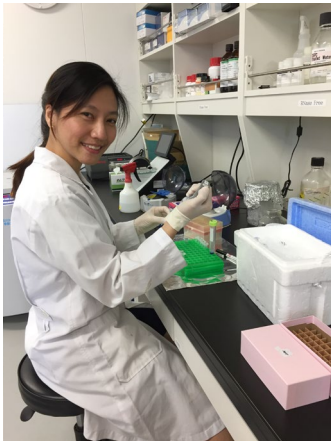


Title of dissertation			
Effects of intermittent compressive force on osteogenic differentiation of periodontal ligament cells and induced pluripotent stem cells			
RONPAKU Fellow			
Name	Jeeranan Manokawinchoke		
Position	Scientist (Science Service Officer)	ID No.	R11819
Department	Anatomy		
Institution	Faculty of Dentistry, Chulalongkorn University	Nationality	Thai
Japanese Advisor			
Name	Hiroshi Egusa		
Position	Professor	Institution	Tohoku University Graduate School of Dentistry

Abstract

Mechanical force plays various roles in the regulation of cell behaviors. Cell responses to mechanical force are depending on several factors for example cell types, force types, magnitude, and duration. Here, I studied an influence of intermittent compressive force (ICF), mimicking mastication, on osteogenic differentiation in human periodontal ligament cells (hPDLs) and mouse gingival fibroblast-derived induced pluripotent stem cells (miPSCs). Firstly, hPDLs were subjected to the ICF in serum-free culture medium for 24 hours. Subsequently, the treated cells were cultured in osteogenic induction medium and then determined osteogenic marker gene expression and an in vitro mineralization. The finding suggested that ICF induced osteoblastic differentiation in hPDLs via the regulation of transforming growth factor β signaling. Secondly, similar ICF treatment was applied to RA-treated miPSCs. I found that ICF pretreatment promoted miPSCs toward osteoblast-like cells as determined by the upregulation of osteogenic marker mRNA expression and an in vitro mineral deposition. Interestingly, gene expression profile of ICF treated miPSCs demonstrated that Mt1 and Mt2 might participate in ICF induced osteogenic differentiation in miPSCs. In conclusion, ICF treatment promotes osteogenic differentiation in both hPDLs and miPSCs. However, the distinct signaling pathways is observed.

Photos



Working in Division of Molecular and Regenerative
Prosthodontics, Tohoku University Graduate
School of Dentistry, Sendai, Japan



With my Japanese advisor, Professor Hiroshi
Egusa, and my home advisor, Professor
Thanaphum Osathanon