INTRODUCTION: Autologous chondrocyte transplantation (ACT) utilises patient derived chondrocytes to repair cartilage damage, with the goal of improving joint function. The procedure involves chondrocyte isolation, proliferation and expansion in vitro followed by implantation into the cartilage defect. Cell yield and viability together with maintenance of the unique chondrocyte phenotype are key determinants of success in ACT and cartilage tissue engineering applications. Curcumin, the principal polyphenolic curcuminoid of turmeric, is increasingly used in tissue engineering and banking applications as an antioxidant, and a cell protective and proliferative agent. It has also been added to biodegradable PLGA (polylactic acid-co-glycolic acid) polymers as an anticoagulation agent. However, its effects on the viability of articular chondrocytes have not been extensively explored. Recent data from our laboratories have demonstrated that curcumin exerts anti-apoptotic and anti-catabolic effects on IL-1β-stimulated chondrocytes. Recent work from other groups however, has shown that curcumin is toxic to immortalized human C-28/I2 chondrocytes.

METHODS: Articular cartilage was obtained from weight-bearing joints of horses euthanased for purposes other than research. Chondrocytes were isolated by collagenase digestion in Dulbecco’s Modified Eagle’s medium (DMEM). Chondrocytes were isolated by collagenase digestion in Dulbecco’s Modified Eagle’s medium (DMEM). Cells were then cultured in 6-well plates in DMEM containing 10% fetal bovine serum and 2% penicillin/streptomycin. Once cells were confluent, media was removed and the following treatments were added to the plates; Control consisted of DMEM containing 10% fetal bovine serum and 2% penicillin/streptomycin, which also formed the base media for the other treatments. Curcumin was made up into 25µM, 50µM, 75µM and 100µM solutions and added to the wells. After 24hr incubation, methanol was added for 10mins to the methanol well as a positive control for inducing necrotic cell death. Cell morphology and viability was then examined using an inverted microscope.

RESULTS: Incubation over 24 hours with curcumin at concentrations over 50µM changed chondrocyte and synoviocyte morphology, causing cells to detach from their monolayers.

DISCUSSION & CONCLUSIONS: Curcumin is cytotoxic to equine chondrocytes and synoviocytes at high doses. These results suggest that using curcumin as an antioxidant and proliferative agent in cultures of stem cells and progenitor cells should be approached with caution.


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