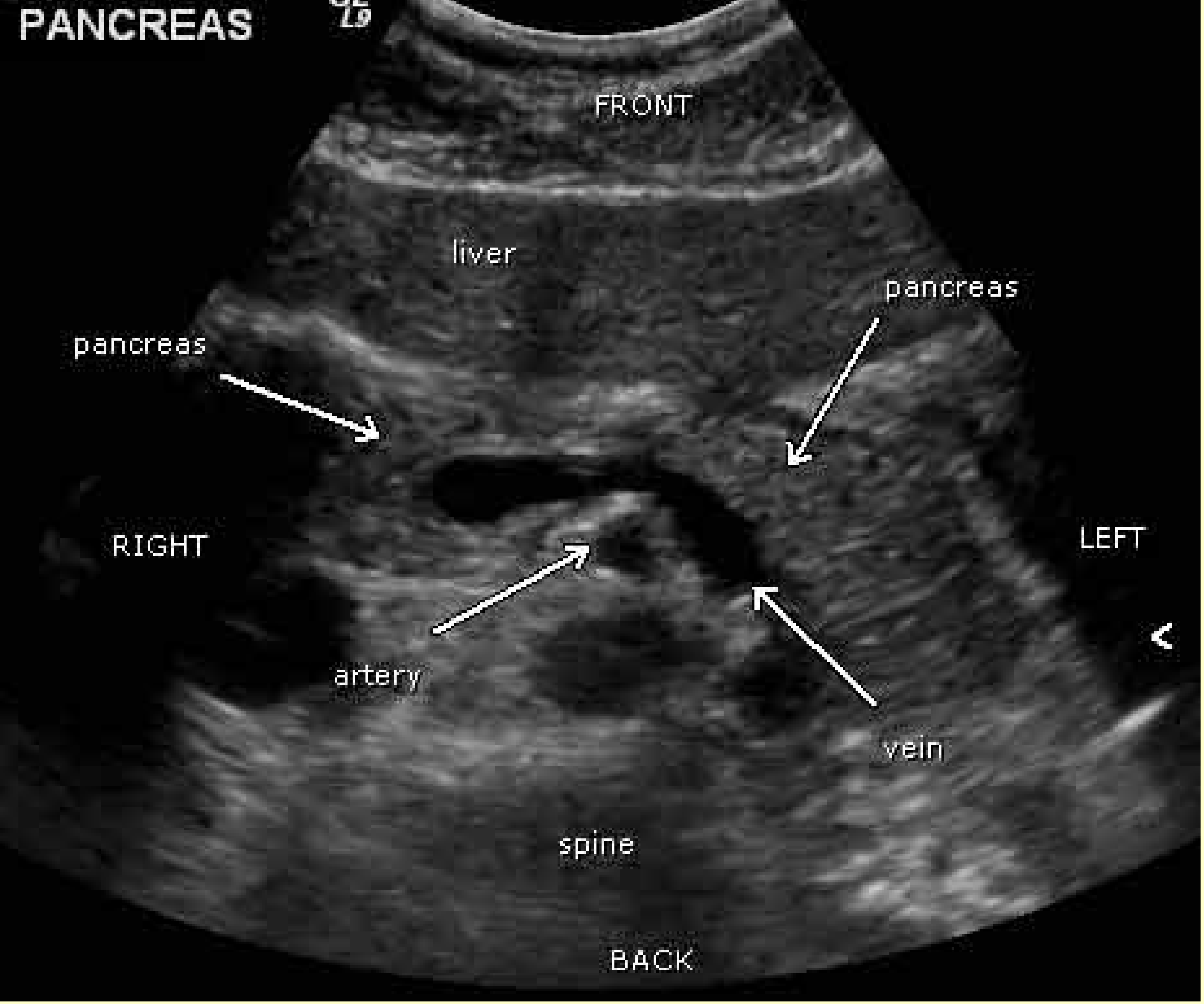
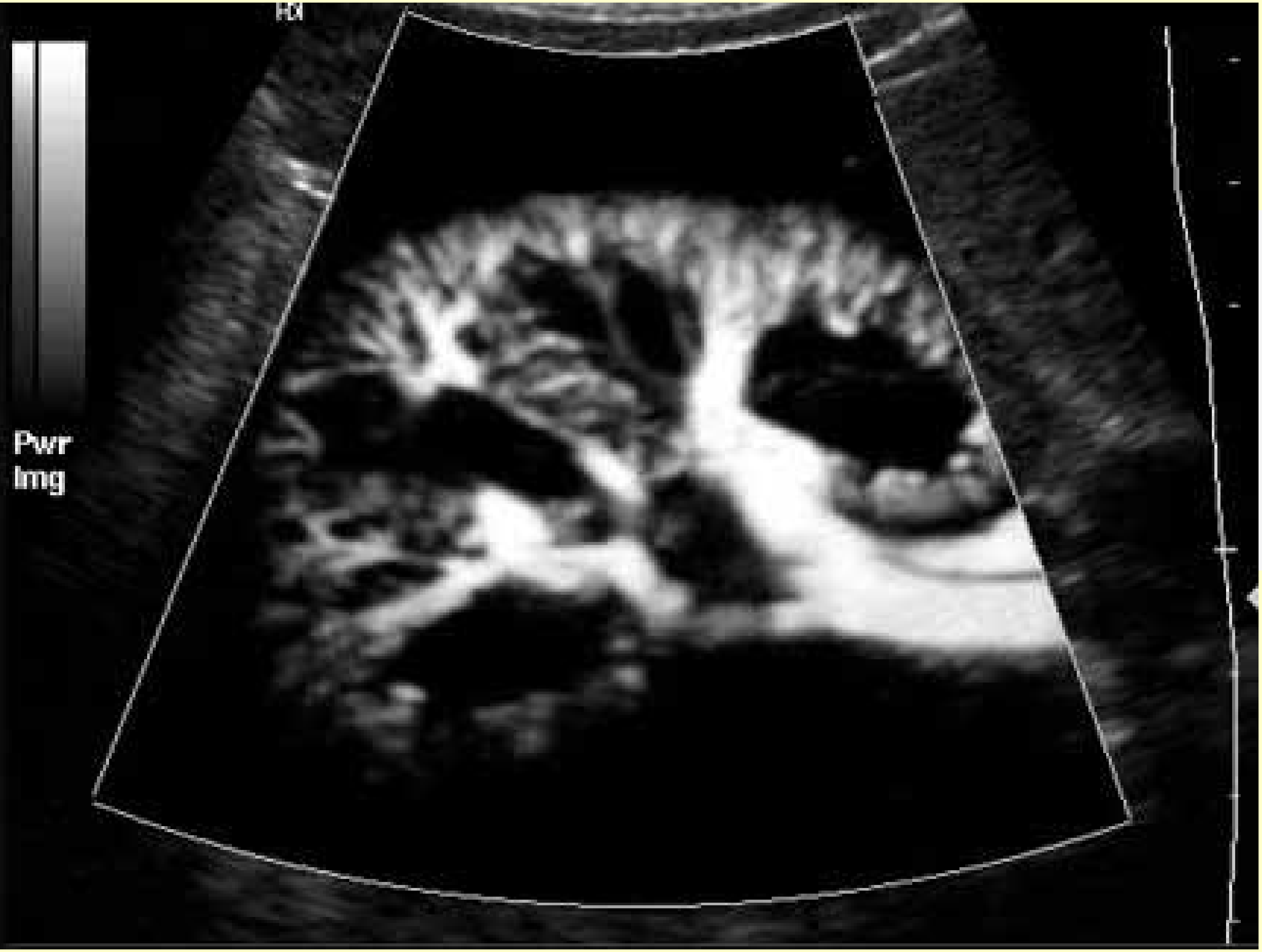


US 1

Sample image: Normal pancreas seen on sonogram. Looking up from abdomen toward the head of the patient. The liver is in front of the pancreas. A vein draining the spleen is behind the pancreas

http://www.radiologyinfo.org/photocat/photos.cfm?image=abdo-us-pancr.jpg&&subcategory=Abdomen&&stop=9



US 2

Power Doppler ultrasound of the kidney. This image shows the tiny blood vessels in the kidney like the branches of a tree

http://www.radiologyinfo.org/photocat/photos.cfm?image=abdo-us-pancr.jpg&&subcategory=Abdomen&&stop=9

US 3

Ultrasound of the liver. This image demonstrates the liver tissue. The darker linear areas in the liver are veins bringing blood and nutrients to the liver and others are draining blood from the liver and returning it to the heart

http://www.radiologyinfo.org/photocat/photos.cfm?image=abdo-us-pancr.jpg&&subcategory=Abdomen&&stop=9

US - aparaty

Ultrasound equipment

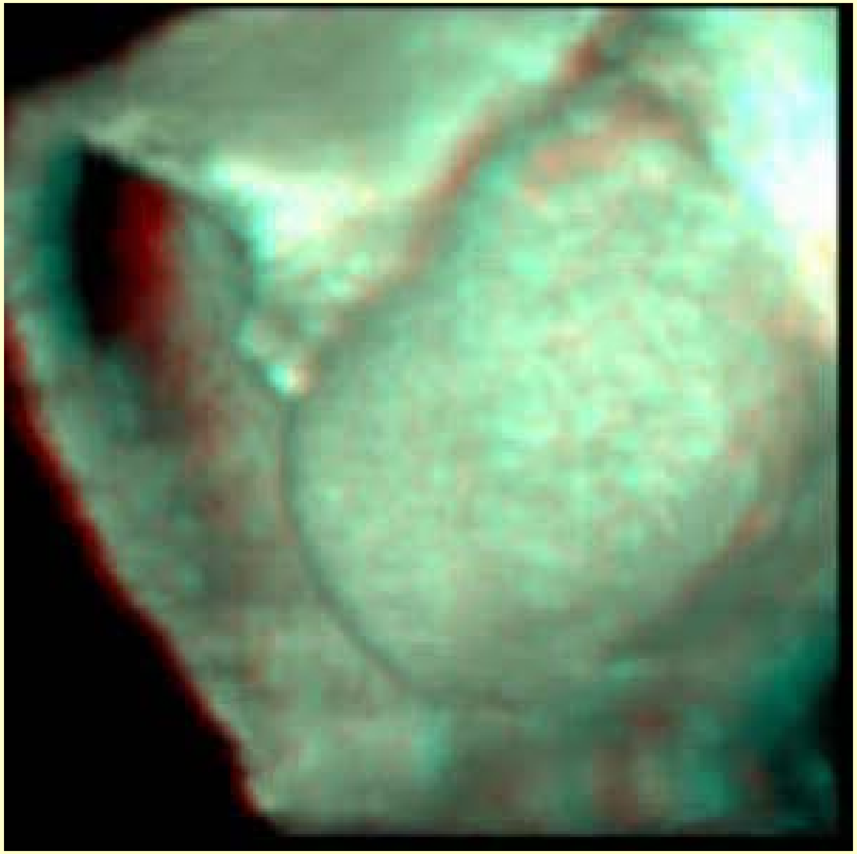
http://www.radiologyinfo.org/photocat/photos.cfm?image=hi_us-system3.jpg&&subcategory=Abdomen&&stop=9

US - aparaty

Ultrasound equipment

http://www.radiologyinfo.org/photocat/photos.cfm?image=hi_us-system3.jpg&&subcategory=Abdomen&&stop=9

3D video



http://www.radiologyinfo.org/content/ultrasound-abdomen.htm

3D – jak to się robi?

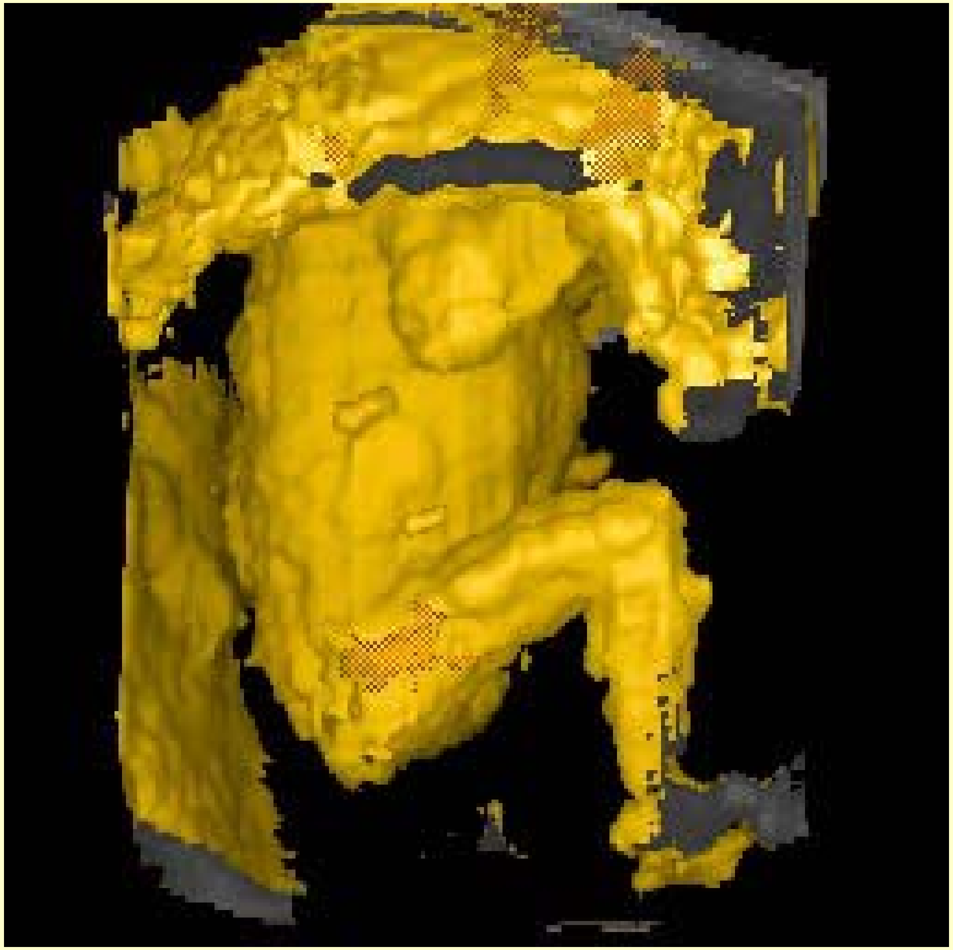
http://www.medphys.ucl.ac.uk/research/mgi/US-3D/index.htm

Medical Ultrasound (*US*) imaging usually records 2D sections through soft tissues, highlighting discontinuities in the acoustic impedance (it produces localised echoes). These discontinuities occur at organ boundaries, giving outlines; smaller structures such as vessels, giving anatomical detail; and from tissue infrastructure at a scale at or below the image resolution, giving rise to '*speckle*'. Speckle is sometimes regarded useful (though subjective) information; but more often as noise. Attempts to free the user from this 'noise' in conventional 2D imaging (*Speckle reduction*) has been unsuccessful. Clinical users appear not to trust the images processed in this way, probably rightly, since any such processing will in general reduce the information content of the scan. In most current 3D US methods, a set of these 2D slices is recorded in such a way that their position in space (& thus of all contained echoes) is known. Combining these slices into some sort of 3D array (eg in computer memory) forms a *3D Image*. If the set of 2D slices has been carefully acquired, this 3D image will contain a good representation of the 3D anatomical detail Since computer screens and the human retina is 2 dimensional, in order to visualise the information we usually need to provide lots of different views in order to allow perception of the 3D detail. The familiar shaded surface rendering (see figs below) gives one such view, in which a rough idea of surface can be obtained from simulated lighting/shading. *Rotating sequences* give a better idea of the surface, but in order to see what is behind, a variety of further interactions such as *cutting*; *multiplanar reformatting*; various translucent *'volume renderings'* is needed.

3D video (2)

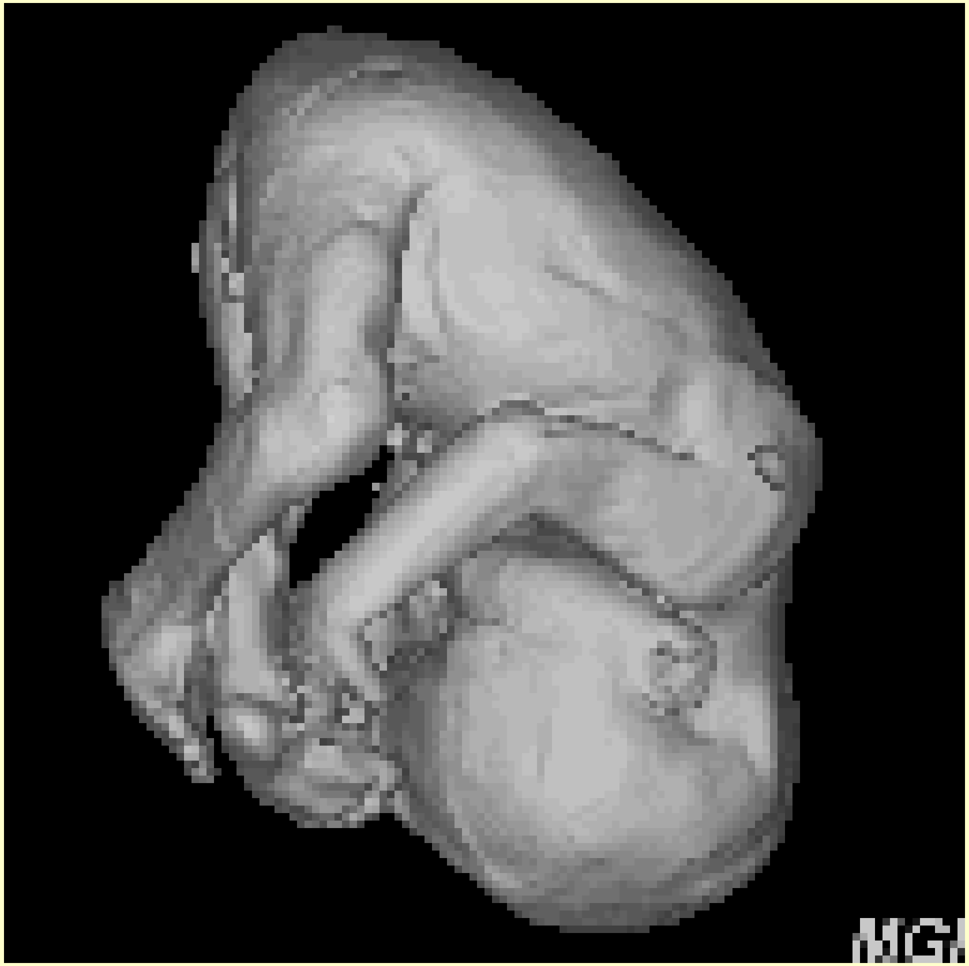
http://www.libramed.com.pl/ginekolog/index.htm

3D video (3)

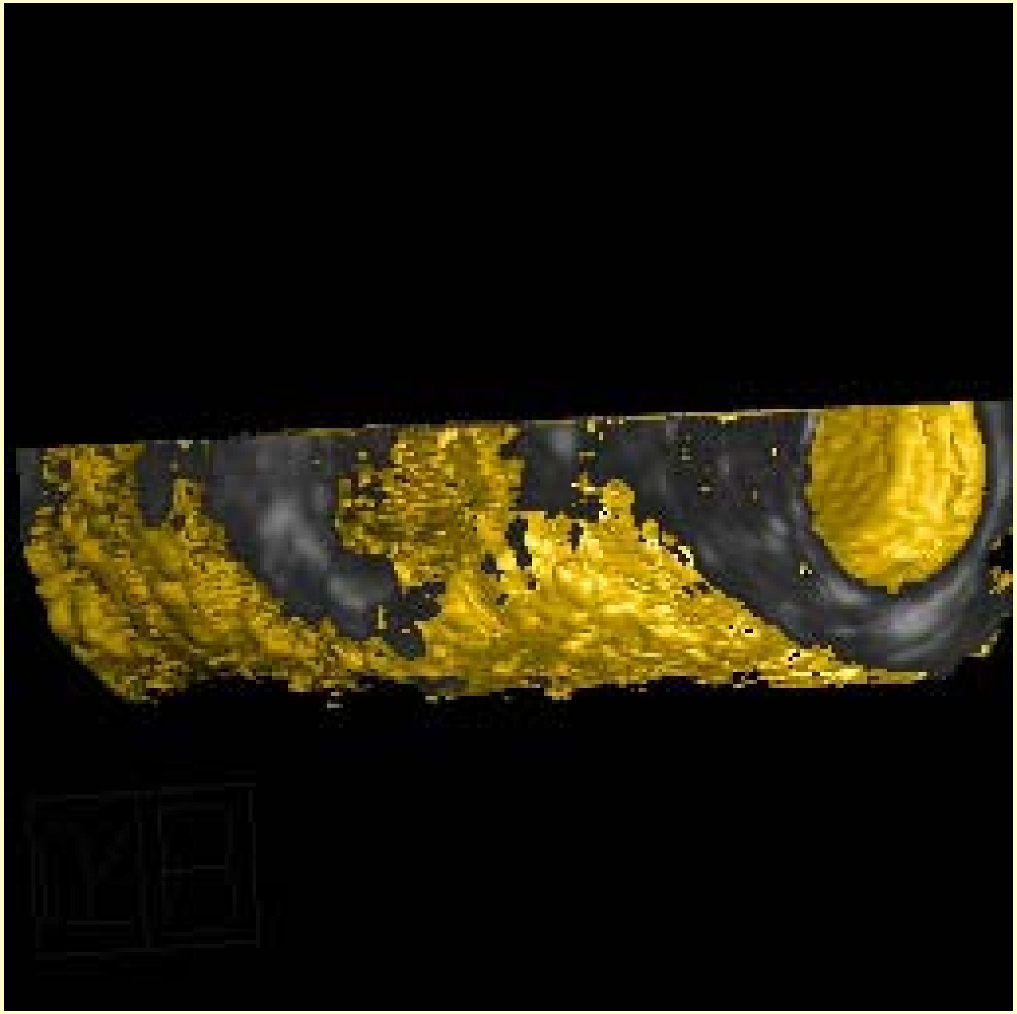


http://www.medphys.ucl.ac.uk/research/mgi/US-3D/vasc-us.htm

3d video – 3b MRI



http://www.medphys.ucl.ac.uk/research/mgi/fetal/index.htm



3D video (4)

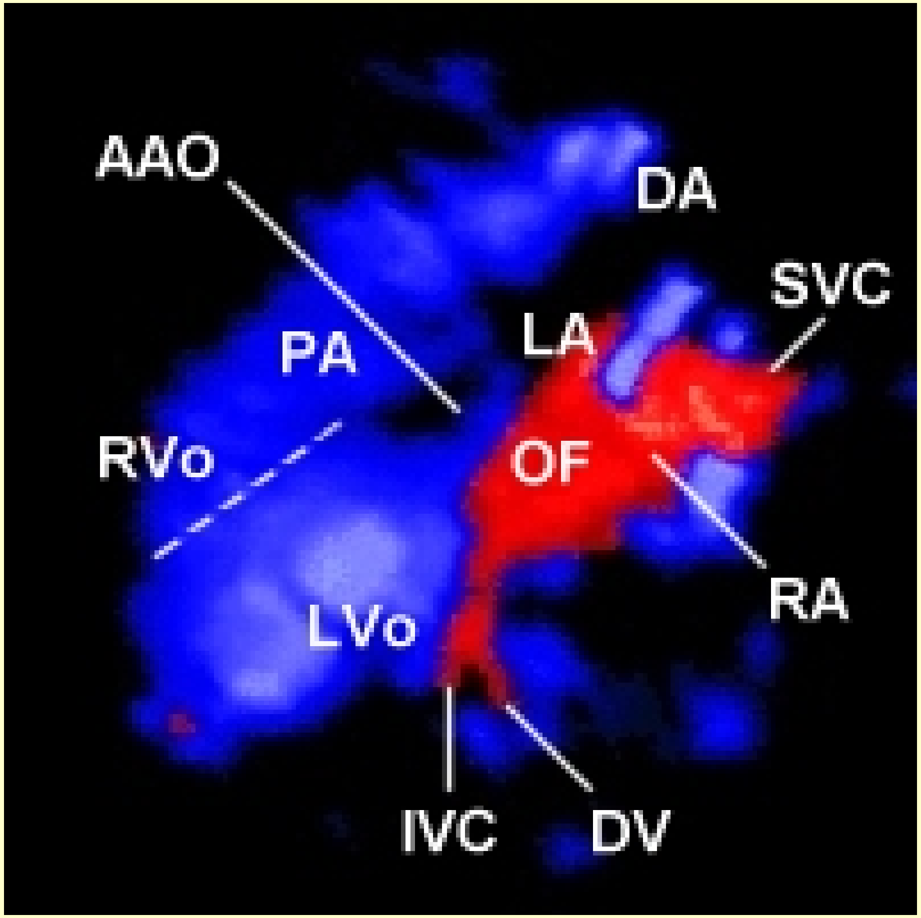
Intravascular ultrasound (IVUS) is recorded using a very small probe (1mm x 3mm) which rotates inside a water-filled catheter. This conventionally produces 2D images which are approximately cross-sections of the vessel.

A 3D image is recorded by pulling back the catheter along the vessel axis, recording its position and grabbing a set of 2D images (typically 80-100). This is then reconstructed assuming linear motion, and viewed on one of our workstations, which allows cutting away; multi-planar reformatting (MPR) and other views.

http://www.medphys.ucl.ac.uk/research/mgi/US-3D/vasc-us.htm

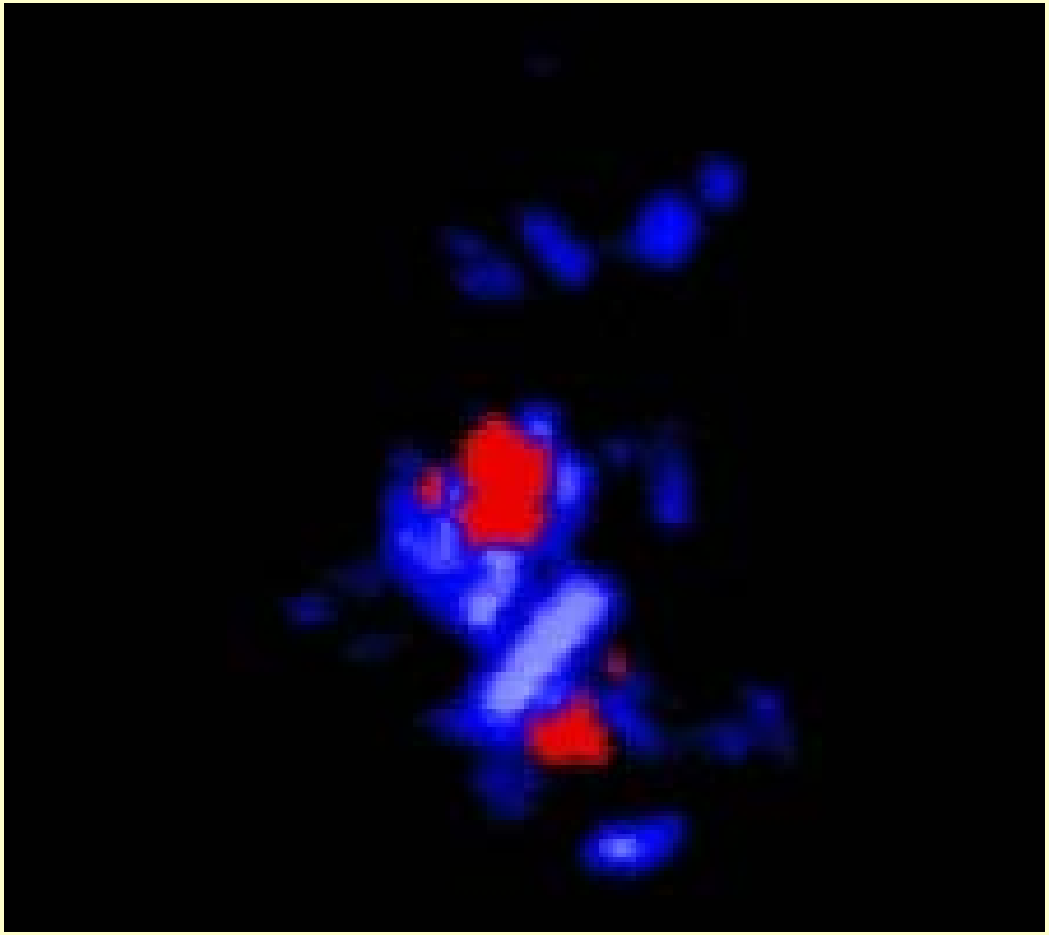
3D video (5)

US – serce – przepływ krwi



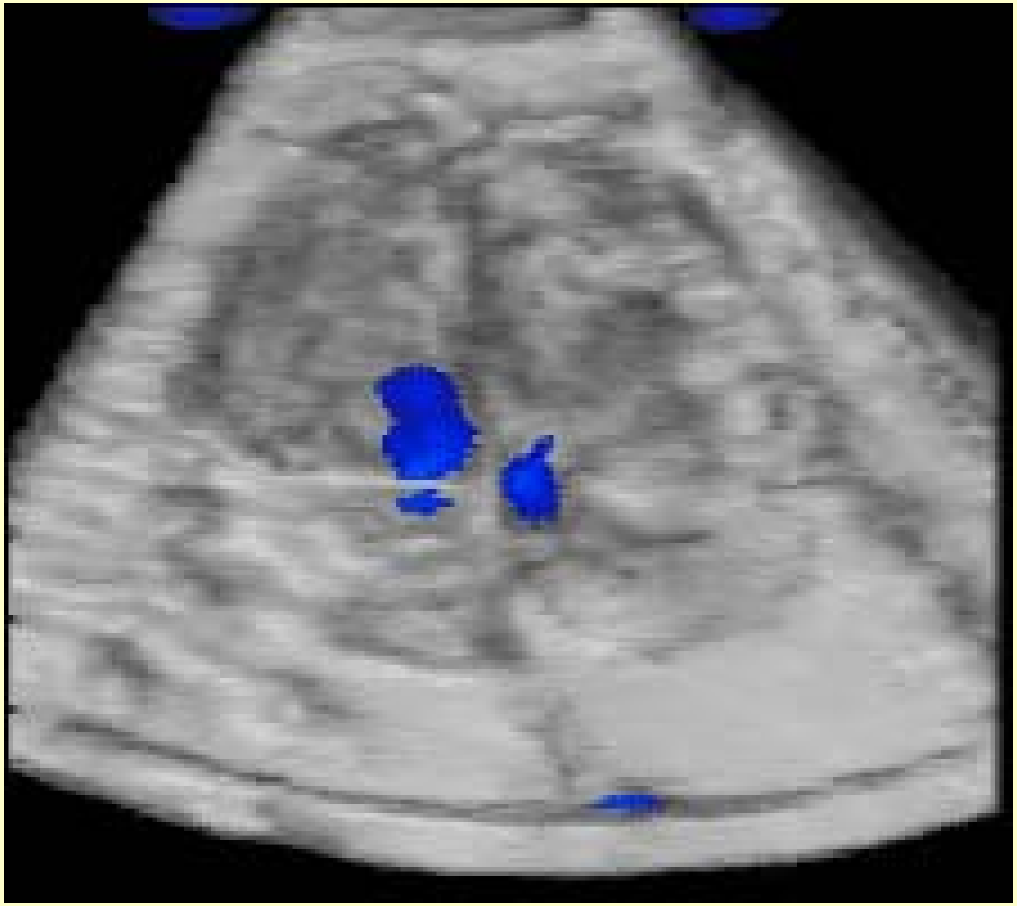
Red & blue in the left image show flows towards & away from the probe located ‘behind’ this page. The red indicates flows from the superior and inferior vena cava (SVC, IVC) returning to the right atrium (RA), with partial flow through the oval foramen (OF) into the left atrium (LA). The blues are systolic flows from the right and left ventricular outlets (RVo, LVo) into the pulmonary trunk (PT) and ascending aorta (AAO, mostly obscured by the red), correspondingly. The blues in the two ventricles appear to merge along the dotted line due to colour smearing artefacts, which are inherited from cross-sectional ultrasound and need to be overcome.

US – serce – przepływ krwi - video



The 4D intracardiovascular flow from a 32-week fetal heart is viewed left-inferio-posteriorly.

US – serce – przepływ krwi – video 2



movie of the same flow running through the heart.

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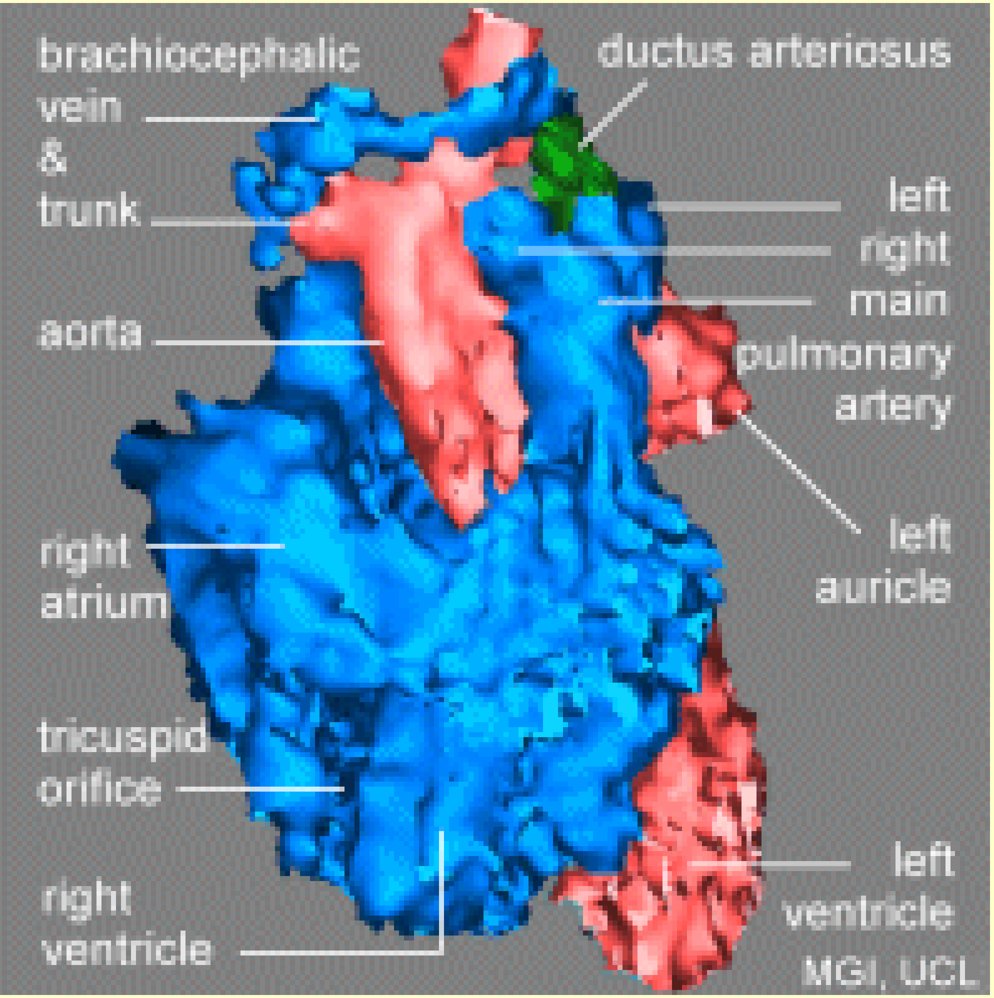
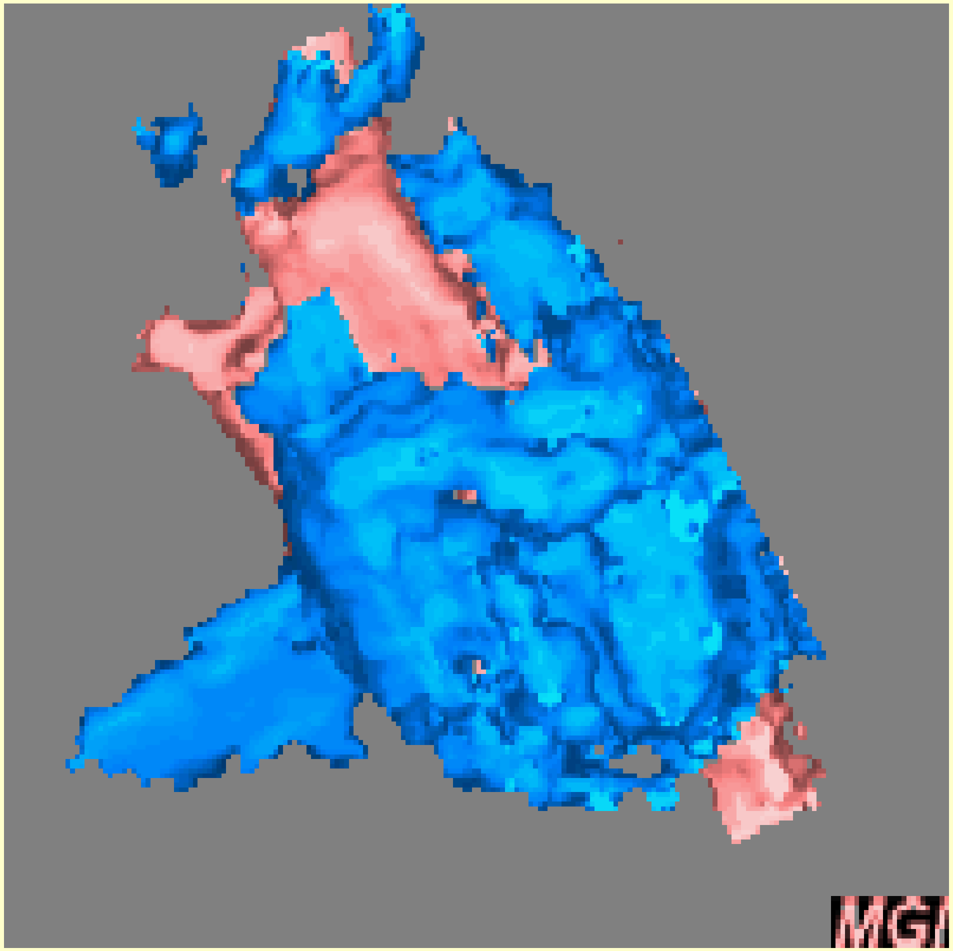
US - serce



22-Week Fetal Heart
(ultrasound)

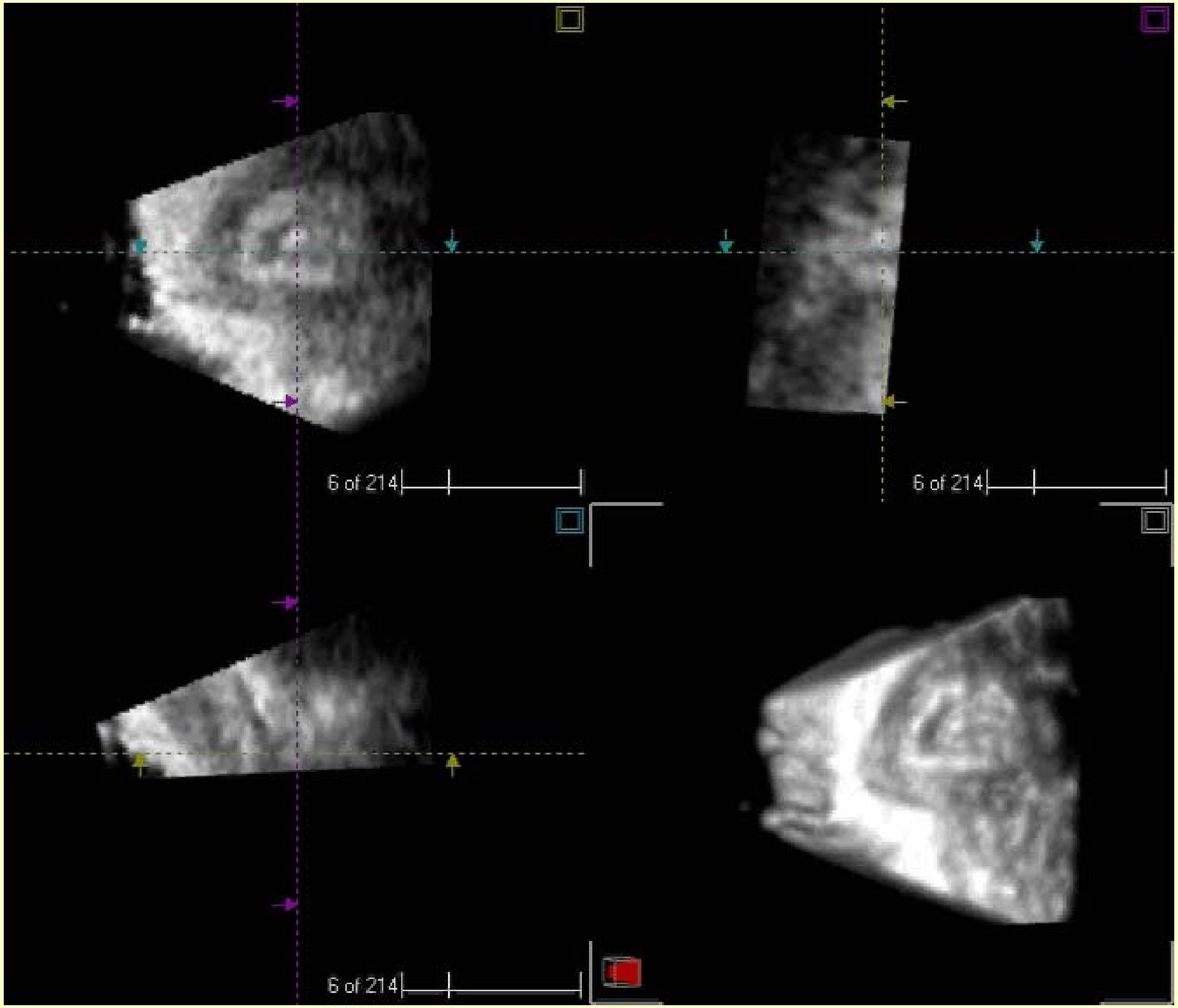
US – serce (2) video



22-Week Fetal Heart
(ultrasound)

US – twarz - noworodka

A Yawning FetusFetal Internal Organs(prenatal studies)



US - pocałunek

The left image shows the coronal view of the orbicularis oris of the female lips without the skin. The right image also shows the (left lateral) sagittal view of the same named muscle in the (pouting) male lips.

US - kontrasty

Three-Dimensional Visualisation & Quantification of Tumour Vascularity with Contrast-Enhanced Ultrasound & CT

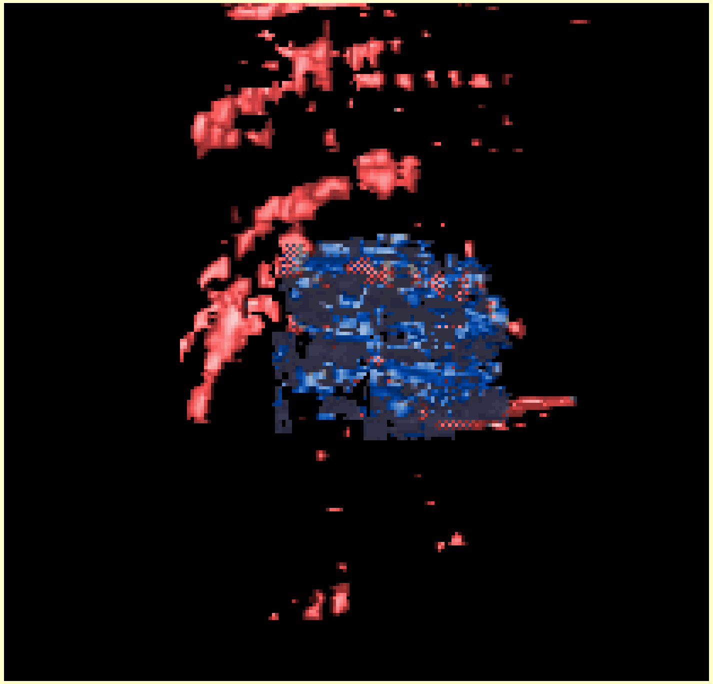
Lesion vascularity and permeability are of value in assessment of tumour angiogenesis and anti-angiogenesis response. Although transpulmonary contrast agents can enhance the vascularity, the distribution patterns are not always ready for mental 3D comprehension from individual 2D images. 3D reconstruction is used to make assessment of these patterns more direct and objective. Permeability is defined as the amount of substance(s) crossing an interface per unit time and per unit surface area (VSA). But current CT and MRI assessments can only calculate the amount of substance(s) over time because their contrast agents leak out through the vascular walls, making the interface unmeasurable. US contrast agents are intravascular-only agents. Therefore, US VSA measurement may be used with MRI or CT for permeability quantification.

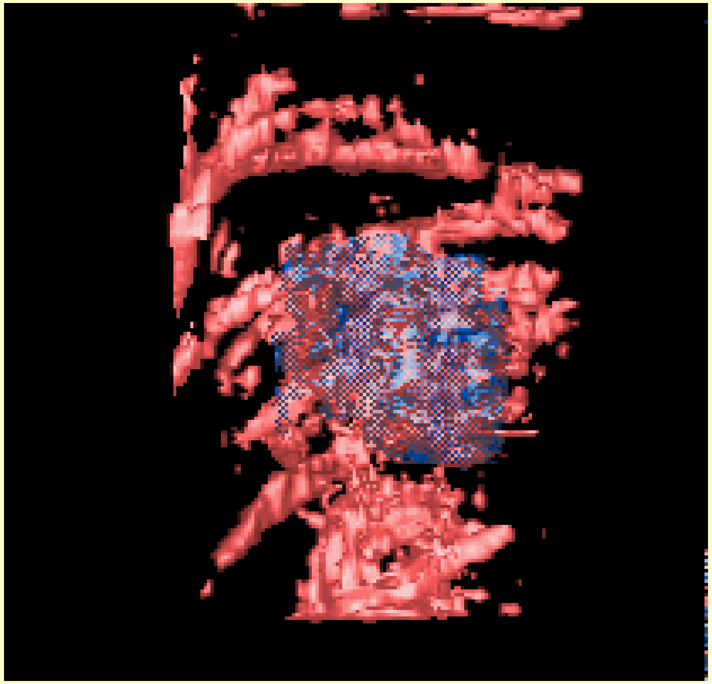
http://www.medphys.ucl.ac.uk/research/mgi/fetal/index.htm

US – kontrasty (2)

A gastrinoma metastasis to the liver

http://www.medphys.ucl.ac.uk/research/mgi/fetal/index.htm





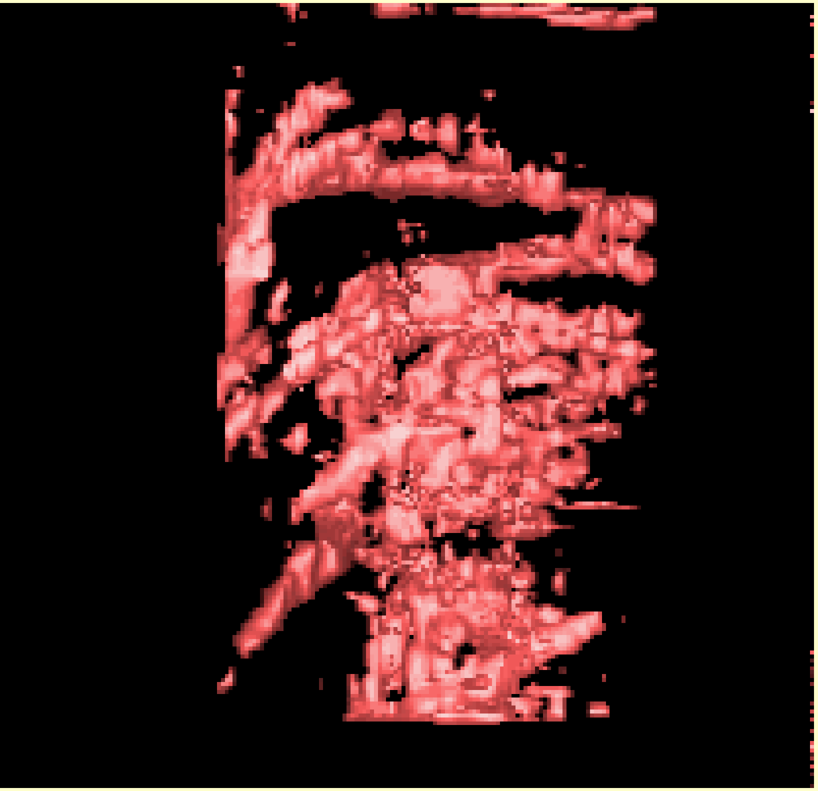
Pre-contrast agent injection:
Power Doppler blood flow signals (red branches) around and within the lesion (blue mass) were only partially visualised

Post-contrast agent injection:
Blood flow signals around and within the lesion were significantly enhanced and the spatial distribution was clearly visualised

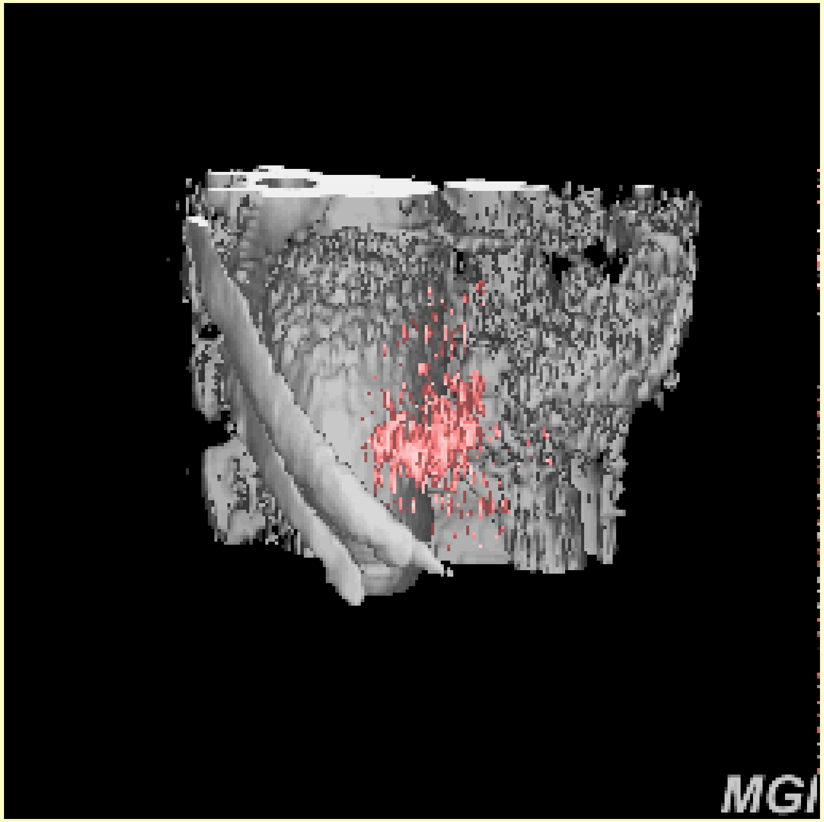
US – kontrasty (3)

A gastrinoma metastasis to the liver

http://www.medphys.ucl.ac.uk/research/mgi/fetal/index.htm



The threshold is set to display the vasculature only

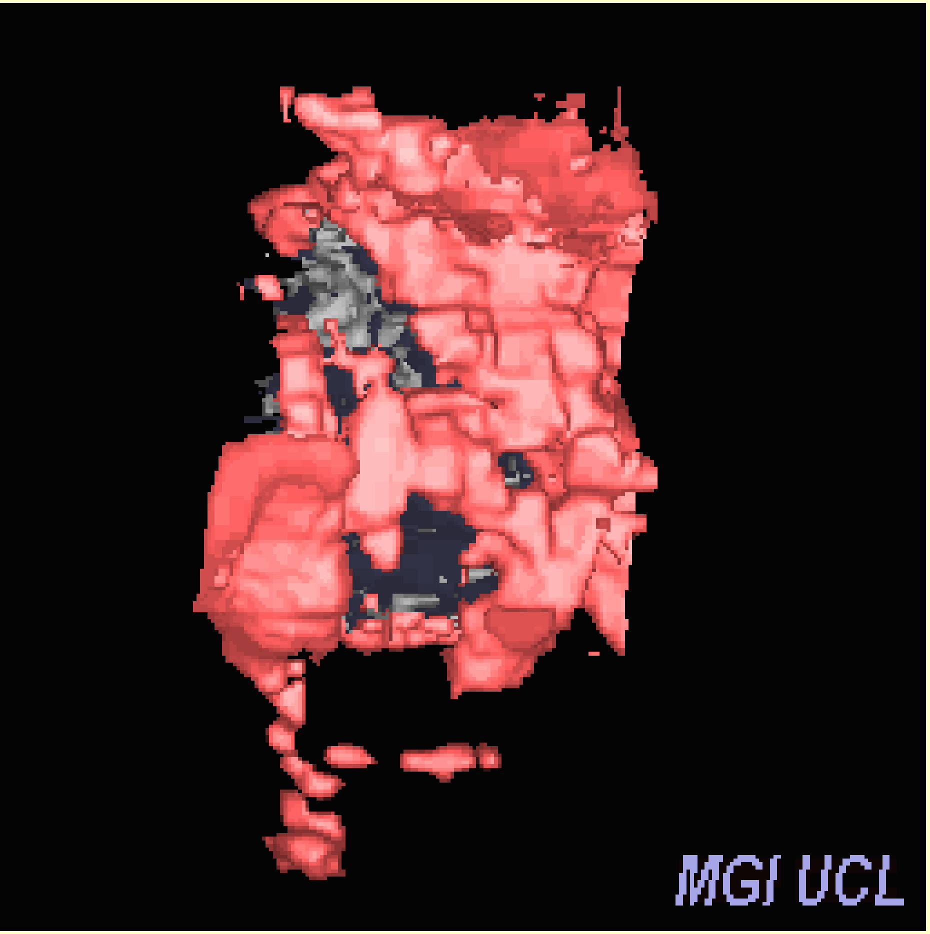


CT images show less striking enhancement with a homogeneous distribution (red-dotted area)

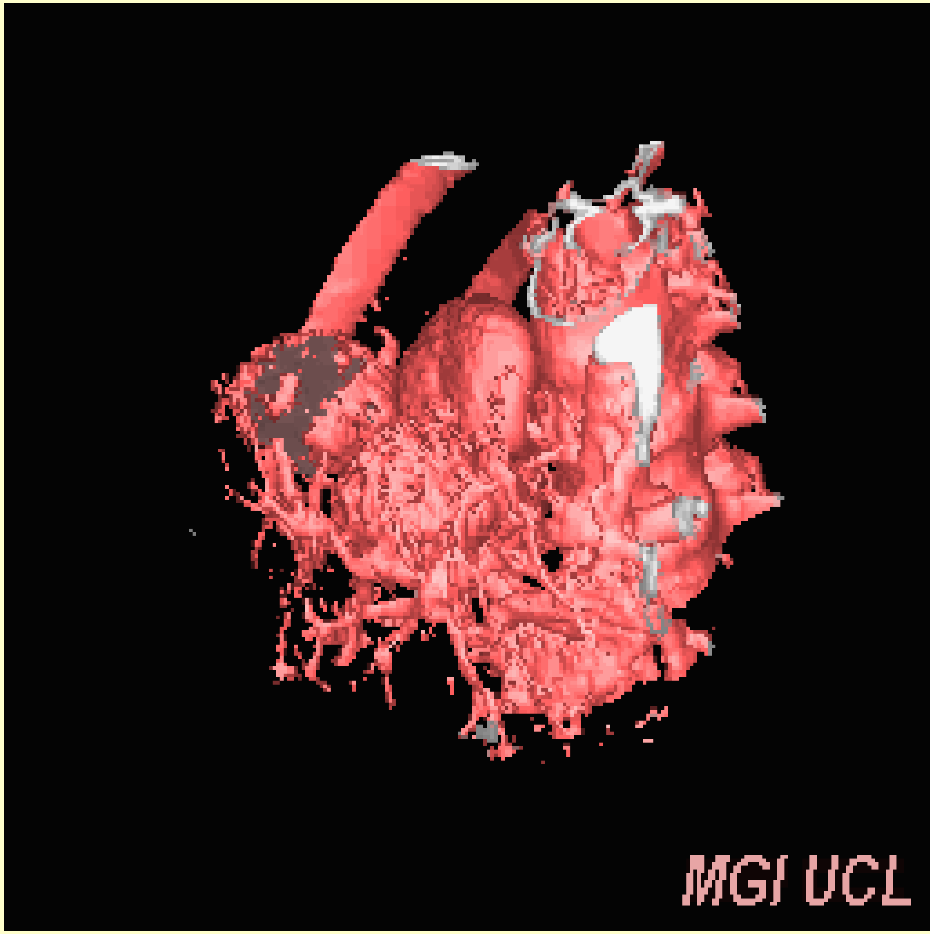
US – kontrasty (4)

A colonic metastasis to the liver

http://www.medphys.ucl.ac.uk/research/mgi/fetal/index.htm



3D US enhancement



3D CT enhancement showing the same distribution pattern