Louis Yuge, J Neurol Neurophysiol 2013, 4:3
http://dx.doi.org/10.4172/2155-9562.S1.015

OMICS Group Conferences
Accelerating Scientific Discovery

2nd International Conference and Exhibition on
Neurology & Therapeutics
June 17-19, 2013 Hilton Chicago/Northbrook, Chicago, USA

Microgravity

Louis Yuge
Hiroshima University, Hiroshima city

Microgravity is known to control cell cycle, cell proliferation, and differentiation. A 3D-clinostat (SBL produced) is a multi-directional gravity device for simulated microgravity. By controlling rotation of two axes, a 3D-clinostat minimizes the cumulative gravity vector in cells cultured at the center of the device and makes 10^{-3} G average over time velocity. This is accomplished by rotation of a chamber at the center of the device to disperse the gravity vector uniformly within a spherical volume, at a constant angular velocity. Our previous studies demonstrated simulated microgravity inhibited myoblasts and osteoblasts differentiation supporting data as gravitational space biology.In our study, we developed the application of microgravity to stem cells culture using a Clinostat. We reported microgravity potentiated stem cell proliferation such as human mesenchymal stem cells and mouse embryonic stem cells.

Recently, regenerative medicine with bone marrow stromal cells (BMSCs) has gained significant attention for the treatment ofcentral nervous system diseases. Here, we investigated the activityof BMSCs under simulated microgravity conditions. Neuralinducedmouse BMSCs (mBMSCs) cultured under 1G conditionsexhibited neural differentiation, whereas those cultured undermicrogravity did not. Moreover, under microgravity conditions,mBMSCs could be cultured in an undifferentiated state. Next,we intravenously injected cells into a model of cerebral contusionand spinal cord injury. Graft mBMSCs cultured under microgravityexhibited greater survival in the both neurological disorder modelsdamaged region, and the motor function of the grafted miceimproved significantly.

We demonstrated that culturing cells under microgravity enhancestheir survival rate by maintaining an undifferentiated state of cells,making this a potentially attractive method for culturing donor cells to be used in grafting by Clinostat. This method has significantpotential for regenerative medicine and development biology.

ryuge@hiroshima-u.ac.jp