Cognitive training during 14-day physical inactivity improves dual-task walking

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Introduction:

Prolonged immobilization or inactivity which follows sports injuries and surgery could lead to serious motor dysfunction preventing a quick recovery and causing elevated costs for a national health care system. Recent studies show that sustained spatial navigation training modifies hippocampal volumes in humans and protects it from age-related decline (Lovden et al. 2012). Therefore, it is important to develop interventions to reduce the deterioration of the motor output during immobilization or inactivity. This study tested a cognitive based intervention during 14-days bed rest (BR) on walking performance with and without a dual-task. To the best of our knowledge this was the first BR study with a cognitive training intervention.

Methods:

Fourteen older male adults (59.7±3.5 years) volunteered for a controlled longitudinal interventional BR study. To study the effect of cognitive training, we randomly split the subjects into 2 groups: a cognitive training group (CTG; N=6) that trained virtual maze navigation for 50 minutes a day and a control group (CG; N=8) that watched documentaries. Gait parameters were measured with the OptoGait system (Microgate, Italy). To measure the effect of cognitive training on gait we used percent of change in gait speed between normal walking (self-selected speed) with and without dual task [(dual-norm)/ norm*100] (Montero-Odasso et al. 2012). Between-groups (CTG vs. CG group) and within-groups (pre- vs. post-BR) differences were tested with the 2x2 mixed ANOVA.

Results:

There were no significant differences (p=0.44) between the CTG and CG before the BR. However, after the BR the CTG showed significantly higher (p=0.02) change of walking speed as compared to the CG (+8.6±7.0% and -1.1±5.8%, respectively). Further, within-group analysis showed for CTG, but not for CG, significantly increased change of walking speed (p<0.001) from pre-BR to post-BR (-13.4±5.7% and +8.6±7.0%, respectively). In other words, the results showed that after BR in CG there was a decrease (1.29±0.23 vs. 1.25±0.15 m/s) while in CTG there was an increase (1.08±0.18 vs. 1.17±0.14 m/s) in walking speed with dual-task.

Discussion:

The results of this study demonstrate that cognitive training during 14-days BR significantly prevents a decrease of gait performance in dual-task walking. Our findings suggest a possible link between cognitive training intervention and motor output and represent new perspectives of basic research regarding novel methods for preventing declines in gait performance due to prolonged immobilization or inactivity.

References: