

POSITIVE EFFECT OF PEPTAN® ON CARTILAGE CELLS



A recent clinical trial demonstrated Peptan® collagen peptides' ability to support joint structure and function. A dose of 8g of Peptan per day demonstrated a positive effect on reducing joint discomfort compared to a placebo.¹ Multiple trials further reported that subjects with joint deterioration benefited from the effects of collagen peptides.² The integrity of articular cartilage depends on the maintenance of the extracellular matrix, a process controlled by the cartilage cells, the chondrocytes. The objective of the present *in vitro* study was to investigate the effect of Peptan collagen peptides on the main components of the cartilage extracellular matrix: aggrecan and type II collagen.

INTRODUCTION

Cartilage is made up of cellular building blocks (chondrocytes), which produce the extracellular matrix, consisting of collagen and proteoglycans (mainly aggrecan). Collagen fibers make up between 70 and 95% of cartilage and are responsible for its structure and strength; proteoglycans serve as a joint lubricant.

In healthy joints, the cartilage matrix composition is regulated by chondrocytes through a finely-tuned balance of synthesis and breakdown, which ensures joint lubrication and cartilage matrix renovation. When this equilibrium is disrupted, the dominance of matrix-degrading enzymes, which breakdown aggrecan and collagen, results in the deterioration of the cartilage's structure and function. To help maintain joint health, it is essential to ensure that this balance is protected and the necessary building blocks for collagen are available to support cartilage regeneration.

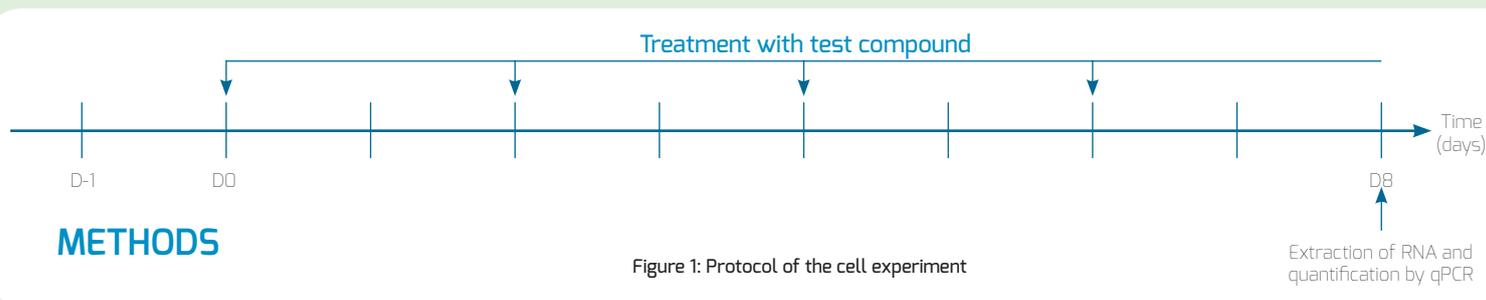
The experiments were carried out by Atlantic Bone Screen Laboratory, Nantes, France (ABS). Chondrocytes were collected from articular cartilage of 4-week-old male rats.

Peptan collagen peptides of bovine origin were used at 3 concentrations 0.01, 0.1 and 1 mg/mL, well-known to induce the expression of extracellular-matrix components. As a negative control, the solvent without active component was added to the cells. All experiments were performed 3 times and the results are averages of the 3 measurements.

The purpose of this study was to assess the effects of Peptan on the gene expression of 2 major constituents of the extracellular matrix of the cartilage: aggrecan and type II collagen.

ASSESSMENT OF THE EFFECT OF PEPTAN B EFFECTS ON CARTILAGE SPECIFIC GENE EXPRESSION

Cells were seeded at day -1 and incubated with the test compounds for 8 days. The cell culture medium was renewed every other day. The cell viability was assessed at 3 different time points of the experiment. (Figure 1). After 8 days the cells were harvested and mRNAs (see glossary) was extracted from the chondrocytes. The expression of the cartilage extracellular matrix specific genes, aggrecan and collagen type II, was then measured by quantitative PCR (qPCR, see glossary) and expressed as fold change of the value in the control.



METHODS



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RESULTS

EFFECT OF PEPTAN B ON CARTILAGE SPECIFIC GENE EXPRESSION

A concentration of 0.1 or 1 mg/mL Peptan B dose-dependently induced the expression of aggrecan and type II collagen mRNA (Figure 2). These results demonstrate that Peptan specifically enhances the gene expression of cartilage extra-cellular matrix components.

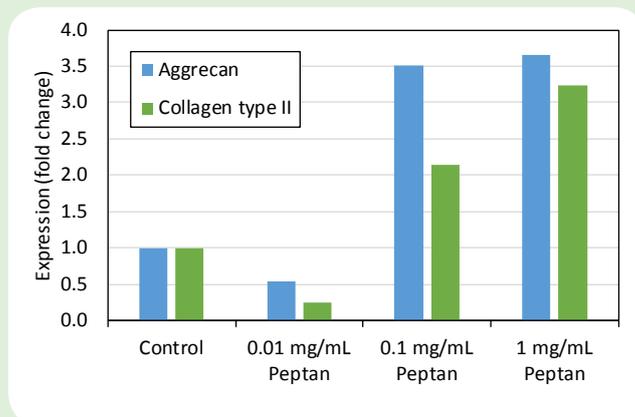
CONCLUSION

After 8 days of treatment, Peptan collagen peptides significantly enhanced the expression of the cartilage specific markers aggrecan and type II collagen.

These data indicate that Peptan collagen peptides can increase the production of aggrecan and type II collagen in chondrocytes and may thus prevent cartilage matrix degradation. Indeed, the cartilage regenerative effect of collagen peptides has been reported in an *in vitro* study⁶ and was recently confirmed in an *in vivo* study by Dar et al.⁵

The present data also strengthen the hypothesis that collagen peptides may be recognized as a signal of cartilage degradation by chondrocytes which in response activate the synthesis of aggrecan and type II collagen.

These results clearly indicate that Peptan collagen peptides can help to promote healthy cartilage and joint function.



Glossary

Aggrecan: the major proteoglycan of the articular cartilage, i.e. a protein modified with large carbohydrates. This molecule is important in the proper functioning of articular cartilage because it provides a hydrated gel structure that endows the cartilage with load-bearing properties [4].

mRNA: Messenger RNA, is a molecule encoding a chemical «blueprint» for a protein product. mRNA is transcribed from a DNA template, and carries coding information to the sites of protein synthesis.

qPCR: quantitative Polymerase Chain Reaction, is a laboratory technique used to amplify and simultaneously quantify a targeted DNA or RNA molecule.

References

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Rousselot® and Peptan® are both brands of Darling Ingredients Inc. Rousselot is the leading manufacturer* of gelatin and collagen peptides to the food, nutrition and pharmaceutical industries. Rousselot's wide range of collagen peptides are marketed under Peptan, globally recognized as the leading brand in its category. Rousselot benefits from a global sales and production network of 13 plants and 10 sales offices located in Europe, North America, South America and Asia.
*Source: Grand View Research, Gelatin Market Analysis and Segments Forecasts to 2024, 2014

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