

UC Irvine

UC Irvine Previously Published Works

Title

An optical technique for fluid velocity measurement applicable to intra-operative blood flow

Permalink

<https://escholarship.org/uc/item/16b1t8z7>

Authors

Rossow, Molly J
Mantulin, William W
Gratton, Enrico

Publication Date

2007

Copyright Information

This work is made available under the terms of a Creative Commons Attribution License, available at <https://creativecommons.org/licenses/by/4.0/>

Peer reviewed

Molly J Rossow, William W Mantulin, and Enrico Gratton.

An optical technique for fluid velocity measurement applicable to intra-operative blood flow.

51st Annual Meeting of the Biophysical Society, Baltimore, Maryland, 2007.

Biophys J. 2007; Suppl: 332a, 1565-Pos/B618.

Abstract

During surgery, especially neurosurgery, it is important for doctors to be able to determine if blood flow is compromised in a vessel due to some obstruction or a vasospasm. It is also useful for doctors to be able to measure to rate of blood flow in order to ensure that the surrounding tissue is properly oxygenated and not ischemic. There currently exist a number of technologies for measuring blood flow but each of them has certain limitations and there is a need for improved technology.

We are developing a new optical correlation method for detecting and measuring the velocity of small (~1mm) particles transported in a flowing liquid. This technique is applicable to blood flow measurements since blood is a fluid (plasma) containing small particles (blood cells). The basis of this technique is the analysis of intensity fluctuations in the detected optical signal caused by particle flow. We have tested this technique at various flow rates and particle concentrations using a) simulations and a model system, b) single and multiple detectors, and c) various spatial and temporal correlation analysis methods. Our results indicate this optical correlation technique holds promise as the basis of a new surgical instrument for blood flow measurement.

This research was supported by the National Institutes of Health (PHS 9RO1 EB00559 and NTROI-1U54CA105480)