



2nd International Surgery, Translational and Regenerative Medicine Conference

April 15-16, 2019 Valencia, Spain

The Effect of Hyperbaric Therapy on the Development of Brown Adipose Tissue: A Controlled Animal Study

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Brown adipose tissue (BAT) plays a critical role in energy homeostasis and thermo genesis in mammals, protecting against diet-induced metabolic syndrome and hypothermia via the action of uncoupling protein 1 (UCP-1). The enormous energy-consuming capacity of BAT evidenced by great amount of oxygen consumption, suggest hyperbaric therapy may promote BAT development. The purpose of our study was to determine the effect of hyperbaric therapy on BAT and to compare the amount of BAT produced with that induced by cold exposure in a rat model. A total of 15 female Sprague-Dawley rats were used. Five rats were randomly assigned to a non-treatment group, a cold temperature group (CTG), or a hyperbaric therapy group (HTG). The expressions of UCP-1 (a marker of BAT production) and PGC-1 α (a transcriptional regulator) were measured by western blot. Volume of fluorodeoxyglucose (FDG) uptake was determined by positron emission tomography/computed tomography (PET/CT) in all groups. Significantly more BAT development was observed, as determined by FDG PET/CT volume, in the CTG and the HTG than in the control group [F(2,12)=185.72, p=.000]. The protein levels of UCP-1 and PGC-1 α of BAT had a statistically significant increase in HTG and CTG compared with control group. These results indicate hyperbaric therapy, like exposure to cold, up-regulate the expressions of UCP-1 and PGC-1 α in BAT and contribute to BAT development in rodents. This study shows for the first time that hyperbaric treatment induced BAT development and thus, suggests hyperbaric treatment as a potential therapeutic means of metabolic disorders with minimal side effects.

Biography:

Dr. Chang-Hyung Lee is a specialist for physical medicine and rehabilitation. He has been interested in various topics related to musculoskeletal diseases. In addition to these clinical topics, his major concern is also focussed to sports medicine about elite athletes. He worked as a Korean team physician in Beijing olympics, Doha asian games, Jangchun asian games and Bangkok universiade games so far. Recently, he worked as a Venue Medical Officer for Speed skating games in Pyeongchang winter Olympic Games. However, his interests are not only limited to clinical field. As a basic researcher, he has been studying the development and genetic analysis of Brown Adipose Tissue (BAT) using controlled animal study. Also, lordotic curve controlled traction devices on cervical and lumbar spines have been studied since 3 years ago. His current topic for this year is about Biomechanical analysis of Golf swing which is coincide with today's topic. He hopes to have a chance to discuss and co-work with other researchers from overseas.