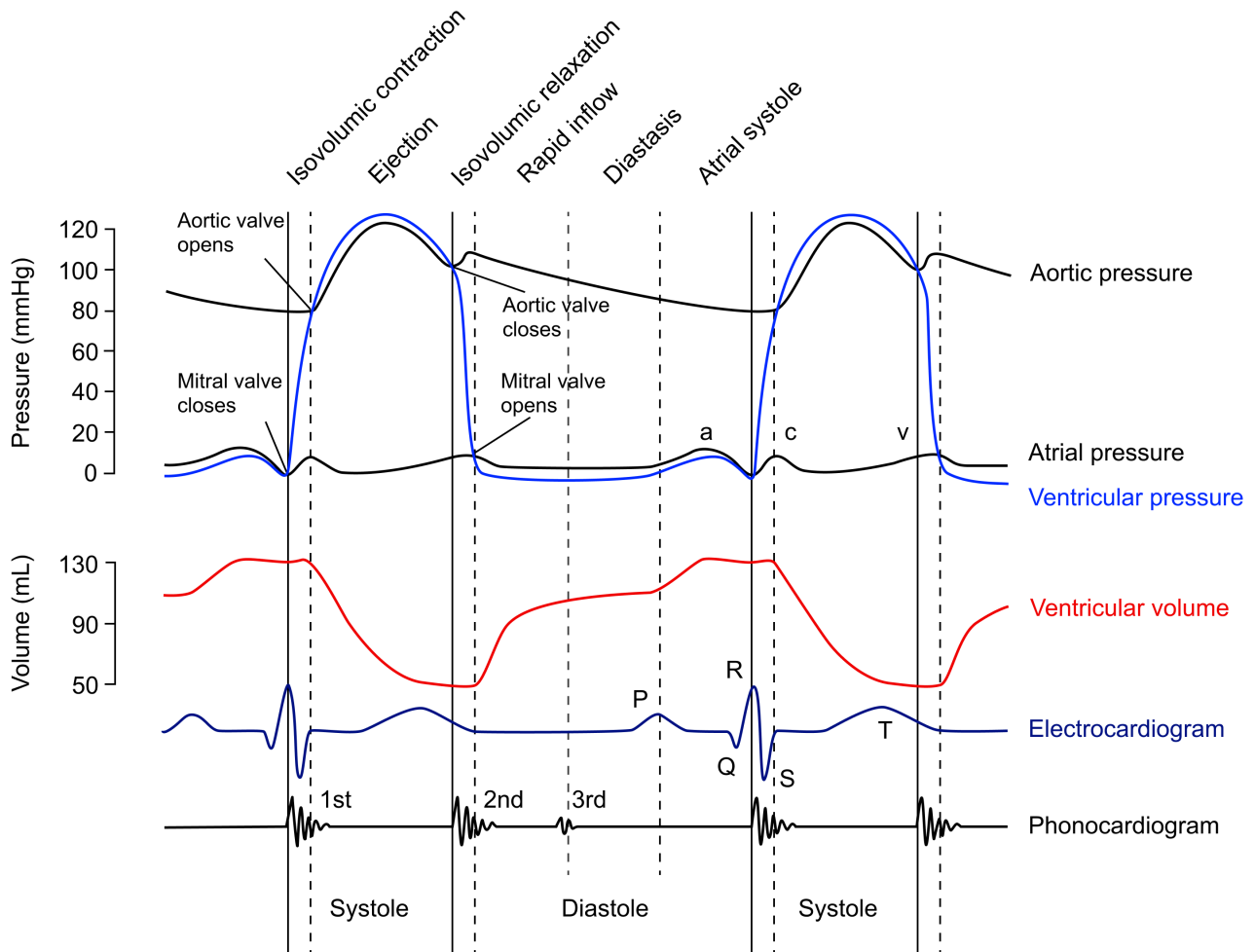


Wiggers Diagram

The Wiggers diagram illustrates the dynamic pressure changes in the left atrium, left ventricle, and aorta during a single cardiac cycle. It integrates key physiological events, including valve function, heart sounds, and corresponding pressure and volume changes.

Although intracardiac pressures differ between the left and right sides of the heart—reflecting the left side's systemic load versus the right side's pulmonary load—the waveform morphology remains consistent across both sides.



Cardiac cycle phases in the Wiggers Diagram

The diagram can be interpreted through four main phases:

Atrial systole

Atrial contraction raises atrial pressure, augmenting ventricular filling and contributing to the end-diastolic volume. This phase ensures the ventricles are fully loaded with blood before contraction. The associated rise in ventricular pressure is proportional to the atrial contribution. The closure of the mitral valve marks the end of atrial systole and produces the first heart sound (S1) as ventricular pressure surpasses atrial pressure.

Ventricular systole: Isovolumetric contraction

During isovolumetric contraction, the ventricles experience a rapid increase in pressure without any corresponding change in volume, as both the mitral and aortic valves remain closed. This phase primes the ventricles for the ejection of blood. Once ventricular pressure surpasses aortic pressure, the aortic valve opens, initiating the next phase—the ejection phase.

Ventricular systole: Ejection phase

In the ejection phase, ventricular pressure continues to rise, reaching its peak during mid-ejection as the ventricles contract maximally. Blood is forcefully ejected into the aorta, causing a synchronous increase in aortic pressure. As ventricular contraction subsides, the pressure in the ventricles declines. When ventricular pressure falls below aortic pressure, the aortic valve closes, producing the second heart sound (S2).

Diastole

Diastole begins with isovolumetric relaxation, occurring immediately after the aortic valve closes. During this phase, the mitral valve remains shut, keeping the ventricular volume constant while the pressure decreases. When ventricular pressure drops below atrial pressure, the mitral valve opens, allowing the ventricular filling to begin. This diastolic filling gradually increases both atrial and ventricular pressures, completing the cardiac cycle.

Notes

Pollock, J. D., & Makaryus, A. N. (2022). Physiology, cardiac cycle. In *StatPearls* [Internet]. StatPearls Publishing. Retrieved January 2025, from <https://www.ncbi.nlm.nih.gov/books/NBK459327/figure/article-786.image.f1/>

Silverthorn D. U. (2022). Constructing the Wiggers diagram using core concepts: a classroom activity. *Advances in physiology education*, 46(4), 714–723. <https://doi.org/10.1152/advan.00046.2022>