In vitro study on the safety of near infrared laser therapy in its potential application as postmastectomy lymphedema treatment

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Clinical studies demonstrated the effectiveness of laser therapy in the management of postmastectomy lymphedema, a discomfiting disease that can arise after surgery/radiotherapy and gets progressively worse and chronic. However, safety issues restrict the possibility to treat cancer patients with laser therapy, since the effects of laser radiation on cancer cell behavior are not completely known and the possibility of activating postmastectomy residual cancer cells must be considered.

This paper reports the results of an in vitro study aimed to investigate the effect of a class IV, dual-wavelength (808 nm and 905 nm) NIR laser system on the behavior of two human breast adenocarcinoma cell lines (namely, MCF7 and MDA-MB361 cell lines), using human dermal fibroblasts as normal control. Cell viability, proliferation, apoptosis, cell cycle and ability to form colonies were analyzed in order to perform a cell-based safety testing of the laser treatment in view of its potential application in the management of postmastectomy lymphedema. The results showed that, limited to the laser source, treatment conditions and experimental models used, laser radiation did not significantly affect the behavior of human breast adenocarcinoma cells, including their clonogenic efficiency. Although these results do not show any significant laser-induced modification of cancer cell behavior, further studies are needed to assess the possibility of safely applying NIR laser therapy for the management of postmastectomy lymphedema.

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Abbreviations: NIR, Near-Infrared; CDT, Complete Decongestive Therapy; PAMs, Physical Agent Modalities; MLS, Multiwave Locked System; PI, Propidium Iodide; ROS, Reactive Oxygen Species; LLT, Low Level Laser Therapy.
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