Improvement of bone healing process by association of a carbon biomaterial to lasertherapy

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Bone diseases such as fractures and bone defects may result from several reasons, which the repair process is normally long and painful. The most used therapies are based either on the implantation of a biocompatible prosthesis or through the insertion of a biomaterial in the local injury. However, those treatments involve extended and costly surgical intervention. Thus, the association of two low cost techniques such as the use of activated carbon fiber felt (ACFF) as bone biosubstitute and the application of the low-level laser therapy to assist the bone repair might be an alternative to overcome those problems. The study was perfomed by induction of a bone defect in rat tibias and subsequent treatment with ACFF and laser therapy. Five different groups of rats were studied: control (CTL), untreated Injury (NT), Injured treated with activated carbon fiber felt (ACFF), Injured treated with lasertherapy (L6J) and Injured treated with association of ACFF and laser therapy (ACFF+L). All groups were evaluated by histological and biomechanical properties of bone after the healing process and by phosphatase alkaline level (ALP). The NT group presented the lowest values of stress at break, besides histological changes related to disorganization of the tissue. Gradually, the groups L6J, ACFF and ACFF+L showed improve mechanical properties in comparison to CTL group. The group AF+L presented the highest value of stress at break, organized histological aspects and increase levels of ALP. Thus, the association of two distinct techniques seemed to assist the process of bone healing in rat tibias.