Low-magnitude whole body vibration with resistive exercise as a countermeasure against cardiovascular deconditioning after 60 days of head-down bed rest

Titre	Low-magnitude whole body vibration with resistive exercise as a countermeasure against cardiovascular deconditioning after 60 days of head-down bed rest
Type de publication	Article de revue
Auteur	Coupe, M. [1], Yuan, M. [2], Demiot, C. [3], Bai, Yanqiang Q. [4], Jiang, S. Z [5], Li, Y. Z [6], Arbeille, Philippe [7], Gauquelin-Koch, G. [8], Levrard, Thibaud [9], Custaud, Marc-Antoine [10], Li, Y. H [11]
Editeur	American Physiological Society
Type	Article scientifique dans une revue à comité de lecture
Année	2011
Langue	Anglais
Date	2011
Numéro	6
Pagination	R1748 - 54
Volume	301
Titre de la revue	American Journal of Physiology - Regulatory, Integrative and Comparative Physiology
ISSN	1522-1490
Mots-clés	Adult [12], Autonomic Nervous System/physiology [13], Baroreflex [14], Bed Rest [15], Blood Pressure [16], Cardiac Output [17], Cardiovascular Deconditioning [18], Exercise/physiology [19], Heart Rate [20], Humans [21], Male [22], Stroke Volume [23], Time Factors [24], vibration [25]

Résumé en anglais	Whole body vibration with resistive exercise is a promising countermeasure against some weightlessness-induced dysfunctions. Our objective was to study whether the combination of low-magnitude whole body vibration with a resistive exercise can prevent the cardiovascular deconditioning induced by a nonstrict 60-day head-down bed rest (Earth Star International Bed Rest Experiment Project). Fourteen healthy men participated in this study. We recorded electrocardiograms and blood pressure waves by means of a noninvasive beat-by-beat measurement system (Cardiospace, integrated by Centre National d'Etudes Spatiales and Astronaut Center of China) during an orthostatic test (20 min of 75-degree head-up tilt test) before and immediately after bed rest. We estimated heart rate, blood pressure, cardiac output, stroke volume, total peripheral resistance, baroreflex sensitivity, and heart rate variability. Low-magnitude whole body vibration with resistive exercise prevented an increase of the sympathetic index (reflecting the sympathovagal balance of cardiac autonomic control) and limited the decrease of the spontaneous baroreflex sensitivity induced by 60 days of head-down bed rest. However, this countermeasure had very little effect on cardiac hemodynamics and did not improve the orthostatic tolerance. This combined countermeasure did not efficiently prevent orthostatic intolerance but prevents changes in the autonomic nervous system associated with cardiovascular deconditioning. The underlying mechanisms remain hypothetical but might involve cutaneous and muscular mechanoreceptors.
URL de la notice	http://okina.univ-angers.fr/publications/ua8310 [26]
DOI	10.1152/ajpregu.00234.2011 [27]
Lien vers le document	http://dx.doi.org/10.1152/ajpregu.00234.2011 [27]
Titre abrégé	Am J Physiol Regul Integr Comp Physiol

Liens

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