PublisherInfo		
PublisherName	:	BioMed Central
PublisherLocation	:	London
PublisherImprintName	:	BioMed Central

New coculture model to study paracrine interactions of chondrocytes and macrophages

ArticleInfo		
ArticleID	:	276
ArticleDOI	:	10.1186/ar-2002-75750
ArticleCitationID	:	75750
ArticleSequenceNumber	:	29
ArticleCategory	:	Paper Report
ArticleFirstPage	:	1
ArticleLastPage	:	3
ArticleHistory	:	RegistrationDate : 2002–2–18 Received : 2002–2–18 Accepted : 2002–2–21 OnlineDate : 2002–2–21
ArticleCopyright	:	Biomed Central Ltd2002

ArticleGrants	:	
ArticleContext	:	130754411

Riako Masuda,[Aff1]

Aff1 Center of Experimental Rheumatology, University Hospital Zurich, Switzerland

Keywords

Agarose, MMP-9, monocytes, rheumatoid arthritis, serum-free coculture

Context

Cartilage destruction in inflammatory joint disease such as rheumatoid arthritis is mediated by proteolytic enzymes, which are released from synovial macrophages and cartilage cells. It is well known that chondrocytes respond to monocyte/macrophage signals and contribute thereby to the establishment of chronic inflammatory joint diseases. However, signaling in the opposite direction, from chondrocytes to monocytes/macrophages, has not been addressed adequately.

Significant findings

The authors established a new serum-free coculture system of chondrocytes and monocytes/macrophages. In this system cells were embedded separately into agarose gel layers to prevent direct contact between the two cell types whereas communication via soluble mediators was possible. Serum was strictly omitted to avoid interference with paracrine interaction between the two cell types. Using this system, the authors analyzed the expression of matrix metalloproteins (MMPs) and tissue inhibitors of MMPs at the mRNA and protein level.

As a result, they found that chondrocytes, but not monocytes, produced MMP-1 and MMP-3 protein. The production of these MMP proteins increased over time in the coculture system. In contrast, no synthesis of MMP-9 was detected in chondrocyte cultures. Monocyte cultures produced the precursor of MMP-9 (pro-MMP-9), but not the biologically active protein. In the coculture system, both pro-MMP-9 and the active MMP-9 proteins could be detected. Since treatment of monocytes with MMP-3 inhibitor

II prevented the activation of Pro-MMP-9 in the coculture system, the authors concluded that the activation of pro-MMP-9 is dependent on the presence of chondrocyte-derived MMP-3.

Comments

This new coculture system is an interesting model to explore the paracrine cross-talk that may take place between chondrocytes and monocytes/macrophages in inflammatory joint diseases. To ascertain the validity of this model, the authors showed that chondrocytes reduced synthesis of the matrix components (e.g. aggrecan and collagen II) and coculture with monocytes/macrophages increased the degradation of them. In this paper, they focused only on proteolytic enzymes. However, under inflammatory conditions, many cytokines are produced that regulate synthesis of MMPs from cells. To better understand the mechanisms governing cartilage degradation of inflammatory joints, a more detailed analysis of the effects of inflammatory cytokines is needed.

Methods

Serum-free coculture, quantitative real-time-RT-PCR, gelatin zymography, immunoblotting

Additional information

References

1. Dreier R, Wallace S, Fuchs S, Bruckner P, Grassel S: Paracrine interactions of chondrocytes and macrophages in cartilage degradation. Articular chondrocytes provide factors that activate macrophage-derived pro-gelatinase B (pro-MMP-9). J Cell Sci. 2001, 114: 3813-3822.

This PDF file was created after publication.