

High glycine concentration increases collagen synthesis by articular chondrocytes in vitro: acute glycine deficiency could be an important cause of osteoarthritis

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6153947/>

Abstract

Collagen synthesis is severely diminished in osteoarthritis; thus, enhancing it may help the regeneration of cartilage. This requires large amounts of glycine, proline and lysine. Previous works of our group have shown that glycine is an essential amino acid, which must be present in the diet in large amounts to satisfy the demands for collagen synthesis. Other authors have shown that proline is conditionally essential. In this work we studied the effect of these amino acids on type II collagen synthesis. Bovine articular chondrocytes were cultured under a wide range of different concentrations of glycine, proline and lysine. Chondrocytes were characterized by type II collagen immunocytochemistry of confluence monolayer cultures. Cell growth and viability were assayed by trypan blue dye exclusion method. Type II collagen was measured in the monolayer, every 48 h for 15 days by ELISA. Increase in concentrations of proline and lysine in the culture medium enhances the synthesis of type II collagen at low concentrations, but these effects decay before 1.0 mM. Increase of glycine as of 1.0 mM exceeds these effects and this increase continues more persistently by 60-75%. Since the large effects produced by proline and lysine are within the physiological range, while the effect of glycine corresponds to a much higher range, these results demonstrated a severe glycine deficiency for collagen synthesis. **Thus, increasing glycine in the diet may well be a strategy for helping cartilage regeneration by enhancing collagen synthesis, which could contribute to the treatment and prevention of osteoarthritis.**