

# **ABSTRACT**

Universität Hamburg, Fachbereich Biologie  
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Cell culture systems to interrogate primate skeletal functional genomics

Host: Joanna Malukiewicz/Tobias Lenz

Comparative skeletal anatomy is integral to evolutionary research, but characterizing the contribution of gene regulation variation to the development and evolution of complex skeletal traits is challenging. This is especially true for primates, as obtaining relevant and well-preserved tissues requires complex ethical and experimental considerations. Alternatively, as a more accessible way of studying functional genomics in the skeleton, we use primate induced pluripotent stem cells (iPSCs) to develop skeletal cell culture models. To simulate normal cell development, iPSCs are first differentiated into mesenchymal stem cells and subsequently into osteogenic cells (bone) or chondrogenic cells (cartilage). Using panels of human and chimpanzee iPSCs, we have collected gene expression patterns at these major stages of differentiation, at a more fine-scale resolution during chondrogenic organoid differentiation, and in chondrogenic cells exposed to tissue-relevant mechanical and cytokine perturbations. These efforts are helping to characterize how regulatory patterns and gene-by-environment interactions in skeletal cells vary across primates and setting the foundation for future skeletal genomics research. Continued work with these primate skeletal cell culture models, alongside primary skeletal tissues and expanded primate cell culture resources, will provide further insight into the mechanisms contributing to variation in skeletal development, maintenance, and disease susceptibility across primates.