AbstractID: 13792 Title: Spreadsheet for Determination of Irradiance Delivered by Cylindrical Diffusers for Intracavitary PDT Treatments

Purpose: This study is aimed to develop a spreadsheet which allows fast determination of laser power and irradiation time for effective dose delivered in PDT intracavitary treatment. Calculations were based on treatment cavity diameter, cylindrical diffuser length, medical radiant exposure prescription (*H*), and adopted clinical irradiance range (*E*). **Method and Materials:** Irradiance profiles delivered by the diffusers were measured with a spherical sensor (2.0 mm diameter). A 630 nm PDT diode laser coupled with sets of different diffusers of 10, 20, 25, and 50 mm length was used as light source. Irradiance was measured from 2-25 mm source to detector distance (SDD). The reference point of measurement was the geometric center of the diffuser and the measurements normalized at its surface (1.59 mm diameter). Curves were fitted with a double exponential decay ($0.9349 \leq r^2 \leq 0.9951$). Simulations were performed to model experimental results and compared with experimental and clinical methods (calculated by the total irradiance divided by the cylinder area bounded by SDD). **Results:** Compared with the irradiance calculated clinically using the area bounded by a cylinder, the irradiance measured with spherical sensor differs by as much as -32% at 1.2 cm SDD for a 20 mm length diffuser. For this case, the irradiance calculated clinically is 99.52 mW/cm2 and the true irradiance is 67.78 mW/cm2. To obtain the prescribed radiant exposure, treatment time calculated by the clinical method is wrong by a factor of 1.46. **Conclusion:** Calculations using the spreadsheet developed in this work allows fast calculations of irradiance, with correct exposure time using the cylindrical diffusers.