

Optical Attenuation Coefficient and clinical morphometric evaluation of squamous cell carcinoma after photodynamic therapy

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Optical coherence tomography (OCT) signal of skin depends on its composition and structure, allowing calculation of optical attenuation coefficient (OAC), which can be used for a more precise diagnosis of tumor. The objective of this work is to provide optical information regarding squamous cell carcinoma (SCC) and its evolution during aminolevulinic acid (ALA) and aminolevulinic methyl-ester acid (MEALA) photodynamic therapy (PDT), and to compare OAC with a morphometric clinical evaluation of SCC after treatment.

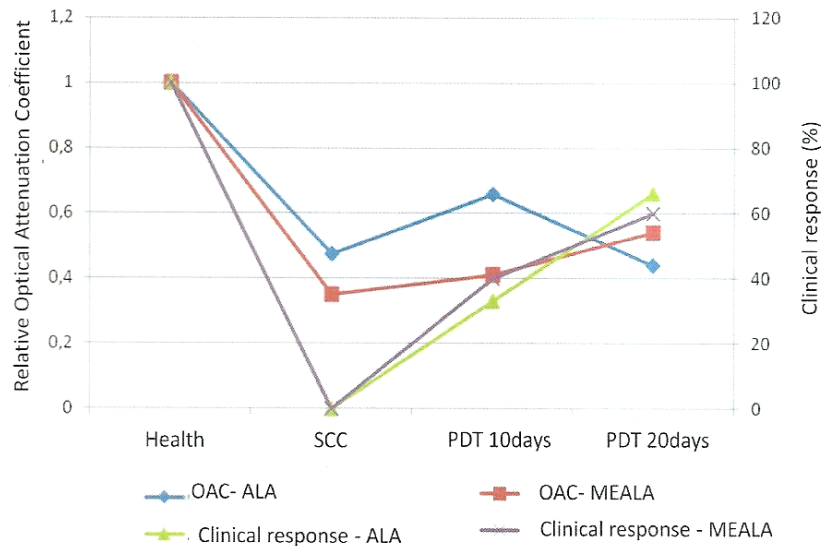


Fig. 01- Relative optical attenuation coefficient for Health skin (G0), SCC (G1 and G2), PDT 10 Days, PDT 20 Days (G5 and G6) related to Clinical Evaluation/histopathology considering- 100% total response, 0% no response, >50% minimal response, <50% partial response

For tumor induction a dose of 50mg DMBA in 100ml of acetone was applied in the back of 40 adult females Swiss mice. After one week, 5g of TPA in 200ml of acetone was applied twice a week during 28 weeks. Patented pharmaceutical cream by the authors (PI-0705591-9-Brazil) based on ALA-20% and MEALA-10% were used for PDT, with a LED cluster ($\lambda=630\text{nm}$; 180mW; $5\text{mW}/\text{cm}^2$) irradiating the lesions with $12\text{J}/\text{cm}^2$ during 40min.

Groups were: Control (health skin), SCC, PDT-

ALA, PDT-MEALA. Clinical morphometry of lesion and OCT ($\lambda=930\text{nm}$, 100nm bandwidth, 1.38 axial and $6.1\mu\text{m}$ lateral resolution) data were collected immediately, 10 and 20 day after PDT. The OAC were calculated from OCT data ($400\mu\text{m}$ thick) using a model for exponential decay for the intensity of backscattered light detected, in a in-house developed software. The OAC values were normalized regarding the control group mean.

The smallest optical attenuation coefficients obtained were from SCC group. The ALA and MEALA treated groups had OAC values increased after 10 days of PDT. The OAC approaches to health skin values for MEALA treated group after 20 days. The clinical response (reduction in lesion size) follows the same OAC behavior

There was a high correlation between the optical attenuation coefficient (>70%) obtained by OCT and morphometric clinical evaluation of SCC, immediately, 10 and 20 days after single PDT section.

Reference: Cara, ACB, et at- Proceedings of SPIE, 2012. v. 8427. p. 84271H-1-84271H-10

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