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Patient information: Transient ischemic attack (Beyond the Basics)

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Disclosures

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TRANSIENT ISCHEMIC ATTACK OVERVIEW — Transient ischemic attack, or TIA, is the medical term for neurologic symptoms, such as weakness or numbness, which begin suddenly, resolve rapidly and completely, and are caused by a temporary lack of blood in an area of the brain. TIAs are common, affecting at least 240,000 people each year in the United States.

Some people call TIAs "warning spells" because anyone who has a TIA is at risk for a stroke. As a result, it is important to be aware of the signs and symptoms of TIA and seek treatment as soon as possible.

This topic discusses the symptoms, diagnosis, and treatment of transient ischemic attacks. Topics that discuss strokes are available separately. (See "[Patient information: Stroke symptoms and diagnosis \(Beyond the Basics\)](#)" and "[Patient information: Hemorrhagic stroke treatment \(Beyond the Basics\)](#)" and "[Patient information: Ischemic stroke treatment \(Beyond the Basics\)](#)".)

WHAT IS A TRANSIENT ISCHEMIC ATTACK? — A transient ischemic attack (TIA) is an episode in which a person has signs or symptoms of a stroke (eg, numbness; inability to speak) that last for a short time. Symptoms of a TIA usually last between a few minutes and a few hours. A person may have one or many TIAs. People recover completely from the symptoms of a TIA.

A TIA is a warning sign that a person may be at high risk for a stroke; immediate treatment can decrease or eliminate this risk. It is important to get help right away if you think you may be having a TIA or a stroke. (See '[When to call for emergency medical assistance](#)' below.)

Most TIAs result from narrowing of the major arteries to the brain, such as the carotid arteries. These blood vessels provide oxygenated blood to brain cells. These arteries can become clogged with fatty deposits, called plaques. Plaques partially block the artery, and can lead to the formation of a blood clot. This blood clot (thrombus) can further or completely block the artery. More frequently, a blood clot will detach from the wall of the artery, travel along the bloodstream to smaller branches, and block blood flow to the area of brain fed by that artery.

In some cases, TIAs can be caused by blood clots that form in the heart and travel to the brain (called emboli). TIAs can also occur as a result of narrowing and closure of small blood vessels deep inside the brain.

If an artery remains blocked for more than a few minutes, the brain can become damaged or infarcted (that is, the tissue in that area dies).

- With a TIA, the symptoms resolve completely (usually within a few hours or less)
- With a stroke, the symptoms may not resolve completely

Many people do not have a TIA before a stroke. However, a TIA is a warning sign that a person is at risk for a stroke. It is important to recognize and treat the symptoms of TIA to reduce the risk of having a stroke.

Transient ischemic attack symptoms — Symptoms of TIA are typically short-lived, lasting only a few minutes to hours. A TIA may occur only once, or may be recurrent (several times per day or once per year).

The most common symptoms of TIA include the following:

- Hand, face, arm, or leg weakness or numbness
- Difficulty speaking (garbled speech), slurred speech, or inability to speak at all
- Blurred, doubled, or decreased vision in one or both eyes

These symptoms are identical to those of a stroke. When the symptoms first develop, it is not easy to tell if a person is having a stroke or TIA.

TRANSIENT ISCHEMIC ATTACK RISK FACTORS — A number of factors can increase a person's risk of TIA, including the following:

- Age greater than 40 years
- Heart disease (eg, atrial fibrillation, carotid stenosis)
- High blood pressure
- Smoking
- Diabetes
- High blood cholesterol levels
- Illegal drug use or heavy alcohol use
- Recent childbirth
- Previous history of transient ischemic attack
- Sedentary lifestyle and lack of exercise
- Obesity
- Current or past history of blood clots

Risk of stroke after TIA — The risk of stroke after a TIA is highest in the first few days to weeks after the TIA. For example, the risk of having a stroke in the first two days after TIA has been estimated to be 4 to 10 percent. People with certain characteristics are thought to have a higher risk (eg, closer to 10 percent) of stroke compared to people without these characteristics.

- Diabetes
- Older than 60 years
- Blood pressure (higher than 140/90), measured after the TIA
- Weakness on one side of the body (eg, face, arm, leg) during the TIA
- Speech problems during the TIA
- TIA symptoms for 60 minutes or longer

TRANSIENT ISCHEMIC ATTACK DIAGNOSIS — Despite the fact that the symptoms of TIA usually resolve quickly, TIA is a medical emergency that should be evaluated as soon as possible because there is a high risk of a stroke after TIA.

When to call for emergency medical assistance — Anyone who is concerned that they are having a TIA should call for emergency medical attention immediately. Emergency medical services are available in most areas of the United States by calling 911.

Emergency medical services (EMS) personnel will respond as rapidly as possible, and will take the person to a

hospital equipped to care for people during and after a TIA. Most clinics and medical offices do not have the ability to diagnose and treat people with a TIA. For these people, every minute is important.

Anyone who may be having a TIA should **not** drive to the hospital and should not ask someone else to drive, but should call 911. In addition, it is not necessary to call a doctor or nurse to ask for advice because precious time will be lost waiting for a return call. Getting to the Emergency Department quickly is the best option. Calling 911 is safer than driving for two reasons:

- From the moment EMS personnel arrive, they can begin evaluating and treating the patient. If the patient drives to the hospital, treatment cannot begin until after arriving in the emergency department.
- If a dangerous complication of a TIA occurs on the way to the hospital, EMS personnel may be able to treat the problem immediately.

Brain imaging — Depending upon the results of the history and physical examination, the clinician will usually order blood tests and a brain imaging test (eg, CT scan or MRI). The imaging test allows the clinician to see the area of the brain affected by the TIA.

Blood vessel imaging — The larger blood vessels that supply the brain can also be imaged using CT or MRI; these scans are referred to as CTA (computed tomography arteriogram) and MRA (magnetic resonance arteriogram). Ultrasound can be used to determine if there are blockages in blood vessels.

Occasionally, a catheter must be inserted through a blood vessel in the groin and threaded up to the blood vessels of the neck, where dye is injected to highlight any areas of blockage. This is called conventional arteriography.

Heart testing — Because a large number of people with TIA also have coronary artery disease, there is a risk of ischemia (lack of blood flow) in the heart during the TIA. In some cases, the person is not able to tell the clinician that he or she feels chest pain. An electrocardiogram (ECG) is usually performed to help the clinician diagnose and treat heart problems as quickly as possible.

In some people with TIA, the heart or the aorta can be the source of a TIA-causing blood clot. Other heart testing, such as an echocardiogram, may be needed. This test uses sound waves to examine the heart and the aorta (the large vessel that arises directly from the heart; blood vessels that supply blood to the brain originate in the aorta).

Heart monitors (also called Holter or loop monitors) may be used to monitor the heart's rhythm for an extended period of time to detect paroxysmal (intermittent) atrial fibrillation. (See "[Patient information: Atrial fibrillation \(Beyond the Basics\)](#)".)

TRANSIENT ISCHEMIC ATTACK TREATMENT — The optimal treatment of a TIA depends upon the presumed cause of the TIA, the time since the first TIA symptoms occurred, and the person's underlying medical problems.

The goal of treatment is to reduce the risk of having a stroke. There are several types of treatment:

- Treating risk factors, such as high blood pressure
- Antiplatelet therapy
- Anticoagulant therapy
- Revascularization

Treating risk factors — Anyone who has had a TIA has an increased risk of having a TIA or stroke in the future, especially within the first 48 hours after the TIA. The treatments discussed above can significantly reduce this risk. In addition, lifestyle changes and careful management of underlying medical problems can help to reduce the risk of future strokes. These include the following:

- Treatment of high blood pressure (see "[Patient information: High blood pressure treatment in adults \(Beyond the Basics\)](#)")

- Controlling diabetes (see "[Patient information: Diabetes mellitus type 1: Overview \(Beyond the Basics\)](#)" and "[Patient information: Diabetes mellitus type 2: Overview \(Beyond the Basics\)](#)")
- Stopping smoking (see "[Patient information: Quitting smoking \(Beyond the Basics\)](#)")
- Treating high cholesterol and lipids (see "[Patient information: High cholesterol and lipids \(hyperlipidemia\) \(Beyond the Basics\)](#)")

Antiplatelet therapy — Platelets are a type of cell circulating in the blood that normally clump together to stop bleeding. In TIA, platelets clump together and form clots inside narrowed arteries. The platelets "plug" themselves and/or the clot that forms around the plug can temporarily block blood flow in the brain. Antiplatelet therapy is given to help prevent new clots from developing.

Current guidelines from the American Heart Association/American Stroke Association and the American College of Chest Physicians recommend that most patients with a TIA and no contraindication receive an antiplatelet agent to reduce the risk of subsequent stroke [1,2]. These guidelines note that [aspirin](#), [clopidogrel](#), and the combination of aspirin plus extended-release [dipyridamole](#) (Aggrenox) are all acceptable options for treatment. An exception is that patients who have a TIA caused by embolism from the heart due to an irregular heart rhythm (atrial fibrillation) should be treated with anticoagulation. (See '[Anticoagulant therapy](#)' below.)

Dipyridamole and aspirin — [Dipyridamole](#) is a medication that may be given after a TIA to reduce the risk of stroke. It is often given in an extended-release form, which combines dipyridamole with [aspirin](#) (called Aggrenox®, which contains 200 mg dipyridamole (ER-DP) and 25 mg aspirin). It is taken two times per day.

Side effects of [dipyridamole](#) include headache, upset stomach, and/or diarrhea. Headaches usually improve over the first week.

Aspirin — [Aspirin](#) can help to reduce the risk of a future stroke by approximately 25 percent [3]. The recommended dose of aspirin is between 50 and 325 mg per day. Higher doses of aspirin have no additional benefit but do increase the risk of gastrointestinal bleeding.

In the United States, one advantage of [aspirin](#) compared to other antiplatelet medications is cost; a one-month supply of aspirin costs approximately \$3 compared to at least \$160 per month for combined [dipyridamole](#) and aspirin and at least \$135 per month for [clopidogrel](#).

Clopidogrel — [Clopidogrel](#) (Plavix®) is an antiplatelet medication that is also used in patients after TIA to reduce the risk of stroke.

Compared to [aspirin](#), [clopidogrel](#) causes a slightly higher frequency of rash and diarrhea, but a slightly lower frequency of stomach upset or gastrointestinal bleeding.

[Clopidogrel](#) is not usually recommended in combination with [aspirin](#) because the combination is no more effective at preventing another stroke than clopidogrel alone.

Anticoagulant therapy — Anticoagulants are often, but incorrectly, referred to as blood thinners. They work by decreasing the formation of blood clots. Anticoagulant therapy is usually recommended for selected people with an irregular heart rhythm (atrial fibrillation) who have had a TIA or are at risk for a TIA or stroke. The oldest and the most commonly used anticoagulant in this situation is [warfarin](#). Newer anticoagulants are now available that appear to have more a more favorable side effect profile (ie, fewer excessive bleeding events) compared with warfarin.

Warfarin (Coumadin®) — [Warfarin](#) is a pill that is taken by mouth. People who take warfarin must be closely monitored with blood tests to ensure that the correct dose is used and that the risk of excessive bleeding or developing blood clots is minimized. (See "[Patient information: Warfarin \(Coumadin\) \(Beyond the Basics\)](#)".)

Revascularization — Revascularization is the medical term for reestablishing blood flow to an area. In people who have had a TIA, revascularization usually refers to a surgical procedure (carotid endarterectomy) that opens a blocked

artery in the neck (the carotid artery), which improves blood flow to the brain and reduces the risk of stroke. The amount of blockage in the carotid artery can be measured with a non-invasive test, such as ultrasound, CT, or MRI (see ['Blood vessel imaging'](#) above).

Carotid endarterectomy is most successful when it is performed by a vascular surgeon who has specialized training and experience with the procedure. However, even in experienced hands, the procedure has risks, including bleeding, brain injury, stroke, and even death.

Some people are likely to benefit from carotid endarterectomy. For others, the risks of the procedure are greater than the potential benefits. Placement of a stent in the carotid artery is an alternative if carotid endarterectomy is not an option or if the person prefers not to have surgery.

WHERE TO GET MORE INFORMATION — Your healthcare provider is the best source of information for questions and concerns related to your medical problem.

This article will be updated as needed on our web site (www.uptodate.com/patients). Related topics for patients, as well as selected articles written for healthcare professionals, are also available. Some of the most relevant are listed below.

Patient level information — UpToDate offers two types of patient education materials.

The Basics — The Basics patient education pieces answer the four or five key questions a patient might have about a given condition. These articles are best for patients who want a general overview and who prefer short, easy-to-read materials.

[Patient information: Stroke \(The Basics\)](#)

[Patient information: Transient ischemic attack \(The Basics\)](#)

[Patient information: Mitral valve prolapse \(The Basics\)](#)

Beyond the Basics — Beyond the Basics patient education pieces are longer, more sophisticated, and more detailed. These articles are best for patients who want in-depth information and are comfortable with some medical jargon.

[Patient information: Stroke symptoms and diagnosis \(Beyond the Basics\)](#)

[Patient information: Hemorrhagic stroke treatment \(Beyond the Basics\)](#)

[Patient information: Ischemic stroke treatment \(Beyond the Basics\)](#)

[Patient information: Atrial fibrillation \(Beyond the Basics\)](#)

[Patient information: High blood pressure treatment in adults \(Beyond the Basics\)](#)

[Patient information: Diabetes mellitus type 1: Overview \(Beyond the Basics\)](#)

[Patient information: Diabetes mellitus type 2: Overview \(Beyond the Basics\)](#)

[Patient information: Quitting smoking \(Beyond the Basics\)](#)

[Patient information: High cholesterol and lipids \(hyperlipidemia\) \(Beyond the Basics\)](#)

[Patient information: Warfarin \(Coumadin\) \(Beyond the Basics\)](#)

Professional level information — Professional level articles are designed to keep doctors and other health professionals up-to-date on the latest medical findings. These articles are thorough, long, and complex, and they contain multiple references to the research on which they are based. Professional level articles are best for people who are comfortable with a lot of medical terminology and who want to read the same materials their doctors are reading.

[Antihypertensive therapy to prevent recurrent stroke or transient ischemic attack](#)

[Antiplatelet therapy for secondary prevention of stroke](#)

[Definition of transient ischemic attack](#)

[Differential diagnosis of transient ischemic attack and stroke](#)

[Etiology and clinical manifestations of transient ischemic attack](#)

[Initial evaluation and management of transient ischemic attack and minor stroke](#)

[Management of asymptomatic carotid atherosclerotic disease](#)

[Management of symptomatic carotid atherosclerotic disease](#)

[Overview of the evaluation of stroke](#)

[Secondary prevention for specific causes of ischemic stroke and transient ischemic attack](#)

[Secondary prevention of stroke: Risk factor reduction](#)

The following organizations also provide reliable health information.

- National Institute of Neurological Disorders and Stroke

(www.ninds.nih.gov/disorders/tia/tia.htm)

- American Heart Association

(www.strokeassociation.org/STROKEORG/AboutStroke/TypesofStroke/TIA/TIA-Transient-Ischemic-Attack_UCM_310942_Article.jsp)

- National Stroke Association

(www.stroke.org)

- Medline Plus

(www.nlm.nih.gov/medlineplus/ency/article/000730.htm, available in Spanish)

[1,2,4]

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REFERENCES

1. Furie KL, Kasner SE, Adams RJ, et al. Guidelines for the prevention of stroke in patients with stroke or transient ischemic attack: a guideline for healthcare professionals from the American Heart Association/American Stroke Association. *Stroke* 2011; 42:227.
2. Lansberg MG, O'Donnell MJ, Khatri P, et al. Antithrombotic and thrombolytic therapy for ischemic stroke: Antithrombotic Therapy and Prevention of Thrombosis, 9th ed: American College of Chest Physicians Evidence-Based Clinical Practice Guidelines. *Chest* 2012; 141:e601S.
3. Antithrombotic Trialists' Collaboration. Collaborative meta-analysis of randomised trials of antiplatelet therapy for prevention of death, myocardial infarction, and stroke in high risk patients. *BMJ* 2002; 324:71.
4. Easton JD, Saver JL, Albers GW, et al. Definition and evaluation of transient ischemic attack: a scientific statement for healthcare professionals from the American Heart Association/American Stroke Association Stroke Council; Council on Cardiovascular Surgery and Anesthesia; Council on Cardiovascular Radiology and Intervention; Council on Cardiovascular Nursing; and the Interdisciplinary Council on Peripheral Vascular Disease. The American Academy of Neurology affirms the value of this statement as an educational tool for neurologists. *Stroke* 2009; 40:2276.

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