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Geometric And Hemodynamic Characterization of Uterine Spiral Arteries: The Concept of Resistance Reserve

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Abstract

Background: The coiled geometry of spiral arteries in the human uteroplacental circulation is a hemodynamic enigma because of added length of a spiral artery compared with that of a straight artery, as well as added complexity of the flow within the vessel because of the coiling curvature.
Methods: We examined the geometric and hemodynamic characteristics of mathematically defined helical and spiral arteries and compared these with the corresponding characteristics of a straight artery traversing the same depth of tissue, with the aim of gaining some insight into the possible role of spiral geometry in uteroplacental perfusion.
Results: The results indicate that the added length of a spiral artery provides the uteroplacental circulation with a *reserve of high resistance to flow*. The effect of coiling geometry on the flow within the artery is the development of churning vortices in planes normal (perpendicular) to the main flow

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