Synergistic beneficial effects of curcuma extract, green tea extract and hydrolysed collagen in bovine chondrocytes in monolayer culture

Fanny Comblain [a], Christelle Sanchez [a], Cécile Lambert [a], Samuel Serisier [b], Yves Henrotin [a,c]

[a] *Bone and Cartilage Research Unit, University of Liège, Institute of Pathology, CHU Sart-Tilman, 4000 Liège, Belgium*
[b] *Royal Canin Research Center, BP 4- 650 av de la petite Camargue, 30470 Aimargues, France*
[c] *Department of Physical Therapy and Rehabilitation, Princess Paola Hospital, Vivalia, Marche-en-Famenne, Belgium*

Introduction

This study aimed to investigate the effects of curcuma extract, green tea extract and hydrolysed collagen, alone or in combination, on the production and gene expression of inflammatory and catabolic mediators by primary bovine chondrocytes.

Material and Methods

Primary bovine chondrocytes were cultured in monolayer until confluence and then incubated in the absence or in the presence of recombinant porcine IL-1β (10^{-10}M) and with or without curcuma extract, green tea extract and hydrolysed collagen, at the concentration of 12.5 µg/ml, alone or in combination. Cell viability was determined by measuring lactate dehydrogenase release. After 24h of incubation, interleukin-6 (IL-6), inducible NO synthase (iNOS), cyclooxygenase2 (COX-2), metalloproteinase3 (MMP-3), A Disintegrin and Metalloproteinase with Thrombospondin Motifs (ADAMTS)4 and ADAMTS5 gene expressions were determined by real time PCR. After 48h of incubation, nitric oxide (NO) and prostaglandin E_2 (PGE_2) productions were quantified.

Results

Cell viability was not affected by these compounds, neither by IL-1β. Curcuma extract alone inhibited IL-1β stimulated NO and PGE_2 productions and IL-1β stimulated IL-6, iNOS, COX-2, MMP-3 and ADAMTS4 gene expressions. Green tea extract or hydrolysed collagen alone did not inhibit inflammatory and catabolic mediators synthesis. When they were combined, curcuma extract, green tea extract and hydrolysed collagen inhibited IL-1β stimulated NO production and IL-1β stimulated IL-6, iNOS, COX-2, MMP-3 and ADAMTS4 gene expressions with a higher magnitude than curcuma extract alone. ADAMTS5 gene expression was not inhibited by these compounds added separately, while the combination of curcuma extract / green tea extract / hydrolysed collagen was efficient.

Discussion and Conclusions

These *in vitro* results indicate that curcuma extract, green tea extract and hydrolysed collagen act synergically to inhibit the production of inflammatory mediators and the expression of genes involved in catabolism and inflammation. These findings provide a preclinical basis for the *in vivo* testing of this combination.