Results of 2011 Rousselot study confirm the positive effect of Peptan® collagen peptides on joint cells (chondrocytes). A dose of 10g of collagen peptides per day [1] has demonstrated a positive effect on joint pain reduction. The integrity of articular cartilage is dependent on the maintenance of the extracellular matrix, a process controlled by the joint cells, the chondrocytes. The objective of the present study with a cell culture model was to investigate the effect of Peptan® collagen on the main components of the extracellular matrix of the cartilage: aggrecan and type II collagen.

Introduction

Osteoarthritis (OA) is the most common form of arthritis which causes major disability worldwide. OA is characterized by cartilage destruction resulting in joint space narrowing and loss of function (figure 1). The result of ongoing cartilage destruction is irreversible damage to the extracellular matrix (ECM) of cartilage with ultimate loss of joint function [2].

Chondrocytes, the only cell type in cartilage, are the versatile regulators of cartilage equilibrium. Traumatic cartilage injury leads to an irreversible cartilage loss since differentiated chondrocytes do not divide and hence do not compensate for these defects [3]. There are no long-term effective treatments for OA.

1. Methods

The tests have been carried out by Atlantic Bone Screen Laboratory, Nantes, France (ABS).

Chondrocytes were collected from articular cartilage of 4-week-old male rats. Rousselot Peptan® B collagen peptides of bovine origin were used at 3 concentrations 0.01, 0.1 and 1 mg/mL. Ibuprofen at 25µg/ml was used as a positive reference item as it is a nonsteroidal anti-inflammatory drug (NSAID).

All the experiments have been done 3 times and the results are averages of 3 measurements.

Assessment of the Peptan® B effects on cartilage specific gene expression

Cells were seeded and cell growth was measured until 8 days (figure 2). At the different end points mRNAs (see glossary) were extracted from the chondrocytes. The concentration of total mRNA was measured by optical density. Gene expression was then measured by quantitative PCR (qPCR, see glossary).

The expression of the cartilage extracellular matrix specific genes, aggrecan, collagen type II, was measured.

Figure 1: Cartilage in normal knee and knee with osteoarthritis

Figure 2: Protocol for gene expression measurements until 8 days.
2. Results

Effect of Peptan® B on cartilage specific gene expression

Peptan® B at 0.1 or 1 mg/mL concentrations over 8 days significantly enhanced the expression of aggrecan and type II collagen mRNA (figure 3). These results demonstrate that Peptan specifically enhanced the chondrocyte gene expression of the cartilage extra cellular matrix components.

3. Conclusion

After 8 days of treatment, Peptan® collagen peptides at concentrations of 0.1 and 1 mg/mL enhanced significantly the expression of cartilage specific markers: aggrecan and type II collagen. In this study, Peptan® has a similar effect on joint cells as Ibuprofen, a usual medication against inflammation.

These data confirm that Peptan® collagen peptides may prevent cartilage matrix degradation by increasing the production of aggrecan and type II collagen, in line with previous studies [5]. The data also strengthen the hypothesis that collagen peptides may be recognized as a signal of cartilage degradation by chondrocytes which therefore activate the synthesis of aggrecan and type II collagen as a response.

These results show that Peptan® collagen peptides may be used to prevent the degradation of cartilage and thus to prevent discomfort and joint pain due to this degradation.

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