What are the disadvantages of turbulent flow in the circulatory system? Explain briefly. Answer individually; **post your response to the Discussion Board by 9:00 PM of Day 4 of the module.**

* When the blood flow is turbulent, there is a dissipation of energy due to the loss of energy in the form of friction. In turbulent flow, pressure drop is approximately proportional to the square of the flow rate (B&L [15] p 349). Therefore, to maintain a given flow, the heart does more work.
* Also, under repeated impaction of high pressure, a turbulent blood on the vessel wall damages the elastic fibers within the media. As a consequence, the elastic fibers break into smaller fragments, rendering the fibers nonfunctional.
* Additionally, regions of turbulences are associated with deposits of plaque, an accumulation of cellular waste and fatty molecules that can obstruct blood flow and potentially cause arterial or pulmonary embolism. Blood turbulences have been also related to some extent with atherosclerosis (Nature: A turbulent path to plaque formation, 540, pages 531–532(2016)).
* In the venous system, disturbed flow resulting from reflux, outflow obstruction, and/or stasis leads to venous inflammation, and hence the development of chronic venous diseases.

(In depth survey on the role of disturbed flows in vascular endothelial cells <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3844671/>)

Turbulent flows are related to a high R Reynold’s number > 3000:

Where:

: fluid density

D: tube diameter

v: mean velocity

: viscosity

A high Reynold’s number is indicative of high fluid densities, small blood vessels, or high flow velocities and low fluid viscosities. Reduced blood viscosities, high flow velocities associated with high cardiac output usually are observed in severe anemia patients.

v