SPACE LIFE SCIENCES SYMPOSIUM (A1)
Medical Care for Humans in Space (3)

Author: Dr. Andreas Werner
Charité - University Medicine Berlin, Germany, andreas.werner@charite.de

Dr. Alexander Stahn
Charité - University Medicine Berlin, Germany, alexander.stahn@charite.de
Mr. Thomas Schlabs
Charité - University Medicine Berlin, Germany, thomas.schlabs@charite.de
Mr. Thilo Noack
Charité - University Medicine Berlin, Germany, thilo.noack@charite.de
Dr. Hanns-Eberhard Koralewski
Charité - University Medicine Berlin, Germany, eberhard.koralewski@charite.de
Ms. Elke Jahn
Germany, EJahn@berlin-chemie.de
Prof. Hanns-Christian Gunga
Charité - University Medicine Berlin, Germany, hanns-christian.gunga@charite.de
Mr. K Scheite
Germany, gkm@therapieforschung.de

EFFECTS OF NEBIVOLOL (NEBILET®) ON CARDIOVASCULAR AND THERMOREGULATORY FUNCTIONS UNDER REAL AND SIMULATED MICROGRAVITY CONDITIONS

Abstract

In future space missions and space tourism the administration of pharmaceutical drugs will increase. Assuming that beta-blockers might be taken under stressful circumstances during space missions, we conducted two studies investigating the effects of Nebivolol (Nebilet®), a highly selective beta-1-receptor blocker, on cardiovascular changes. The first study consisted of a randomized, cross-over (Nebivolol vs. placebo) clinical trial using a tilt-table (TT) experiment, which was divided into five different phases in analogue to changes in g-forces which occur during a parabola. The second study tested the effects of Nebivolol during a parabolic flight (PF) employing a semi-experimental setup, where all subjects received the substance. Outcome measures in both studies were heart rate (HR), systolic (BPsys) and diastolic (BPdia) blood pressure, and oxygen saturation (SO2), relative hemoglobin concentration (rHb) and peripheral blood flow (rBF) at the temple and shinbone. It was found that TT and PF induced nearly identical cardiovascular and microcirculative changes. Furthermore, these responses were not significantly affected by Nebivolol. Irrespective of Nebivolol, most markedly were the sudden changes from between normal-g to micro-g and vice versa. Specifically, HR, BPsys, and BPdia decreased during (simulated) micro-g, and subsequently increased again to nearly baseline levels. Similar patterns were observed for SO2, rHb, and rBF at the shinbone, while exactly the opposite behavior was identified for the temple. In addition, SO2 at the shinbone showed a pronounced increase following micro-g compared to all other outcome measures. It is concluded that i) Nebivolol showed no harmful side-effects in both studies, ii) it did not affect the characteristic response of cardiovascular changes during micro-g conditions in healthy subjects, and iii) tilt table tests and parabolic flights seem to be attractive models to test pharmaceutical drugs in for future space missions.