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### KEY POINTS

- The foramen ovale is a natural hole between the chambers of the heart as it develops. It should close when you are born, but sometimes it can last into adulthood.
- Patent foramen ovale is a condition where the foramen ovale does not close, so blood continues to move between the sides of the heart. This makes the heart beat less effectively.
- Patent foramen ovale (PFO) affects around 1 in 4 people, and is **usually not dangerous**. Most people are only diagnosed with PFO after they have died from unrelated causes. A patent foramen ovale does not usually directly cause heart problems.
- There is some evidence that PFO might be associated with conditions such as stroke, migraine, and embolism.
- PFO usually does not need treatment, but if it is causing problems, it may be closed through a medical procedure.

**Patent** means “open” or “apparent”.

**Foramen ovale** (pronounced **for-a-MEN oh-vahl-ey**) is the natural hole between the left and right sides of a developing heart.

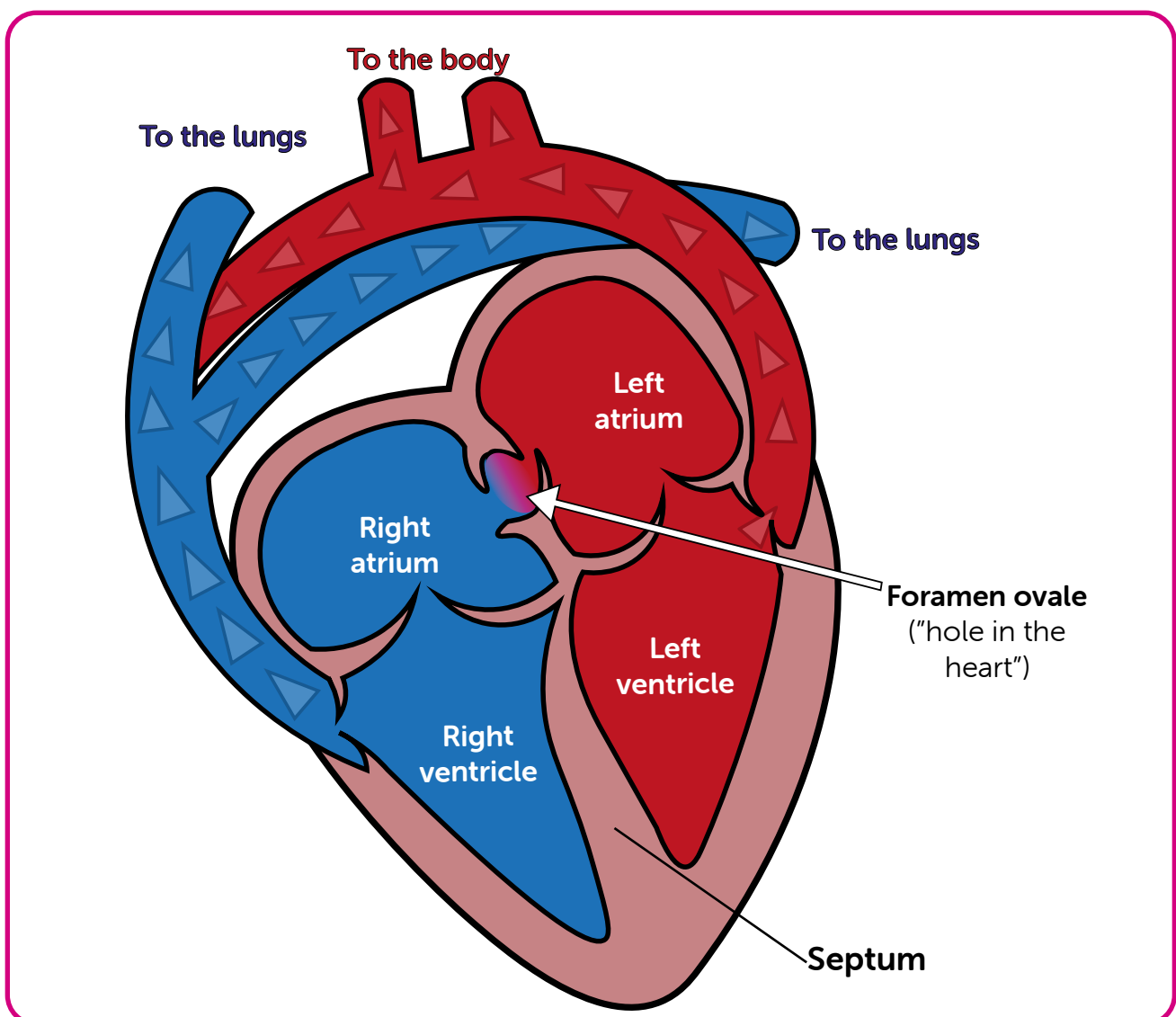
# What is the foramen ovale?

The human heart has four chambers - two on the left and two on the right. Blood comes into the heart through the atria, and then passes through one-way valves down into the ventricles, and is pushed from the ventricles to other parts of the body.

The left and right sides of the heart have different functions. The right side pumps low-oxygen blood to the lungs to be re-oxygenated. The left side pumps high-oxygen blood to the rest of the body. They are separated by the **septum**.

The septum forms quite late in a baby's development. Up until the late stages of pregnancy, there is still a gap between the left and right sides of the heart. This is because a foetus in the womb does not need to breathe, so there is no need for blood to circulate separately to and from the lungs.

This circular hole is called the **foramen ovale**. It usually closes after birth, separating the **venous blood** in the right chambers from the **arterial blood** in the left chambers.



# What is a patent foramen ovale?

A patent foramen ovale is a foramen ovale that remains partially or completely open after birth, letting small amounts of blood pass between the left and right side of the heart.

In most people, this space closes in the first 5-6 years of life. However, in some people, it does not close entirely, and may last into adulthood.

Patent foramen ovale is very common, and usually does not cause problems, particularly if the foramen ovale is small. However, there can be risks associated with patent foramen ovale, especially if the hole is larger than average.

PFO is usually diagnosed in adulthood, following some other heart problem or complaint, which may not even be related to your PFO. Many people who have a "hole in the heart" never know about it at all.

**Around 1 in 4 people have some degree of patent foramen ovale into adulthood.**

PFO can mean that small amounts of blood continue to move between the left chambers (which contain high-pressure, oxygenated blood) and the right chambers (which contain lower-pressure, deoxygenated blood). This does not usually cause major problems. However, it can mean that your heart has to work harder to get enough oxygenated blood around the body.

In some cases, the relatively slow movement of blood through the PFO can also lead to clotting. A small clot which passes through the PFO can block arteries elsewhere in the heart, raising the risk of a heart attack. It can also be pushed into the brain, causing a stroke or embolism.

PFO can also mean that you are more likely to experience decompression sickness while flying or doing some other activities such as diving or mountaineering.

People with PFO are more likely to suffer with migraines, especially migraines with aura. These can often be managed using over-the-counter painkillers and rest. However, if you have frequent or severe migraines which are affecting your ability to live your life, speak to your doctor about what longer-term treatments may be available.

If your doctor or health team think that your PFO is likely to cause problems, they may recommend treatment to close the hole. This might be done with a **catheter** (a small tube used to insert a plug into the hole) or, in rare cases, through **open-heart surgery**. However, most people with PFO do not require treatment at all.

# Risks and associated conditions

Sometimes, the blood in your veins may either start to clot, or collect quantities of fat or other blockages. If you have a PFO, these blockages can pass through the foramen ovale and end up in your arteries, where they may block the blood flow that carries oxygen around your body. This kind of blockage is called an **embolism**.

As a result, PFO can put you at a higher risk of associated conditions like **heart attack** or **stroke**. This is considered the main risk of PFO, but the risk can be managed by living a healthy lifestyle, taking any medications your doctor prescribes you, and keeping your blood pressure in a range that is healthy for you.

The risk of a heart attack or stroke is considered to be slightly higher for people with larger foramen ovals.

PFO can also be associated with:

- Migraine or severe headaches.
- Increased risk of decompression sickness when scuba diving.
- Kidney problems (in very rare cases).

All of these conditions are considered to be treatable.

## Should I worry?

A “hole in the heart” might sound like a scary phrase, but PFO is usually not a serious medical concern, especially in adults!

As long as you manage your other risk factors (see our booklet on **Reducing The Risk of Heart Attack and Stroke** for more), the risk posed by a PFO is minor.

In some cases, particularly in premature births, infants may be born with a large enough PFO to cause circulation issues early in life. This should be picked up in the neonatal unit and treated as appropriate. However, if you are concerned about your child’s circulation, it is always best to speak to your GP, midwife, or other health professional as soon as possible.

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