

UNDERSTANDING YOUR STENT PROCEDURE



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INTRODUCTION

As a patient, this booklet provides you with insight and information about the available options for treating coronary artery disease.

This information does not replace medical advice. Only a doctor can diagnose your health problem and determine which treatment is best for you.



YOUR HEART

Your heart is the muscle that pumps blood throughout your body.

The blood carries oxygen and nutrients that your body needs to work correctly.

For the heart to be able to function properly, it also needs a constant supply of oxygen-filled blood.

The vessels that supply this blood to the heart are called coronary arteries. If these arteries become blocked or narrowed, treatment is usually required to restore blood flow and the vital supply of oxygen to the heart.



CORONARY ARTERY DISEASE

Coronary artery disease occurs when a waxy substance called plaque builds up on the inside of your arteries, in a process known as atherosclerosis.

These plaque deposits can cause a narrowing of the inside of the arteries, which decreases the supply of blood and oxygen. When atherosclerosis occurs in the arteries that supply your heart, it is called coronary artery disease. When it occurs in the arteries that supply oxygen-rich blood to your arms and legs, it is called peripheral vascular disease.

The reduced blood flow to the heart can lead to chest pain (called angina) and numbness in the arms and shoulders. In some cases, when a plaque becomes disrupted or ruptures (Figure 5.), it can cause myocardial infarction (a heart attack).

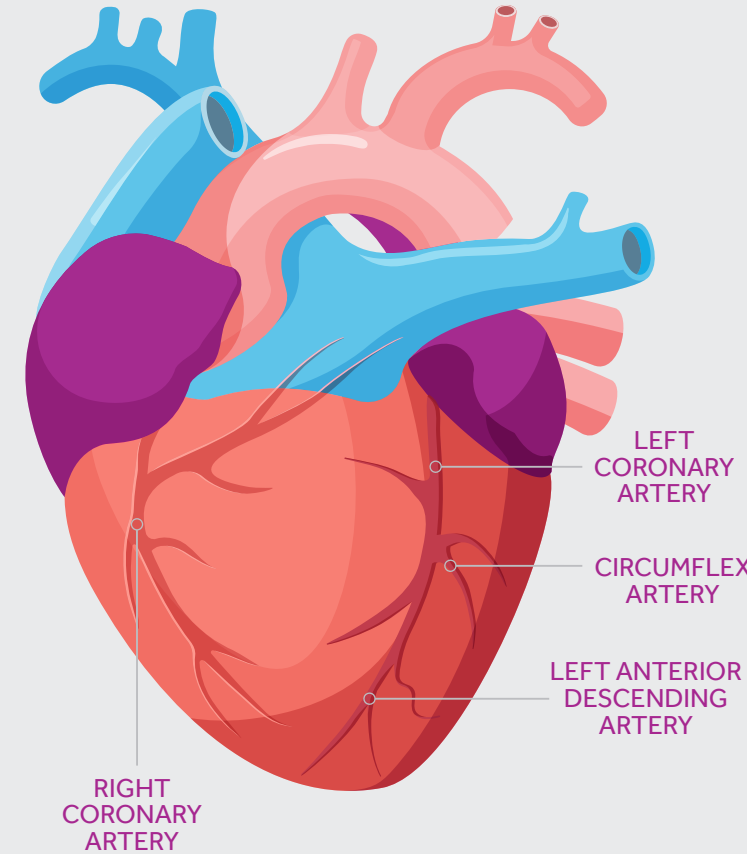


Figure 1. Coronary arteries.

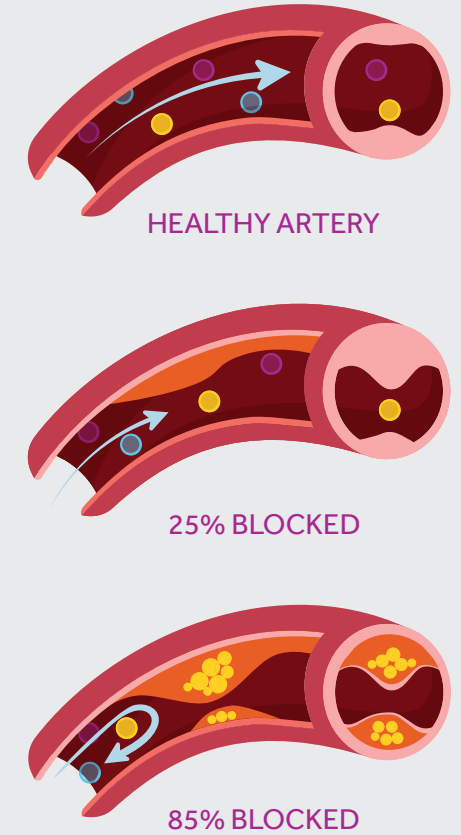


Figure 2. Plaque deposits build up inside the coronary arteries, decreasing blood flow.

RISK FACTORS

Several factors can increase your risk of coronary artery disease (see List 1). The more risk factors you have, the higher your risk.

Some proven risk factors are beyond your control, such as your age, sex and family history.

Other risk factors can be managed or eliminated to lower your risk. These risk factors are smoking, diabetes, high blood pressure, high cholesterol, obesity and having a sedentary lifestyle.

Your doctor can support your efforts to make healthier choices regarding your diet, tobacco use, activity level and stress management.

For more information on steps you can take to prevent heart disease, see page 22.



LIST 1

RISK FACTORS FOR CORONARY ARTERY DISEASE

- High blood pressure (also called hypertension)
- High cholesterol
- Diabetes
- Obesity
- Smoking
- Lack of physical activity
- Age over 65 years
- Family history of coronary artery disease

Figure 3. Healthy artery

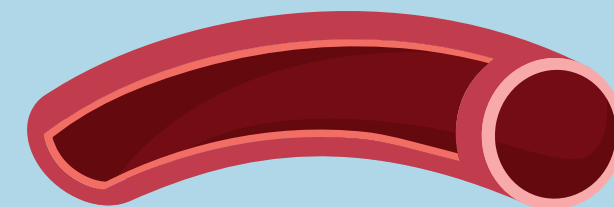


Figure 4. Artery with plaque

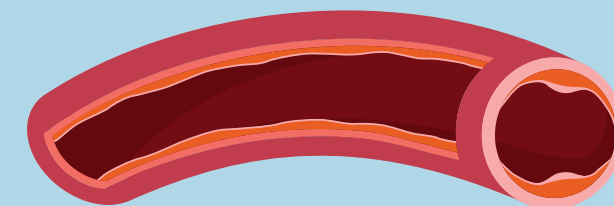
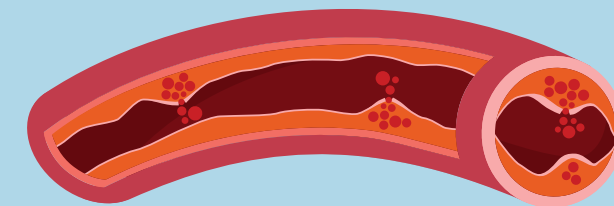


Figure 5. Artery with a ruptured plaque



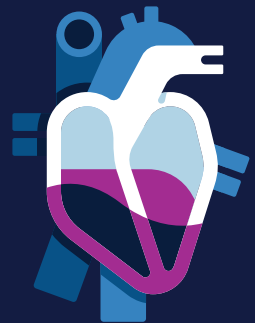
DIAGNOSIS

When making a diagnosis in the clinic, your doctor will consider your current symptoms, past medical history and risk factors.

Before deciding on a treatment plan, your doctor will undertake some initial investigations such as blood tests and possibly a chest X-ray.

A baseline resting electrocardiogram (ECG or EKG) records your heart's electrical activity at rest but cannot alone determine whether you have coronary artery disease or angina.

Other investigations will be chosen to try and clarify whether the heart is working properly and whether there is a problem with the blood supply.



You may be asked to undergo:

- An echocardiogram for an ultrasound examination of the heart muscle's pumping function and the heart valves
- A stress test to examine the heart with ECG or Echo while you exercise
- A perfusion scan as an alternative stress test that will utilize MRI or nuclear technology

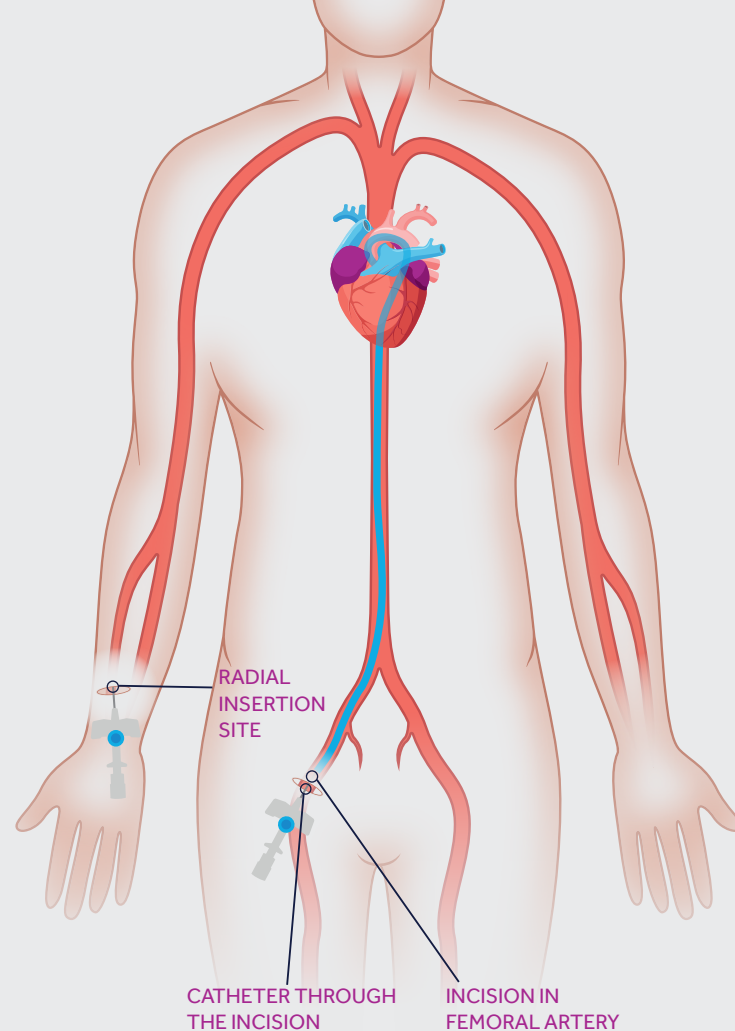


COMPUTERIZED TOMOGRAPHY (CT) CORONARY ANGIOGRAPHY

A CT scan can be undertaken to determine whether or not there is any plaque in the coronary arteries. This can be a very helpful and minimally invasive test to decide on the need for medication or further investigation.

Many people have some plaque in the arteries without it causing the arteries to be narrowed and, thus, are without symptoms.

Figure 6. Heart catheterisation through femoral artery and radial artery.



INVASIVE CORONARY ANGIOGRAPHY

If your doctor is concerned that there may be significant narrowing in the arteries, a coronary angiogram may be recommended.

This will show, in detail, the exact location and extent of any narrowed or blocked coronary arteries. This test is a little more invasive and requires you to come into hospital to the cardiac catheterization suite for a few hours.

The procedure itself takes 20-40 minutes and is performed in an X-ray room (the cathlab).

For the procedure, you will be offered a mild sedative to help you relax. Small sticky patches, called electrodes, will be placed on your chest to monitor your heart rate and rhythm.

Your doctor will insert a short, hollow tube into an artery in your wrist or the top of your leg, after numbing the area with local anaesthetic (see Figure 6.). Through this tube, the doctor can insert flexible tubes called catheters, guided by steerable wires, up to the origin of your coronary arteries. From here, a special X-ray dye is injected, via the catheter, into the arteries to produce picture of the arteries on a screen.

By taking pictures from different angles, a detailed roadmap of your arteries is obtained. It is normal to feel a temporary warm flush when the dye is injected, but you should not experience any pain or discomfort during the procedure. The results will allow your doctor to decide and discuss with you which treatment options will be best if any artery narrowing is discovered.

TREATMENT OPTIONS FOR **CORONARY ARTERY DISEASE**

Your doctor will discuss a treatment plan for you depending on your symptoms, all your test results and your medical history.

This may be immediately or may be after your case has been discussed with the heart team. The plan may include medications to improve the blood supply to the heart and relieve your chest pains.

Medications are also vitally important to reduce the build up of further plaque. Because medications alone cannot clear arteries which are already blocked or narrowed, your doctor may suggest that you would benefit from mechanical treatments, either surgery or angioplasty.



SURGERY

Coronary artery bypass grafting is a common surgical procedure that redirects a section of artery from your chest wall to supply the main coronary artery, bypassing the blockage or narrowing.

Sections of vein from the leg are also used to create other bypass grafts where needed so that the entire heart has a good blood supply.

Coronary surgery is undertaken in surgical centers, where patients remain for about a week followed by a recovery period at home.

BALLOON ANGIOPLASTY

Angioplasty is the treatment of the arteries on the inside using balloons and often stents and is undertaken in the cath lab in a similar way to a coronary angiogram. In emergency procedures for heart attacks (see page 18), an angiogram and angioplasty are usually performed in the same sitting.

Via a tube in the wrist (or leg) artery, again, under local anaesthetic, a very fine guidewire is advanced inside the narrowed coronary artery. A catheter with a small balloon on the tip is threaded over this wire to reach the point of narrowing or blockage.

The balloon is inflated to squeeze the plaque against the wall of the artery, and then deflated, clearing the way to allow the normal flow of blood down the vessel. The balloon is removed in the same way and the area is usually secured with implantation of a stent.

STENTING

A stent is a tiny, expandable, mesh-like tube that acts as a scaffold inside the artery and helps to keep the artery open. It is delivered to the artery using the same balloon procedure described above.

The stent comes crimped onto a balloon and, as the balloon is inflated at high pressure, the stent expands and is deployed into the wall of the artery. As the balloon is deflated and removed, the stent remains in place permanently.

The stent cannot move, wear out or degrade. Instead, your own artery grows a new 'skin' or lining to cover over the mesh, which then just becomes part of the wall of the artery.

Re-narrowing occasionally occurs inside stents as a result of an overgrowth of tissue during this healing process.

Many stents now have a drug applied to them that is released into the wall of the artery to try and prevent this 'restenosis' from occurring (drug-eluting stents).

Not all narrowings require, or are suitable, for a stent, sometimes balloon angioplasty alone will suffice.

Angioplasty and stent procedures are less invasive than bypass surgery, the recovery time is short and many patients are discharged from hospital the same day.

However, not all coronary artery narrowings are suitable for stent procedures, and the pattern of coronary artery disease may mean that the long-term results of your treatment would be better after bypass surgery.

The best options for you will be carefully considered and explained to you.

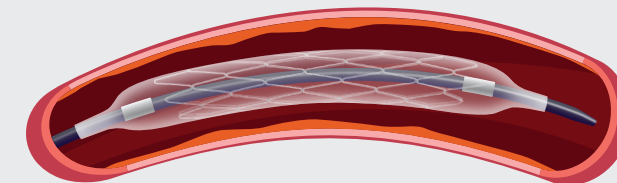


Figure 7a. The unexpanded stent is delivered to the treatment area via a special catheter.

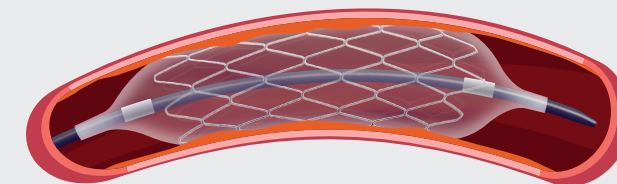


Figure 7b. The balloon is inflated to expand the stent.

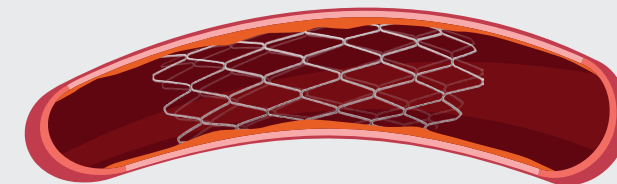


Figure 7c. The balloon is deflated and withdrawn from the body, leaving the stent to support the artery and maintain good blood flow.

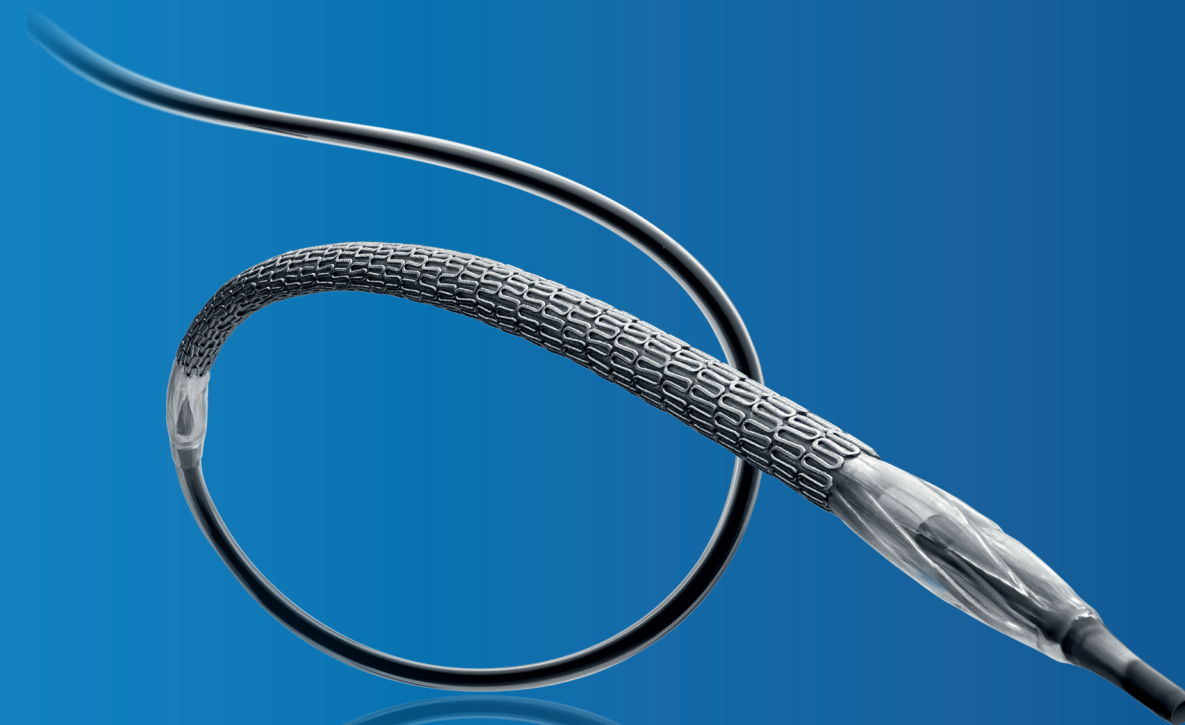
EMERGENCY AND PRIMARY **ANGIOPLASTY**

If you have been admitted to hospital with a heart attack, then your ECG may inform doctors that a major coronary artery is completely blocked. In this situation, you may be rushed straight in for an emergency angiogram and an angioplasty to unblock the problem artery.

The angiogram pictures will be taken as soon as possible after your arrival in the hospital and the blood flow to the heart restored by the procedures described above to relieve your chest pain and protect the heart from major damage.

A stent will often, but not always, be implanted at the same time. After this procedure, you will need to stay in hospital and be monitored for about 3 days.

If you have a heart attack, but your ECG doesn't suggest a major artery blockage, then you will be treated initially with medication to help settle the heart down and an angiogram will be planned during your hospital admission, sometimes proceeding to angioplasty and stenting at the same time.



Resolute Onyx™
Zotarolimus-Eluting
Coronary Stent System

Figure 8. A stent is a tiny, expandable, mesh-like tube that helps support the artery, increasing blood flow.

WHAT TO EXPECT AFTER YOUR STENT PROCEDURE

You will be able to get out of bed soon after your procedure while the nurses keep a careful eye on the small puncture area made in your wrist. This is usually compressed with a bracelet for 2 – 4 hours after the procedure. If the artery in the leg was used, you may need to lie flat for a more prolonged period of time.

Your doctor or nurse will tell you what to do if you experience any chest pain bleeding or bruising around the puncture site.

You will be given advice about when you can return to normal activities, such as walking, working, driving, your follow-up plan and which medications you need to continue.



IMMEDIATELY AFTER PROCEDURE

Antiplatelet medications are extremely important before and after an angioplasty and stent procedure.

These usually consist of aspirin and another agent such as clopidogrel, ticagrelor or prasugrel. These are medications which stop the blood from being sticky and clotting inside the treated or stented area.

You will be given clear instructions about what to take and for how long. These medications should be taken strictly as prescribed and must not be interrupted without consulting your heart doctor.

PREVENTING CORONARY ARTERY DISEASE

Coronary artery disease can be treated effectively, but it has no cure. You can help to prevent your coronary artery disease from progressing by carefully following your doctor's advice.

Your doctor may prescribe medications to help control your blood pressure, diabetes and/or high cholesterol. Your doctor may also recommend some lifestyle changes. Among the healthy choices you can make:



STOP SMOKING

If you smoke, quitting is the single most important thing you can do to lower your risk of coronary artery disease.

Chemicals in cigarette smoke may make it easier for plaque to build up on your artery walls. And smoking increases your heart rate and blood pressure, raising your risk of heart attack and stroke.

If you are ready to quit, ask your doctor for advice, he or she can recommend smoking cessation aids to help you quit.



CHOOSE A HEALTHY DIET

A diet low in saturated fats and cholesterol and rich in lean protein, fresh fruits, vegetables and whole grains can help you achieve a healthy weight and control your blood pressure and cholesterol levels.



INCREASE YOUR ACTIVITY

A sedentary lifestyle increases your risk. Your doctor can recommend an activity program tailored for your situation.

Regular exercise can help you lower your blood pressure and blood cholesterol and reach a healthy weight.

It can also help you manage the daily stresses of modern life more easily.



MANAGE YOUR STRESS

Stress is an inescapable aspect of modern-day living, but you can help lessen its negative health effects by practicing the 'relaxation response'.

Research has shown that relaxation techniques can improve your ability to cope with stressful events while decreasing your heart rate, blood pressure and stress hormone levels.



FREQUENTLY ASKED QUESTIONS

How long will the stent stay in my body?

Stents are designed to stay in your body permanently. They do not move in the body after they have been implanted.

What are the restrictions or cautions?

If you require an MRI (magnetic resonance imaging) scan, the technician will want to know about your stent. The presence of a coronary stent, however, does not prevent you from having an MRI scan and is not dangerous at all in the scanner.

When can I resume my regular activities?

Your doctor will advise you. Many patients can return to work and follow their normal routine about a week after their stent procedure.

Will my stent set off the metal detector at the airport?

No, your stent implant will not trigger alarms at security checkpoints.

Will I be able to feel the stent inside me?

No, you will not be able to feel the stent once it has been implanted into your artery.

Could I have recurring symptoms?

Yes, it is possible that you will experience symptoms again, either due to a new blockage in the treated region or another blockage in your arteries. Your doctor will monitor your progress.

How can I help prevent a recurrence of symptoms?

While there is no sure way to prevent a recurrence of symptoms, you can reduce the risk through exercise, not smoking and eating a healthy diet. Your doctor can advise you about lifestyle changes.

GLOSSARY

Angina

Pain or discomfort in the chest because of reduced blood flow and oxygen supply to the heart muscle.

Angiogram

Special X-ray test that indicates the number, exact location and extent of narrowed or blocked coronary arteries.

Atherosclerosis

Disease process involving the build-up of a waxy substance called plaque on the inside of arteries.

Balloon angioplasty

Non-surgical medical procedure in which a specially designed balloon catheter is used to open a narrowed or blocked artery.

Catheterization

Procedure in which a thin, hollow tube (catheter) is inserted into an artery for the purposes of visualizing the heart and blood vessels, and diagnosing and treating heart disease.

Coronary arteries

Blood vessels on the outside of the heart that provide oxygen-filled blood to the heart.

Coronary artery bypass graft

Common surgical procedure that grafts an artery from your chest or a vein from your leg to create an alternate route around a narrowed or blocked coronary artery.

Drug-eluting stent (DES)

Used to refer to stents that carry drugs that help keep arteries from re-narrowing after a stent has been implanted.

Electrocardiogram (ECG or EKG)

Medical test in which several electronic sensors are placed on your body to monitor electrical activity associated with the heartbeat.

Myocardial infarction

Damage to an area of heart muscle because of a blocked coronary artery or rupture of a plaque within an artery temporarily disrupting the blood flow.

Plaque

Waxy substance consisting of fats and cholesterol that can build up on the inner lining of your arteries.

Restenosis

Re-narrowing of an artery at the site of angioplasty and/or a stent implant, due to the overgrowth of normal tissue.

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