

## Voorstel MDO-opdracht Opleiding Technische Geneeskunde Universiteit Twente

### A. Algemeen

1. Titel MDO-opdracht: **3D measure for quantifying cerebral aneurysm recurrence**

2. Gegevens instelling/indiener:

Naam indiener: Dr Henk Marquering

Instelling/afdeling: AMC Radiologie/Biomedical Engineering & Physics

Contactgegevens: [h.a.marquering@amc.uva.nl](mailto:h.a.marquering@amc.uva.nl); 020-5665182

Medisch begeleider: Dr Charles Majoie, Dr René van den Berg AMC Department of Radiology

Technologisch begeleider (UT):

### B. Faciliteiten

1. Welke faciliteiten zijn nodig voor een adequate uitvoering van de vraagstelling?

Computers om op te werken, beschikbaarheid van MRA scans.

2. Wat zijn daarbij mogelijke risico's voor de voortgang van de opdracht?

Niet werkende software

### C. Overige opmerkingen

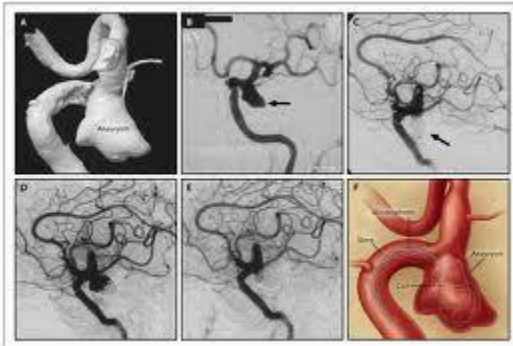
#### D. Inhoudelijke informatie MDO-opdracht

1. Omschrijving van de technisch geneeskundige vraagstelling (maximaal 400 woorden)

**N.B.: zo mogelijk directe afstemming tussen medische en technische groep, anders hiervoor contact opnemen met de opleiding TG.**

A cerebral aneurysm is a localized dilation of a blood vessel in the brain. Aneurysms can either have an acute presentation due to rupture or can produce symptoms due to the mass effect, the latter is especially true for giant aneurysms. Some aneurysms are found during routine MR or CT scanning. Rupture of a cerebral aneurysm leads to a subarachnoid hemorrhage or intracranial hematoma and can be life threatening or cause severe neurologic deficits. The first goal after rupture is to secure the aneurysm. This can be performed by placement of platinum coils inside the aneurysm sac (coiling) or by placement of a clip over the neck of the aneurysm. At present, 80 percent of aneurysms, both ruptured and unruptured, are treated by coiling.

In about 13-20% of the treatments, the aneurysm reopens. In some of these reopened aneurysms additional treatment is advocated because of the risk for re-rupture of the aneurysm. To identify patients at risk follow-up imaging is warranted. Until recently, standard follow-up imaging was performed using digital subtraction angiography. This procedure is invasive, has a risk of complications, and results in a 2D projection image of the 3D structure (see the first figure).

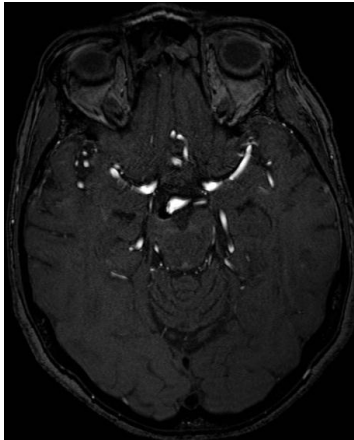


Recent developments in MR angiographic imaging made non-invasive follow up imaging possible. 3D Time of flight MR angiography is now the imaging modality of choice to assess the recurrence. MR gives us the possibility to assess the 3D structure of the recurrence with low-risk imaging (see the second image). At the AMC we have image data sets of follow up at multiple stages nicely illustrating the (3D) growth of the reopening of the aneurysm. However, we are missing *quantitative* measurements to assess the recurrence in 3D. During the internship, the student(s) shall develop an automated quantification method in which consecutive imaging studies can be compared and differences in volume of recurrence can be assessed. Up to now, only qualitative assessment of morphology of the recurrence is possible,

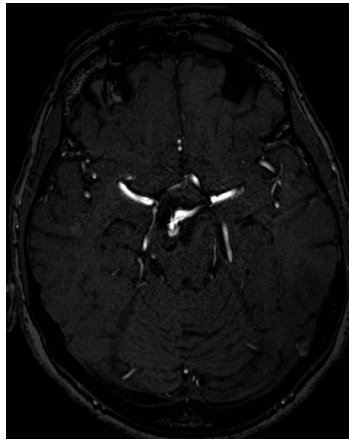


09-12-2010  
CK  
Email: [tg@tnw.utwente.nl](mailto:tg@tnw.utwente.nl)  
Tel.: 053-4893300

introducing high inter and intraobserver variability. This quantification is very valuable to study the recurrence volume over time, allowing better decisions when to intervene to stabilize aneurysm growth. Furthermore, quantitative assessment of aneurysm regrowth can be used as a surrogate primary outcome measure of aneurysm treatment trials in which different treatment methods are used. The measurement shall be compared with conventional angiographic measurements and the reproducibility needs to be assessed during the internship.



Axial 3D time of flight MR image of coiled superior cerebellar artery aneurysm



Axial time of flight MR image of coiled superior cerebellar artery aneurysm shows increases flow in the aneurysm consistent with recurrence



Volume rendered MR angiography image showing the recurrence

**Ondertekening:**

Datum: 11 Januari 2011

Naam indiener: Henk Marquering

Handtekening indiener:

A handwritten signature in black ink, appearing to read 'Henk Marquering', written over a horizontal line.

**Gaarne dit formulier retourneren aan:**

Universiteit Twente  
Opleiding Technische Geneeskunde  
Gebouw Noordhorst

09-12-2010  
CK  
Email: [tg@tnw.utwente.nl](mailto:tg@tnw.utwente.nl)  
Tel.: 053-4893300  
Postbus 217  
7500 AE Enschede