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A CFD Study of the Effects of Physiological Vessel Wall Motion on Oxygen Transport in Coronary Arteries

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The principle objective of this paper is to present the development of a CFD methodology to simulate motion of a coronary artery and luminal transport of oxygen to the wall using a commercially available CFD solver. To study the effects of physiological motion on oxygen transport two simulations were carried out, with (dynamic) and without (static) motion. The pulsatile blood flow and wall motion are based on physiological velocity and vessel motion waveforms derived from previously published works. The results demonstrate that the oxygen transport in coronary arteries is altered by the wall motion. In the cases presented here the SDR was not only greater in the dynamic model but the differences between the inner and outer wall as seen in the static model disappeared in the dynamic model. However, it should be noted that this will of course depend upon the motion patterns used in this study.

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