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## COMPARISON OF ARTERIAL CHANGES INDUCED BY LONG TERM EXPOSURE TO CONFINEMENT, BED REST AND MICROGRAVITY (SPACEFLIGHT) WITH THE CARDIOVASCULAR EFFECTS OF AGING

Arbeille<sup>a</sup> and K Zuj<sup>a</sup><sup>a</sup>University School of Medicine of Tours, France

In the preparation for manned missions to Mars, research studies have been conducted investigating cardiovascular adaptations of healthy subjects to long term confinement, bed rest, and microgravity. The purpose of this study was to determine how the observed changes, compare to those induced by aging in a normal population. Method: Echography was used to determine cardiovascular changes to 1.5 years confinement, 2 months of continuous head-down bed rest, and 6 months spaceflight aboard the International Space Station. Measurement was made of Left Ventricle Diastolic Volume (LVDV), Myocardium Thickness (Myoc), and Common Carotid (CC) Femoral Artery (FA) diameter and Intima media Thickness (IMT). Results were compared to published effects of normal aging on Earth.

**Results:** With bed rest and spaceflight LVDV and Myoc were reduced (-12-15%,  $P < 0.001$ ). The observed CC and FA changes were similar to those seen in 30+ years of normal aging on Earth.

**Conclusion:** Orthostatic intolerance induced by long term bed rest and spaceflight and Arterial changes observed in long term confinement, bed rest, and spaceflight, corresponded to changes similar to accelerated aging on Earth. These three environments which include reduced physical activity, change in nutritional regime and life in stressing environment may be a model to study the mechanism of aging on the vessels and to design adapted counter measures.

[arbeille@med.univ-tours.fr](mailto:arbeille@med.univ-tours.fr)

## CAROTENOID INFLUENCES ON OCULAR HEALTH, VISUAL PERFORMANCE AND COGNITIVE FUNCTION

Christopher M. Putnam<sup>a</sup><sup>a</sup>University of the Incarnate Word Rosenberg School of Optometry, USA

Macular Pigment (MP) is the collective name for three carotenoids, Lutein(L), Zeaxanthin(Z) and Meso-zeaxanthin, which are uniquely concentrated in the central retina. Due to the anatomic position of the MP, it has the ability to alter the spectral composition and energy of the incident light upon photoreceptors. In addition to its short wavelength filtering properties, MP also possess potent antioxidant qualities that have become the subject of interest for a wide range of retinal conditions.

The term Macular Pigment Optical Density (MPOD) refers to a quantifiable value of an MP concentration in the central retina. Studies have indicated that supplementation of the constituents of MP is associated with increased levels of MPOD that have resulted in the improved visual function and decreased pathology in a number of retinal conditions, most notably age-related macular degeneration and diabetic maculopathy.

Studies of neural processing have also found significant, positive correlations between cortical levels of L and Z and cognitive function including verbal fluency, memory and processing speed. MPOD has shown significant, positive associations with cortical L and Z supports the hypothesis that MPOD may act as a proxy measurement for cortical levels of L and Z. Underlying these associations is the need for repeatable, accurate measures of MPOD that can provide peak optical density and spatial distribution. This presentation will review the current understanding of the role of MP within the aging adult, clinical measurement techniques, strategies for improved visual function and cognition as well as a reduced risk of retinal disease.

[cmputnam78@yahoo.com](mailto:cmputnam78@yahoo.com)