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P137 Reflections Revisited: Reinterpretation Required

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ABSTRACT

Introduction: Pressure waveshape derived parameters such as the augmentation index are related to unfavourable cardiovascular events [1]. Wave reflections determine wave shape [2], however, several findings seem to contradict the current views. Current view. The arterial system can be modelled by a tube with a reflection site at the end: the heart sets up waves propagating down the system, reflecting at the end and returning to the heart after twice the travel time, i.e. aortic length over Pulse Wave Velocity (PWV).Data. Return time of the reflected wave is not inversely proportional to PWV [3]. Also, reflected waves appear to run downstream rather than to the heart [4]. These findings conflict with the current concepts.

Interpretation: At all locations in the arterial system, wave reflection is determined by the characteristic impedance of the supplying vessel and the input impedance of the downstream system. The input impedance results from a system of many arteries with multiple reflection sites [5]. Time delay between forward and reflected wave is mainly determined by the phase angle of the downstream impedance, and does not systematically increase or decrease with distance. This implies that the time difference between reflected and forward wave is not increasing towards the heart as assumed by the single-tube model. As a consequence, the return time of the reflected wave is not inversely proportional to PWV.

Conclusion: The single tube model should be abandoned as conceptual model as is does not explain the measured data. A frequency domain (impedance) model is required.

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