Methods evaluate its effects on the affected upper limb function. associate tDCS stimulation with physical therapy of the upper limb, in order to petition. tDCS is easy to perform, its cost is low, and the feasibility of a dies with repeated sessions [2]. In fact, tDCS can modulate plasticity following stroke [1,2]; the presented results were very encouraging, especially for stu-

Keywords: Transcranial magnetic stimulation; Brain plasticity

Transcranial magnetic stimulation (TMS) is a technique for noninvasive brain stimulation used in humans. The sudden change of a magnetic field can induce an electric current in nerve tissue and depolarize the axons of neurons in the motor cortex. This technique was first used to study the plasticity of the motor cortex with the production of brain mapping and to quantify the excitability of different brain areas. More recently, repetitive transcranial magnetic stimulations (rTMS) have demonstrated their ability to modulate cortical plasticity. rTMS is applied to repeated stimulation at a variable frequency from 1 to 50 Hz for periods of 1–30 min. The nature of the resulting post-effects of this stimulation depends on the frequency, intensity and temporal organization of stimulus. Stimuli applied at a frequency of 1 Hz are most often responsible for a sustained decrease in the excitability of the motor cortex, whereas higher frequencies lead to an opposite result. Because rTMS can modulate brain activity, it has been used at least in a single session in many diseases. The results of these studies open the most opportunities for the use of this new therapeutic tool in neurorehabilitation. Nevertheless there are studies in a single session mostly on intermediate standards (electrophysiology) and not on clini-

cal criteria. The extension of this method of brain stimulation thus requires further, multicenter double-blind randomized versus sham tries to study their influence on clinical criteria of recovery. As such it is essential that teams of physical medicine and rehabilitation may be involved in this validation for the passage of what is still an experimental concept to an actual therapeutic application.


CO32-004–EN

Neural bases of Aubert effect and prospects in rehabilitation

A. Marque∗, a, J. Barra b, C. Reymond c, R. Joassin c, V. Chauvineau c

a Clinique MPR, hôpital Sud, CHU de Grenoble, avenue de Kimberley, 38434 Echirolles, France
b Université René-Descartes, Paris, France
c CHU de Grenoble, Grenoble, France

∗Corresponding author.

Keywords: Visual vertical; Stroke; Aubert effect

Introduction.—The Aubert effect [1] is a tilt of visual vertical (VV) towards the body during lateral body tilt. Interpretation refers to internal model of verticality, with greater reweighting of somesthetic graviception upon vestibular graviception. To date, presence of a synthesis of somesthetic and vestibular graviception has not been proved, and its neural bases have not been analysed. This was the aim of this study.

Materials and methods.—Fourteen paraplegic subjects (T4-T12 ASIA A), 23 hemispheric subjects (unique hemisphere stroke) and 39 control sub-

jects were studied. VV was assessed in upright sitting position and in laterally-tilted postures (30° for paraplegics, 30° for hemiplegics). In hemiplegics, hypoaesthesia was quantified and cerebral lesion location was analysed.

Results.—Upright, VV was accurate, but more variable in paraplegics than in controls. This indicates that the somesthetic graviception contributes to the sense of verticality, even in upright position.

As expected, a spontaneous contralesional VV tilt (−4.7±4.7°; P <0.001) was found in hemiplegics. Lateral tilts induced Aubert effect in controls (ave-

rage = 5°), whereas it was abolished in paraplegics. This means there is a modulation of VV by somesthesiaic information. In hemiplegics, Aubert effect was decreased during contralesional tilt, proportionally to hypoaesthesia degree (r =−0.55; P <0.01). This gradient proves the existence of a synthesis of vestibular and somesthetic graviceptions. Ana-

tomical analysis showed that this synthesis was made in the postero-lateral thalamus (P<0.003). Interestingly, ipsilesional tilt in hemiplegics normalized VV (−4.7±4.7° vs 1.1±4.5°; P<0.01).

Discussion—Conclusion.—The Aubert effect results from a synthesis of vestibular and somesthetic graviceptions, in which the postero- lateral thalamus plays a major role [2]. Aubert effect could be useful in clinical practice: ipsilesional tilt may readjust VV in hemiplegics. Whether this improvement lasts together with its positive effects on balance need to be studied.

References