AbstractID: 13692 Title: Light fluence rate calculation for intracavity photodynamic therapy

Purpose: To develop an algorithm used to calculate the fluence rate in real time for intracavitory photodynamic therapy using an infrared (IR) camera tracking system.

Method and Materials: Diffusion approximation is used to derive an analytical form of light fluence rate in a spherical cavity inside the cavity and the tissue. The results of our resulting analytical solution are compared with a Finite Element Model (FEM) for the sphere. The FEM method can be used to calculate the fluence rate in tissue in any arbitrary geometries. An light fluence rate calculation algorithm is developed in the chest cavity while taking into account the effect of multiple scattering. We then use a chest phantom and an IR camera system to obtain a 3D map of a chest cavity. This map is then read into our algorithm and the fluence rate is then calculated on the chest surface. We compare our calculations to measured phantom data to determine how accurately our algorithim determines the light fluence in treatment-like setting. Measurement are made using an in-situ dosimetry system.

Results: Detailed derivation of the light fluence rate in The fluence measurements taken of our chest phantom are currently being analyzed and compared with the fluence rate calculated under the same optical properties from our algorithm. This comparison will help us constrain our algorithm to better fit the observed results and create a more precise treatment planning tool.

Conclusion: The work presented here presents the foundation for a valuable new tool in PDT of the pleural cavity in humans. By calculating the fluence rate for patient specific geometries treatment can become more effective and robust. The possibility of developing the work of this paper into a real-time fluence rate monitoring system provides a new level of exactness in treatment planning for the pleural region.