

Proceedings Meeting Belgian Neurological Society Liège, 14th December 2002

NG2 proteoglycan-expressing progenitor cells represent postnatal CNS neural stem cells. S. BELACHEW^{1,3,4}, R. CHITTAJALLU^{1,3}, A. AGUIRRE^{1,3}, X. YUAN¹, S. ANDERSON², V. GALLO^{1,3} (¹Laboratory of Cellular and Synaptic Neurophysiology, National Institute of Child Health and Human Development ; ²Gene Transfer Laboratory, Hematopoiesis Section, Flow Cytometry Core Unit, National Human Genome Research Institute, National Institutes of Health, Bethesda, Maryland 20892, U.S.A. ; ³Center for Neuroscience Research, Children's Research Institute, Children's National Medical Center, 111 Michigan Ave, N.W, Washington DC, 20010 U.S.A. ; ⁴Center for Cellular and Molecular Neurobiology, Department of Neurology, University of Liège, C.H.U. Sart Tilman, 4000 Liège).

Neurogenesis is known to persist in the adult mammalian central nervous system (CNS). The identity of cells that generate new neurons in the postnatal CNS has become a crucial, but elusive issue. In order to determine to what extent oligodendroglial cells may display multipotent stem cell-like properties *in vitro* and *in vivo*, we used a transgenic mouse selectively expressing the green fluorescent protein (EGFP) in the oligodendroglial lineage under the control of the 2',3'-cyclic nucleotide 3-phosphodiesterase (CNP) promoter. We found that FACS-purified NG2 proteoglycan⁺/CNPEGFP⁺ cells from early postnatal (P2-P7) brain express a multipotent phenotype *in vitro* and generate electrically excitable neurons, as well as astrocytes and oligodendrocytes. The fast kinetic (2 days in culture) and the high rate (35% of NG2⁺/CNPEGFP⁺ cells become neurons) of multipotent fate of NG2⁺ cells *in vitro* reflect an intrinsic property of this lineage, rather than reprogramming. We also found that *in vivo* early postnatal and adult (P30) CNPEGFP⁺/NG2⁺ cells are proliferative precursors whose post-mitotic progeny appears to differentiate in the hippocampus into NeuN⁺ neurons capable of propagating action potentials, and displaying spontaneous synaptic currents. These data show that postnatal NG2-expressing cells, previously so-called oligodendrocyte progenitors, are in fact CNS multipotent precursors that may be directly involved in adult hippocampal neurogenesis.

R.C. was supported by a Wellcome Trust Fellowship, S.B. by the Fonds National de la Recherche Scientifique (Belgium), and by N.I.C.H.D., and A.A. by a pre-doctoral fellowship from Conacyt (Mexico).

Effects of repetitive high frequency transcranial magnetic stimulations (rTMS) on functional recovery after a compression-injury of rat spinal cord : relationship with the segmental level of compression. A. POIRRIER, Y. NYSSEN, F. SCHOLTES, G. A. BROOK, S. MULTON, P. MALCHAIR, C. RINKIN, M. VAN LANGENACKER, R. FRANZEN, J. SCHOENEN (Neuroanatomy laboratory, Research Center for Cellular and Molecular Neurobiology, University of Liege, Belgium).

Electrical fields applied in the peripheral nervous system are able to promote axonal regeneration (Borgens 1982, Al-Majed *et al.* 2000). Neuronal depolarisation also facilitates neurite outgrowth *in vitro* (Kocsis *et al.* 1994). Repetitive transcranial electromagnetic stimulation (rTMS) is a convenient method to activate motor pathways. We have investigated the ability of rTMS to ameliorate functional recovery in a rat model of incomplete spinal cord compression-injury.

The thoracic spinal cord of adult female rats was injured with a subdural inflatable microballoon (20 µl, 5 min) according to a previously published protocol (Martin *et al.* 1992). As functional recovery depends on the segmental level of injury, 13 animals were lesioned between T3 and T7, 12 between T8 and T13. In each group, respectively 5 and 6 animals received daily rTMS (10 5-sec trains at 10 Hz at 50% of the stimulator output) for 8 weeks while the remaining animals were manipulated but not stimulated. Motor function in hind-paws was scored weekly using the BBB scale. After 8 weeks, motor responses evoked by single TMS were assessed. The rats were subsequently sacrificed for histological examination.

As found in our previous studies, the mean final BBB score was higher (8.74) in high thoracic lesions than in low lesions (5.08) in control animals. The opposite was found in the rTMS group : mean final BBB score was significantly higher (10.25) after a low thoracic spinal injury than after a thoracic lesion (6.90).

Our study demonstrates that high frequency rTMS applied daily improves functional recovery after low, but not after high thoracic spinal cord injury. The precise reasons for this differential effect and the potential therapeutic utility of this non-invasive intervention in selected human cases of spinal cord injury remain to be determined.

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Reevaluation of intraperitoneal injection of pentylenetetrazol as a model for generalized epilepsy using digital video-EEG monitoring. P. CLAEYS, K. VONCK, S. DEDEURWAERDERE, P. BOON.

Introduction : Intraperitoneal injection of Pentylenetetrazol (PTZ-i.p.) in rats causes generalized seizure activity ranging from absences to generalized tonic clonic seizures. PTZ is often used as a screening method for testing the efficacy of new antiepileptic therapies. In the literature different rat strains are used and reported PTZ dosages are variable and range from 25 to 125 mg/kg. The electroclinical correlation in reported experiments was not assessed by video-EEG monitoring. The purpose of our study is to reevaluate PTZ-i.p. (45 mg/kg) in two different commonly used rat strains in video-EEG monitoring conditions.

Methods : 9 male Wistar (WI) and 11 male Sprague-Dawley (SD) rats were implanted with 5 subdural EEG electrodes. During continuous digital video-EEG monitoring the rats were injected with 45 mg/kg PTZ-i.p. The electroclinical correlation of ictal events was documented by means of the following parameters within 60 min post-injection : main clinical seizure type ; number of seizures ; duration of seizures ; time to (first) seizure(s). Results were compared between WI and SD.

Results : For both strains the following seizure types (t), the mean number of seizures (n), the mean duration per seizure (d), and the mean time to first seizure (x) were documented : typical absences (WI : t = 0 ; n = 0 // SD : t = 1 ; n = 77 ; d = 2,3s ; x = 925s) ; isolated myoclonic jerks (WI : t = 0 ; n = 0 // SD : t = 1 ; n = 55 ; d = 1 s ; x = 86s), major motor events resembling tonic clonic seizures (WI : t = 8 ; n = 1 ; d = 31,5s ; x = 74s // SD : t = 8 ; n = 1 ; d = 33,9s ; x = 94s) and generalized tonic clonic status epilepticus (WI : t = 1 ; n = 1 ; d = 292s ; x = 59s // SD : t = 1 ; n = 1 ; d = 365s ; x = 60s). In all animals of both strains, major motor events were consistently followed by isolated myoclonic jerks and/or absences.

Conclusions : Video-EEG analysis of clinical characteristics, frequency, duration and time course of PTZ-i.p. induced seizures at a dose of 45 mg/kg showed no significant differences in Wistar rats versus Sprague-Dawley rats.

Supported by grants from the Fund for Scientific Research- Flanders (F.W.O.), Ghent University Research Fund (B.O.F.) and the Clinical Epilepsy Grant Ghent University Hospital 1998-2002.

Vagus nerve stimulation in Genetic Absence Epilepsy Rats from Strasbourg (GAERS). S. DEDEURWAERDERE, K. VONCK, M. D'HAVÉ, D. NARITOKU, T. GRISAR, P. BOON (Ghent University Hospital, Ghent 9000, Belgium).

Vagus nerve stimulation (VNS) is a neurophysiological treatment for partial epileptic seizures with or without secondary generalization. In a previous study *acute* VNS had no significant influence on the number, duration and frequency of spike and wave discharges (SWDs) in GAERS. The effect of chronic VNS in GAERS has not been studied yet. The aim of the present work is to evaluate *chronic* VNS in this model of primary generalized epilepsy.

Nineteen GAERS were implanted with 5 epidural EEG electrodes and a stimulation electrode around the left vagus nerve. Subsequently they underwent long-term video-EEG monitoring during a 2-week period. Between day 1 and day 7 (baseline EEG recording) the animals were not stimulated. After baseline EEG recording, 10 GAERS were stimulated 24 hours-a-day from day 8 until day 14 with the following stimulation parameters : output current : 1.5 mA, frequency : 30Hz, pulse width : 500 µsec, on/off time : 60 sec/12 sec. Nine control GAERS were not stimulated. The number, duration and frequency of SWD were compared between day 7 and day 14.

In stimulated GAERS, average number per hour, duration and frequency of SWD in baseline conditions (day 7) was 23 (SD = 20.1), 11 sec (SD = 5.6) and 8.0 Hz (SD = 0.45) respectively. During the last day of VNS (day 14) these figures were 27 (SD = 21.6), 9.3 sec (SD = 4.3) and 7.9 Hz (SD = 0.38). In baseline conditions (day 7), control rats had an average number of SWD per hour of 35 (SD = 34.4). The average duration and frequency of SWD were 12 sec (SD = 6.4) and 8.1 Hz (SD = 0.49) respectively. During day 14, these figures were 20 SWD (SD = 15.9) per hour, 11 sec (SD = 6.4) and 7.7 Hz (SD = 0.52). When control GAERS versus stimulated GAERS, and baseline conditions (day 7) versus stimulation conditions (day 14) were compared, no statistically significant differences could be found.

VNS according to a 7-day/24-hours-per-day-protocol, has no significant influence on the number, duration and frequency of SWD in GAERS. Further studies using other stimulation parameters should confirm that VNS is not active in this model of primary generalized epilepsy.

Teaching Euro to Alzheimer patients in a Cognitive Rehabilitation Centre : a case study. D. SEPUL, P. MARIQUE, A. QUITTRE, E. SALMON (Cognitive Rehabilitation Center, University Hospital, Liège, Belgium).

Background : Cognitive rehabilitation has been recently introduced as a therapeutic option in Alzheimer's disease.

Aim : We present a therapeutic program which was implanted in a Cognitive Rehabilitation Centre in order to teach one patient (MC) with mild Alzheimer disease to use euro. MC was 76 Years Old, was diagnosed since 24 months and had a MMSE's score of 17/30.

Method : By the using space retrieval and errorless procedures, we taught MC semantic, Perceptual and practical knowledges about this new European currency. Semantic learning was focused on having MC able to demonstrate explicit knowledge of euro's value and symbol. By Perceptual learning we tried to induce recognition of different bills and coins and to encourage their correct manipulation. Practical knowledge training consisted to automate a conversion calculator's use in order to compare prices in euro with his framework in Belgian francs. The ability of MC to use euro was demonstrated by a game called "Europoly" which constitutes a more ecological situation than a desk work.

Results : During initial evaluation, MC was not able to give the value of one euro, had difficulties in recognising coins and bills (6 errors/17) and in evaluating their value (11 errors/20), and could not use a conversion calculator. Five séances of 45 minutes were necessary for MC to memorise euro's value by the space retrieval technique. After two seances using the space retrieval technique, MC was able to recognise coins and bills and to make the difference between euro and cent. The calculator's use was automated after five seances, using the space retrieval technique and errorless learning. MC played three times to europoly, showing learning's automation and an adequate use of the new currency. The final evaluation three months after the beginning of the rehabilitation was perfect (0 error/17, 0 error/ 20). Moreover, MC's spouse reported that those knowledges were used at home.

Conclusion : It is possible to teach new informations to people with mild Alzheimer disease, despite episodic memory difficulties they suffer.