CAAS | 4D Magnetic Resonance Analysis

MR 4D Flow

Visualization and Quantification of Aortic Blood Flow

PIE MEDICAL IMAGING

solutions in cardiovascular analysis

Complete assesment of your MR 4D Flow data

Time-efficient and intuitive analysis of your 3D phase contrast MR

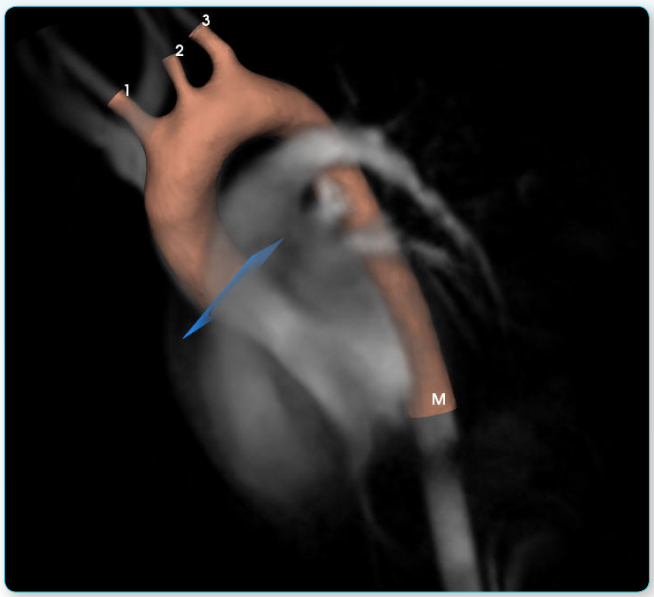
Nowadays a lot of research on valvular disease is based on 3D phase contrast MR images. CAAS MR 4D Flow is specifically designed to extract relevant information from the 3D phase contrast MR images, within a few clicks. Automatic 3D segmentation of the data provides interactive visualization of flow patterns by means of streamlines, time-resolved path lines and color coded vectors.

Parameters for Flow comparison

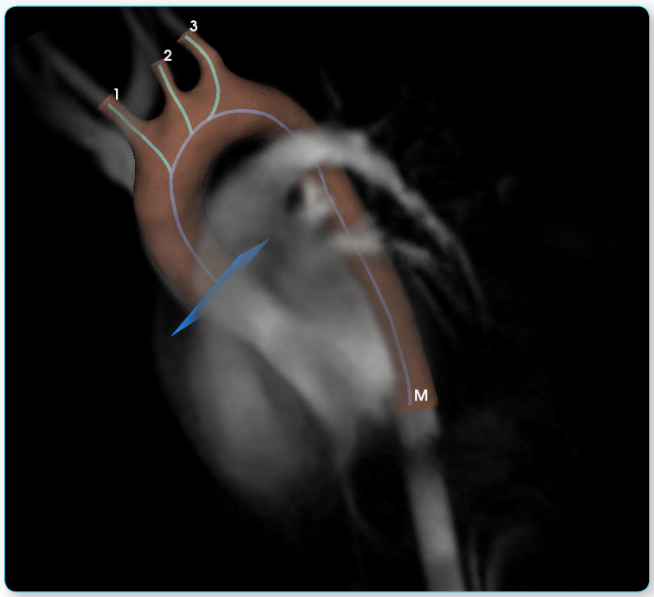
Compare different planes in the aorta or different datasets by 2D flow and Wall Shear Stress parameters, provided by the software.

Segmentation

CAAS MR 4D Flow enables you to construct a 3D Volume of the cardiovascular structure that can be visualized interactively. You can turn, pan and adjust opacity of the 3D anatomical structure for easy visualization. A centerline, for planar visualization and quantification, can automatically be defined by just one click in the ascending and one click in the descending aorta. The provided workflow guides you through the software for easy and fast analysis of your dataset.



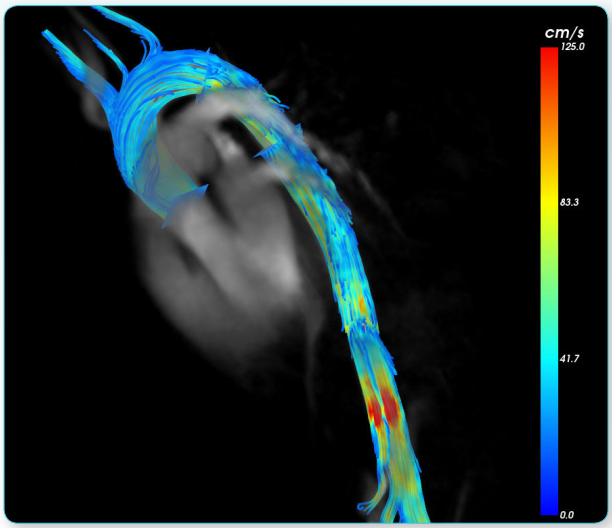
Mesh edit of 3D Model



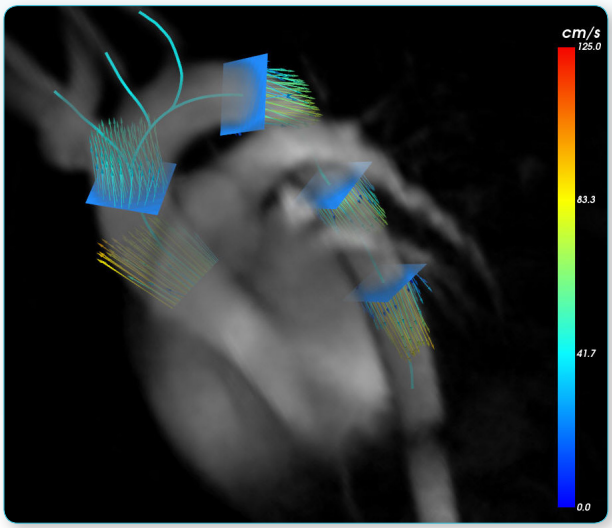
3D volume with centerline

Visualization

CAAS MR 4D Flow provides multiple options for visualization of blood flow. Through interactive 'point and click', multiple emitter planes can be placed along the centerline. Originating from multiple and freely selectable emitter planes, aortic flow can be visualized by streamlines, time-resolved 3D pathlines or as color coded vectors.



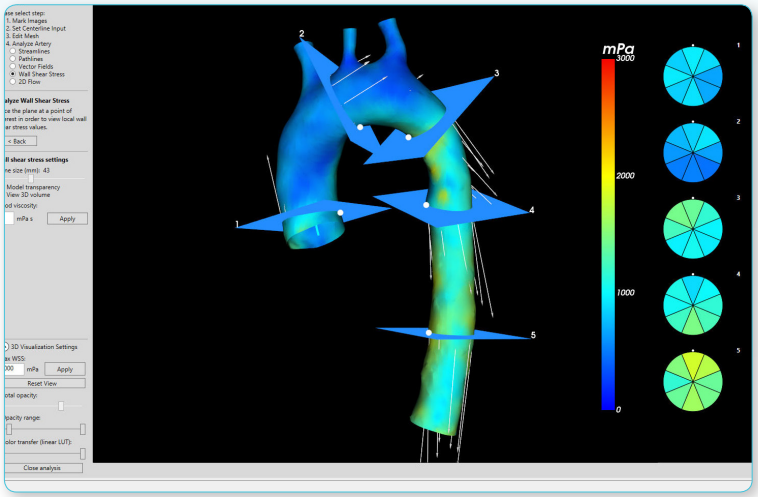
Streamline visualization



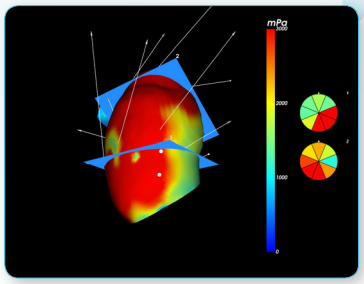
Vector fields from three emitter planes

Wall Shear Stress

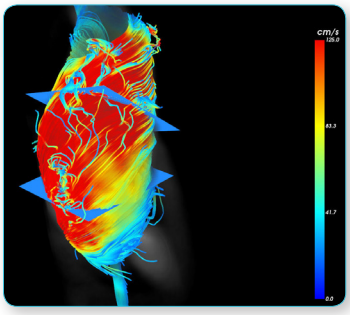
Compare different planes within a dataset by measuring the wall shear stress (WSS). The distribution of the wall shear stress will be presented in a 3D color coded model. By placing multiple planes in the 3D model, local values of wall shear stress are represented by pie charts.



Wall shear stress distribution and representation in pie charts



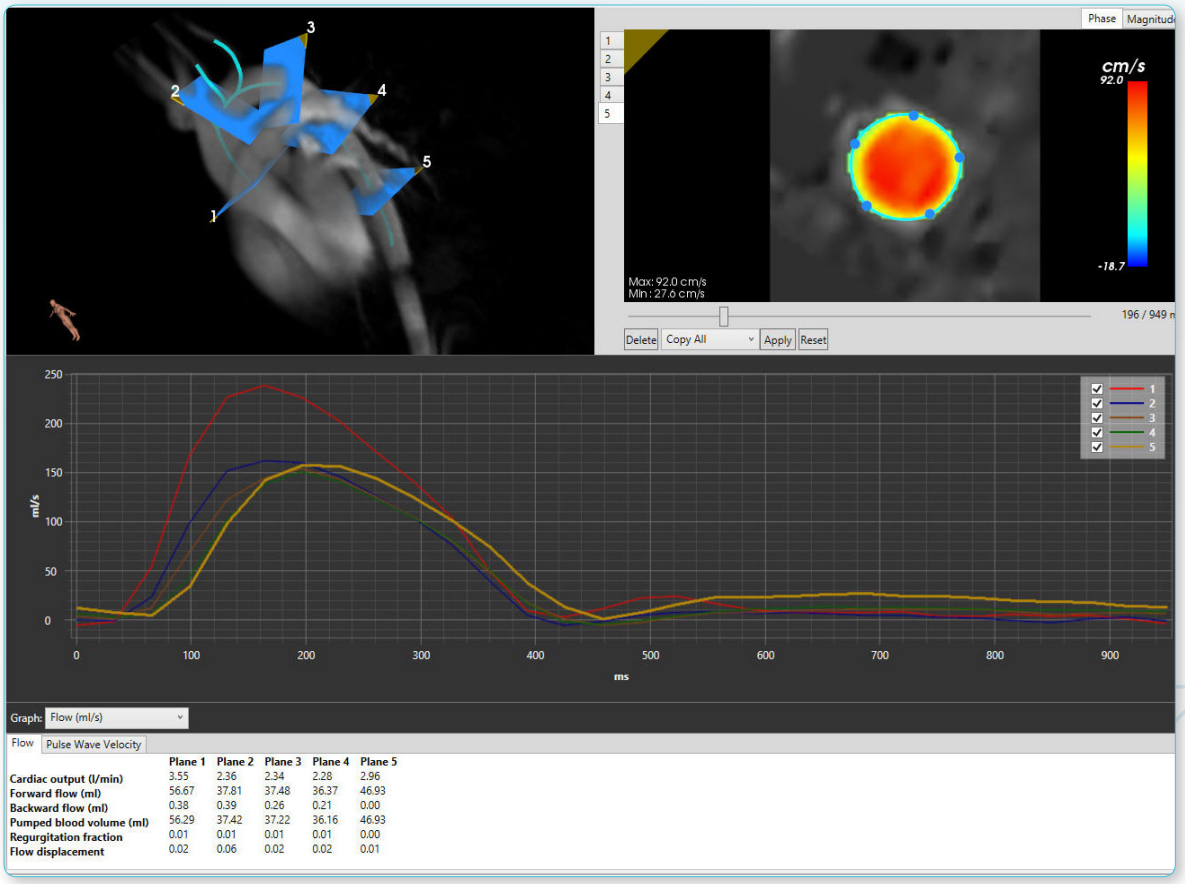
WSS within aneurism (ascending aorta)



Corresponding streamlines within aneurism (ascending aorta)

2D Flow Parameters

A 2D flow phase contrast analysis in the 3D volume can be performed in just a few clicks. You can freely place multiple planes throughout the aorta for 2D velocity analyses. Using the phase contrast and magnitude images, a 2D vessel contour is automatically detected which can be manually corrected. Contours can be automatically propagated to calculate results over time. Basic 2D flow parameters are presented in a graph.



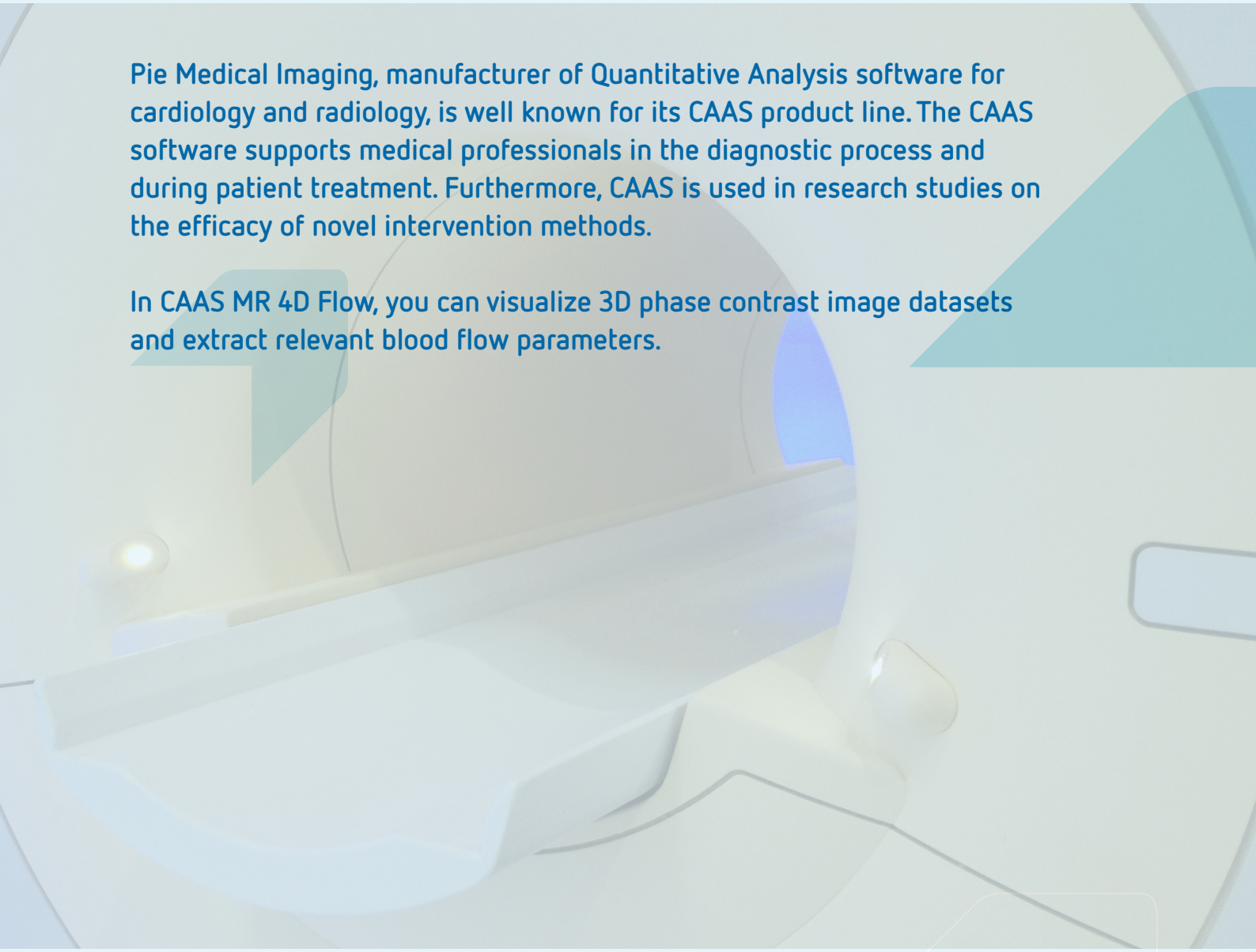
	Plane 1	Plane 2	Plane 3	Plane 4	Plane 5
Cardiac output (l/min)	3.55	2.36	2.34	2.28	2.96
Forward flow (ml)	56.67	37.81	37.48	36.37	46.93
Backward flow (ml)	0.38	0.39	0.26	0.21	0.00
Pumped blood volume (ml)	56.29	37.42	37.22	36.16	46.93
Regurgitation fraction	0.01	0.01	0.01	0.01	0.00
Flow displacement	0.02	0.06	0.02	0.02	0.01

2D Flow parameters from multiple planes

Find out more or contact us at piemedicalimaging.com

Pie Medical Imaging, manufacturer of Quantitative Analysis software for cardiology and radiology, is well known for its CAAS product line. The CAAS software supports medical professionals in the diagnostic process and during patient treatment. Furthermore, CAAS is used in research studies on the efficacy of novel intervention methods.

In CAAS MR 4D Flow, you can visualize 3D phase contrast image datasets and extract relevant blood flow parameters.



Visualization of Blood Flow

> Visualize blood flow through streamlines
> Dynamic visualization with time-resolved pathlines
> Visualization of color coded vectors from one or multiple emitter planes

Blood Flow parameters

> Wall shear stress in a 3D model
> 2D flow parameters of blood velocity at any arbitrary plane in the aorta

solutions in cardiovascular analysis

Pie Medical Imaging stands for:

> The gold standard in Quantitative Analysis software
> Extensive validation for both patient care and research
> Accurate and reproducible analysis results
> Fast and intuitive operation
> Expertise in cardiovascular quantitative analysis software

Quality Assurance:

Pie Medical Imaging develops, produces and sells products in accordance with international accepted standards. CAAS MR 4D Flow is CE marked and pending 510(k) clearance and therefore meant for research purposes only in the US.

Quality Management System complies with:

> ISO 13485
> Canadian CAN/CSA ISO 13485

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