HGH and Cartilage

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Abstract
Recombinant human growth hormone (rHGH) which plays an important role for remodeling of bone has an effect on cartilage differentiation and regeneration, as well. Herein, we reviewed human growth hormone and its roles on cartilage. We discussed different roles on growth, regeneration, inflammation, cell maturation, and mitotic activity. These findings provide proof of principle that therapeutics based on rHGH can improve treatment for numerous disorders.

Keywords: Growth Hormone; Somatropin; GH; Cartilage; Growth; Regeneration; Inflammation; Chondrocytes

Abbreviations: rHGH: Recombinant Human Growth Hormone; GH: Growth Hormone

Short Communication
Growth hormone, which is a peptide hormone called somatotropin or somatropin, is proved to increase humans and animals' growth, regeneration and cell proliferation (Figure 1) [14]. GH has an important role in bone and cartilage metabolism, which is mediated through insulin like growth factor (IGF-I) [6,7]. Moreover, GH treatment, which enhances mitotic activity while delaying cell maturation in the mandibular condylar cartilage, has a significant effect on cartilage growth [12]. Using the intra-articular injection of rHGH on TMJ arthritis exhibited regeneration of articular cartilage layers along with the thickness compared with the control group [2]. Coincide with this study; treatment with 2 mg/kg HGH stimulates the cartilage growth and higher cartilage thickness in rabbits [6]. In addition, GH defeats inflammatory pain through the role of IGF-1 by overcoming the inflammation and prostaglandin which have a role as the pain mediator [1,3]. In other studies, the healing of the cartilage was generated after the intra articular injection of GH [9,16,8]. Interestingly, GH, through IGF-1, stimulates chondrocytes to be active and proliferate [8,10]. The higher hypercellularity of the knee cartilage was seen in the GH group which proves the occurrence of the healing [15]. Growth hormone (GH), in companion with insulin-like growth factor 1 (IGF-1), increase growth plate chondrogenesis, so that recombinant human growth hormone and IGF-1 lead to linear growth in different types of disorders [5]. Not only does GH show cell proliferation and proteoglycan synthesis in chondrocytes in vitro [11], but also it increases the number of the cells in the germinal layer of epiphyseal cartilage in vivo [13]. Besides stimulating mitotic activity in

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the mandibular condylar cartilage in vivo and in *in-vitro* [4], GH contributes to increasing mitotic activity in tibial cartilage, as well [13].

**Figure 1**: A) Human growth hormone 3D structure. B) Human growth hormone protein sequence.

![Image](image_url)

### Conclusion

This paper has investigated the role of growth hormone on cartilage and chondrocytes. The evidence from this study implies that growth hormone, which is named Somatropin, has an effect on cartilage regeneration and its thickness through IGF-1. The upshot of this is the possibility that IGF-1 has an influence on chondrocytes to proliferate, which leads to regeneration of articular cartilage.

### Disclosure

Dr. Gordon Slater is medical director of Integrant Pty Ltd, an orthobiologics company. He is a former director of Albury Day Surgery.

### References


