The effectiveness of virtual reality on motion sickness

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Motion sickness is characterized by a disagreement between visually perceived movement and the vestibular system's perception of movement. It commonly involves symptoms like dizziness, fatigue, and nausea. Most cases of motion sickness are mild and self-treatable. However, very severe cases require a specific care by a vestibular therapist. In this context, optokinetic investigation is based on the habituation of the occulo-vestibular conflict to reduce the motion sickness disorder (Trendel, 2010). The goal of this study is to assess the effectiveness of the virtual reality rehabilitation on motion sickness.

Thirty-seven subjects (38.24 years $\pm$ 13.07) gave their consent to take part to this study and carried out between 6 and 22 training sessions (12.14 $\pm$ 2.8). None of them suffered of vestibular or neurological pathology which could explain their motion sickness. In a corner free projection room, each subject performs two optokinetic training sessions by week, using virtual reality with the BioStim sofware (RM Ingénierie, France). The sessions were composed by a succession of "plane simulations" during 2 min 30 s and "diode tracking" during 1 minute until reaching patient's saturation (~11 min 30 s). The diode tracking is an ocular jerk exercise, considered here as an active rest. To assess the motion sickness of the patients, a visual analog scale was used: before the optokinetic training, 1 month after and then 6 months after. A score of 10 indicates a high motion sickness discomfort while a score of 0 indicates the lysis of symptoms. A repeated measures ANOVA was conducted to compare the average scores.

Results show a significant decrease of the motion sickness score between the initial score (7.51 $\pm$ 1.02) compared to the score after 1 month (2.86 $\pm$ 1.64) and also with the score after 6 months (3.32 $\pm$ 2.20) ($p<0.001$). Statistical analysis reveals no interaction effect between the score and the age, the sex and the number of sessions ($p>0.05$).

This study attests the benefits of optokinetic training for motion sickness rehabilitation with virtual reality. Compared with other methods like pharmaceutical prescription, rehabilitation of motion sickness by optokinetic simulations has the advantage of having sustainable effects, without adverse side consequences and with excellent success rate.