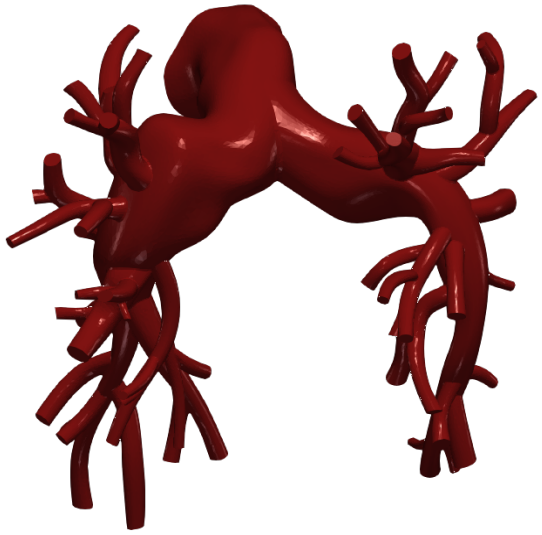
Vascular Model Repository Specifications Document



0134_0002

Species	Human
Anatomy	Pulmonary
Disease	Congenital Heart Disease Tetralogy of Fallot
Procedure	-

Clinical Significance and Background

Pulmonary

The pulmonary circulation involves blood flowing from the right ventricle of the heart into the pulmonary arteries. From the pulmonary arteries, the blood then reaches the lungs, performs a gas exchange, and then continues to the pulmonary veins which then lead to the left atrium of the heart.

By definition, an artery is a blood vessel that carries blood away from the heart. This usually means arteries carry oxygenated blood to the rest of the body, but since the pulmonary arteries are transporting blood from the right side of the heart to the lungs to perform respiration, that makes the pulmonary arteries the only arteries in the body that actually carry deoxygenated blood. Similarly, the pulmonary veins, which carry blood that has been freshly oxygenated from the lungs back to the heart, are the only veins that actually carry oxygenated blood.

Congenital Heart Disease

Congenital heart disease is one or more problems with the heart's structure that exist since birth. Congenital means that you're born with the condition. Congenital heart disease in adults and children can change the way blood flows through the heart. Some types of congenital heart disease may be mild. But complex defects may cause life-threatening complications. However, advances in diagnosis and treatment continue to improve survival for those with congenital heart disease. People with congenital heart disease need lifelong medical care. Treatment may include regular checkups (watchful waiting), medications or surgery.

Tetralogy of Fallot

Tetralogy of Fallot is a rare condition caused by a combination of four heart defects that are present at birth (congenital). These defects, which affect the structure of the heart, cause oxygen-poor blood to flow out of the heart and to the rest of the body. Tetralogy of Fallot includes four defects: pulmonary valve stenosis, ventricular septal defect, shifting of the aorta, and right ventricular hypertrophy.

In pulmonary valve stenosis, the valve that separates the lower right chamber of the heart (right ventricle) from the main blood vessel leading to the lungs (pulmonary artery) is narrowed and blood flow to the lungs is reduced. The narrowing might also

affect the muscle beneath the pulmonary valve. Sometimes, the pulmonary valve doesn't form properly (pulmonary atresia).

A ventricular septal defect is a hole in the wall (septum) that separates the two lower chambers of the heart (left and right ventricles). The hole causes oxygen-poor blood in the right ventricle to mix with oxygen-rich blood in the left ventricle. This causes inefficient blood flow and reduces the supply of oxygen-rich blood to the body. The defect eventually can weaken the heart.

Normally the aorta branches off the left ventricle. In tetralogy of Fallot, the aorta is in the wrong position. It's shifted to the right and lies directly above the hole in the heart wall (ventricular septal defect). As a result, the aorta receives a mix of oxygen-rich and oxygen-poor blood from both the right and left ventricles.

Right ventricular hypertrophy is the thickening of the right lower heart chamber. When the heart's pumping action is overworked, the muscular wall of the right ventricle becomes thick. Over time this might cause the heart to stiffen, become weak and eventually fail.

Some children or adults who have tetralogy of Fallot may have other heart defects such as a hole between the heart's upper chambers (atrial septal defect), a right aortic arch or problems with the coronary arteries.

Clinical Data

General Patient Data

Age (yrs)	31
Sex	Male

Specific Patient Data

Height (m)	167.64
Weight (kg)	78.93
CI (L/min/m^2)	2.9
Cardiac Output (L/min)	5.68
F PA index MRI	2.88
F PA MRI	5.5

Notes

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

Image Modality:	MR
Image Type:	DICOM
Image Source:	STAN
Image Manufacturer:	GE MEDICAL SYSTEMS
Boundary Conditions:	Refer to boundary conditions in the SimVascular file.

Publications

There are no publications associated with the featured model.

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