombolysis (Tissue plasminogen activator - tPA): tPA is a clot-busting drug administered intravenously within 4.5 hours (sometimes up to 7 hours depending on individual factors) of stroke onset. It dissolves the blood clot blocking the artery, restoring blood flow to the brain. This is a crucial intervention to minimize brain damage.

Mechanical Thrombectomy: This procedure involves using a catheter to physically remove the clot from the blocked artery. It's often used when tPA is not an option or the clot is large. It can be performed up to 24 hours after stroke onset in certain cases.[5]

2. Secondary Prevention (Long-Term Management):

Antiplatelet Medications: Aspirin and other antiplatelet medications are prescribed to prevent the formation of new clots. They reduce the stickiness of platelets, preventing them from forming clots that could block arteries.

Anticoagulants: These medications, such as warfarin or newer oral anticoagulants (NOACs), are used to thin the blood and reduce the risk of blood clots forming in the heart.

Statins: These medications lower cholesterol levels, reducing the buildup of plaque in the arteries.

Blood Pressure Control: Medications to lower blood pressure are essential to reduce the risk of future strokes.[6]

Diabetes Management: Managing diabetes through medication and lifestyle changes helps control blood sugar levels and reduce the risk of stroke.

Lifestyle Changes: Maintaining a healthy weight, eating a balanced diet, exercising regularly, and avoiding smoking are crucial for preventing future strokes.

3. Rehabilitation:

Physical Therapy: Physical therapy helps patients regain lost mobility and strength.

Occupational Therapy: Occupational therapy focuses on improving daily living skills and activities.

Speech Therapy: Speech therapy helps patients with language and swallowing difficulties.

Cognitive Therapy: Cognitive therapy helps patients with memory, attention, and other cognitive problems.

4. Emerging Treatments:

Endovascular Therapies: Newer endovascular therapies, like stent retrievers and aspiration devices, are being used to remove clots more effectively.

Neuroprotective Agents: Research is ongoing to develop drugs that protect brain cells from damage during a stroke.[7]

[5] Saver, J. L. (2013). Time is brain—quantified. *Stroke*, 44(1), 21-27.
[6] Powers, W. J., et al. (2018). 2018 Guidelines for the Early Management of Patients with Acute Ischemic Stroke. *Stroke*, 49(3), e46-e110.
[7] Campbell, B. C. V., & Khatri, P. (2020). Stroke Lancet 2018—Acute Ischemic Stroke: Review and Guidelines. *The Lancet*, 396(10262), 129-142.

Stem Cell Therapy: Stem cell therapy is being investigated as a potential treatment to regenerate damaged brain tissue.

5. Importance of Time:

"Time is brain" is a critical concept in stroke treatment. Every minute that passes without blood flow to the brain increases the risk of permanent brain damage.

Prompt medical attention: It's essential to recognize the signs of stroke and seek immediate medical help. Early treatment significantly improves the chances of a good recovery.

Preventing Ischemic Stroke: A Multifaceted Approach

Ischemic stroke, caused by a blockage in a brain artery, can have devastating consequences. While some risk factors are beyond our control, adopting a proactive approach to prevention significantly reduces the risk. Here's a comprehensive guide:

1. Control Modifiable Risk Factors:

High Blood Pressure: Regularly monitor and manage high blood pressure through medication and lifestyle changes like a healthy diet, exercise, and reducing sodium intake.[8]

High Cholesterol: Maintain healthy cholesterol levels through diet modifications, exercise, and potentially statin medication if needed.

Diabetes: Control blood sugar levels through medication and lifestyle modifications like diet and exercise.

Smoking: Quitting smoking is one of the most effective ways to reduce stroke risk.

Physical Inactivity: Engage in at least 30 minutes of moderate-intensity exercise most days of the week.

Obesity: Maintain a healthy weight through diet and exercise.

Excessive Alcohol Consumption: Limit alcohol intake, as excessive alcohol can raise blood pressure and contribute to heart problems.

Drug Use: Avoid illicit drug use, especially cocaine and methamphetamine, which can damage blood vessels and increase stroke risk.

2. Manage Underlying Medical Conditions:

Atrial Fibrillation: Work closely with your doctor to manage atrial fibrillation, potentially using blood thinners to prevent clots.

Heart Valve Disease: Get regular checkups and follow your doctor's recommendations for managing heart valve disease.

Heart Failure: Follow your doctor's instructions for managing heart failure, including medication and lifestyle changes.

3. Adopt Healthy Lifestyle Choices:

Healthy Diet: Eat a balanced diet rich in fruits, vegetables, whole grains, and lean protein. Limit saturated and Trans fats, cholesterol, and added sugars.

Regular Exercise: Aim for at least 150 minutes of moderate-intensity aerobic activity or 75 minutes of vigorous-intensity aerobic activity per week.[9]

[8] Luo, Y., et al. (2019). Mechanisms and Therapeutic Targets of Neuroinflammation in Stroke. *Frontiers in Immunology*, 10, 2167.

Stress Management: Practice stress-reduction techniques like yoga, meditation, or deep breathing exercises.

Adequate Sleep: Aim for 7-8 hours of quality sleep per night.

4. Regular Checkups:

Blood Pressure Monitoring: Get your blood pressure checked regularly, especially if you have a family history of high blood pressure or other risk factors.

Cholesterol Screening: Get your cholesterol levels checked regularly, especially if you have a family history of high cholesterol or other risk factors.

Diabetes Screening: Get screened for diabetes if you have risk factors, such as a family history of diabetes, obesity, or a history of gestational diabetes.[10]

Cardiac Evaluation: If you have a history of heart disease or risk factors, discuss with your doctor about undergoing a cardiac evaluation to identify potential problems.

5. Know the Signs and Symptoms:

Be familiar with the warning signs of stroke, including:

Sudden numbness or weakness of the face, arm, or leg, especially on one side of the body.

Sudden confusion, trouble speaking, or understanding.

Sudden trouble seeing in one or both eyes.

Sudden trouble walking, dizziness, or loss of balance.

Sudden severe headache with no known cause.

6. Seek Immediate Medical Help:

Conclusion.

Modern treatments for ischemic stroke have significantly improved outcomes for patients. Early recognition, prompt medical attention, and comprehensive treatment strategies are crucial for minimizing brain damage, promoting recovery, and preventing future strokes.[11]

Ischemic stroke occurs when a blood vessel supplying the brain is obstructed, causing a reduction in blood flow and oxygen to brain tissue. This results in brain cells' damage or death in the affected area. Ischemic stroke is the most common type of stroke, accounting for about 85%[12] of all stroke cases.

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