

# A computational algorithm-based method for extracting intrinsic fluorescence properties of tissue

## Value Proposition

Fluorescence spectroscopy has been used successfully to discriminate premalignancy and malignancy in a number of organ sites. However, due to the complex interplay of absorption, scattering, and fluorescence in tissue, it is difficult to separate the intrinsic fluorescence properties from absorption and scattering, thus making these spectra difficult to interpret. These approaches are generally limited in that they are valid for a limited range of absorption and scattering, they require extensive empirical calibration, and/or they are not flexible in their applicability to different optical probe geometries.

## Technology

Duke inventors have developed a computational algorithm-based method that is capable of extracting the intrinsic fluorescence properties of tissue, which are independent of the absorption and scattering properties of tissue. This is potentially useful in a variety of biomedical applications, including cancer diagnostics and monitoring the physiological response to therapy. The Monte-Carlo-based method removes any dependency on the instrument and probe geometry. The inventors have demonstrated this technology in a number of clinical studies including breast biopsy diagnosis, cervical cancer diagnosis, breast cancer margin assessment, monitoring response to therapy, and drug discovery and pharmaceutical testing.

## Advantages

- This method is based on Monte Carlo modeling and therefore has a theoretical advantage of not having to impose constraints on the range of optical properties being modeled
- Can model the actual fiber optic probe geometry used for fluorescence measurement is therefore flexible in its application to a variety of probe geometries
- The approach requires only a single phantom measurement to enable adaptation to any optical system configuration

## Duke File (IDF) #

T-002638

## Inventor(s)

- Palmer, Greg
- Ramanujam, Nimmi

## Links

- [From the lab of Dr. Nimmi Ramanujam](#)
- [From the lab of Dr. Gregory Palmer](#)

## College

Pratt School of Engineering

## For more information please contact

Rasor, Robin  
(919) 681-6412  
[robin.rasor@duke.edu](mailto:robin.rasor@duke.edu)

## Publications

- [Monte-Carlo-based model for the extraction of intrinsic fluorescence from turbid media \(J Biomed Opt, 2008\)](#)
- [Diagnosis of breast cancer using fluorescence and diffuse reflectance spectroscopy: a Monte-Carlo-model-based approach \(J Biomed Opt, 2008\)](#)

## Patents

Patent Number: 7,818,154

Title: Monte carlo based model of fluorescence in turbid media and methods and systems for using same to determine intrinsic fluorescence of turbid media

Country: United States of America