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# Epigenetic factors involved in musculo-skeletal interaction: How skeletal muscle cells and osteoblasts derived from stem cells communicate with special reference to histone deacetylases (HDACS), transcription factors (TFs), microRNAs and vitamin K2

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The Epigenator-Initiator-Maintainer axis determines the ultimate fate of the phenotype characteristics of the cellular functions within different organs of the body. The initiator signals (pertained within the realm of histone modifications, transcriptional control through transcription factors, and microRNAs) represent slowly "dissipating" forces tilting the cell phenotype towards a more or less stable profile. However, phenotypic characteristics may be altered, i.e. changed or reinforced, as a result of developing diseases or gene therapy. Here, we present some results of manipulations of HDACs, transcription factors (TFs), microRNAs, as well as vitamin K2 status on mineralizing cells (osteoblasts) and striated muscle cells exposed to both normal growth conditions and inflammation mediators (Th-cells, macrophages or interleukins), showing that it is possible to engineer cells with a phenotype where: 1) wanted mineralization is reinforced, and 2) unwanted mineralization is blocked, and 3) musculo-skeletal interactions are stabilized. By using various algorithms, one may pinpoint regulatory loops, including TFs and microRNAs. The subject TFs and MicroRNAs are also part of an intricate hierarchical regulation by several HDAC classes, including the Sirtuins, which respond to cellular rations of NADH/NAD+ (cellular energy status). Furthermore, we will show how vitamin K2 (MK-7, via binding to SXR) interferes with several signaling pathways down-stream of several growth factor signaling mechanisms, thus reinforcing the cross-talk between or suppressing the mineralizing characteristics of different cell phenotypes. It may be concluded that vitamin K2 plays a pivotal role in modulating (optimizing) the endocrine interaction between osteoblasts and skeletal muscle cells yielding a "win-win" condition.

## Biography

Jan O Gordeladze holds a triple professor competence (Medical Biochemistry, Physiology and Pharmacology) and is presently working as a Professor at the Inst. of Basic Medical Science, Dept. for Molecular Medicine, Section for Biochemistry, University of Oslo, Norway. He has previously been employed as the Medical Director of MSD, Norway, serving two years as a Fulbright scholar at the NIH, Bethesda, Maryland, USA and from 2006-2009 being employed as Associate Professor at University of Montpellier, France. He has published more than 100 scientific articles, reviews/book chapters and presented more than 250 abstracts/posters/talks at conferences worldwide.

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