

Press release

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Basic information

Name: Maryam Anzabi Email: maryam@cfm.au.dk Phone: +45 60212715

Department of: Clinical Medicine

Main supervisor: Leif Østergaard

Title of dissertation: Brain Microcirculation and Tissue Damage after Subarachnoid Hemorrhage

Date for defence: Friday 19 January 2018 at (time of day): 14:00 Place: DNC Auditorium, AUH building 10G, Nørrebrogade 44, Aarhus C.

Press release (Danish)

Hjerne-mikrocirkulation og vævsskade efter subarachnoidblødning

Et nyt ph.d.-projekt fra Aarhus Universitet, Health, der bekræfter formodningen om at kapillærer kan spille en meget stor rolle efter SAH. Projektet er gennemført af Maryam Anzabi, der forsvare det d. 19/1 2018.

Den dårlige prognose efter subarachnoidalblødning (SAH) skyldes i høj grad sen cerebral iskæmi (DCI), som opstår flere dage efter patientens aneurisme er behandlet. DCI tilskrives ofte vasospasmer, men undersøgelser har sat spørgsmålstegn ved denne antagelse, da vasospasmer ikke ser ud til at være en forudsætning for, at patienter udvikler DCI. Den kapillære fordeling af hjernens blodtilførsel er for nylig foreslået som årsag til udviklingen af hjerneskade efter SAH. I afhandlingens første studie blev kapillære flow forstyrrelser undersøgt fire dage efter henholdsvis SAH og sham-operation hos mus. Vores resultater viste, at hjernens blodforsyning var nedsat og blodets mikroskopiske fordeling forstyrret hos de dyr, som havde udviklet SAH. Afhandlingens andet studie undersøgte astrocytters rolle for hjerneskade efter SAH. Astrocytter udfører en række vigtige funktioner i den raske hjerne. Vi fandt hippocampus atrofi fire dage efter SAH, og samtidig svære morfologiske forandringer i hippocampus' astrocytter. Også hippocampus' kapillærer var forsnævrede, og den forstyrrede kommunikation mellem astrocytter og kapillærer kan således være én af årsagerne til, at kapillærernes blodgennemstrømning forstyrres. Bølger af celle-depolarisationer, som spredte sig over den syge hjernebark, såkaldte CSD'er, menes at bidrage til hjerneskade efter bl.a. SAH. I vores tredje undersøgelse fremprovokerede vi CSD bølger på hjernebarken hos raske dyr og fulgte ændringer i arteriolernes diameter og i antallet af blodfyldte kapillærer. Vi fandt at den kapillære fordeling af blod blev forstyrret før at diameteren af opstrøms arterioler ændrede sig. Disse resultater er i overensstemmelse med forudsigelsen om, at CBF justeres i forhold til den kapillære fordeling af blod under CSD.

Forsvaret af ph.d.-projektet er offentligt og finder sted den 19/01 2018 kl. 14:00 i DNC Auditorium, AUH building 10G, Nørrebrogade 44, Aarhus C. Titlen på projektet er "Brain Microcirculation and Tissue Damage after Subarachnoid Hemorrhage". Yderligere oplysninger: Ph.d.-studerende Maryam Anzabi, e-mail: maryam@cfm.au.dk, tlf. +45 60212715.

Bedømmelsesudvalg:

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Press release (English)

Brain Microcirculation and Tissue Damage after Subarachnoid Hemorrhage

A new PhD project from Aarhus University supports the notion that capillary flow pattern could play a crucial role in the tissue injury after SAH. The project was carried out by Maryam Anzabi, who is defending her dissertation on 19/01 2018.

The poor outcome after subarachnoid hemorrhage (SAH) is mainly ascribed to delayed cerebral ischemia (DCI), which is traditionally believed to be the result of parallel vasospasms. This causal relation has recently been questioned and the capillary bed flow was proposed as a crucial contributor to the brain damage after SAH. In the current PhD project, we investigated the role of microcirculation in ischemic brain injury four days after SAH in mice and estimated tissue oxygenation based on capillary flow pattern changes. Tissue injury was addressed by volumetric investigation of the hippocampus as well as astrocytic morphological changes and capillary coverage by astrocyte endfeet. Microvascular changes and tissue hypoxia may render brain tissue vulnerable to some injuries that are known to occur in the aftermath of SAH. One such injury mechanism, cortical spreading depolarization (CSD), imposes extreme metabolic demands on brain tissue. We determined the temporal dynamics of arteriolar diameter and capillary perfusion in relation to the arrival of the CSD waves and tried to address whether capillaries or arterioles are first affected by CSD-related hemodynamic changes. Overall, the findings of the current PhD project support the notion that capillary flow pattern plays a crucial role in the tissue injury after SAH, where capillary flow disturbance is a primary phenomenon relative to upstream arteriolar constriction. Adding to known sources of capillary dysfunction after SAH, we identified changes in astrocyte morphology and parallel loss of capillary coverage by astrocyte. The observed hippocampal atrophy may provide insights into the etiology of cognitive dysfunction often affecting SAH survivors.

The defence is public and takes place on 19/01 2018 at 14:00 in DNC Auditorium, AUH building 10G, Nørrebrogade 44, Aarhus C. The title of the project is "Brain Microcirculation and Tissue Damage after Subarachnoid Hemorrhage". For more information, please contact PhD student Maryam Anzabi, email: maryam@cfm.au.dk, Phone +45 60212715.

Assessment committee:

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