

Poster PO-026

Latest technologies of homogeneous light distribution for photodynamic therapy of non-planar anatomical surfaces

E. Thecu^a *, J.-B. Tylcz, N. Betrouni, S. Mordon

University Lille, INSERM, CHU Lille, U1189 – ONCO-THAI – Image Assisted Laser Therapy for Oncology, Lille, INSERM, France

Photodynamic therapy remains a promising treatment of precancerous and cancerous lesions in several medical fields (dermatology, gynaecology, oncology and so on. . .). To deliver an optimized light dose and prevent over – or – under treatment, a controlled, homogeneous and stable light delivery is one of the major concerns. Currently, most of sources used for photodynamic therapy do not fit with the complexity of human anatomy, and can-not ensure the homogeneity of the light delivery [1]. To overcome this issue, the development of flexible light sources could be an interesting solution. In addition to ensure a compliant therapy, the development of these technologies could provide therapeutic solutions for non-planar anatomical surfaces, such as pleural cavity, curved surfaces, and corporal extremities [2].

This communication aims to describe the different methods of optical fibres integration into a flexible structure, in order to improve light illumination during PDT.

Initially, optical fibres were developed to transmit the input light energy with minimum losses to their distal end. Usually called Dis-tal End Emitting Optical Fibres (DEEOF), they use, under several conditions, the total reflection of the light property which confines light rays inside the core and propagates them along the fibre [3].

Based on the DEEOF properties, several methods were devel-oped to enable the light emission not only distal, but through the side-surface of optical fibres. The side emission effect is the result of the light leaking from the core to the external surface of the fibre. The integration of these Side Emitting Optical Fibres (SEOF) into a flexible structures seems to be one of the best technical options to overcome the lack of homogeneity of the light distribution in PDT. Several techniques will be presented among the winding of a SEOF around a flexible material, the embroidery within a thin textile substrate, the integration of SEOF within woven and knitted structures [4].

References

- [1]H. Moseley, Photochem. Photobiol. Sci. 4 (2005) 911–914.
- [2]C. Cochrane, Mater. Sci. Eng. C: Mater. Biol. Appl. 33 (3) (2013) 1170–1175.
- [3]D. Kremenakova, et al., J. Fiber Bioeng. Inf. 5 (4) (2012) 423–431.
- [4]S. Mordon, et al., Photodiagn. Photodyn. Therapy (2014) 605.

<http://dx.doi.org/10.1016/j.pdpdt.2017.01.114>