

# Stenosis Classification

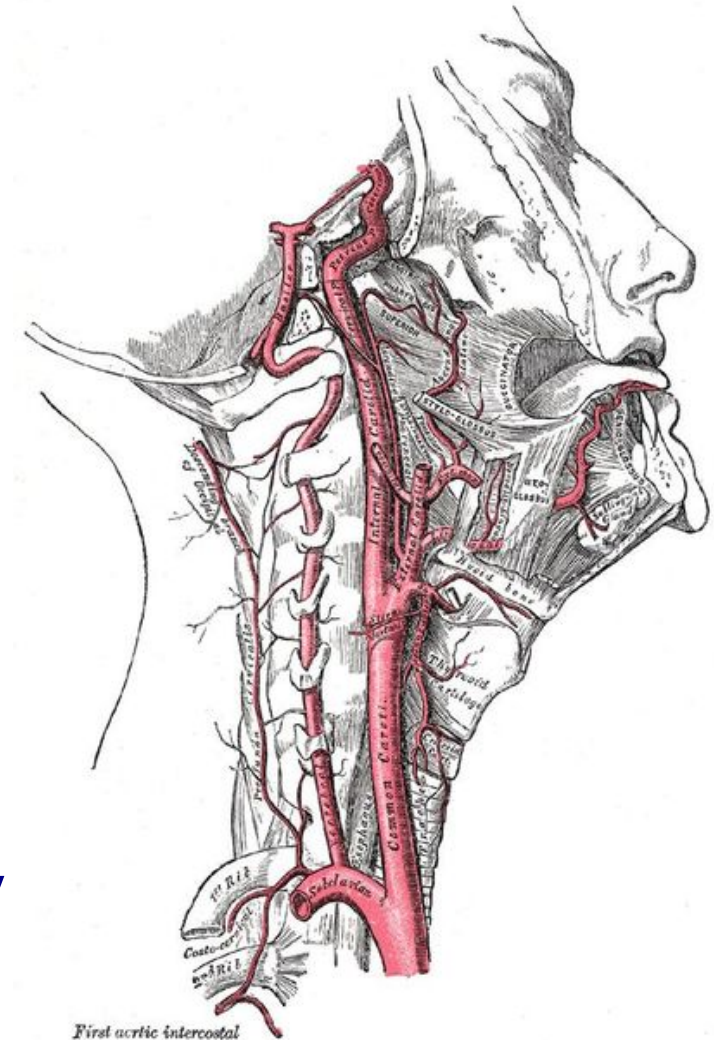
Project Kickoff Presentation

20 July 2006

Chair for Computer Aided Medical Procedures & Augmented Reality  
Department of Computer Science | Technische Universität München

# Medical background

- Stroke:
  - 3<sup>rd</sup> leading cause of death
  - Due to: Interruption of the bloodsupply to parts of the brain (*ischemic stroke*)
- Main cause: **Stenosis**
  - i.e. abnormal narrowing in a blood vessal
- Special setting: Stenosis in the *arteria carotis* due to plaque
- Various types of plaque (not necessarily along with a stenosis)



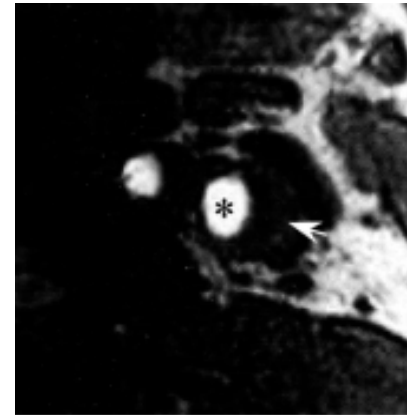
First aortic intercostal

# Conventional approach

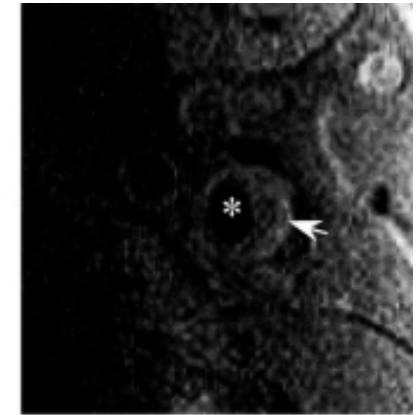
- Decision about surgery based only on grade of the stenosis (given by f.e. Ultrasound) – faulty approach
- Goal of this project: **classify stenosis into types** (according to the AHA)
- Based on:
  - structure
  - **composition** (Calzification, necrotic core, fibrous tissue, ...)
- CT, (intravascular) Ultrasound and Angiography have various drawbacks:
  - radiation
  - shows only grade, no information about the composition
  - intravascular

# Approach in this project

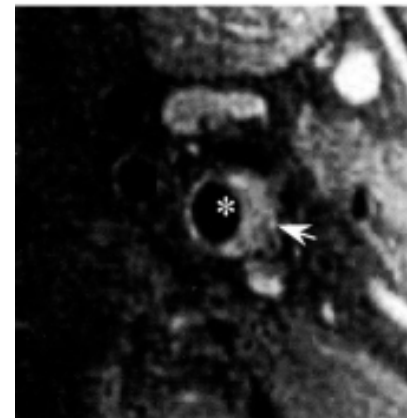
- MR images give information about the composition
- Using different weighted MR images it is possible to classify plaque correctly
- Weightings used:
  - T1
  - T2
  - Proton Density
  - Time of Flight



TOF



T1WI



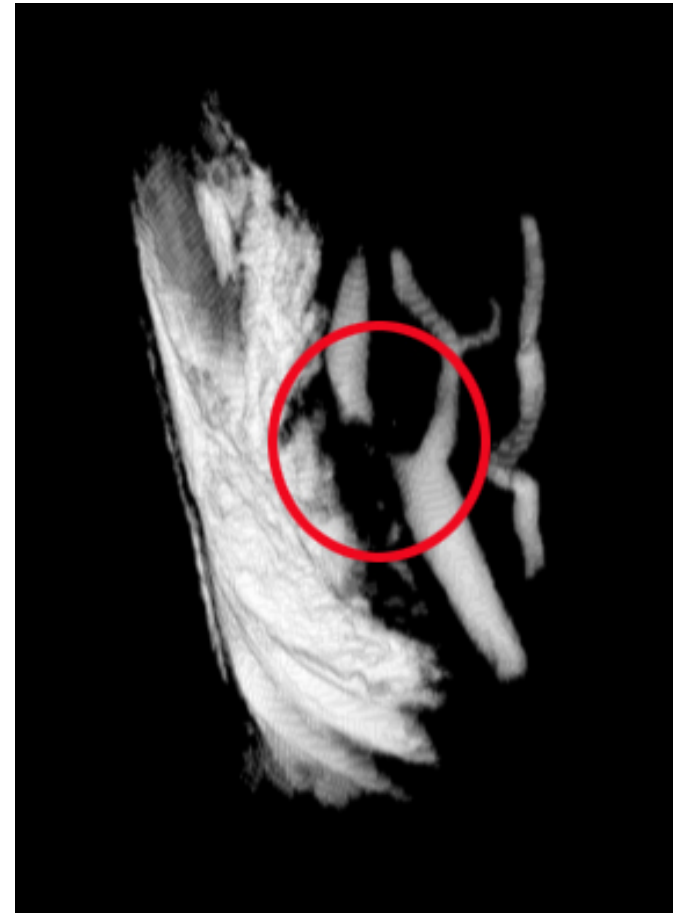
PDWI



T2WI

# Current state

- Basic GUI has been implemented
- Data has been sorted out, checked for registration
- Basic segmentation algorithms have been tested (esp. on tof images) in order to get the *arteria*



# Expected challenges

- Working on 4 images simultaneously
  - Registration
    - „What method to use on a specific weighting?“/ „Which weighting gives best results on current task?“
- Segmentation
  - Locate the plaque
  - Get the features needed for classification
- Classification – 2 approaches
  - Learning algorithm
  - Imitate doctor: exclude „impossible“ plaquetypes