Optimizing Probes to Improve Spectroscopic Measurement in Turbid Media

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The Wisconsin Alumni Research Foundation (WARF) is seeking commercial partners interested in developing a system for determining the optimal probe geometry for use in a particular tissue or other turbid medium.

Overview

Fiber optic probes can be used for spectroscopic measurement of tissue. A fiber optic tube emits light on one side of the tissue that is absorbed and measured on the other side by fiber optic detectors. The interaction between the light and tissue gives information about the absorption and scattering properties of the tissue, which is useful in medical diagnosis.
There are many variants in probe design, including diameter of fiber optic emitters and detectors, the distance between them, and the number of detectors. Because the interaction between light and tissue is complex, it is difficult to determine which probe geometry is best suited for each application.

The Invention

UW-Madison researchers have developed a method, apparatus and corresponding computer program to determine the optimal probe geometry for use in a particular tissue or other turbid medium. Light transport through the medium is modeled to simulate the diffuse reflectance properties that would be measured by a specific probe geometry. An inversion algorithm then converts the diffuse reflectance properties into optical properties. Those optical properties are compared to the known optical properties of the tissue to determine how well they match. When this process is repeated for additional probe geometries, the program indicates which geometry gives the most accurate measurement of the optical properties of the medium.

Applications

- Medical diagnostics, including diagnosis of cancerous and pre-cancerous tissue

Key Benefits

- Diffuse reflectance spectroscopy is a possible approach to early diagnosis of pre-cancerous and cancerous tissue
- Probes may operate with optical or other electromagnetic radiation
- Can be used to indicate the absorption and scattering properties of tissues and/or cells

Tech Fields

- Information Technology : Image processing
- Medical Devices : Diagnostics & monitoring tools

For current licensing status, please contact Jeanine Burmania at jeanine@warf.org or 608-960-9846.