

Integrative Study of transcriptional network systems during enchondral ossification

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【Outline of survey】

In vertebrae, most of skeletons are formed by enchondral ossification. Endochondral ossification is a sequential and complex biological event that consists of condensation of mesenchymal cells, their differentiation into chondrocytes, maturation and apoptosis of chondrocytes, and replacement of cartilage tissue by bone. Transcription factors, Sox9 and Runx2 play an essential role in enchondral ossification and regulate the expression of genes necessary for chondrogenesis by cross-talking with numerous intracellular signalings. In this study, using molecular and cellular approaches and genetically engineered mice, we aim to understand transcriptional regulation and the network system spatially and temporally during enchondral ossification. Especially, we investigate the transcriptional factory which is a large protein complex assembled by Sox9 or Runx2. Thus, this study not only contributes to understanding of enchondral ossification but also makes breakthrough of the biology.

【Expected results】

We would understand transcriptional network system, mainly of Sox9 and Runx2, at molecular, cellular and animal levels, thus spatially and temporally regulatory mechanisms of enchondral ossification. Moreover, our findings might contribute to development of novel and effective treatment for cartilage diseases such as osteoarthritis and rheumatoid arthritis. Therefore, our study would be important for not only advancement of science but also clinical fields.

【References by the principal investigator】

1. Muramatsu S, Wakabayashi M, Ohno T, Amano K, Ooishi K, Sugahara T, Shiojiri S, Tashiro K, Suzuki Y, Nishimura R, Kuhara S, Sugano S, Yoneda T, Matsuda A (2007) Functional gene screening system identified TRPV4 as a regulator of chondrogenic differentiation *J Biol Chem* 282: 32158-67
2. Yoneda T (eds): (2008) Cutting-Edge of Biodentistry (Osaka University Press)

【Term of project】 FY2008—2010

【Budget allocation】

164,100,000 yen (direct cost)

【Homepage address】

<http://www.dent.osaka-u.ac.jp/~biochm/>