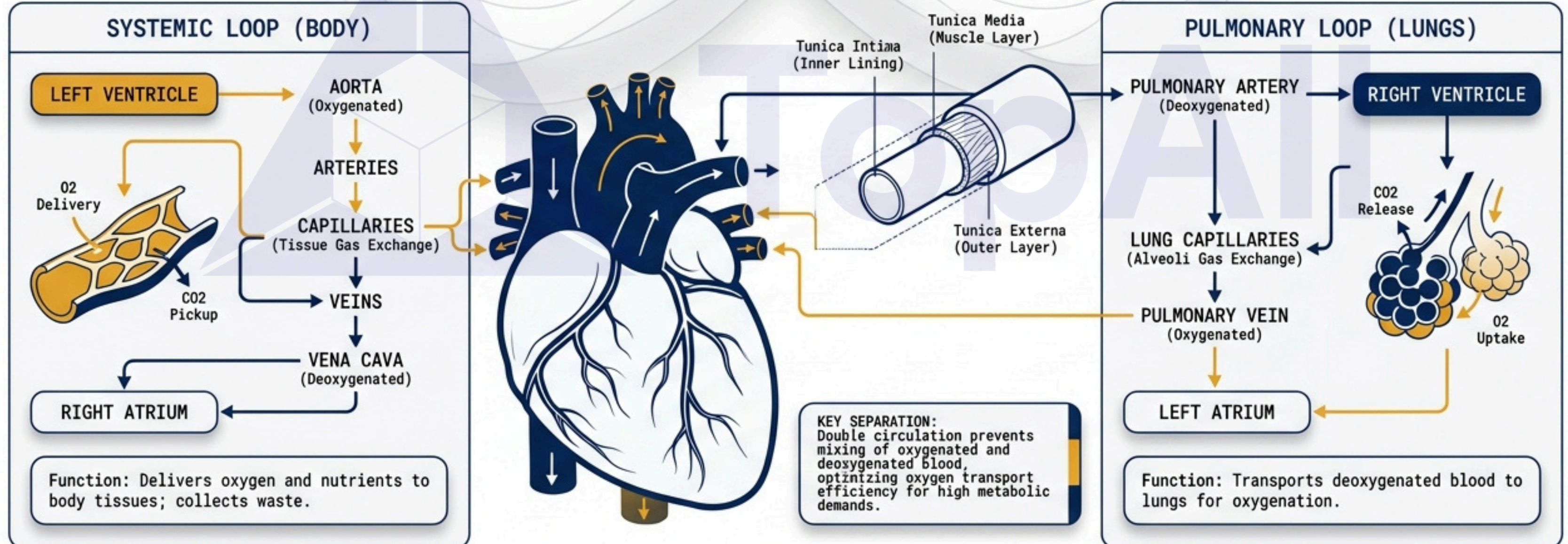


Two Loops That Keep Blood Flowing

The architectural breakdown of human double circulation, blood vessels, and the strict separation of oxygenated and deoxygenated pathways.



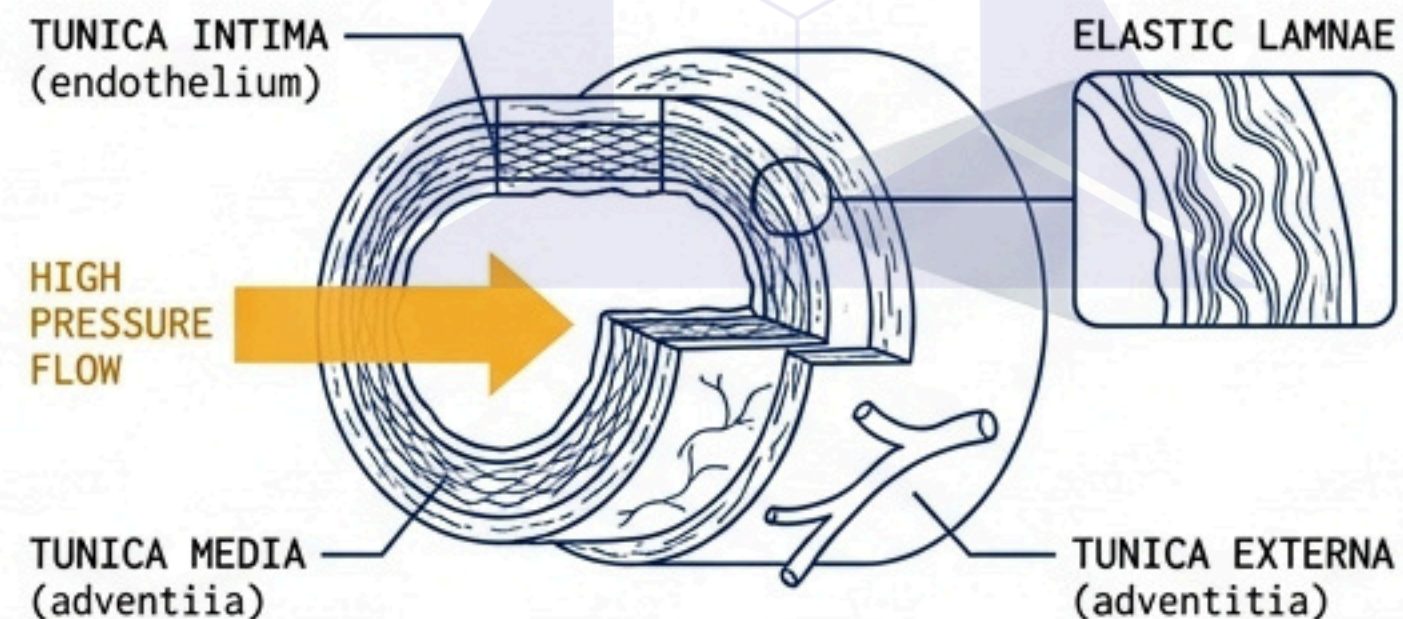
THE VESSELS: ARTERIES AND VEINS

Blood flows strictly through a fixed route of specialized vessels. Both vessel types share a fundamental architecture, but with crucial structural adaptations based on functional pressure.

ARTERIES (Distributors)



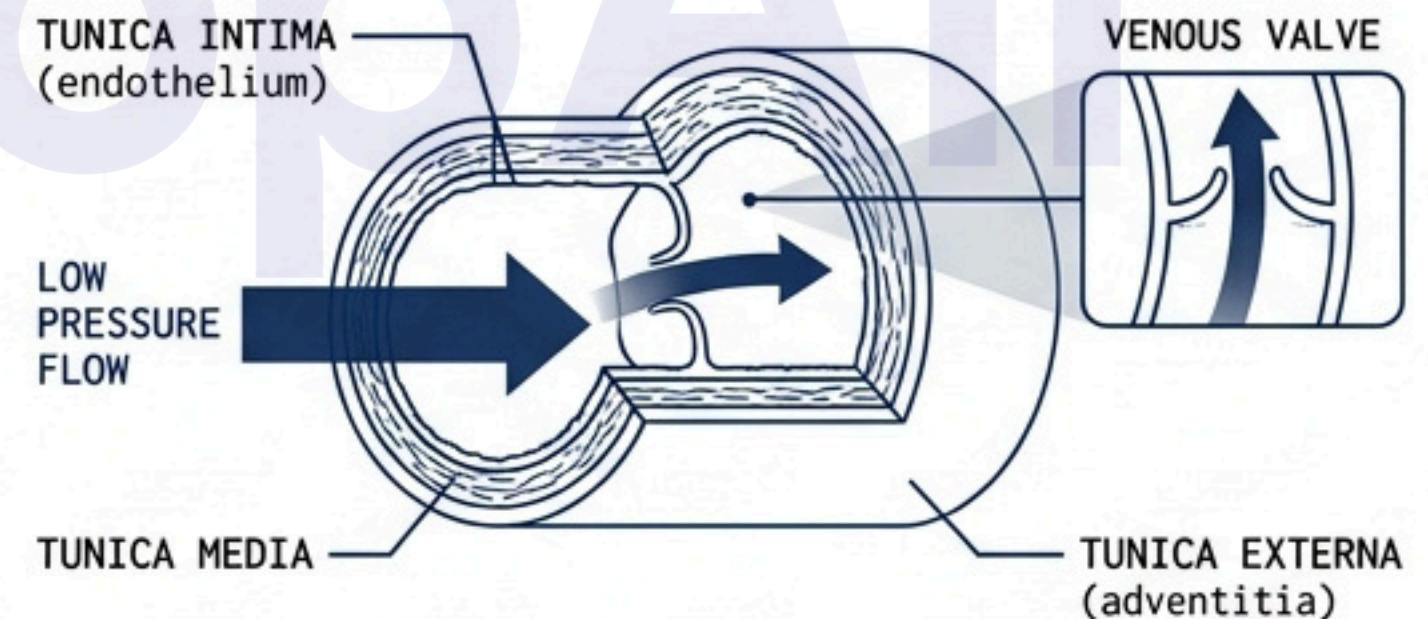
Carries blood away from the heart. Engineered to withstand high pumping pressure from the ventricles, requiring thicker, highly elastic walls.



VEINS (Collectors)



Carries blood toward the heart. Operates under lower pressure, featuring comparatively thinner walls and internal valves to prevent backflow.



NOTE: Both utilize a fundamental **three-layer structure**.

Tunica Intima, Media, and Externa

1. TUNICA INTIMA

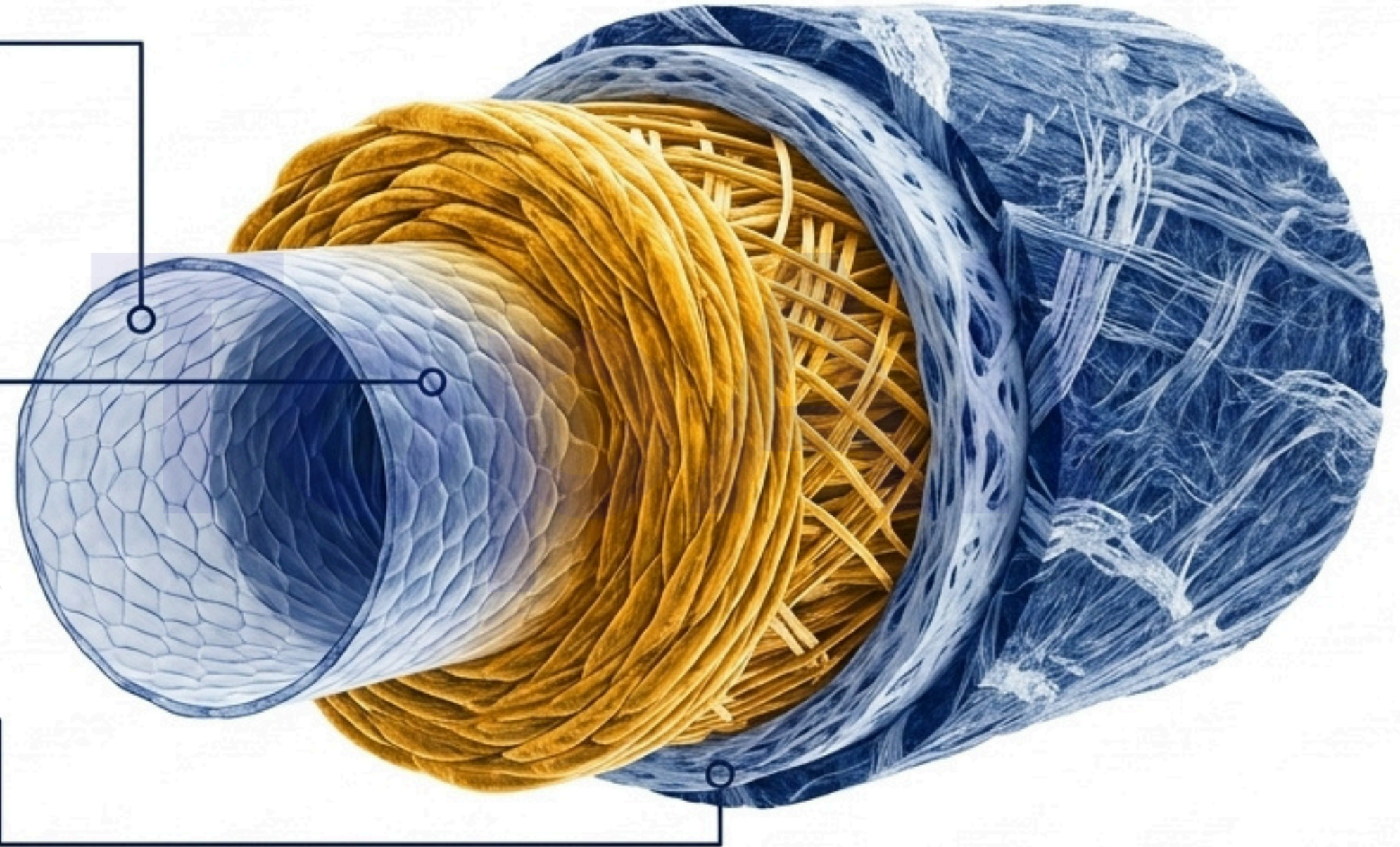
Inner lining composed of squamous endothelium. Creates a smooth surface for minimal friction.

2. TUNICA MEDIA

Middle layer of smooth muscle & elastic fibres. Diagnostic feature: Comparatively thin in the veins.

3. TUNICA EXTERNA

External layer of fibrous connective tissue with collagen fibres for structural integrity.





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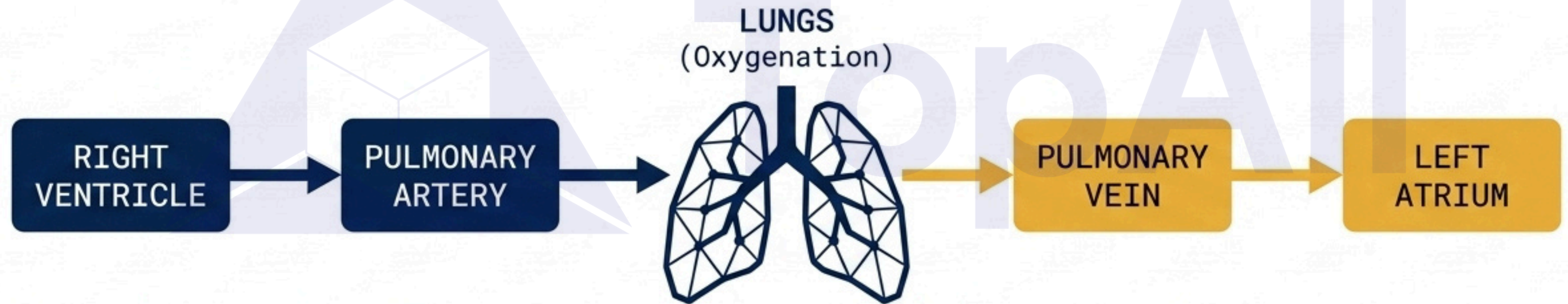
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- » Track Your Performance Smarter



PULMONARY CIRCULATION: THE RECHARGER

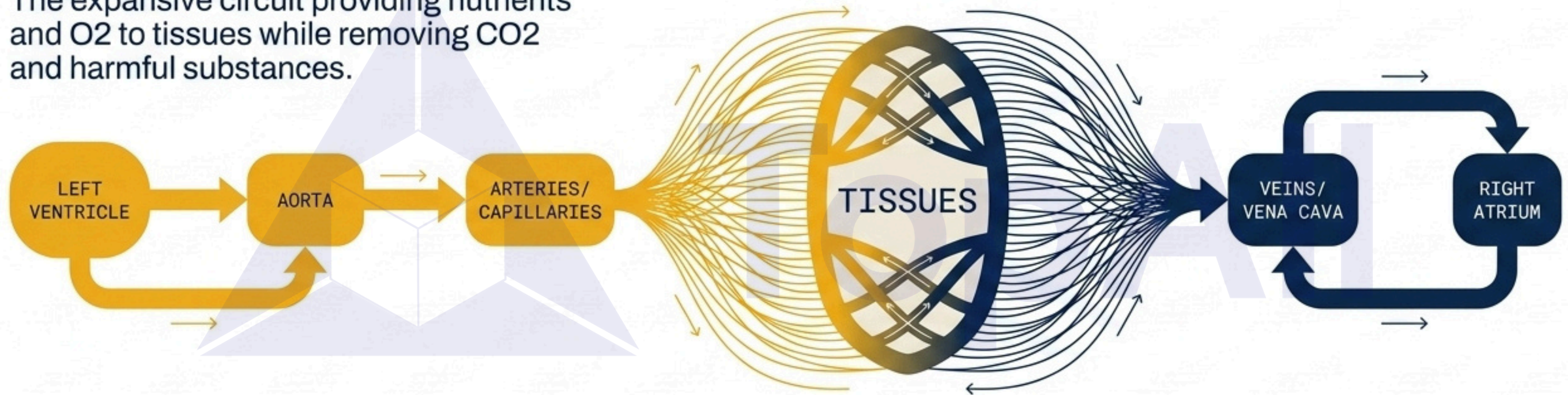
The dedicated pathway for gas exchange, routing deoxygenated blood to the lungs and returning it oxygenated to the left atrium.



Note: The Pulmonary Artery is the rare artery that carries deoxygenated blood.

Systemic Circulation: The Delivery Network

The expansive circuit providing nutrients and O₂ to tissues while removing CO₂ and harmful substances.



Hepatic Portal System

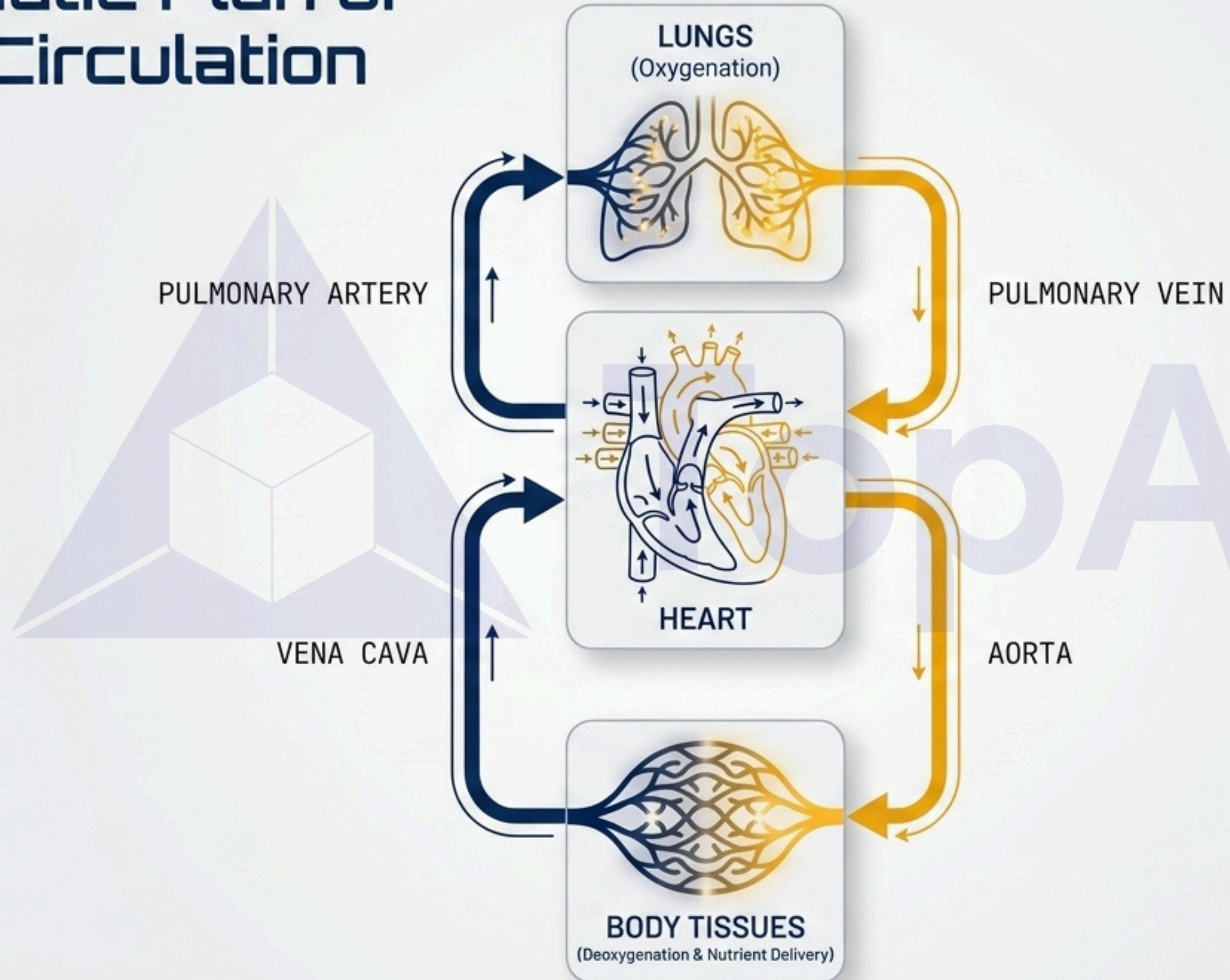
Unique vascular connection routing blood from the digestive tract to the liver before systemic return.

Coronary System

Exclusive blood vessels serving the cardiac musculature to and from the heart itself.

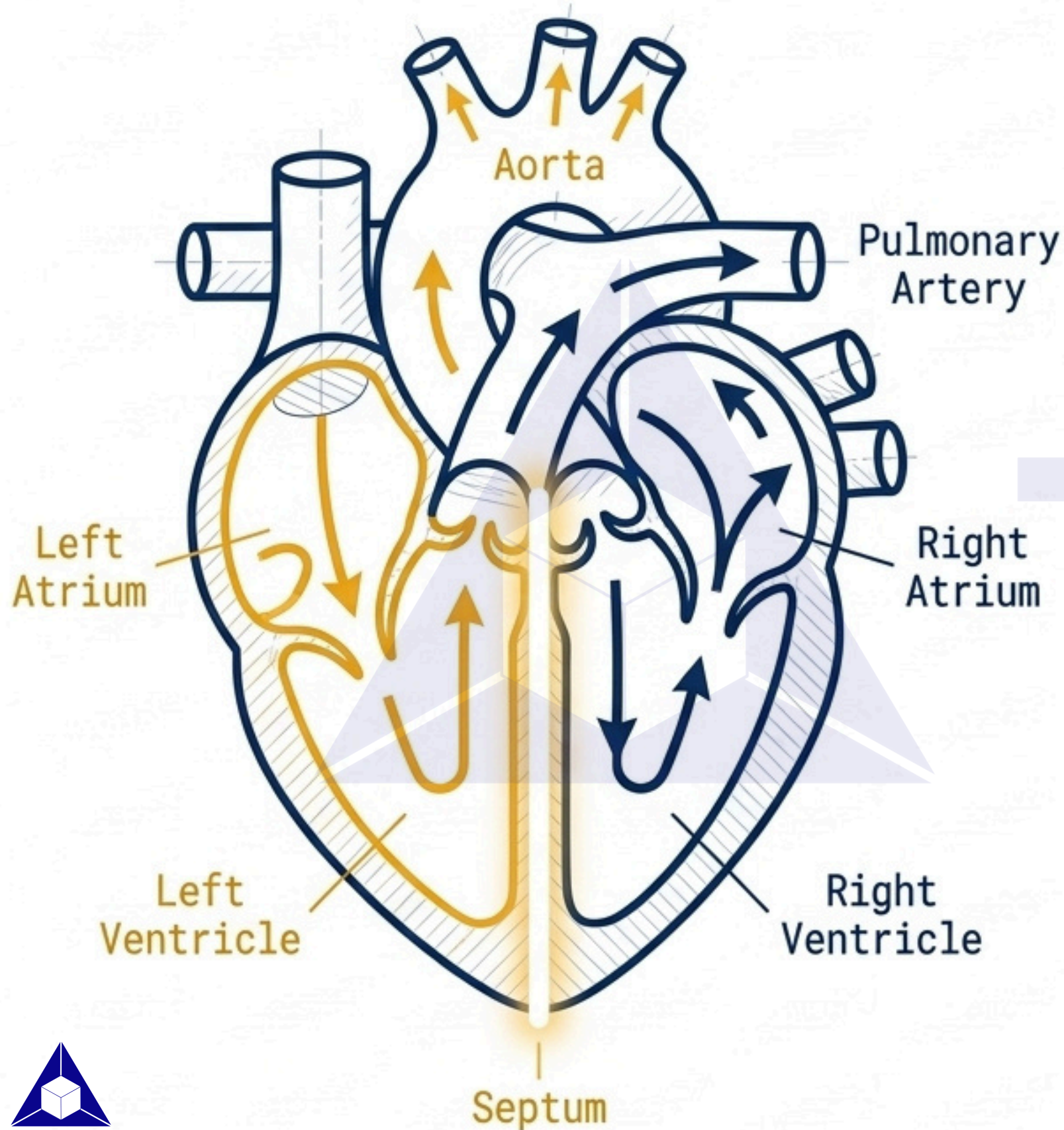
Schematic Plan of Blood Circulation

FIG 15.4: SCHEMATIC PLAN OF BLOOD CIRCULATION IN HUMANS



Oxygenated & Deoxygenated Blood Separation

In birds and mammals, the left and right sides of the heart act as completely isolated pumps.



- Oxygenated blood (left atrium) and deoxygenated blood (right atrium) pass into their respective ventricles.

- The ventricles pump the blood out without any mixing occurring in the heart.

- This strict separation defines Double Circulation, enabling a highly efficient supply of oxygen.

WARNING: Incomplete separation (as seen in amphibians/reptiles) leads to mixed blood in a single ventricle, which is dangerously inefficient for human metabolic needs.

Key Takeaway

Human double circulation utilizes a closed, three-layered vascular network to run two simultaneous, perfectly separated loops. The pulmonary loop recharges the blood, while the systemic loop nourishes the body—ensuring high-pressure, unmixed oxygen delivery for maximum metabolic efficiency.



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