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Your open platform for translational research

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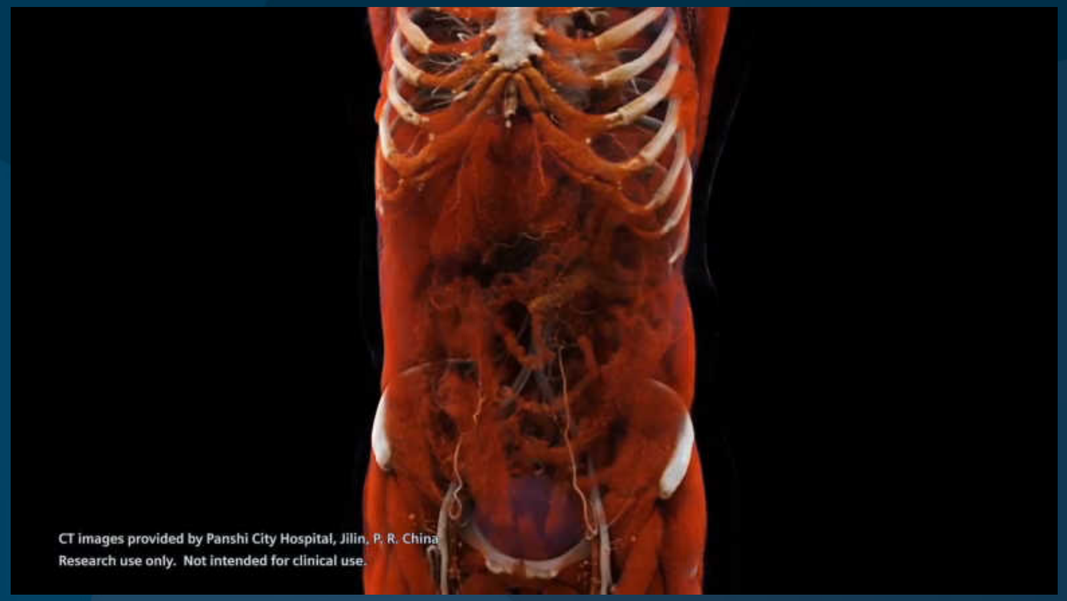
Your open platform for translational research



An ideal research environment gives you access to the latest applications, provides tools that translate your ideas into tangible prototypes, and supports your exchange with other experts around the world.

With *syngo*.via Frontier, you can explore the potential of advanced post-processing prototypes that are seamlessly integrated with your routine *syngo*.via system. *syngo*.via Frontier also enables you to easily implement your own algorithms and connects you directly with other key opinion leaders and the Siemens Healthcare pre-development teams.

Save time and reduce costs with an integrated research solution. Boost your reputation and attract talent as well as patients. Bridge the gap in post-processing translational research with *syngo*.via Frontier.

syngo.via Frontier Prototype Store

Explore the unseen

Access the right tools at the right place and overcome obstacles like being limited to standard applications or having to work on separate systems for research and clinical tasks.

The *syngo*.via Frontier Prototype Store allows you to strengthen your clinical opinion leadership. Easily access post-processing prototypes for evaluation and publication purposes and seamlessly integrate them with your routine *syngo*.via environment. The dedicated *syngo*.via Frontier Prototype Store is continuously enriched with new contributions from Siemens Healthcare R&D and external partners.

With *syngo*.via Frontier and the Prototype Store you can:

- access the latest prototypes for different modalities from any *syngo*.via client
- use the same workplace and a similar user interface for your research activities and clinical tasks
- easily send data from your *syngo*.via environment for evaluation and retrieve the results for inclusion in ongoing research studies
- upload your own prototypes on your *syngo*.via Frontier server[1]

[1] requires *syngo*.via Frontier Development Kit

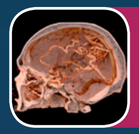
syngo.via Frontier Prototype Store

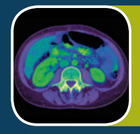
Examples of prototypes


CT Coronary Plaque Analysis


CT Best Contrast

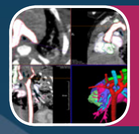

MR Track Density Imaging

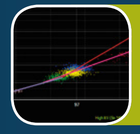

CT/MR Cinematic Rendering

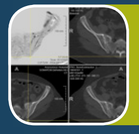

CT DE Rho/Z Maps


CT Cardiac Risk Assessment

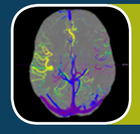

MR Quantitative Analyzer

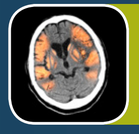

CT/MR 3D Printing

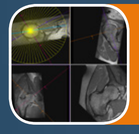

CT DE Scatter Plots


CT Bone Subtraction

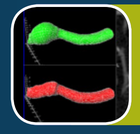

MR Spine pCPR

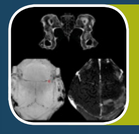

CT Flow Visualization

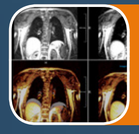

CT ASPECTS Score

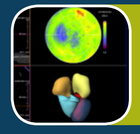

MR Orthopedic Radial MPR

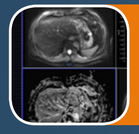

RO syntheticCT


CT 3D Printing for AAA


CT Skull and Pelvis Unfolding

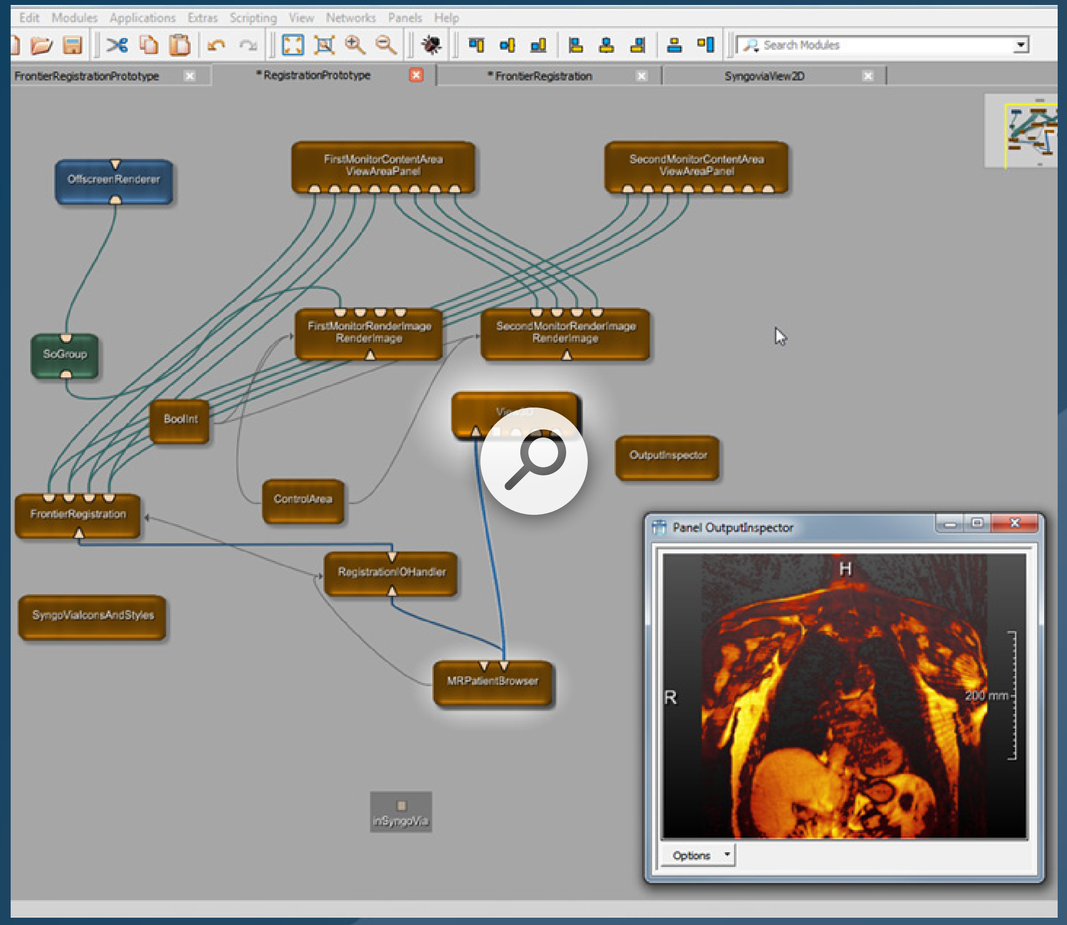

MR Elastic Registration


CT Cardiac Functional Analysis


MR Body Diffusion

syngo.via Frontier Development Kit

Create innovation



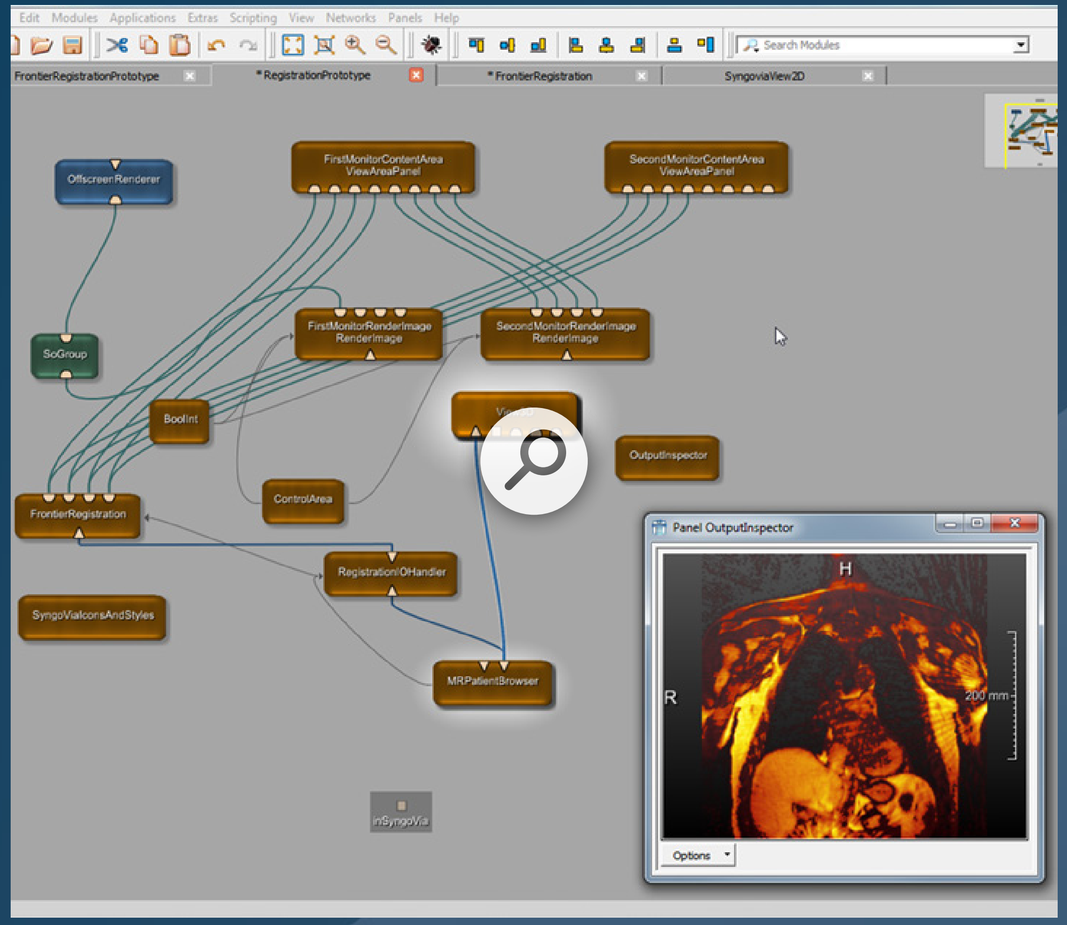
Define individual tools for your clinical research and overcome obstacles like stand-alone programs that are frequently difficult to operate.

The *syngo*.via Frontier Development Kit provides you with an integrated solution for translating clinical requirements into programming language. This enables you to rapidly transform your clinical ideas into tangible prototypes and establish a seamless connection between your research platform and the clinical infrastructure.

Get started with the prototype Starter Kit that enables you to easily reuse existing code for your own prototype development.

syngo.via Frontier Development Kit

Create innovation



With the *syngo*.via Frontier Development Kit you can:

- advance your research closer to evaluation by clinicians and reduce costs by using a shared platform
- use predefined modules and clinical libraries to facilitate and speed up prototype development
- go as deep as you want, from the network level to MeVis MDL, Python, and C++
- easily interface with your existing algorithms by using a compiled .dll and the prototype Starter Kit
- speed up algorithm iterations for smoother and potentially faster clinical validation

syngo.via Frontier Forum

Join the pioneer community

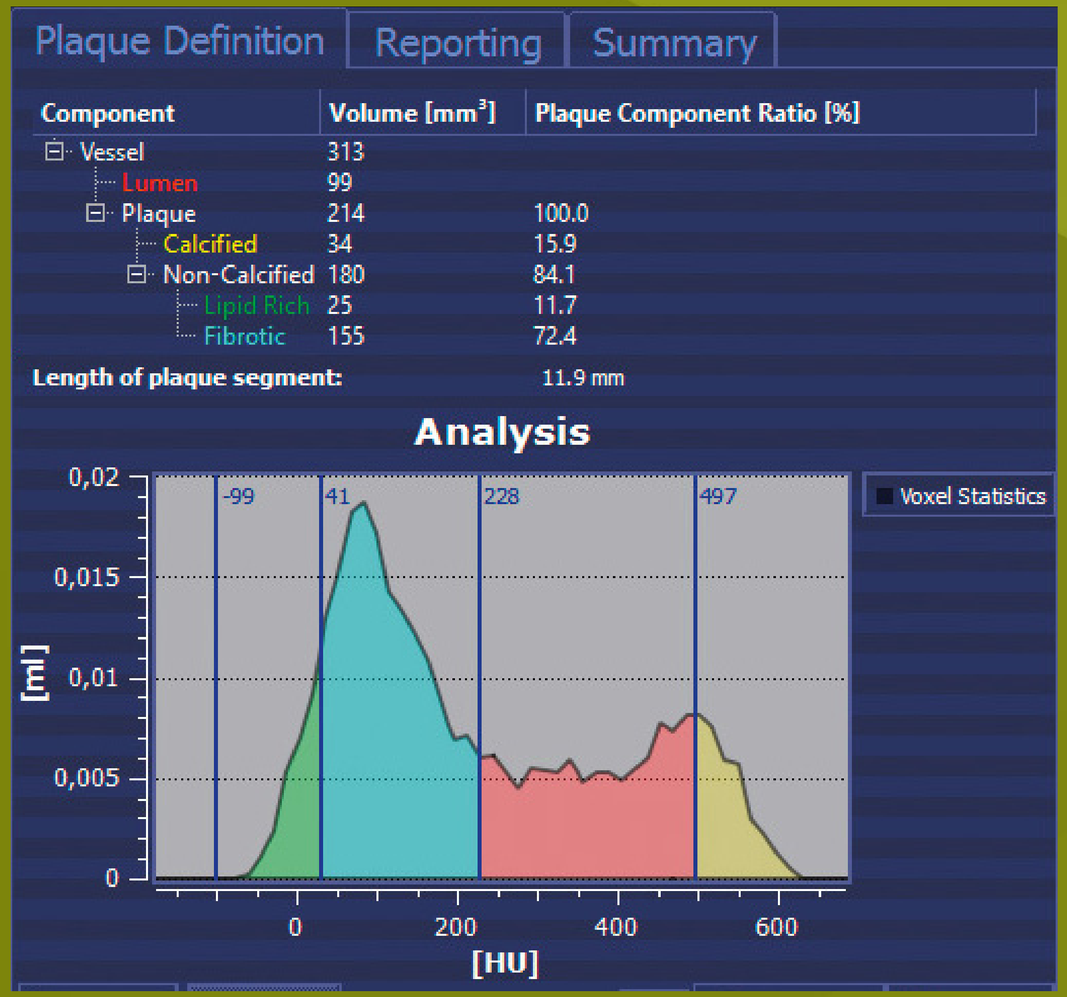
Reinforce your connections with the research community and overcome obstacles like limited visibility or lack of a formal collaboration agreement with a major technology partner.

With the *syngo*.via Frontier Forum you become part of an exclusive global network of clinicians and researchers – an ideal platform for sharing your ideas in prototype development and bring your research activities closer to a trusted industry partner.

With the *syngo*.via Frontier Forum you can:

- initiate and maintain fruitful connections with other institutions and key opinion leaders
- gain global visibility for your research
- test and validate your new developments on a large scale, up to a multi-center approach
- directly access Siemens Healthcare R&D for advice, orientation, and support
- facilitate the validation of your prototypes as a prerequisite for potential commercialization

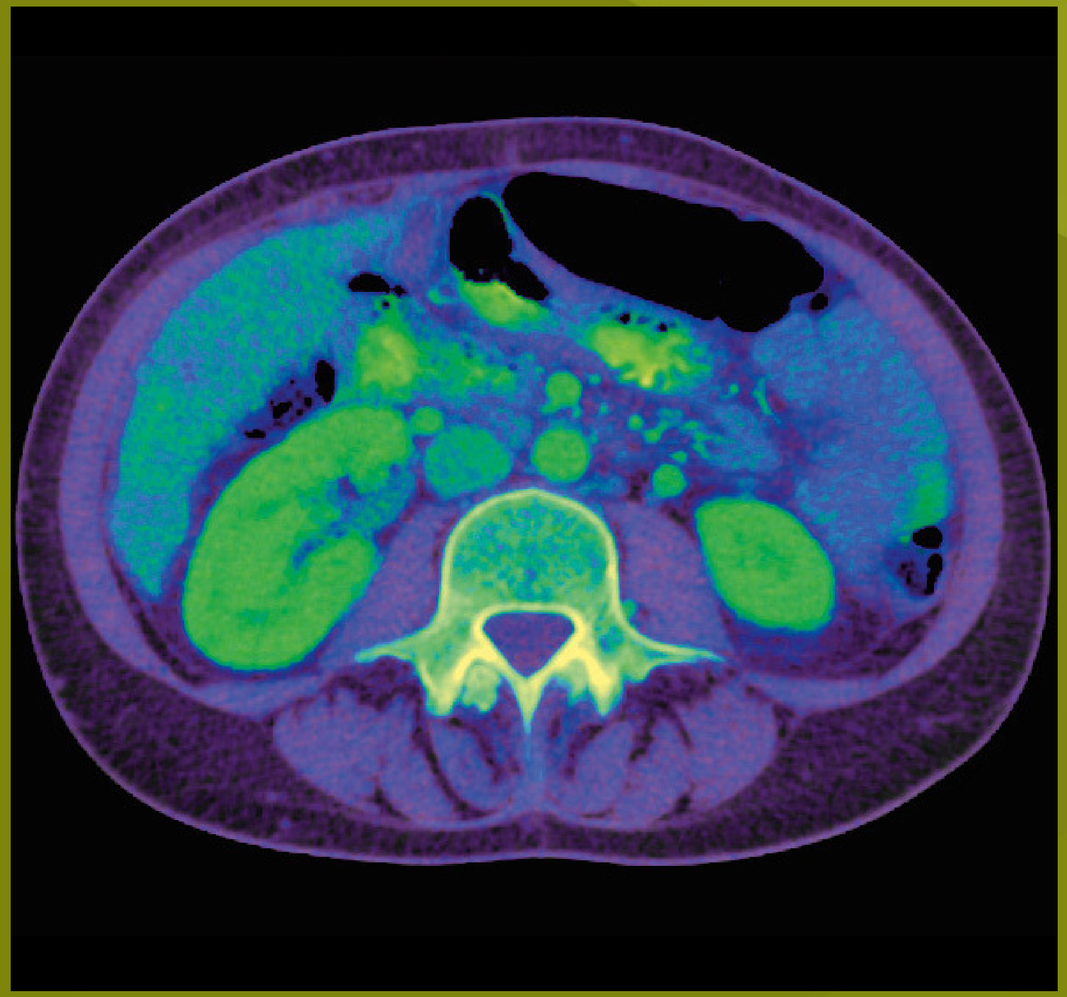
CT Coronary Plaque Analysis



This prototype allows volumetric quantification and differentiation of lipid, fibrous, and calcified plaques.

- Advanced tools for analyzing atherosclerotic plaque morphology and characterizing different plaque composites, such as lipid and fibrous:
  - Overall Plaque Burden
  - Segment Involvement Score
  - Quantitative Remodeling Index
  - Quantitative Eccentricity Index
- Potential to assess the vulnerability of atherosclerotic lesions and evaluate strategies for stabilizing plaque

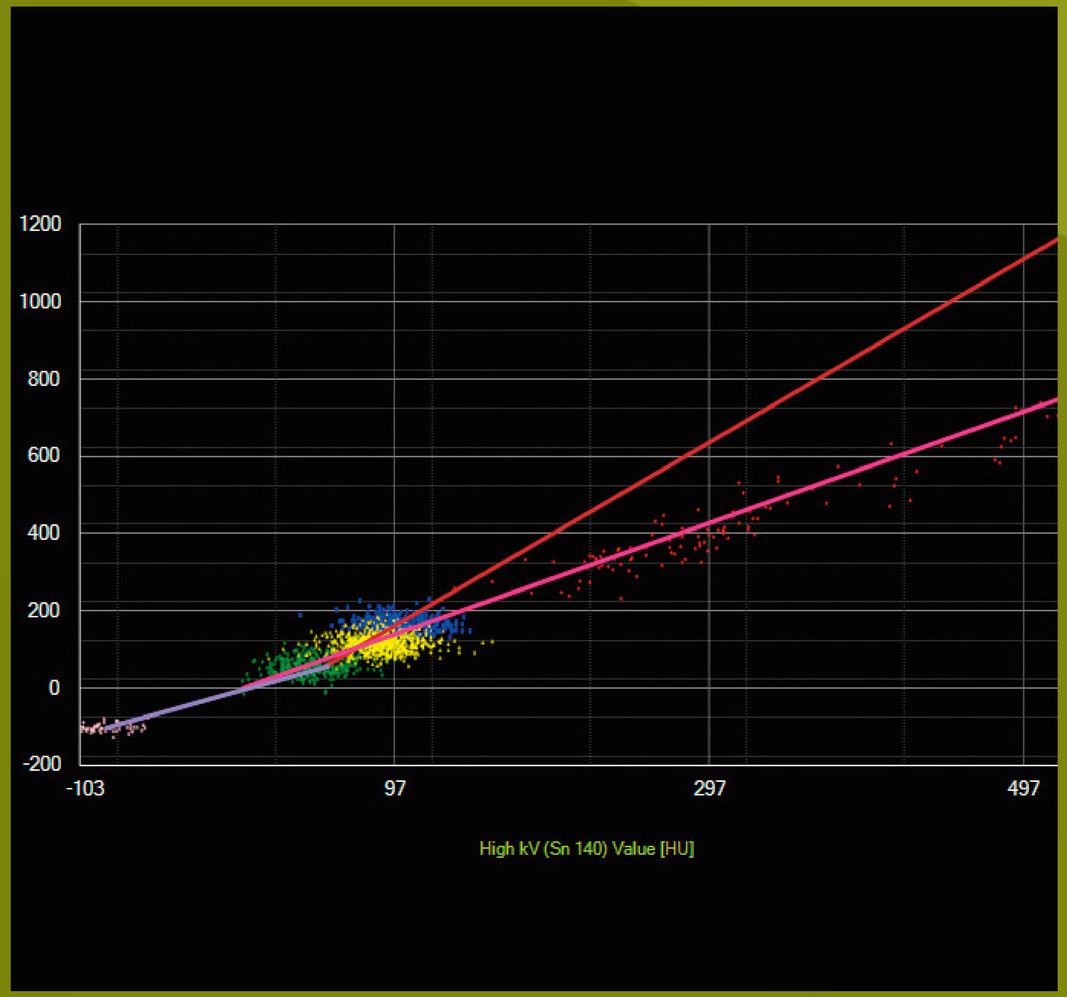
CT DE Rho/Z Maps



This advanced Dual Energy technique provides tissue differentiation based on electron density and effective atomic number.

- Improved differentiation and characterization of different tissues
- Allows the conversion of standard Hounsfield units into electron density maps without the use of calibration phantoms that may lead to deviations
- More reliable planning for radiation therapy and reduced risk of overexposure

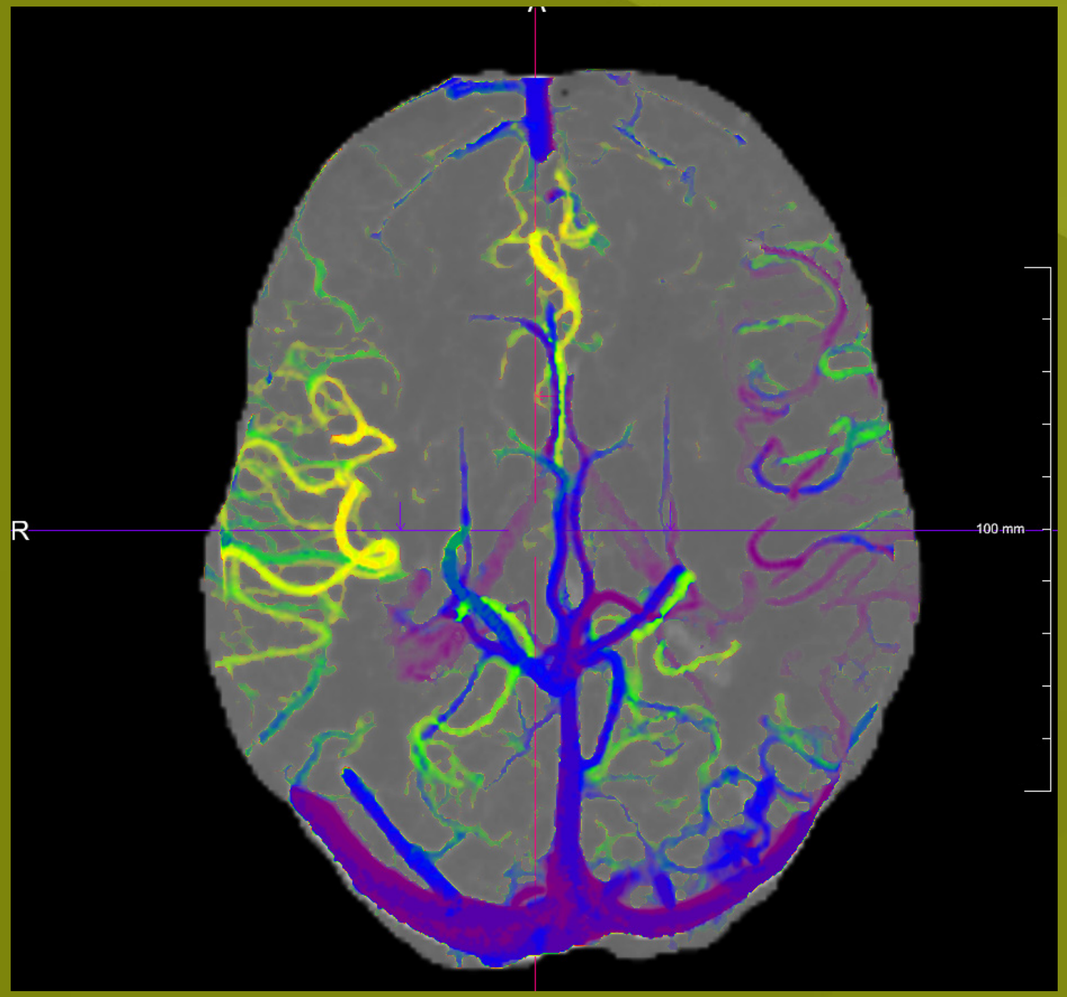
CT DE Scatter Plots



This research prototype provides a novel representation of Dual Energy information: The energy dependencies of materials shown within a region of interest (ROI) are visualized graphically.

- Complete statistical evaluation of an ROI
- Visualization of energy dependencies for analyzing material homogeneity
- Detailed material analysis with advanced statistical parameters such as variance and skewness

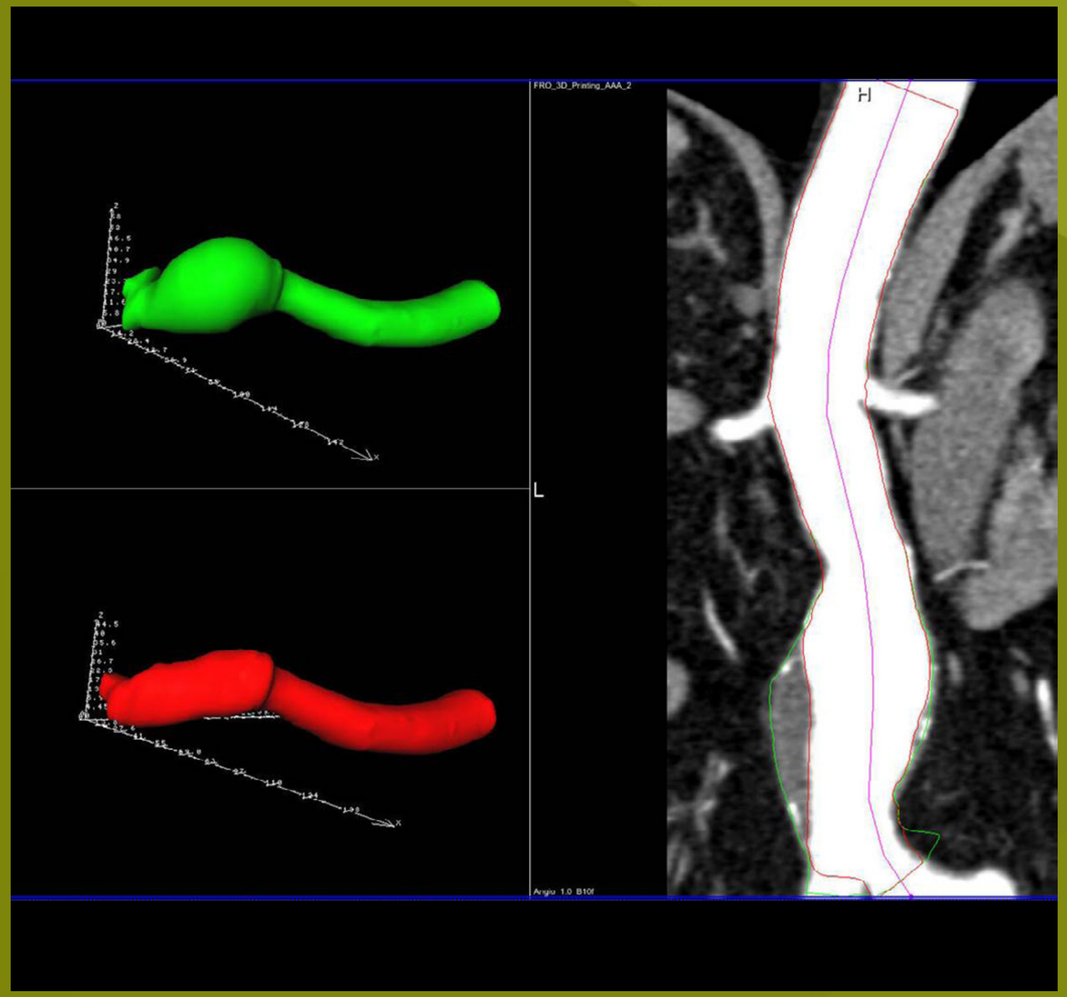
CT Flow Visualization



Whereas perfusion techniques evaluate the patient's brain parenchyma, the main goal of this prototype is to provide insight on the dynamics of the vascular structures.

- Complementary visualization of dynamic data
- Overlay of the color image to the tMIP (temporal Maximum Intensity Projection) of the perfusion dataset, showing the time of maximal enhancement
- Visualization of the blood flow from the arteries to the sinus sagitalis superior in colors corresponding to the time over the MPRs or VRT

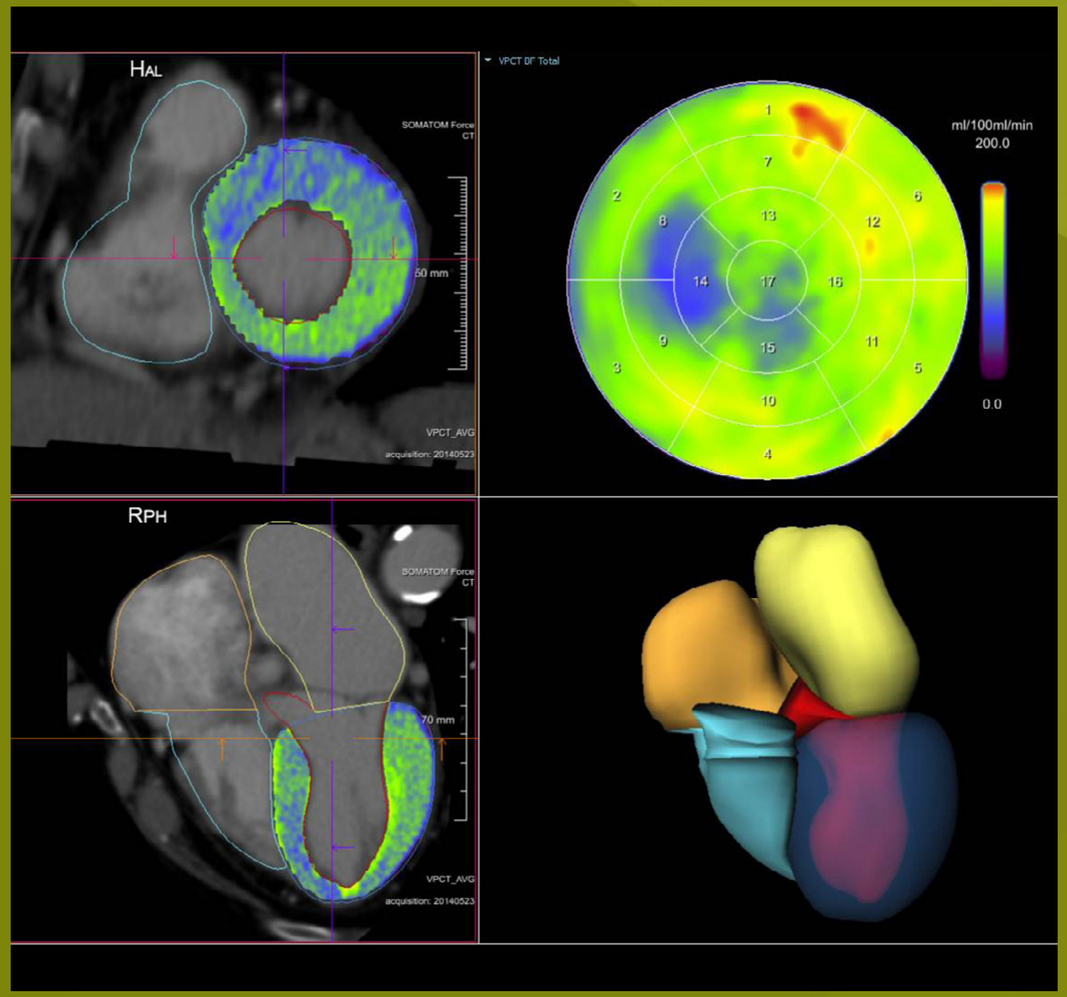
CT 3D Printing for AAA



3D printing of an abdominal aortic aneurysm can be used to facilitate decision-making and device selection for endovascular repair. This post-processing prototype enables:

- Automatic segmentation of the lumen and thrombus of an abdominal aortic aneurysm on CTA images
- Export of segmentations as .stl meshes as an input for 3D printers

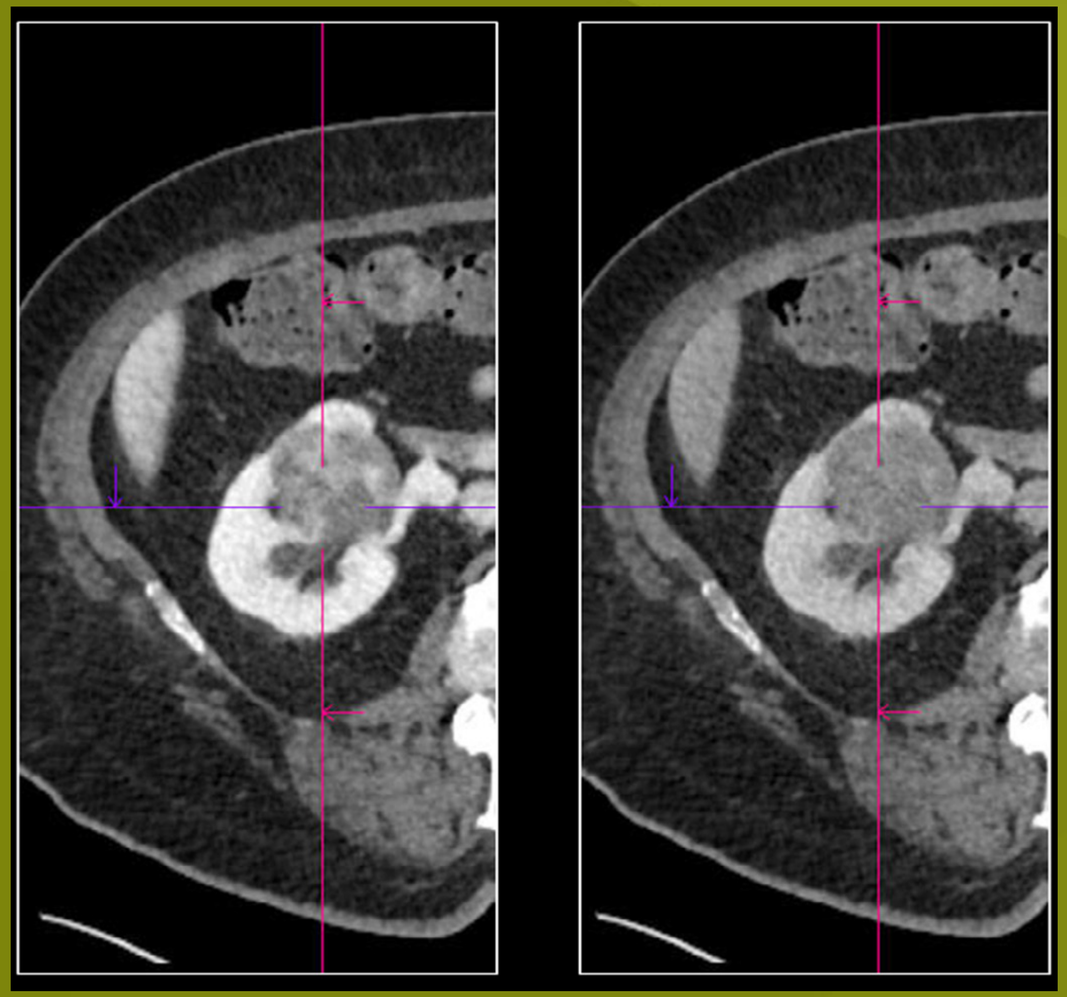
CT Cardiac Functional Analysis



This prototype compiles a functional analysis of the heart and its compartments from different CT acquisitions and datasets.

- Incorporates stress and rest studies, static and dynamic myocardial perfusion, multiphase CTA, Dual Energy Perfused Blood Volume, and others
- Quantitative statistical analysis of 2D polar map-related AHA segments and user-defined ROIs in the underlying 3D data
- Automatic segmentation of left ventricle (epi- and endocardium), right ventricle, and left and right atria

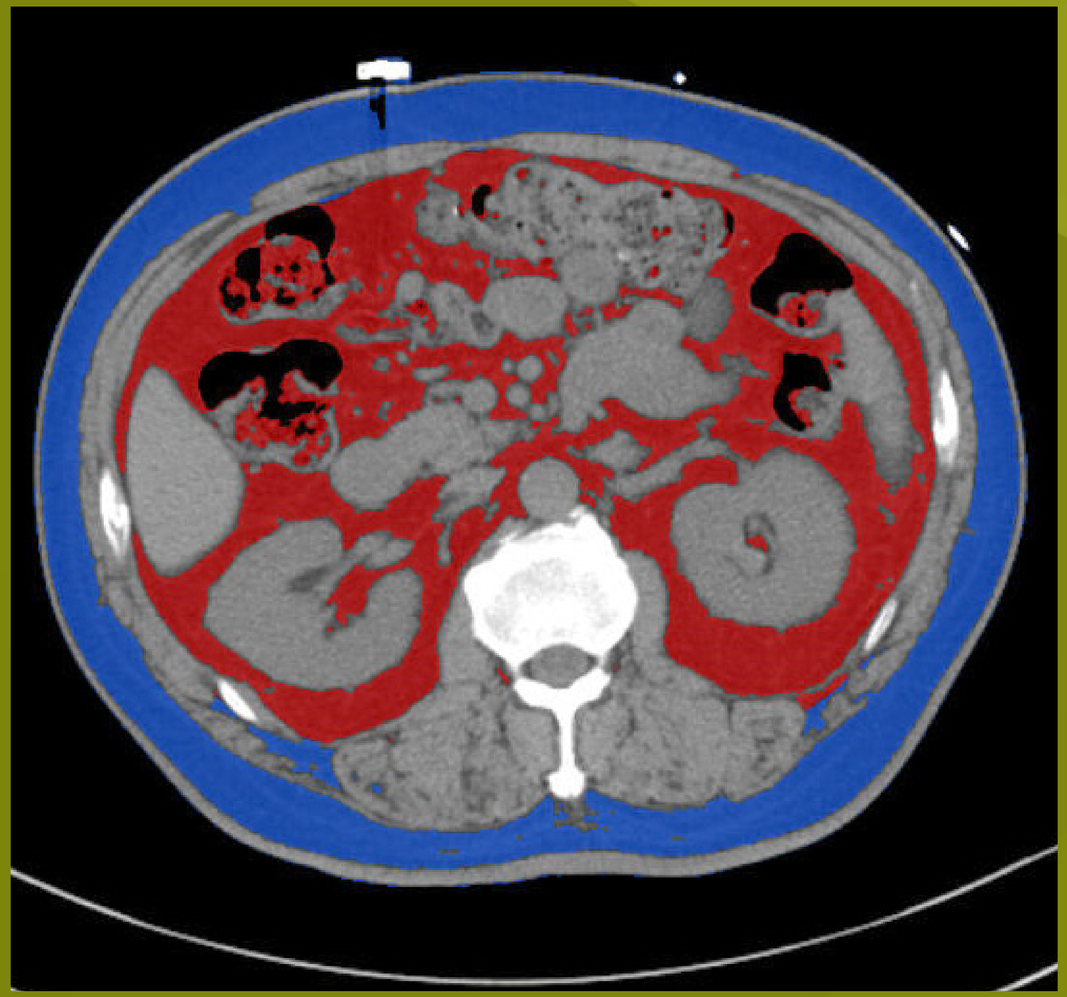
CT Best Contrast



CT Best Contrast employs multiband filtering to improve low-contrast resolution while keeping noise unaffected.

- Improved contrast-to-noise ratio
- Enhanced image quality and tissue differentiation
- Potential to reduce radiation dose

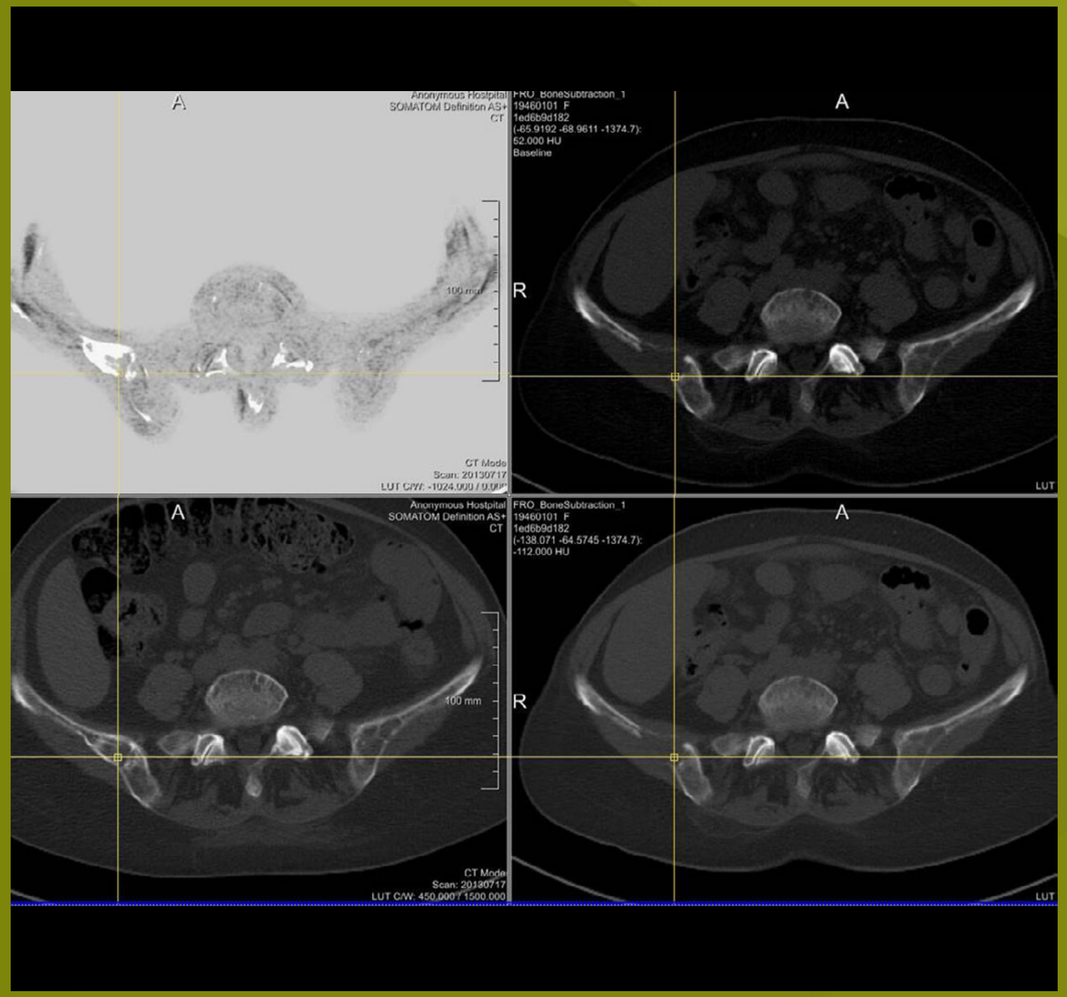
CT Cardiac Risk Assessment



This prototype uses non-contrast CT data to provide an analysis of visceral fat.

- Quantitative abdominal and pericardial fat analysis
- Includes fat volumes, histograms, and other measurements such as the waistline or patient diameters
- Improved risk assessment for cardiovascular disease and type 2 diabetes

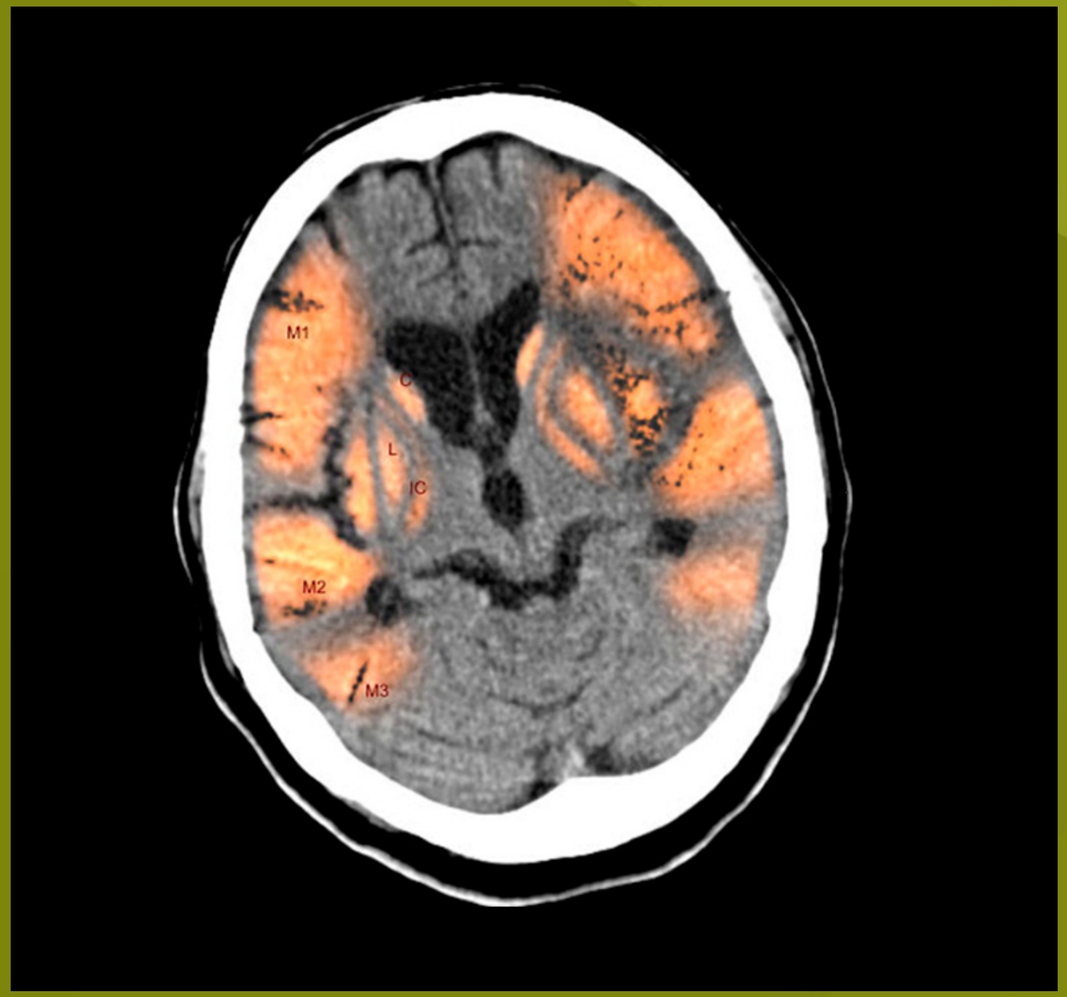
CT Bone Subtraction



This software allows the identification of bone lesion progression from baseline to follow-up study.

- Improved identification of subtle changes in bone lesions, such as hyperplasia and bone metastasis
- Intelligent and adaptive image subtraction for spine and pelvis
- Includes quantitative analysis tools to statistically calculate the bone density loss/gain
- Intelligent synchronization and navigation between baseline and follow-up scans

CT ASPECTS Score



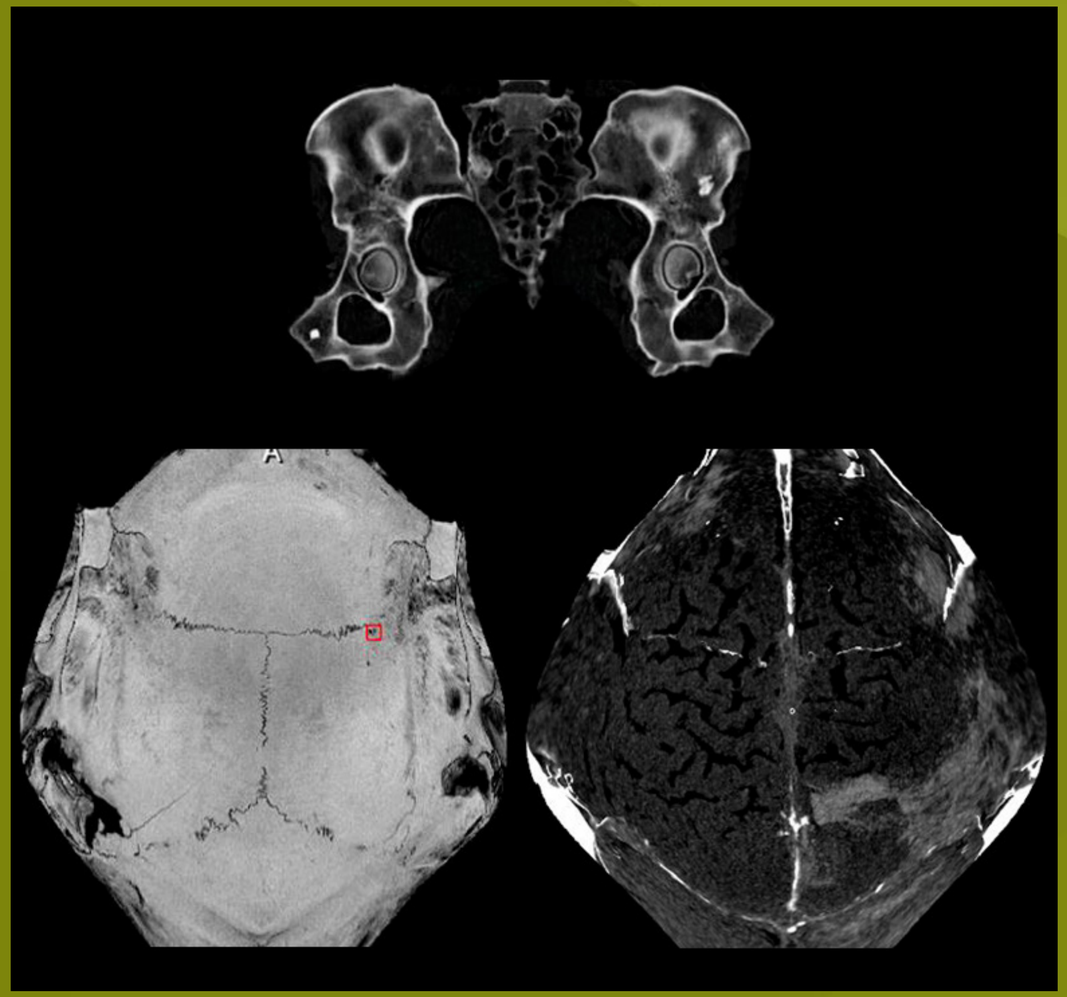
Alberta Stroke Program Early CT Score (ASPECTS) is a 10-point quantitative CT score to assess early ischemic changes on pretreatment CT studies in patients with acute ischemic stroke of the anterior circulation.[1]

The ASPECTS prototype offers:

- Patient specific mapping of the score regions based on an atlas of the human brain
- Comparison of the CT values of all score regions and their contralaterals
- Comprehensive Red-Yellow-Green color coding of the score values

[1] Pexman JH, Barber PA, Hill MD, Sevick RJ, Demchuk AM, Hudon ME, Hu WY, Buchan AM. Use of the Alberta Stroke Program Early CT Score (ASPECTS) for assessing CT scans in patients with acute stroke. AJNR Am J Neuroradiol. 2001 Sep;22(8):1534-42.

CT Skull and Pelvis Unfolding



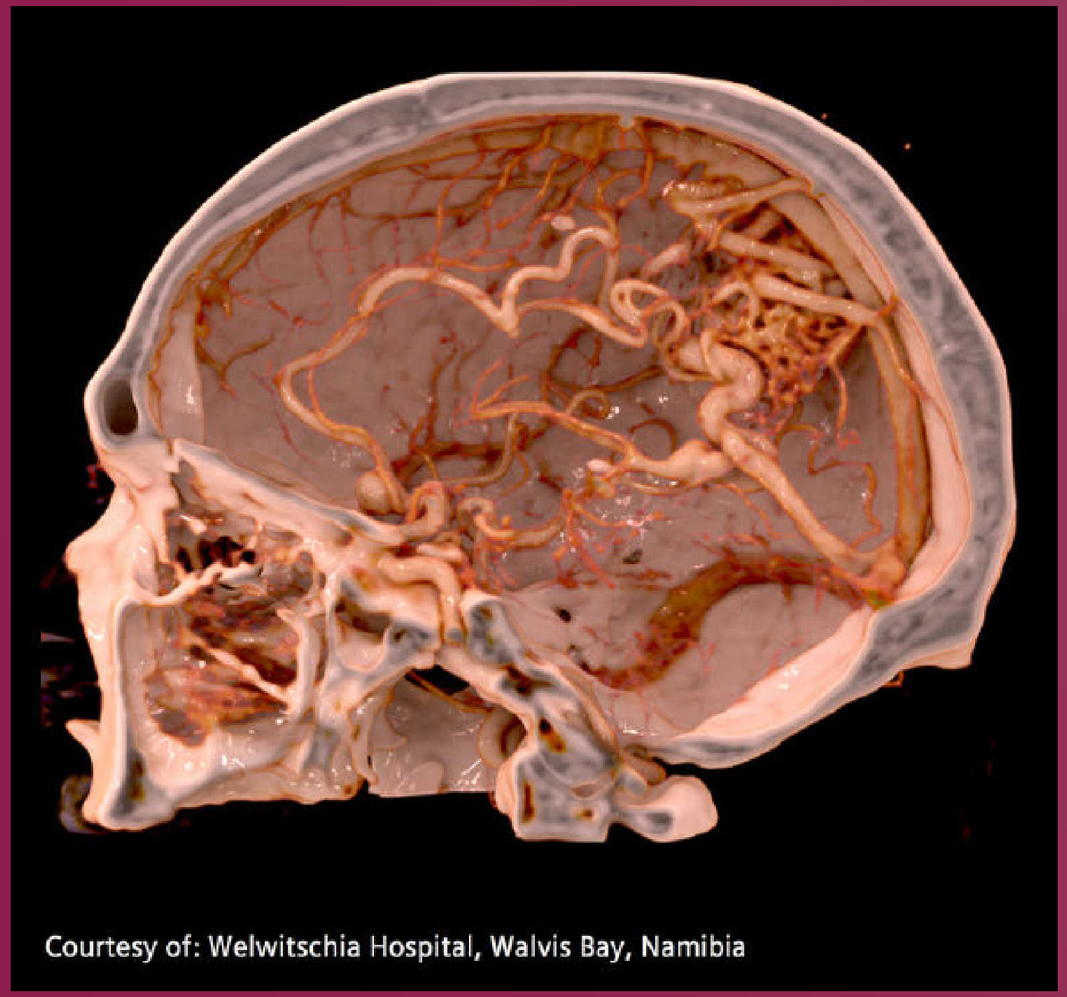
This prototype enables a fully-automatic unfolding of skull and pelvis that aids in the detection of fractures and bleeding:

- Unfolding of pelvic bone, skull base, skull vault and the soft tissue directly beneath the vault
- Improved sensitivity in detection of fractures and hematoma – fast and easy[1,2]
- Synchronized navigation between unfolding views and MPRs

[1] Ringl H., Schernthaner R. E., Schueller G., Balassy C. et. al.: „The skull unfolded: a cranial CT visualization algorithm for fast and easy detection of skull fractures." Radiology, 255(2), May 2010, 553-562.

[2] Ringl H., Stiassny F., Schima W., Toepker M., Czerny C., Schueller G. et. al.: „Intracranial hematomas at a glance: advanced visualization for fast and easy detection." Radiology, 267(2), May 2013, 553-562.

CT/MR Cinematic Rendering



Cinematic Rendering is a unique rendering technology based on a physically accurate simulation of how light interacts with matter. It provides a photo-realistic rendering of:

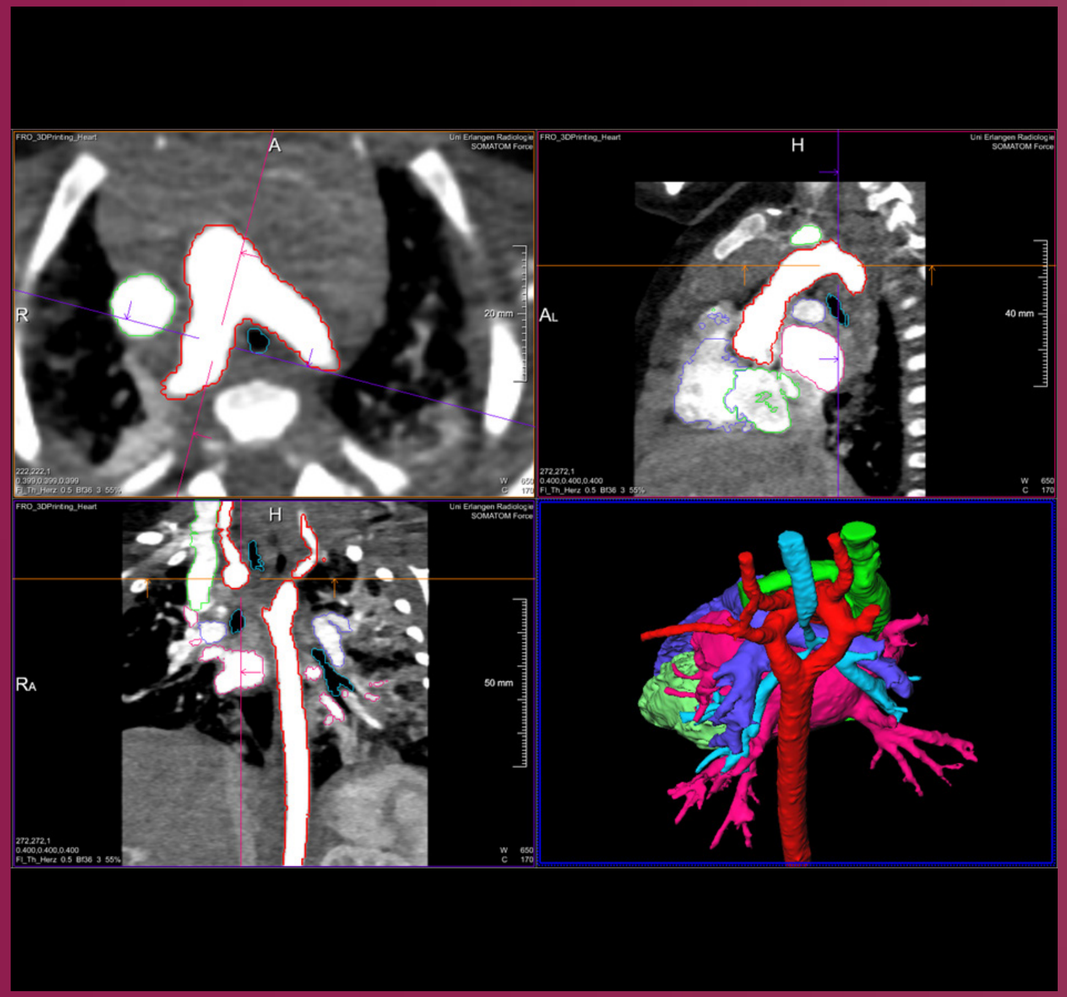
- Shapes
- Shadows
- Scattering and subsurface scattering

Cinematic rendering is designed to see in vivo the true anatomy for improved counseling, surgery planning, teaching, and other purposes.

Ranges can be generated and exported in DICOM format.

[1] Image acquisition with a MAGNETOM 7T scanner with no CE or 510k clearance.

CT/MR 3D Printing

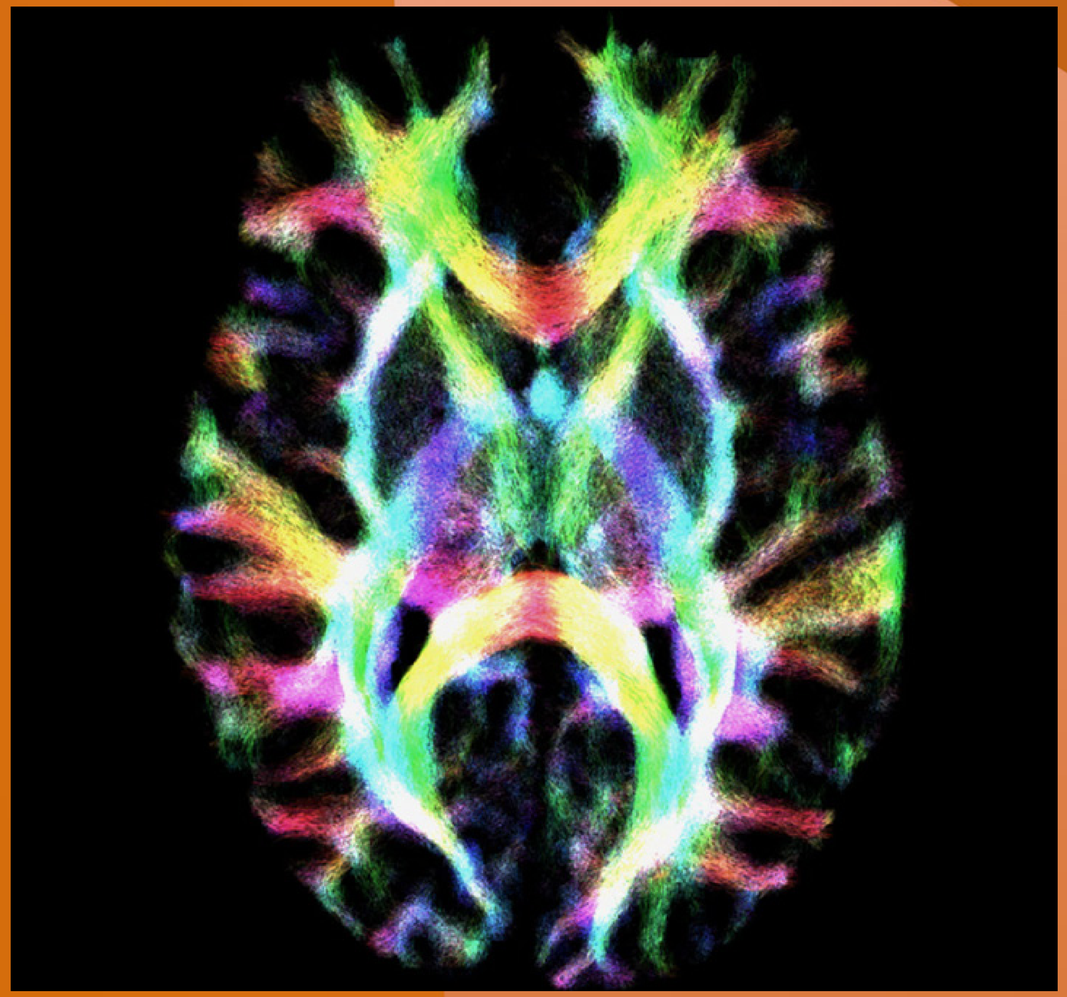


This prototype enables the segmentation of individual anatomical structures from CT or MR datasets to generate .stl files for 3D printers. It contains multiple segmentation tools, for example:

- Volumetric tools like region growing and HU-based thresholding
- Semi-automatic contouring tools using smart interpolation
- Object editing tools
- Support for hollow model creation

Segmentation objects generated in other *syngo*.via or research applications can be imported.

MR Track Density Imaging (TDI)

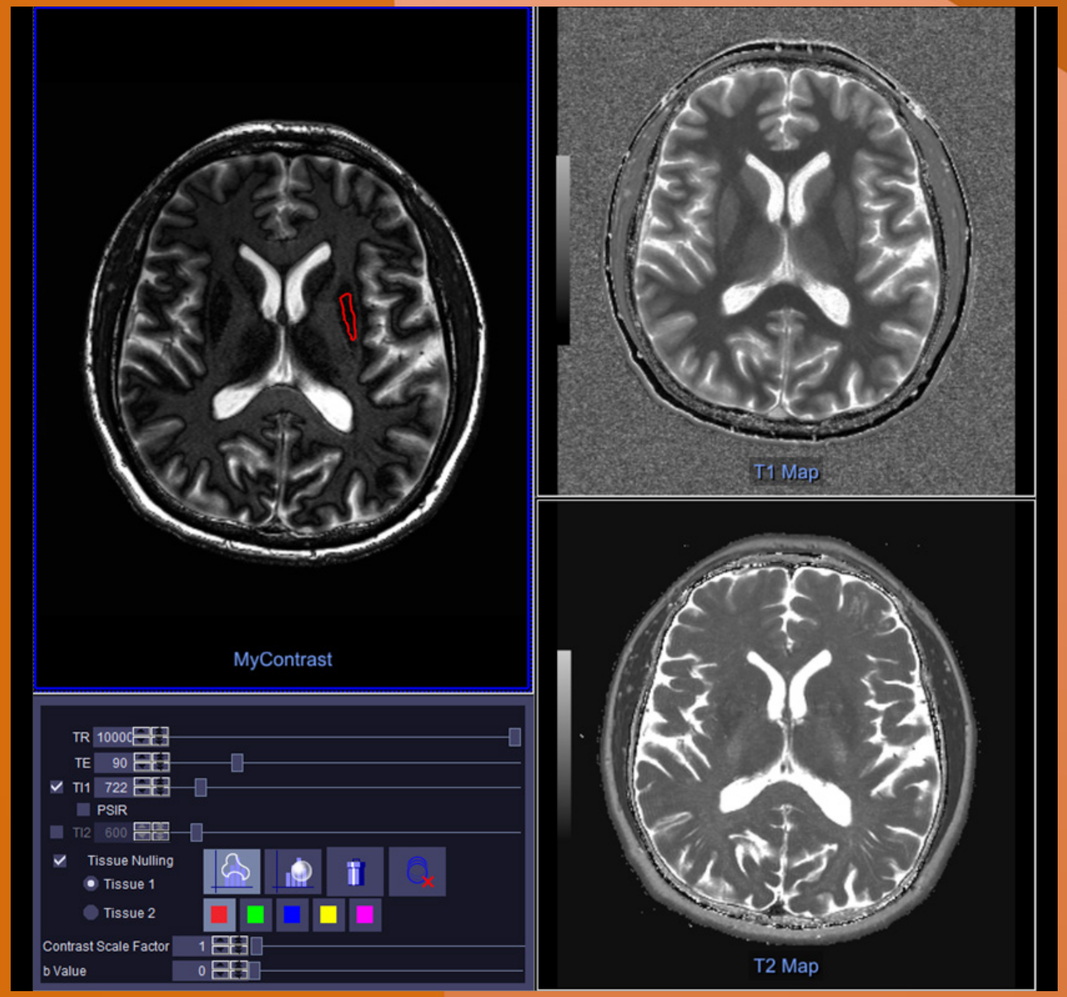


Track Density Imaging supports the visualization of brain structures, such as the different thalamic nuclei. This could potentially help facilitate neurosurgery research.[1]

- *syngo*.via Frontier TDI prototype generates track density images with multiple user-specifiable options
- Grey-scale and colored images are displayed as MPR along with the unformatted original
- Images (greyscale and colored) can be exported in DICOM format

[1] Shepherd, T.M., Chung, S., Glielmi, C., Mogilner, A.Y., Boada, F., Kondziolka, D. „3-Tesla magnetic resonance imaging track density imaging to identify thalamic nuclei for functional neurosurgery." Paper presented at CNS 2014. Proceedings of the 63rd Annual Congress of Neurological Surgeons; Oct 18-22, 2014, Boston, USA.

MR Quantitative Analyzer

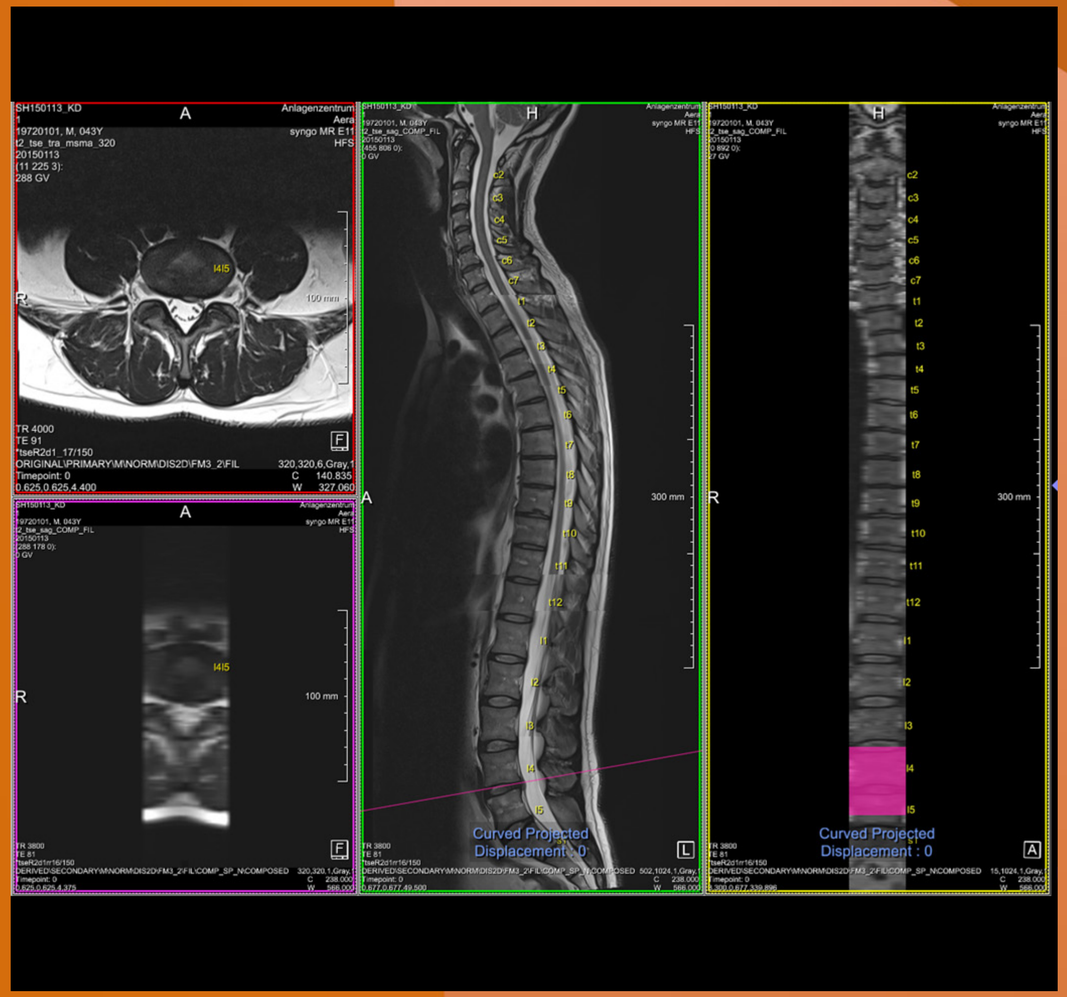


Designed to generate multiple MR contrasts using quantitative T1 and T2[1] maps, M0[1] data, and optional ADC map.

- Contains preset contrasts (DIR, FLAIR, PSIR, ...)
- User-specific contrasts can be generated with interactive sliders (TR, TE, TI1, TI2, b-value) and ROI-based tissue nulling. Contrast presets can be saved for future use
- ROI-based statistical analysis and DICOM/CSV export

[1] T2 mapping with extrapolation of M0 data is currently under development; it is not for sale in the U.S. Its future availability cannot be guaranteed.

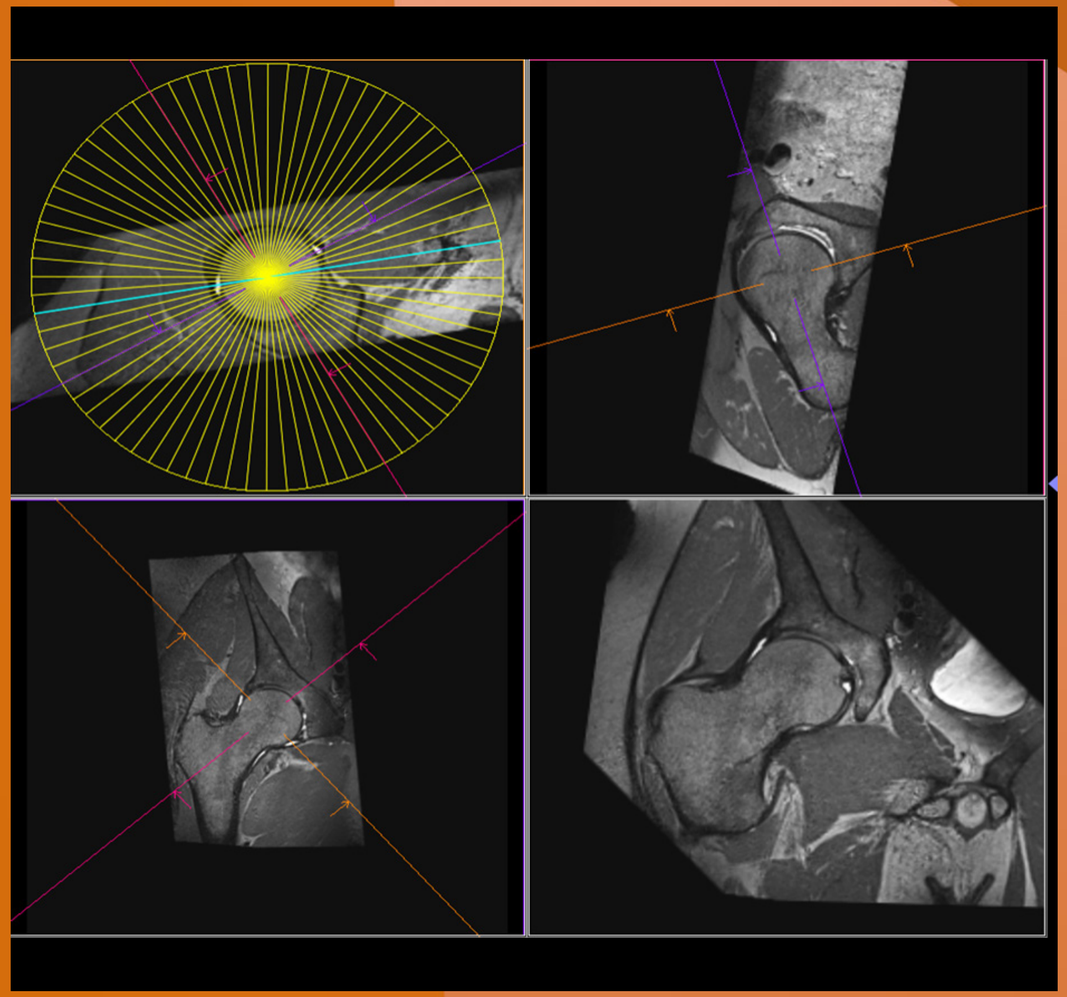
MR Spine pCPR



This prototype is designed for easier and faster evaluation of disks and vertebrae, even in cases of severe spine curvature.

- Automatically generates of spine pCPRs for datasets acquired with Spine AutoAlign and spine labelling in all images
- Synchronized navigation between axial and CPR/MPR segments; navigation through a stack of pCPR images
- Export of pCPR images in DICOM format

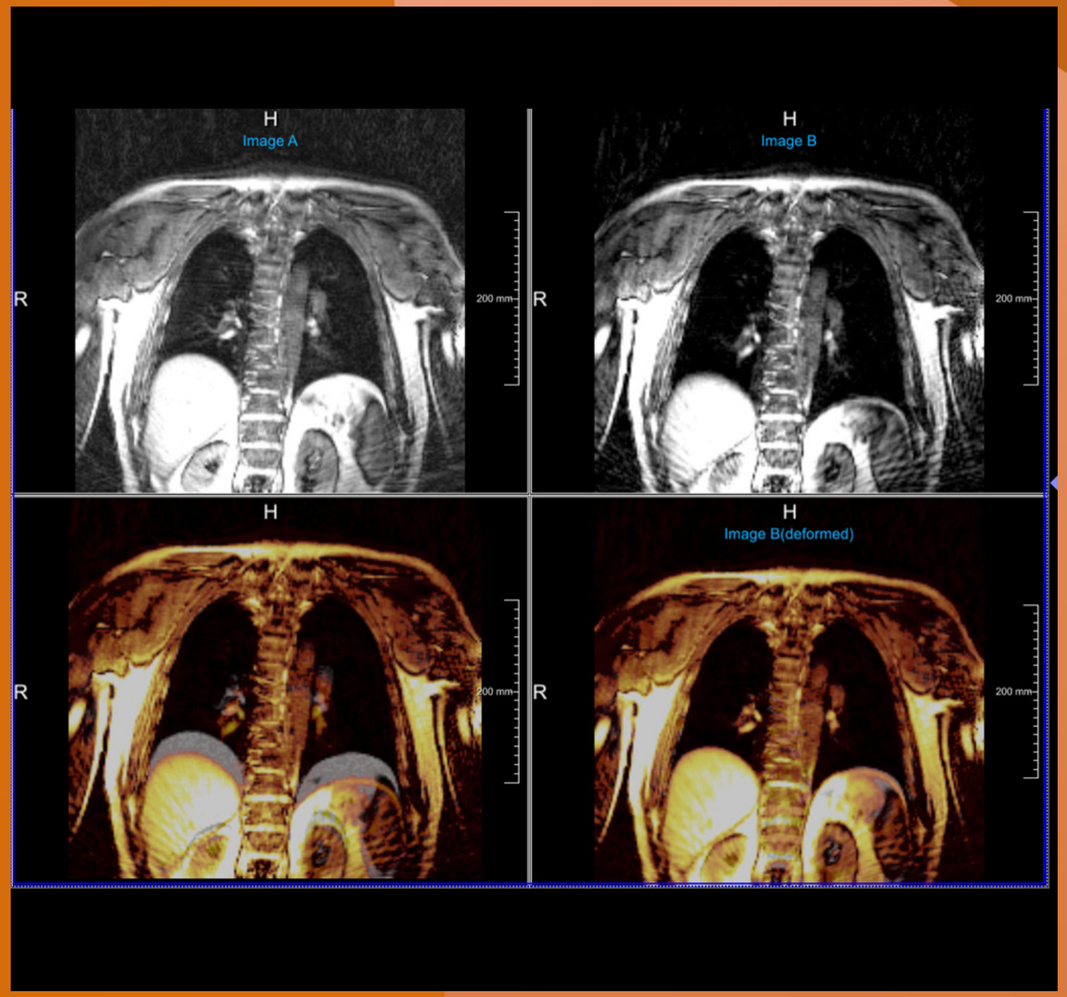
MR Orthopedic Radial MPR



This prototype is designed to help the user efficiently create radial MPRs of 3D hip and knee images acquired with AutoAlign.

- Automatic positioning and orientation of radial MPRs for hip and knee images
- Single-click toggle between left and right hip joints
- Angle measurement tool
- Export of images as DICOM, export of measurements as CSV

MR Elastic Registration

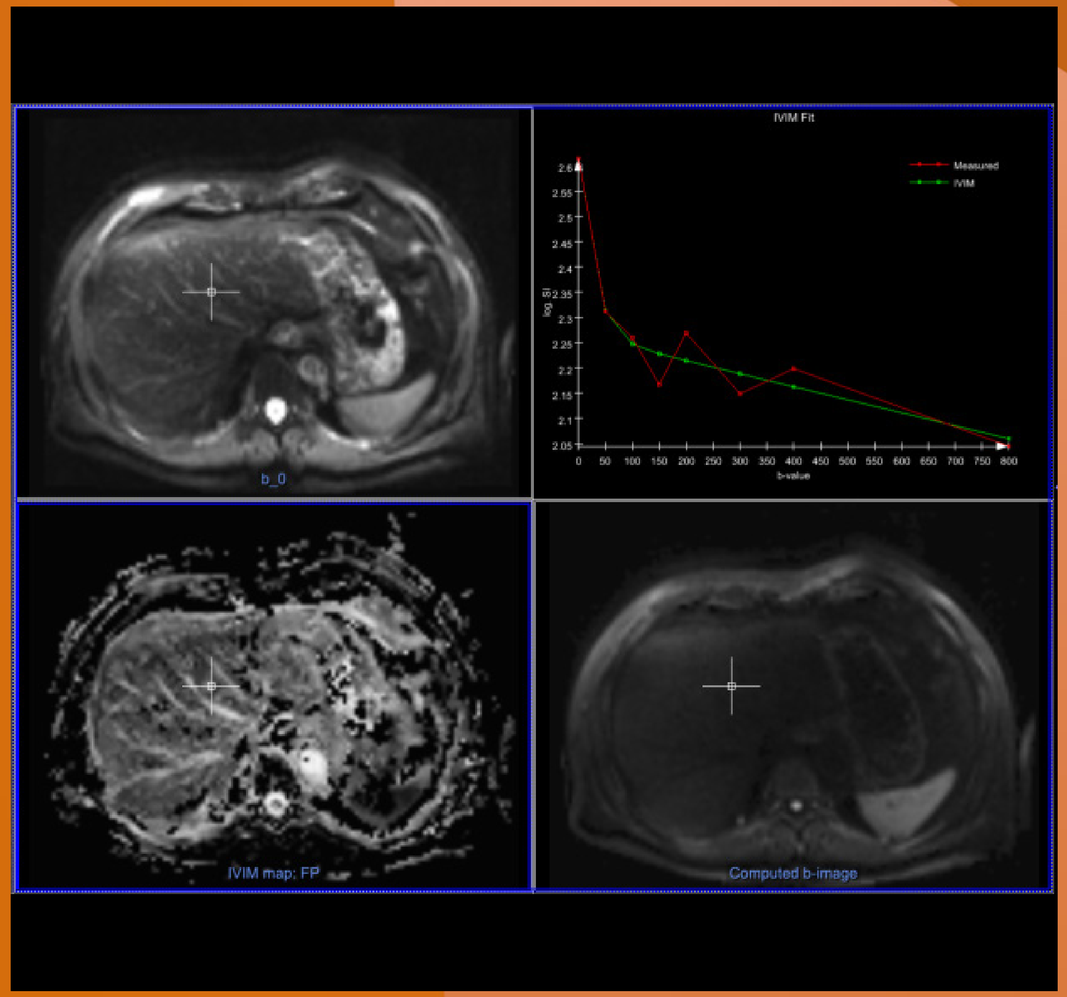


This prototype enables deformable registration of two 3D datasets[1] for improved accuracy in soft-tissue reading.

- Easy specification of the reference volume for the elastic registration with a toggle button
- Alpha blending functionality
- Export of the elastically registered series in DICOM format

[1] Images must have same matrix size, FoV, and contrast.

MR Body Diffusion



The Body Diffusion prototype provides three state-of-the-art advanced parametric models for diffusion-weighted imaging (DWI):

- Monoexponential model
- Intravoxel Incoherent Motion (IVIM)[1] – a bi-exponential model based on the acquisition of very low b values
- Diffusion Kurtosis Imaging (DKI) – a parabolic model based on the acquisition of very high b values

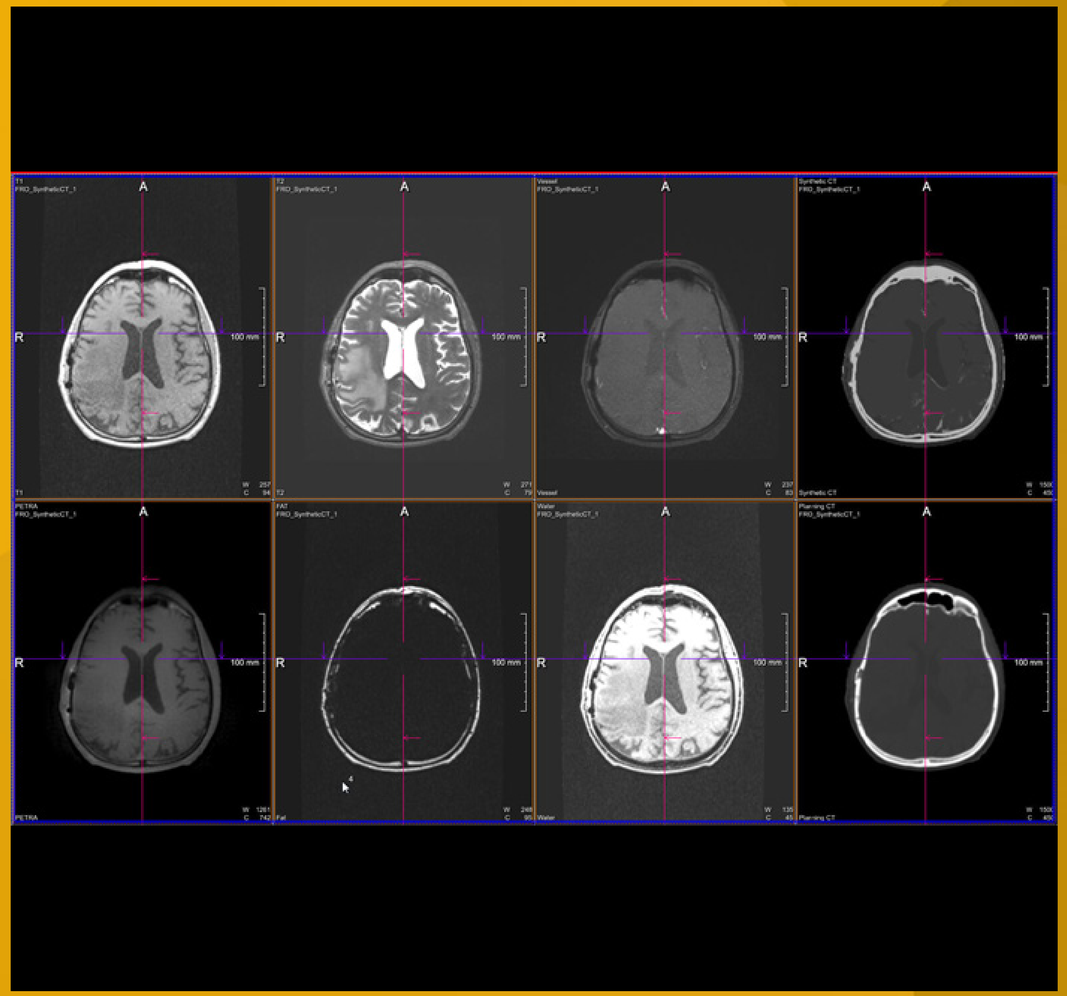
The analysis includes:

- Pixel-based evaluation of the fit and measured curves
- Computed b-value image using any of the models
- ROI measurements

Images can be exported in DICOM format.

[1] Acquisition of IVIM data is currently under development; it is not for sale in the U.S. Its future availability cannot be guaranteed.

RO syntheticCT



syntheticCT aims at creating an image representative of electron density (CT-like) that is based solely on MR acquisitions. This can find application in treatment-planning for radiation therapy and provides the following benefits:

- Time-efficient workflows: no need to perform both a CT and an MR examination for treatment planning of selected cases.
- Reduction of systematic errors arising from image registration, as only MR images are required.

This prototype can generate a synthetic CT image when fed with the appropriate MR acquisitions. To verify the quality of the method used, the resulting synthetic CT can be compared side-by-side to the original planning CT whenever the latter is available.

In the event that upgrades require FDA approval, Siemens Healthcare cannot predict whether or when the FDA will issue its approval. Therefore, if regulatory clearance is obtained and is applicable to this package, it will be made available according to the terms of this offer.

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