AbstractID: 14078 Title: Determination of tissue optical properties in ALA-mediated Head & Neck PDT

Purpose: The main objective of this study was to determine the optical properties (scattering and absorption coefficients) *in vivo* by interstitial measurements during H&N PDT.

Methods and Matierals: We developed a model for quick and accurate determination of tissue optical properties (absorption coefficient μ_a and transport scattering coefficient μ_s') in semi-infinite medium, which is theoretically suitable for determination of optical properties head and neck with ALA-mediated PDT. We measured and determined the optical properties at the treatment wavelength. Measurements were performed before and after the delivery of the light treatment. The light detection device consists of two parallel light transmitting catheters placed 5mm apart. Diffuse light, from a 2mm cylindrical diffusing tip, is collected by an isotropic detector with a 0.5mm scattering bulb whose position is determined by a computer controlled step motor. The system automatically records and plots the light fluence rate per unit source power as a function of position.

Results: The result is fitted with a diffusion equation to extrapolate μ_a and μ_s'. A theory based on light source on semi-infinite medium has been developed to interpret the measured data. Another measurement was done using a fiber-optic based probe. This probe was placed on the tissue surface, and white light was delivered to the tumor surface by one of its source fibers. The diffusely reflected white light was collected by a spectrograph and analyzed to determine the absorption and scattering spectra of the tissue. Results from both methods were compared for accuracy. To test the ability of this algorithm to accurately recover the optical properties of the tissue, we made measurements in tissue simulating phantoms.

Conclusion: We developed a model for quick and accurate determination of tissue optical properties in semi-infinite medium, which is theoretically suitable for determination of optical properties head and neck PDT.