Empower | Understand | Thrive

EMPOWER MY CONGENITAL HEART

Home Is Where the *Heart is*

A Guided Tour of How Your Heart Works

THE HEART AS A HOUSE

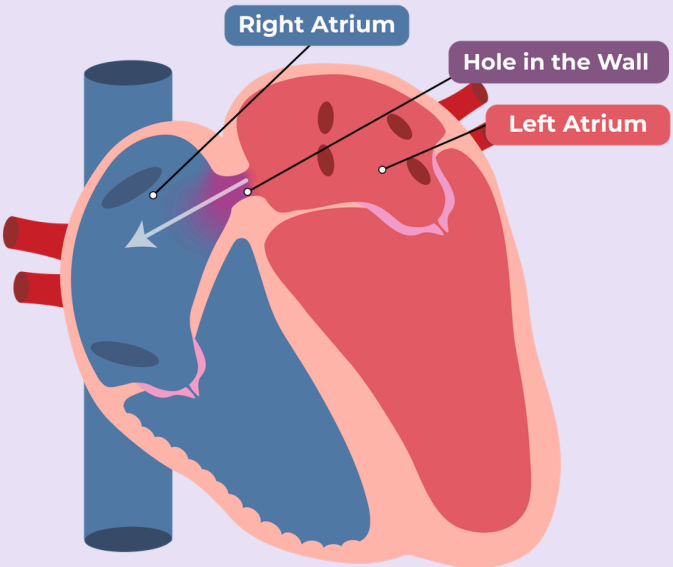
The **heart**, just like a **house**, is a single, complex system. Its structure, plumbing, electrical, and pumps must all work together to keep the system running. Similarly, a heart **functions best when all its components work together**.

STRUCTURAL → THE FRAME

- Think of your **heart** as the **structure or walls** of a house.
- The **chambers** are like **rooms**, each with its own purpose (the atria receive blood, and the ventricles pump it out).
- The **valves** are like your **doors** between rooms that only open one way, keeping blood moving in the right direction.
- The **septum** (the wall between the right and left sides) is like the **dividing wall** that keeps rooms separate.

When there's a "hole in the wall," like a septal defect, it's like a leak between your cold garage and warm bedroom. Air mixes, and your heating system has to work harder to keep the house comfortable.

Example of a Defect Causing a "Hole in the Wall"
Atrial Septal Defect (ASD)

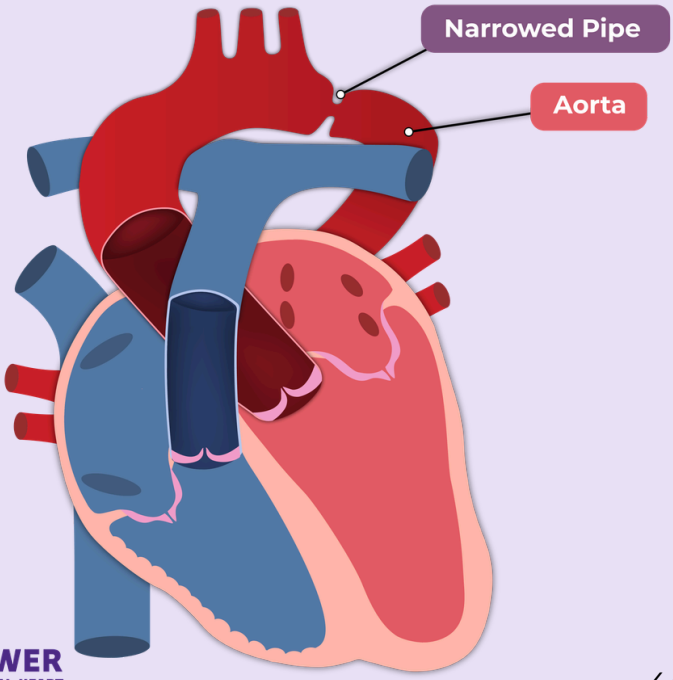


PLUMBING → THE PIPES

- The **arteries and veins** are like the **plumbing pipes** that carry water through the house.
- **Arteries** carry blood **away** from the heart, like pipes that carry water out of the house.
- **Veins** bring blood **back**, like water lines that carry water into the house.
- The **lungs** act like a water **filter**; they refresh the blood with oxygen before it returns to the heart.

If the plumbing (a blood vessel) is narrowed or blocked, it's like a clogged pipe, causing pressure to build and blood flow to slow.

Example of a Defect Causing a Narrowed Pipe
Coarctation of the Aorta

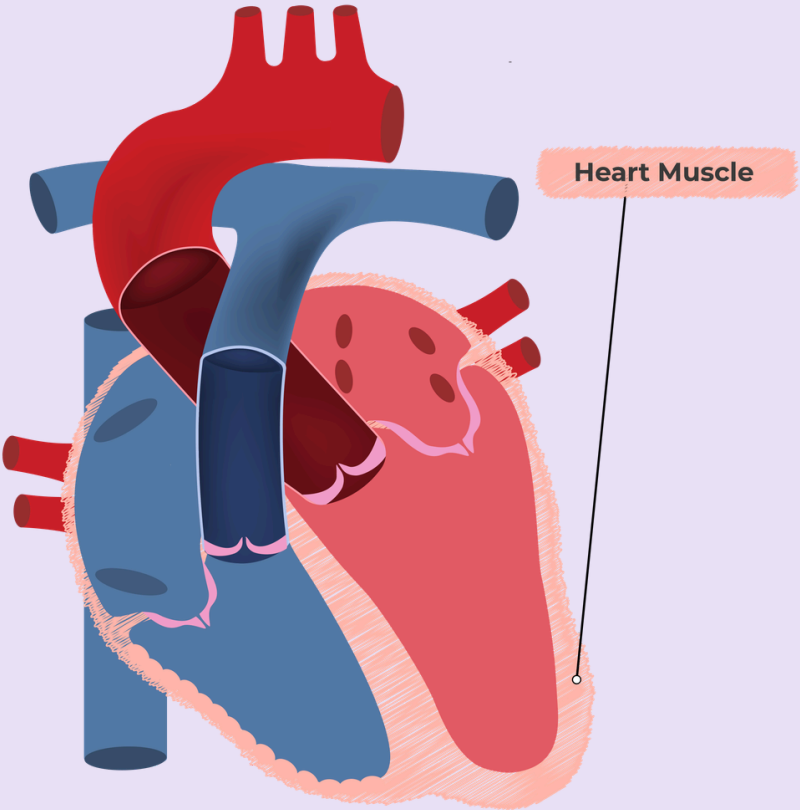


HEART MUSCLE → PUMP

- The **heart muscle** is like the **well pump** that keeps water flowing through all the pipes in your house, pushing blood through your body just as the pump sends water everywhere it's needed.

- When the **pump weakens**, it can't push blood as strongly, like a water pump **losing pressure.**

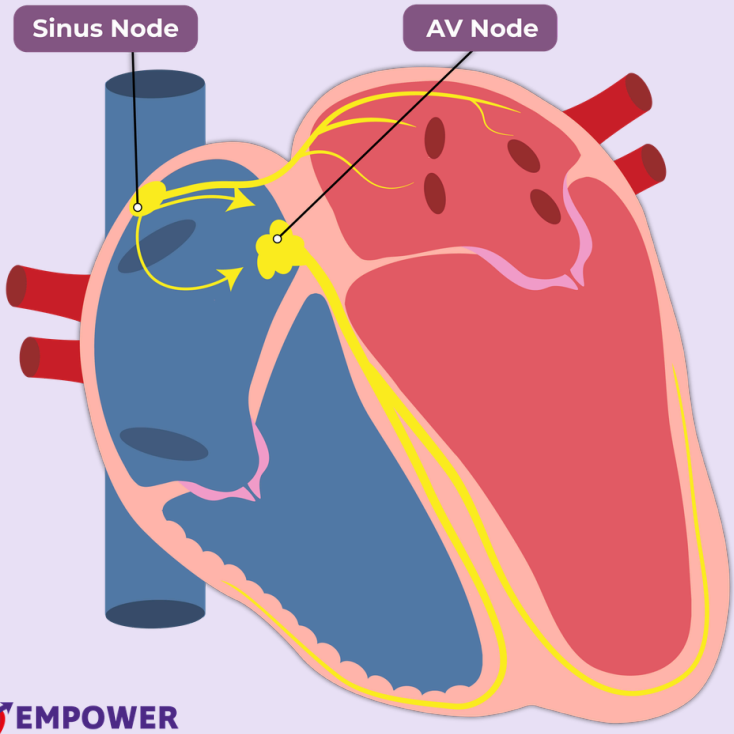
The heart is like a water pump: if it doesn't function well, the blood doesn't move as smoothly, and fluid can build up in the lungs, belly, or legs — often referred to clinically as 'heart failure'.



ELECTRICAL → THE WIRING

- Your heart has its own **electrical system**, like the **wiring** in a house.
- The **sinus node** is like the main light switch in the front hallway—it initiates a signal.
- The **AV node** (atrioventricular) is like a dimmer switch—it controls how fast the signal travels so the heart doesn't beat too fast.
- The electrical pathways are the wires hidden in the walls—they carry the signal to every room.

If the electrical wiring is faulty, the lights might flicker, which can trigger an abnormal heartbeat (arrhythmia).



VALVES → THE DOORS

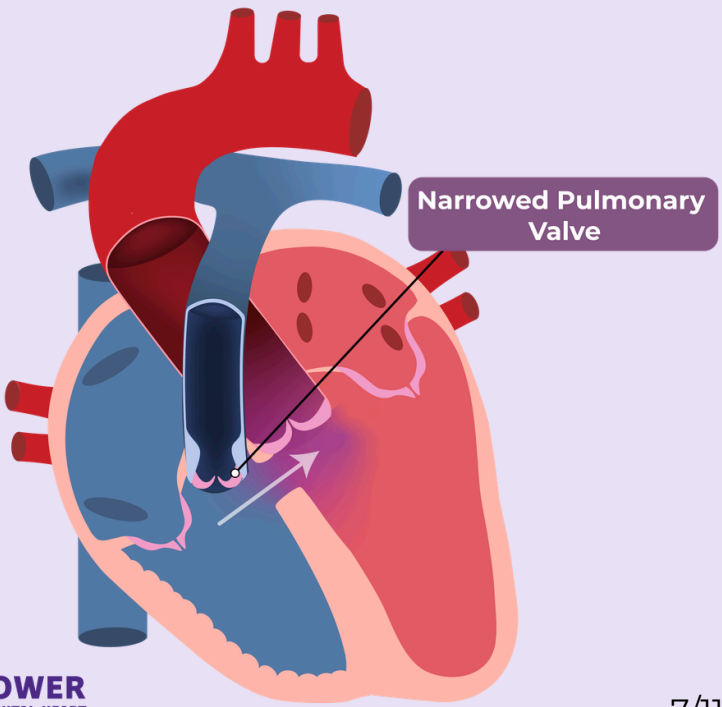
- The **valves** in your heart work like **doors** in a house, opening and closing to keep blood moving in one direction.

- Each time the heart beats, these doors **open fully** to let blood pass through and then **close tightly** so nothing leaks backward.

If a valve becomes stuck or weak, it's like a door that won't close all the way. Air (or in this case, blood) slips back through, and the system has to work harder to stay balanced.

If a valve becomes too stiff or narrow, it's like a door that's hard to open, forcing the heart to push harder to get blood where it needs to go.

Example of a Defect With a Narrowed Door
Tetralogy of Fallot



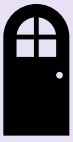
BRINGING IT ALL TOGETHER

The **Structure** of the heart gives it its shape and guides the flow of blood.

The **Plumbing** (the blood vessels) moves blood throughout the body.

The **Pump** (the heart muscle) maintains strong blood flow.

The **Electrical** signals keep the heartbeat in rhythm.



The **Valves** control the direction of blood flow.

MAKING THE CONNECTION

The **Structure** of the heart gives it its shape and guides the flow of blood.

Rooms that are too small (hypoplastic) don't function as intended.

Rooms that are too large (***hypertrophied***) are harder to keep at a comfortable temperature.

A hole in the wall of the heart is like an open window stuck open in the middle of winter, letting the cold air in.

The **Plumbing** (the blood vessels) moves blood throughout the body.

Pipes that are too narrow (stenosis, like coarctation) increase pressure and slow flow.

Pipes that are weak or thin can become enlarged (***dilated vessels or aneurysm***) and unsafe.

Pipes connected to the wrong room (like transposition) send water to places where it can't be used properly.

The **Pump** (the heart muscle) maintains strong blood flow.

A weak pump is like a heating or cooling system that cannot keep your house at a comfortable temperature.

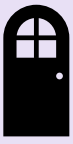
MAKING THE CONNECTION

The **Electrical** signals keep the heartbeat in rhythm.

If there is a problem with the electrical system, it is like a fuse that keeps blowing or a tripped circuit breaker, causing the lights in your bedroom to go out.

If there are extra wires, damaged wires, or a blocked switch, the rhythm can become too fast or too slow.

We treat the heart's electrical system the same way you'd fix house wiring: remove bad wires, block extra circuits, or add a small generator (pacemaker or defibrillator) to keep things steady.

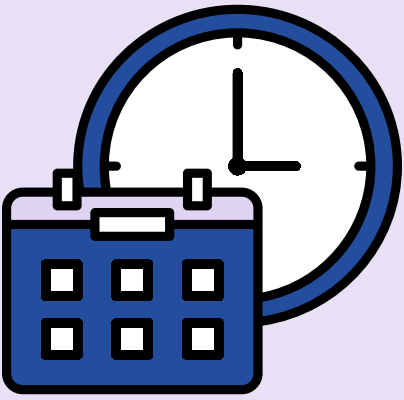


The **Valves** control the direction of blood flow.

A door that is too tight (stenosis) makes it hard to let people in from the cold.

A door that doesn't close (regurgitation) lets strangers you kicked out slip back into your house.

NEXT TIME



Now that you understand the basics of how the heart works, you'll be ready next time to explore different CHD conditions through the "heart as a house" framework. For each condition, we will go over:

- **What it is**
- **What happens when you have it**
- **How common it is**
- **Common repairs & procedures**
- **Long-term implications**
- **Recommended follow-up**

These sections will help you connect what you've learned here to your own heart and support you in understanding your care.