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Human Aorta Is a Passive Pump NIEMA PAHLEVAN, MORTEZA GHARIB, California Institute of Technology — Impedance pump is a simple valveless pumping mechanism that operates based on the principles of wave propagation and reflection. It has been shown in a zebrafish that a similar mechanism is responsible for the pumping action in the embryonic heart during early stages before valve formation. Recent studies suggest that the cardiovascular system is designed to take advantage of wave propagation and reflection phenomena in the arterial network. Our aim in this study was to examine if the human aorta is a passive pump working like an impedance pump. A hydraulic model with different compliant models of artificial aorta was used for series of in-vitro experiments. The hydraulic model includes a piston pump that generates the waves. Our result indicates that wave propagation and reflection can create pumping mechanism in a compliant aorta. Similar to an impedance pump, the net flow and the flow direction depends on the frequency of the waves, compliance of the aorta, and the piston stroke.

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