

# Laser Speckle Imaging of blood flow in the microcirculation of the cerebral cortex

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1. Protocol A: Laser Speckle Imaging (LSI) of blood flow changes coupled to neuronal activity in the human cerebral cortex: To investigate and optimize the use of LSI to visualize blood flow changes coupled to neuronal activity. The aim is to...

<b>Ethical review</b>	Approved WMO
<b>Status</b>	Pending
<b>Health condition type</b>	Nervous system neoplasms malignant and unspecified NEC
<b>Study type</b>	Observational non invasive

## Summary

### ID

NL-OMON36491

### Source

ToetsingOnline

### Brief title

Laser Speckle Imaging of cerebral cortex

### Condition

- Nervous system neoplasms malignant and unspecified NEC

### Synonym

function of the microcirculation in the cerebral cortex

### Research involving

Human

### Sponsors and support

**Primary sponsor:** Erasmus MC, Universitair Medisch Centrum Rotterdam

**Source(s) of monetary or material Support:** Ministerie van OC&W

## Intervention

**Keyword:** imaging, Laser Speckle Imaging, microcirculation

## Outcome measures

### Primary outcome

The aim of the study is two-sided. First we propose to investigate and further develop the use of LSI to assess blood flow changes coupled to neuronal activities and to find out whether this approach can be used during tumor dissection. Secondly we aim to investigate the effects of several therapeutic standard interventions (infusion of mannitol, artificial elevation of mean arterial pressure and placement of surgical devices), which are expected to influence CBF, and are routinely used during neurosurgical procedures on microcirculatory flow in the brain, with and without the use of Transcranial Doppler Ultrasound to compare blood flow velocity in the microvasculature with the larger cerebral arteries.

### Secondary outcome

nvt

## Study description

### Background summary

Imaging activities in the human brain form one of the major challenges in the field of neuroscience, and advances in this area will directly affect approaches in the fields of neurology and neurosurgery. To date, the methods for visualizing neuronal activity in humans suffer from several limitations. They either reflect differences in neuronal activity indirectly by measuring changes in vascular perfusion (fMRI and PET-scan), or they directly reflect neuronal electrical activity, but do not provide robust neuro-anatomical specificity (EEG and MEG). These technologies suffer respectively from

relatively limited temporal and spatial resolutions. Usually brain tumors are initially identified using standard MRI, and once the patient is subjected to neurosurgery, an attempt is made to obtain a total resection of the tumor with minimal loss of surrounding vital neuronal tissue, especially that of areas involved in pivotal functions such as speech and limb movements. The currently used golden-standard procedure for identifying functional regions surrounding the tumor is the electrocortical stimulation mapping (ECM) technique. Unfortunately, ECM has several disadvantages (risk of hemorrhage, seizures and time-consuming). Here, we provide an alternative by using the non-invasive Laser Speckle Imaging technique, a technique with a high spatiotemporal resolution for imaging local blood flow changes, which are known to be coupled to neuronal activity.

## **Study objective**

1. Protocol A: Laser Speckle Imaging (LSI) of blood flow changes coupled to neuronal activity in the human cerebral cortex: To investigate and optimize the use of LSI to visualize blood flow changes coupled to neuronal activity. The aim is to identify and discriminate specific functions of vital neuronal tissue more precise, more efficient and faster as compared to current methods.
2. Protocol B: Effect of systemic medication on microcirculatory flow in the brain assessed by Laser Speckle Imaging (LSI): Evaluation of the effects of routinely used systemic medication and surgical devices (standard interventions during neurosurgical procedures) on the local microcirculation in parts of the cerebral cortex, with (not routinely used) and without the use of Transcranial Doppler.

## **Study design**

The study design will be observational without invasive measurements. Recording will be made during taskperforming (in the awake craniotomy) and during the standard infusion of mannitol and phenylephrine as described in the protocol.

## **Study burden and risks**

There will be no risks involving taking the measurements, it is a non-invasive method and the camera will stay approximately 30 centimeter above the cortex of the brain. The LSI measurements will take at most 15 minutes and are not painful or dangerous. The measurements will not have a negative influence on the patient, the surgery or the surgeon. The surgeon will be monitoring the medical situation at all times.

## Contacts

### Public

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### Scientific

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## Trial sites

### Listed location countries

Netherlands

## Eligibility criteria

### Age

Adults (18-64 years)

Elderly (65 years and older)

### Inclusion criteria

All patients that will undergo an awake craniotomy will be eligible for protocol A. They have to be at least 18 years old and there has to be informed consent.

All patients that will undergo a craniotomy under anaesthesia are eligible for protocol B. They have to be at least 18 years old and there has to be informed consent.

### Exclusion criteria

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## Study design

### Design

**Study type:** Observational non invasive

Masking: Open (masking not used)

Control: Uncontrolled

Primary purpose: Diagnostic

### Recruitment

NL

Recruitment status: Pending

Start date (anticipated): 01-08-2013

Enrollment: 40

Type: Anticipated

## Ethics review

Approved WMO

Date: 11-02-2011

Application type: First submission

Review commission: METC Erasmus MC, Universitair Medisch Centrum Rotterdam (Rotterdam)

## Study registrations

### Followed up by the following (possibly more current) registration

No registrations found.

### Other (possibly less up-to-date) registrations in this register

No registrations found.

## In other registers

### Register

CCMO

### ID

NL29227.078.09