Wide field speckle imaging and two photon microscopy close up for the Investigation of cerebral blood flow in vivo in murine model of obesity.

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Abstract: The morphological and functional changes in cerebral blood vessels network is not well characterized in mice models of obesity. In order to study the hemodynamics of these models at rest and during sensory stimulation, we have developed a multi exposure speckle imaging system. It allows wide field superficial imaging of blood flow of the mice cortex. We have characterized the performances of the system using microfluidic phantoms where blood mimicking fluids speed is set between 1mm/s and 1cm/s. The acquisition of speckle contrast for different expositions time allows discriminate moving and static diffusers and therefore to image quantitatively with limited invasiveness through a thin layer of bone. In vivo speckle imaging of the mice brain will be presented. The spatial resolution of speckle limits access to the smaller capillaries as well as to capillaries in layers III-IV of the cortex. Therefore, in vivo two photon imaging was chosen as a complementary technique. It allowed to record the blood vessels architecture down to several hundreds of microns and the extraction of red blood cells densities and velocities from rapid line scans acquired at the center of cortical capillaries. © 2018 The Author(s)

OCIS codes: (170.0170) Medical optics and biotechnology ; (170.6480 ) Spectroscopy, speckle