A Photoacoustic Tomography Method and System

A method to make photoacoustic imaging quantitative, with applications in deep tissue spectroscopy, blood oxygenation monitoring, and more.

Reference: Photoacoustic Tomography

Objective

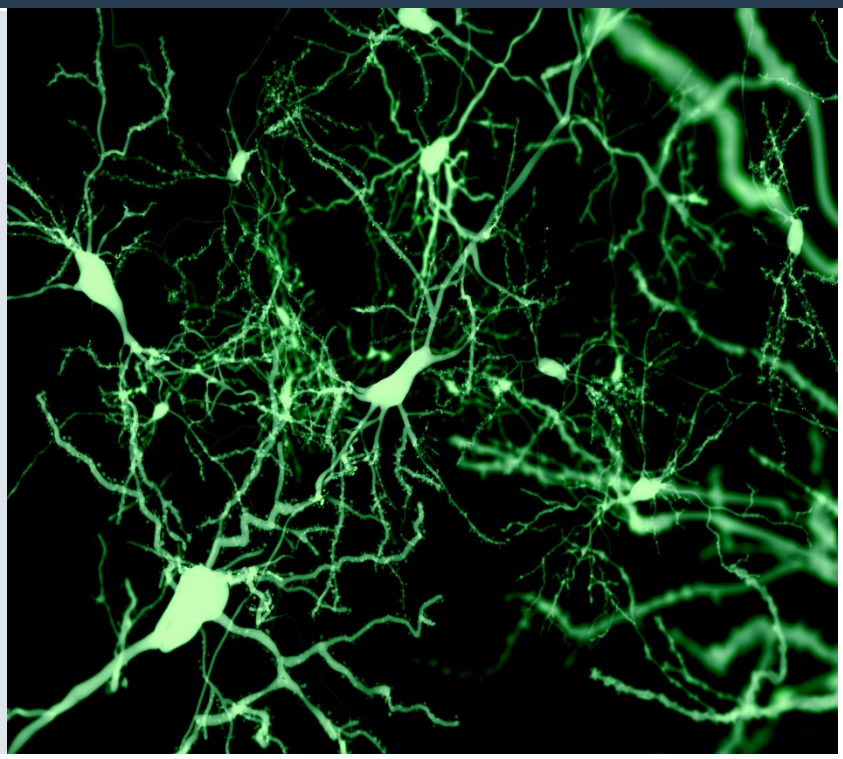
Seeking Licensing Opportunities

Research and IP Status

Patent application submitted

Patents

European EP15700468.0
Japanese 2016-548167
US 15/111,911



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Background

Photoacousic imaging (PAI) is an imaging technique which measures optical absorption, which is related to the optical absorption coefficient and the optical fluence. It has clinical applications in monitoring subsurface tissue.

It is well known that the main disadvantage of PAI is that uncertainty about the fluence at any voxel makes it difficult to make any quantitative measurement or image of the volume. t

Tech Overview

Scientists at NUI Galway have developed a method to make photoacoustic imaging (PAI) quantitative. Several attempts have been made to calibrate the PAI system, but this has proved elusive. A calibrated system will be quantitative and hence has many applications in clinical and pre-clinical medicine, as well as fundamental science and discovery, including stem cell tracking, optimisation of cancer treatments and basic physiology studies.

Applications

Quantifying blood oxygen saturation (sO2) is an important tool in preclinical and clinical imaging. The method of
calibration described in the NUI Galway patents would have application in:

1. Deep tissue spectroscopy for scientific discovery
2. Photoacoustic imaging for neoadjuvent cancer, parathyroid cancer and carotid stenosis.
3. Clinical cerebral venous oxygen saturation sensor, for example, continuous monitoring of cerebral blood oxygenation is critically important for the management of many life-threatening conditions such as:
   - Cerebral Ischemia
   - Severe traumatic brain injury and shock
   - During Cardiac Surgery
   - Cerebral blood oxygenation below 50% (associated with death or severe neurologic complication (normal range 55% - 75%)

Benefits

Many techniques have been developed to quantify sO2 *in vivo*; however, they all have limitations. For instance,
near-infrared spectroscopy (NIRS) and diffuse optical tomography (DOT) lack the spatial resolution and depth discrimination to differentiate heterogeneities in tumor oxygenation; functional magnetic resonance imaging monitors the blood oxygen level dependent (BOLD) contrast, which is sensitive only to deoxygenated hemoglobin; and positron emission tomography (PET) requires the use of ionizing radioisotopes.

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