Image analysis in acute ischemic stroke: visualizing the effect of collateral status on final infarct volume

Amsterdam UMC, Univ. of Amsterdam, Location Academic Medical Center,
Dept. of Biomedical Engineering and Physics, www.amc.nl/bmep

An internship position is available at the Biomedical Engineering and Physics department of the Academic Medical Center (AMC). In our group, new treatment and diagnostic procedures based on innovative physical techniques are developed. Research is performed by a multidisciplinary team that includes physicists, engineers, mathematicians, medical doctors, biologists, and chemists.

Background

An acute ischemic stroke occurs when an intra-cranial artery is partially or completely occluded by a thrombus (or clot) causing a decrease in the supply of oxygen and nutrients to the brain [1]. This can lead to the formation of two zones in the brain tissue: core (cerebral tissue that cannot restore function) and penumbra (cerebral tissue that can restore function on reperfusion) [2]. This lesion volume is generally measured on non-contrast CT scans that are obtained either 24 hours or 1 week after treatment. The survival of penumbral tissue also depends on the cerebral collateral circulation that allow retrograde filling [3].
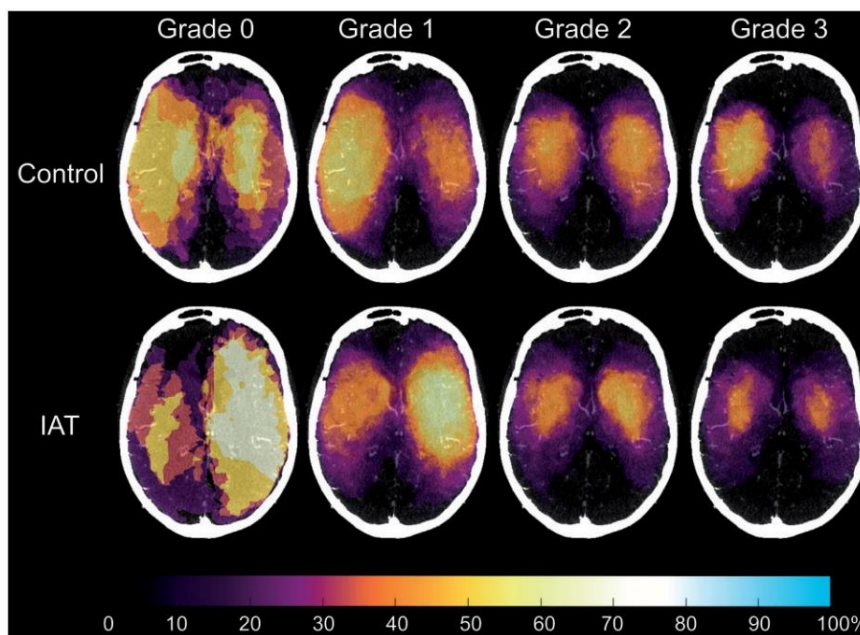

Figure: Overlay of segmentations of final infarct volume to show voxel-wise frequency of infarction for different collateral circulation grades and treatment modalities [3]

Research description

In this project, you will build an infarct probability map using the segmentations of the final infarct volume of hundreds of patients. You will develop a platform to visualize the effect of collateral score and occlusion location on the extent and anatomical location of the final infarct.

Requirements

Bachelor/Master student (physics/engineering sciences) with interest in 3D medical imaging and knowledge of –or interested in programming. The internship duration can be adjusted according to the curriculum.

Learning outcome

The student will gain knowledge in medical image analysis and programming. Being part of an interdisciplinary and international research group, the student will acquire competences including collaboration, scientific writing, and presentations.

References

1. Stroke https://www.world-heart-federation.org/
2. The Ischemic Penumbra http://www.strokecenter.org/
3. Boers, Anna MM, et al. "Collateral status and tissue outcome after intra-arterial therapy for patients with acute ischemic stroke." Journal of Cerebral Blood Flow & Metabolism 37.11 (2017): 3589-3598.

Contact

Name: Praneeta Konduri, Dr. Henk Marquering
Email : p.r.konduri@amc.uva.nl, or h.a.marquering@amc.uva.nl