

Aortic Regurgitation



The 4 valves of the heart are normally very efficient, providing almost no resistance to forward flow when open and nearly infinite resistance to backflow when closed.

Valves that fail to open properly can create a significant impediment to forward flow. This is called stenosis.

Valves that fail to close properly provide less than infinite resistance to backflow. This backflow is called regurgitation.

In this exercise, we'll investigate the hemodynamic consequences of aortic valve regurgitation.

The Aortic Regurgitation Protocol

Click **Restart** to reestablish initial conditions and then record control values.



Go to **Left Heart Valves** and increase the closed area of the aortic valve to 0.12 mM^2 . Record the acute hemodynamic effects of this stenosis. Advance time and record data. Look for evidence of compensation.





Cardiac Output (mL/Min)

Pulm. Artery Pressure (mmHg)

Pulm. Capillary Pressure (mmHg)

Pulm. Vein Pressure (mmHg)

Left Atrial Pressure (mmHg)



Plasma Colloid Pressure (mmHg)

Arterial pO₂ (mmHg)

Blood Volume (mL)



Excess Lung H₂O (mL)

Time	Control	Acute	1 Week
Cardiac Output			
Pulm. Artery Pressure			
Pulm. Caps Pressure			
Pulm. Vein Pressure			



Left Atrial Pressure			
Plasma COP			
Arterial pO2			
Blood Volume			
Excess Lung H2O			

Pulmonary Edema

Normally, the plasma colloid pressure is considerably greater than the pulmonary capillary pressure. Note the control data above. This creates a negative filtration pressure in the pulmonary capillaries and keeps the lungs dry.

Aortic regurgitation can interfere with left heart diastolic filling, increasing pressures in the pulmonary circulation. Pulmonary edema can develop.

Click **Restart** to reestablish initial conditions and then record control values.



Go to **Left Heart Valves** and increase the closed area of the aortic valve to 0.14 mM^2 . Attempt to advance time for a week, but stop and record data if QCP's condition deteriorates.

Time	Control	Acute	1 Week



Cardiac Output			
Pulm. Artery Pressure			
Pulm. Caps Pressure			
Pulm. Vein Pressure			
Left Atrial Pressure			
Plasma COP			
Arterial pO ₂			
Blood Volume			
Excess Lung H ₂ O			

What effect does aortic regurgitation have on tolerance to exercise?

