

# Interleukin-1beta-induced extracellular matrix degradation and glycosaminoglycan release is inhibited by curcumin in an explant model of cartilage inflammation.

[Clutterbuck AL](#), [Mobasheri A](#), [Shakibaei M](#), [Allaway D](#), [Harris P](#).

Division of Veterinary Medicine, School of Veterinary Medicine and Science, University of Nottingham, Leicestershire, United Kingdom. [Abigail.Clutterbuck@nottingham.ac.uk](mailto:Abigail.Clutterbuck@nottingham.ac.uk)

Osteoarthritis (OA) is a degenerative and inflammatory disease of synovial joints that is characterized by the loss of articular cartilage, for which there is increasing interest in natural remedies. Curcumin (diferuloylmethane) is the main polyphenol in the spice turmeric, derived from rhizomes of the plant *Curcuma longa*. Curcumin has potent chemopreventive properties and has been shown to inhibit nuclear factor kappaB-mediated inflammatory signaling in many cell types, including chondrocytes. In this study, normal articular cartilage was harvested from metacarpophalangeal and metatarsophalangeal joints of eight horses, euthanized for reasons other than research purposes, to establish an explant model mimicking the inflammatory events that occur in OA. Initially, cartilage explants (N= 8) were stimulated with increasing concentrations of the proinflammatory cytokine IL-1beta to select effective doses for inducing cartilage degeneration in the explant model. Separate cartilage explants were then cotreated with IL-1beta at either 10 ng/mL (n= 3) or 25 ng/mL (n= 3) and curcumin (0.1 micromol/L, 0.5 micromol/L, 1 micromol/L, 10 micromol/L, and 100 micromol/L). After 5 days, the percentage of glycosaminoglycan (GAG) release from the explants was assessed using a dimethylmethylene blue colorimetric assay. Curcumin (100 micromol/L) significantly reduced IL-1beta-stimulated GAG release in the explants by an average of 20% at 10 ng/mL and 27% at 25 ng/mL back to unstimulated control levels ( $P < 0.001$ ). Our results suggest that this explant model effectively simulates the proinflammatory cytokine-mediated release of articular cartilage components seen in OA. Furthermore, the evidence suggests that the inflammatory cartilage explant model is useful for studying the effects of curcumin on inflammatory pathways and gene expression in IL-1beta-stimulated chondrocytes.

PMID: 19723086 [PubMed - indexed for MEDLINE]

## Publication Types:

Research Support, Non-U.S. Gov't

**MeSH Terms:**

Animals  
Anti-Inflammatory Agents, Non-Steroidal/pharmacology  
Cartilage/drug effects\*  
Cartilage/metabolism  
Cartilage/pathology  
Curcumin/pharmacology\*  
Dose-Response Relationship, Drug  
Extracellular Matrix/metabolism\*  
Glycosaminoglycans/secretion\*  
Horses  
Insulin-Like Growth Factor I/pharmacology  
Interleukin-1beta/toxicity\*  
Metacarpophalangeal Joint/drug effects  
Metacarpophalangeal Joint/metabolism  
Metacarpophalangeal Joint/pathology  
Osteoarthritis/chemically induced  
Osteoarthritis/metabolism  
Osteoarthritis/prevention & control\*  
Tissue Culture Techniques

**Substances:**

Anti-Inflammatory Agents, Non-Steroidal  
Glycosaminoglycans  
Interleukin-1beta  
Curcumin  
Insulin-Like Growth Factor I

**Grant Support:**

BBSRC/S/M/2006/13141/Biotechnology and Biological Sciences Research Council/United Kingdom