Fibrosis consists in an excessive and persistent formation of fibrous connective tissue that occurs frequently in different organs or tissues after an injury or disease [1]. The cells principally involved in the onset and progression of fibrosis, are the activated form of the fibroblasts namely myofibroblasts that combine immunophenotypical and ultrastructural features of fibroblasts and smooth muscle cells. Although myofibroblasts are required for the wound healing and the reparative response to organ/tissue damage, their persistence contribute to the increased synthesis and deposition of extracellular matrix proteins, which replace the necrotic or damaged tissue with a scar [2]. As current therapeutic options for tissue fibrosis are very limited and organ transplantation is the only effective treatment for end-stage disease, identification of treatments capable of preventing myofibroblast generation and defining their molecular targets appears a key step for the design of therapeutic strategies aimed at counteracting the fibrosis.

**RESULTS**

1. **LASER STIMULATION INHIBITED TGF-β1-INDUCED FIBROBLAST-MYOFIBROBLAST TRANSITION**

   We found that the laser stimulation did not affect cell viability (MTS assay) and was able to induce a slight increase of proliferation of TGF-β1 treated fibroblasts (confocal immunofluorescence analysis of Ki67 expression).

2. **LASER STIMULATION REGULATED THE EXPRESSION OF MATRIX METALLOPROTEINASES (MMPs) AND OF TISSUE INHIBITORS OF METALLOPROTEINASES (TIMPs) IN TGF-β1-TREATED FIBROBLASTS**

   We also found that the laser treatment up-regulated MMP-2 and MMP-9 expression and down-regulated TIMP-1 and TIMP-2 in TGF-β1-treated fibroblasts.

3. **LASER – INDUCED PREVENTION OF FIBROBLAST-MYOFIBROBLAST TRANSITION IS MEDIATED BY THE TRANSIENT RECEPTOR POTENTIAL CHANNEL 1 (TRPC1) FUNCTIONALITY**

   Interestingly, the effects of the laser on fibroblasts involved the Transient Receptor Potential Channel 1 (TRPC1) functionality. Indeed, TRPC1 expression (confocal immunofluorescence analysis) and functionality (SAC currents, electrophysiological recordings) significantly augmented in TGF-β1-treated fibroblasts and this increase was prevented by the treatment of these cells with laser. Moreover, the block of these channels with Gadolinium Chloride (GdCl3) as well as the silencing of TRPC1 gene expression by siRNA, reduced TGF-β1-induced myofibroblast differentiation.

**CONCLUSIONS**

In conclusion, the present study besides offering novel experimental evidence on the mechanisms of action of the diode laser, may provide a promising therapeutic perspective for the treatment of tissue fibrosis extending the potential clinic application of the low level laser therapy.