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BIOMARKER-ENHANCED VIRTUAL REALITY-BASED PLATFORM FOR ASSESSING MOTION SICKNESS

SUSCEPTIBILITY PLATEFORME À BASE DE RÉALITÉ VIRTUELLE RENFORCÉE PAR BIOMARQUERS POUR ÉVALUER LA SENSIBILITÉ À LA MALADIE DE MOUVEMENT

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Introduction: Motion sickness (MS) is a relatively common occupational hazard in aviation and space exploration. One reason for this is a lack a simple and cost-effective method of assessing MS susceptibility that could be used during recruitment; MS desensitisation programs are expensive and time-consuming. Exposure to provocative VR content readily elicits MS ("cybersickness"), and it may be that VR technology could be used for both identification of MS-susceptible individuals and for MS desensitisation. To advance this idea, two issues should be first clarified: i) whether sensitivity to VR provocations reflects sensitivity to vestibular provocations; and ii) whether cybersickness is clinically identical to a "classic", motion-induced motion sickness. Consequently, our aim was to fill this gaps of knowledge.

Methods: A cohort of 30 young healthy volunteers was exposed to both vestibular (Coriolis cross-coupling) and VR (virtual ride on a roller coaster) provocations in a counter-balance order on different days. Nausea scores were recorded during the exposure, and Motion Sickness Assessment Questionnaire (MSAQ) was used to profile subjective symptoms. Tonic and phasic forehead skin conductance level (SCL) was measured before and during exposure.

Results: Nausea onset times and maximum nausea ratings correlated during both provocations ($r=0.40$, $p=0.03$ and $r=0.56$, $p=0.0012$, respectively). Symptom profiling with the MSAQ revealed substantial and significant correlations between total symptom scores ($r=0.69$, $p<0.0001$) and between 15/18 individual symptoms assessed in both conditions. Both provocations caused increase in tonic and phasic SCL activity associated with nausea, with a reasonably close correlation between the conditions ($r=0.48$, $p=0.04$).

Conclusions: Similarities in sensitivity to both provocations, and in clinical profile and physiological changes occurring during VR-induced and "classical" motion sickness suggest that using VR technology might be a promising approach for identification of MS-susceptible individuals and for MS desensitization.