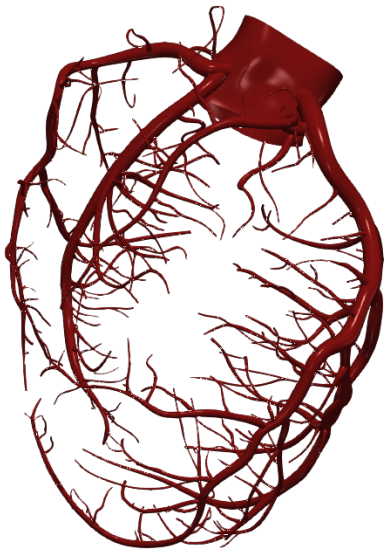
Vascular Model Repository Specifications Document



190529_P6

Species	Mouse
Anatomy	Coronary
Disease	Myocardial Infarction
Procedure	-

Clinical Significance and Background

Coronary

Coronary arteries supply blood to the heart muscle. Like all other tissues in the body, the heart muscle needs oxygen-rich blood to function. Also, oxygen-depleted blood must be carried away. The coronary arteries wrap around the outside of the heart. Small branches dive into the heart muscle to bring it blood. The two main coronary arteries are the left main and right coronary arteries.

The left main coronary artery (LCMA) supplies blood to the left side of the heart muscle (the left ventricle and left atrium). The left main coronary then divides into branches: The left anterior descending artery which supplies blood to the front of the left side of the heart and the circumflex artery which encircles the heart muscle supplies blood to the outer side and back of the heart.

The right coronary artery (RCA) supplies blood to the right ventricle, the right atrium, and the SA (sinoatrial) and AV (atrioventricular) nodes, which regulate the heart rhythm. The right coronary artery divides into smaller branches, including the right posterior descending artery and the acute marginal artery. Together with the left anterior descending artery, the right coronary artery helps supply blood to the middle or septum of the heart.

Myocardial Infarction

A myocardial infarction, or more commonly known as a heart attack, happens when one or more areas of the heart muscle don't get enough oxygen. This happens when blood flow to the heart muscle is blocked. The blockage is caused by a buildup of plaque in the arteries (atherosclerosis). Plaque is made up of deposits, cholesterol, and other substances. When a plaque breaks (ruptures), a blood clot quickly forms. The blood clot is the actual cause of the heart attack. If the blood and oxygen supply is cut off, muscle cells of the heart begin to suffer damage and start to die. Irreversible damage begins within 30 minutes of blockage. The result is heart muscle affected by the lack of oxygen no longer works as it should.

Clinical Data

General Patient Data

Age (yrs)	0.016438356
Sex	-

Specific Patient Data

Condition	wild-type, non-injured

Notes

See below for information on the image data and boundary conditions associated with the model.

Image Modality: Ultramicroscope II, light sheet microscopy

Image Source: Stanford

Publications

See the following publications which include the featured model for more details:

Anbazhakan, S., Coronado, P. E. R., Sy-Quia, A. N. L., Seow, A., Hands, A. M., Zhao, M., ... & Red-Horse, K. (2021). Blood flow modeling reveals improved collateral artery performance during mammalian heart regeneration. bioRxiv. http://www.doi.org/10.1016/j.vascn.2011.10.003

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