

Near Infrared Fluorescent Imaging Used to Assess Tissue Perfusion in Surgery

Tech ID: 27594 / UC Case 2017-164-0

BACKGROUND

Near infrared (NIR) fluorescence imaging (FI) utilizing the fluorophore indocyanine green (ICG) has become more popular for use in medical diagnostics. It is useful for assessing tissue perfusion in a number of surgeries, particularly abdominal, heart, plastic, hepatic as well as other areas of medicine. The light needed for the excitation of the fluorescence is generated by a near infrared light source which is attached directly to a camera. A digital video camera allows the absorption of the ICG fluorescence to be recorded in real time, which means that perfusion can be assessed and documented. Currently, ICG provides a visual representation of tissue perfusion as a global view. Although some efforts have been put into density analysis, no device or software currently performs dynamic evaluation of blood flow for a surgeon. Without objective dynamic measurements, practitioners are only limited to snap shot view of the static environment. This is a problem because it is the dynamics of blood flow that determines tissue perfusion, not how much blood present at a stationary point in time. Furthermore, because there are no numerical evaluations out on the market that can capture this dynamic aspect of blood flow, practitioners are forced to use the naked eye to make a clinical decision that is not only subjective, but is difficult to assess between cases.

TECHNOLOGY DESCRIPTION

Clinicians at UC San Diego have developed a method of filtering the background noise to obtain dynamic ICG signal then perform analysis as a function of time to make inferences to tissue perfusion. When done during the operation, this information can be given to clinical practitioners in real-time to make clinical decisions. This invention will potentially allow doctors to perform ICG fluorescence on tissue and decide exactly how well or poorly perfused it is and make decisions on management based on this. This software provides the temporal intensity ruler for measuring how well an organ or tissue is perfused with blood. This standardization of measurement will allow fluorescent surgery to become a viable technique based on verifiable scientific method.

APPLICATIONS

This invention can be used as a diagnostic tool for surgeons. They can use it in the following cases: • Plastic surgery: skin and muscle transplants; determination of amputation level • Abdominal surgery: gastrointestinal anastomosis • General surgery: wound healing and ulcers • Internal medicine: diabetic extremities • Heart surgery: aortocoronary bypasses • Tissue perfusion • Hepatic function • Cardiac output monitoring

ADVANTAGES

This invention allows for the evaluation of the perfusion of blood in tissue in real-time thus providing an objective assessment of the patient and potential outcomes.

STATE OF DEVELOPMENT

The invention has been validated by demonstrating in live-pig studies the blood flow and quantification of it.

INTELLECTUAL PROPERTY INFO

This technology has a patent pending and is available for licensing.

PATENT STATUS

Country	Type	Number	Dated	Case
Patent Cooperation Treaty	Published Application	2018144785	08/09/2018	2017-164

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OTHER INFORMATION

KEYWORDS

diagnostic tool for surgeons, near infrared fluorescent imaging, tissue perfusion, blood flow

CATEGORIZED AS

- ▶ **Imaging**
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