Series 9 (29 April 2024)

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Chapter 20 : Wave Travel and Velocity

Exercise 20.1

Determine the order of magnitude of the wavelengths of the pressure waves in the human body. Which factors can modify this value?

Exercise 20.2

The figure below shows the pressure-internal diameter curves of a rat common carotid artery. The curve in blue is the p-d curve under maximal vasodilation, the curve in green under normal physiological tone and the curve in red under maximal contraction.
Determine:

1) The PWV at normal physiological conditions (normal tone and at mean pressure of 100 mmHg).
2) After a strong dose of norepinephrine, the mean pressure is raised to 150 mmHg. What is the new value of PWV? Assume still normal tone.
3) Following the increase in pressure to 150 mmHg, the artery develops very strong myogenic tone and reaches maximal contraction. What would the new value of PWV be? Discuss the results.
4) What is the value of incremental elastic modulus in all of the above states, if it is known that the ratio of thickness to diameter at 100 mmHg and under normal tone is 1:10?