Effects of hyperbaric oxygen and platelet derived growth factor on medial collateral ligament fibroblasts.

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Source

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Abstract

PURPOSE: This study investigated hyperbaric oxygen (HBO2) and platelet-derived growth factor-BB (PDGF-BB) to determine their combined effects on fibroblasts from rabbit medial collateral ligament (MCL).

METHOD: Cells were divided into four groups: (I) Control, (II) HBO2 treatment, (III) PDGF-BB treatment and (IV) HBO2 combined with PDGF-BB treatment. All hyperoxic cells were exposed to 100% O2 at 2.5 atmospheres absolute (ATA) in a hyperbaric chamber for 120 minutes per 48 hours. Measurement of cell growth was based on increase in cell number. Cell cycle modulations were analyzed by fluorescence-activated cell sorter (FACS). Quantity of Type I and Type III collagen was determined by western blotting and image analyzer.

RESULTS: Treatment doses of HBO2 alone or PDGF-bb alone dependently increased cell growth. A combination of HBO2 treatment plus PDGF-bb treatment had an additive effect on cell growth in comparison with HBO2 treatment alone or PDGF-bb treatment alone. FACS analysis revealed that HBO2 alone, PDGF-bb alone and PDGF-bb plus HBO2 treatment increase the percentage of cells accumulated in S-phase. Western blotting analysis revealed that Type III collagen content was decreased significantly after HBO2 treatment alone or HBO2 plus PDGF-bb treatment but not in PDGF-bb treatment alone. In contrast, although Type I collagen content was increased after HBO2 treatment, the increase in Type I collagen (increase /original) was not statistically significant.

CONCLUSION: HBO2 or HBO2 plus PDGF-bb treatment decreases the Type III collagen/Type I collagen content, which could result in mechanically stronger collagen fibrils. We propose HBO2 therapy as a potentially effective treatment for MCL healing.

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