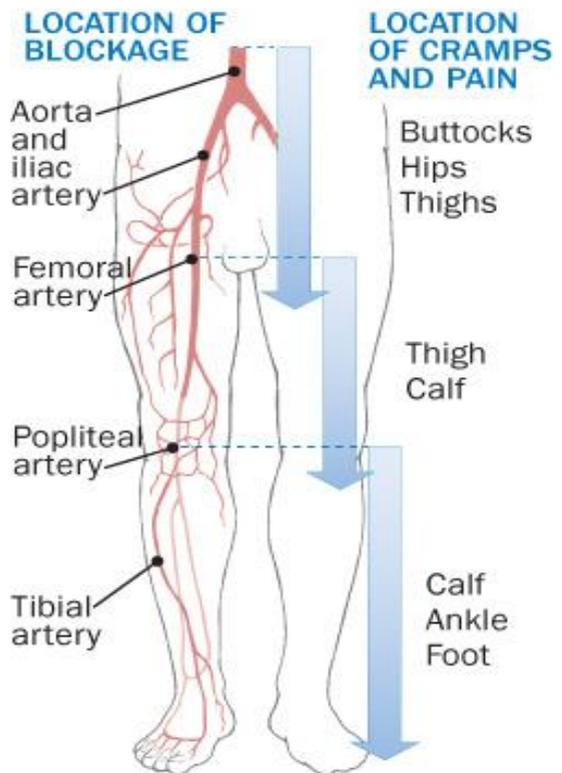


What is Peripheral Artery Disease?

Peripheral arterial disease, or PAD, is a serious condition where blood flow to the legs and feet is significantly reduced. It occurs when extra cholesterol and other fats circulating in the blood, collect (in the form of plaque) in the walls of the arteries that supply blood to your limbs. Arteries are the vital channels that carry oxygen-rich blood from the heart to all the body's tissues. Peripheral artery disease (PAD) is the narrowing of the arteries that supply the legs and arms. Just like clogged arteries in the heart, clogged arteries in the legs mean you are at risk of having a heart attack or stroke.

Plaque or narrowing and hardening of the arteries (atherosclerosis) in the legs does not always cause symptoms, so many people can have PAD and they may not know it. People who do experience symptoms, such as pain or cramping in the legs, often do not report them; they may think their leg pain and trouble walking are just signs of getting older but the truth is they may have PAD.



Treatment for PAD depends on many factors, including your symptoms, health status, and the severity of blockage(s) in your arteries. Timely detection and treatment of PAD can improve the quality of your life; help you keep your independence and mobility; and reduce your risk of heart attack, stroke, leg amputation, and even death. Take steps to learn about PAD, and ask your health care provider to check your risk.

What is intermittent claudication?

The most common symptom of PAD is

- muscle cramping in the calves, thighs or buttocks while walking,
- climbing stairs or exercising, this is called ‘intermittent claudication’.

This pain or discomfort goes away once the activity is stopped and during rest.

During exercise, blood flow to muscles normally increases to meet the demand for oxygen; when there is narrowing or blockage present in the arteries, this extra blood cannot be supplied. This means that blood flow to your leg muscles is inadequate when you need extra oxygen during exercise.



This causes pain when you walk. Many people do not report this problem to their health care providers because they think it is a natural part of ageing or due to some other cause.

Other severe symptoms of PAD include:

- Leg pain that doesn't go away when you stop exercising; pain in the form of coldness, burning in the foot at night that is relieved by dangling legs over the side of the bed, is referred to as **rest pain**. If this is occurring regularly, it is important that you inform your doctor as it may indicate a more severe form of poor circulation.
- Foot or toe wounds that won't heal or heal very slowly
- Gangrene, or dead tissue
- A marked decrease in the temperature of your lower leg or foot, compared to the other leg or the rest of your body
- Poor nail growth on the toes or hair growth on the legs
- Erectile dysfunction, especially in men with diabetes

What are the causes of PAD?

Certain causes or 'risk factors' for PAD can't be controlled. These include

- ageing and a personal or family history of PAD,
- cardiovascular disease or stroke.

However, you can control the following risk factors:

- Smoking
- Diabetes
- Overweight or obesity

- High cholesterol
- High blood pressure
- Not being active

What can I do to improve my symptoms and condition?

Quit smoking – Don't smoke, and if you do, quit. Smoking is the most important risk factor linked to worsening of PAD, and amputation rates are much higher in smokers than non-smokers. Smoking increases the risk of PAD by considerably. The chemicals in tobacco smoke harm your blood cells and damage the structure and function of your blood vessels. This damage increases your risk of atherosclerosis. Consult with your health care provider to develop an effective cessation plan and stick to it.

Lower your numbers – Work with your health care provider to correct any high blood pressure, cholesterol, and blood glucose levels. Lowering your cholesterol – Excess cholesterol (a type of fat found in the blood and food) in your blood contribute to the formation of plaque in the arteries. Know your cholesterol numbers. These include total cholesterol, LDL, HDL, and triglycerides

Get moving – Make a commitment to be more physically active. The preferred exercise is walking.

- Each session should last at least 30-45 minutes and be performed at least three times a week for a minimum of 12 weeks.
- But ideally, over time you should be aiming to exercise daily for the rest of your life.

- It is recommended that you walk as far as you can before the symptoms of pain in the leg (s) become intolerable. Once this happens, rest until the pain goes and begin walking again until the pain returns. Keep using the 'stop start' method until you have spent at least 30 minutes walking.
- You should gradually notice a marked improvement in your symptoms and you will begin to go longer and longer without experiencing any pain.
- As well as improving your ability to walk for longer, exercise also benefits you by enhancing your overall health.
- Exercise helps to maintain an ideal body weight, can help lower blood pressure, lower cholesterol and blood sugar, and improves the overall condition of the heart and blood vessels.

Diabetic Control – if you have diabetes, you need to strictly control your blood sugar to prevent worsening of your condition.

- Frequent or ongoing high blood sugar can cause damage to your nerves, blood vessels, and organs.
- When uncontrolled diabetes causes nerve damage, the sensation in feet is reduced therefore increasing the risk of developing foot ulcers.
- It is imperative that you look after your feet and attend a chiropodist or podiatrist regularly. The combination of nerve damage and PAD predisposes to the development of diabetic foot ulcers, gangrene and even limb loss.
- It is also very important that even the non-diabetics look after their feet; if you have been diagnosed with PAD you may have poor

healing. Therefore any damage to the skin on your feet or legs can lead to infections and ulcers.

Follow a healthy eating plan. Choose foods that are low in saturated fat, trans fat, and cholesterol. Cut down on sugary foods, don't add salt to your food and try to maintain a balanced diet. Be sure to include whole grains, vegetables, and fruits. Aim for a healthy weight. If you are overweight or obese, work with your health care provider to develop a weight loss plan.



How is Peripheral Artery Disease treated?

There are three main approaches to managing and treating PAD

- making lifestyle changes outlined above and
- taking medication (risk factor management), this combined approach will be first line of treatment; and in some cases,
- having a special procedure or surgery may be a further option if symptoms do not improve.

Your health care provider or Vascular surgeon will determine the best treatment options for you, based on your medical history and the severity of your condition. It is crucial that lifestyle changes are made whether surgery is an option or not.

Taking medication –

- If your cholesterol is high it is important that you take medication called a **statin** to lower this. Even if your cholesterol is normal, you may be prescribed a statin because this medication stabilises/slow the rate of plaque progression.
- If you have high blood pressure (hypertension), it will be likely that you will be prescribed an **anti-hypertensive** drug if your blood pressure is higher than 140/90mmHg if you do not have diabetes, or 130/80mmHg if you do have diabetes.
- One of the biggest potential dangers if you have atherosclerosis, is a piece of fatty deposit (plaque) rupturing and clot develops. This can cause critical reduction in blood supply and potentially lead to limb loss. The risk of this is reduced by medications called **anti-platelets** such as aspirin and clopidogrel.

You may be reviewed regularly at the Vascular outpatients department or you may be referred back to your GP once you have been assessed at the clinic and are on the appropriate treatment.

How is PAD diagnosed and what investigations are required?

PAD diagnosis begins with a medical history and physical exam which includes assessment and palpation of peripheral pulses.

- A simple test called the **ABPI** (ankle brachial pressure index) that compares the blood pressure in your ankle to the blood pressure in your arms will also be performed. If you are increasingly symptomatic, other tests may be done. They include:
- Treadmill exercise tests
- Doppler ultrasound 'duplex' -this test uses sound waves to measure the blood flow in the veins and arteries in your arms and/or legs
- MRA (magnetic resonance angiography) – uses a strong magnetic field combined with radiofrequency waves to create highly detailed images of blood vessels in the body
- CTA (computed tomographic angiography) – is a special kind of CT exam that focuses particularly on the blood vessels, using a contrast material to make them show up clearly in the images
- Peripheral angiogram – is an X-ray of the arteries and veins to detect blockage or narrowing
- Toe pressures

If you are male and over 65 you may be screened for an abdominal aortic aneurysm (AAA), this involves an ultrasound of your abdomen to check for any bulging or swelling in your aorta. You can ask your health care provider or Vascular Surgeon for more information.

When is surgery or revascularisation procedure required?

The vast majority of patients with claudication may never need an operation once the risk factors are managed effectively. Reasons for surgery include

- severe limitation (which varies from person to person depending on lifestyle),
- failure adhering to lifestyle changes or exercise programme,
- development of rest pain (page 4), foot damage or ulcers and gangrene (critical limb ischemia). The presence of **critical limb ischaemia** is a serious condition in which there is inadequate blood flow and oxygen to a specific part of the body, ischaemia is a severe condition that can cause tissue damage and loss of limbs. This condition will not improve on its own and requires appropriate medical attention.

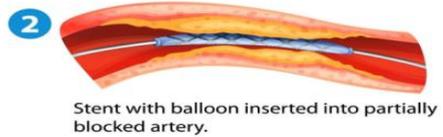
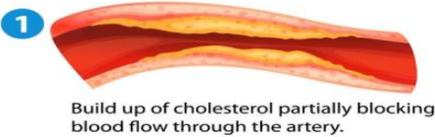
Revascularisation of the limb plays a central role in the management of symptomatic peripheral arterial disease (PAD). It should be stressed that the physiological state of the patient and the status of the limb primarily determines the appropriateness and urgency of intervention for PAD.

All surgeries carry a small risk of worsening the situation and do not usually last a lifetime. The Vascular Surgeon will explain the risks in greater detail if you ever need surgery. Procedures such as angioplasty and bypass graft surgery will not cure PAD, but they can improve the blood circulation to your legs and your ability to walk.

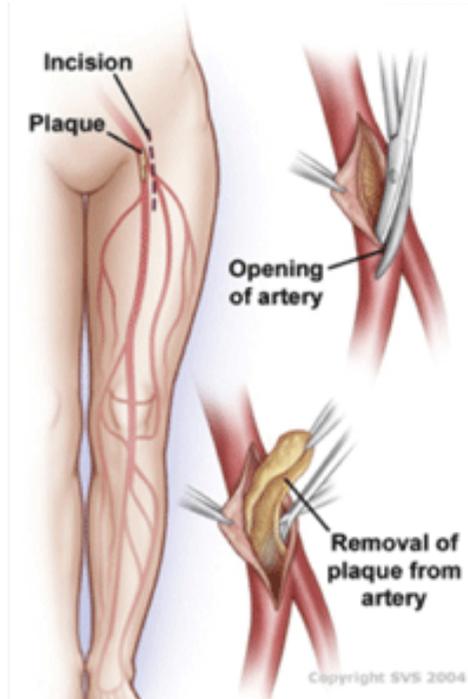
Angioplasty with stent placement – Angioplasty is done by making a small incision in the skin normally at the groin level, through which a thin tube

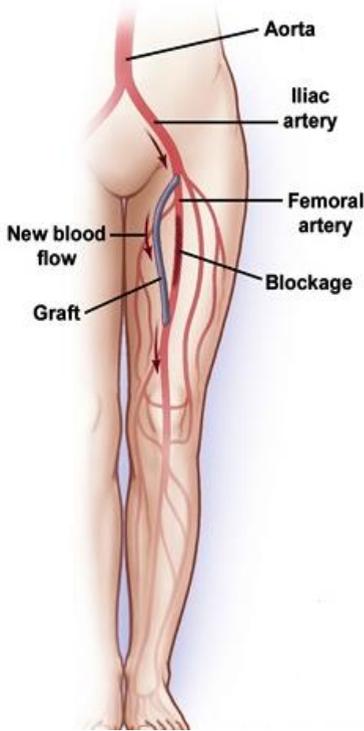
(catheter) is inserted in the artery to reach the artery affected by the blockage or narrowing. A tiny balloon on the tip of the catheter is inflated inside the artery to open the partial blockage or narrowing. A stent — a tiny wire mesh cylinder — may also be put in at this time. The stent acts like a scaffolding and holds the artery open.

Stent with Balloon Angioplasty



Endarterectomy – is the direct removal of obstructive plaque from an arterial segment. If there is disease with narrowed or blocked arteries elsewhere above the groin or further down the leg, the endarterectomy operation can be combined with angioplasty and stenting to treat these other areas at the same time.





Bypass surgery – If a long part of an artery is narrowed, bypass surgery may be required. The bypass reroutes the blood supply around the blocked portion of the artery in your leg. A vein from another part of the body or a synthetic blood vessel is attached above and below the blocked area to detour blood around the blocked spot. A bypass procedure is an open surgical procedure carried out in the lower limb for ischaemia (lack of sufficient blood supply).

Amputation – Amputation is the removal of a limb (arm or leg) or part of an extremity (foot, toe, hand or finger/s) when an alternate treatment is not feasible or has failed to remove bone and tissue due to:

- Extensive infection.
- Lack of blood supply.
- Significant trauma.
- Frostbite.
- Severe burns.
- Wounds.

If you have been told you need an amputation due to advanced PAD, you likely have a blockage in one of your arteries which is preventing blood from

reaching a part of your body, such as your feet or toes. The alternative surgical procedures may not be possible due to the advancement of your PAD or attempted revascularization may not have improved symptoms.

The decision to recommend a major limb amputation is always a last resort and following multidisciplinary discussion which involves a second opinion from another consultant. In some cases, amputation may be the best solution.

The overall goals for treating PAD are to reduce any symptoms, improve quality of life and mobility, and prevent heart attack, stroke, and amputation. PAD treatment includes making long-lasting lifestyle changes.

Stay in Circulation: Take Steps to Learn About PAD. September is PAD awareness month to increase public and health care provider awareness about peripheral arterial disease (PAD) and its association with other cardiovascular diseases. To find out more about PAD go to <https://www.hse.ie/eng/health/az/p/peripheral-arterial-disease/treating-peripheral-arterial-disease.html>

If you believe you have or are at risk for PAD, discuss this concern with your health care provider and he/she will to arrange a referral to your nearest Vascular Specialist.

If University Hospital Limerick is your immediate hospital and you have any questions or concerns feel free to ask a member of the Vascular team below.

- Prof. Eamon Kavanagh's secretary University Hospital Limerick
061482761
- Mr Tony Moloney's secretary University Hospital Limerick:
061482121
- Mr Mekki Medani's secretary University Hospital Limerick:
061588249
- Ms Pamela Ryan Vascular Clinical Nurse Specialist 061585633

This booklet has been developed by the Vascular Department, UHL Group 2021