

# **Effect of acceleration on osteoblastic and osteoclastic activities: Analysis of bone metabolism using goldfish scale as a model for bone**

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It is well known that hypo-gravity and hyper-gravity influence bone metabolism. However, basic data concerning the mechanism are a few because no in vitro model system of human bone is available. Human bone consists of osteoblasts, osteoclasts, and the bone matrix. No technique for the co-culture of these components has ever been developed. Fish scale is a calcified tissue that contains osteoblasts, osteoclasts, and bone matrix, all of which are similar to those found in human bone. Recently, we developed a new in vitro model system using goldfish scale. This system can simultaneously detect the activities of both scale osteoclasts and osteoblasts with tartrate-resistant acid phosphatase and alkaline phosphatase as the respective markers. Using this system, we analyzed the bone metabolism under acceleration with a custom-made G-load apparatus. Osteoclastic activity in the goldfish scales was suppressed under low-acceleration (0.5-G), while osteoblastic activity did not change under this acceleration. Under high-acceleration (6-G), however, the osteoblastic activity of the scales increased. In addition, the osteoclastic activity of the scales decreased. These results suggest that both osteoblastic and osteoclastic activities are regulated by the strength of acceleration. Therefore, we strongly believe that our in vitro system is useful for analysis of bone metabolism under acceleration.