

signs of latency shortening are characteristic of VEP changes in the initial stage, correlating with the clinical picture of erethism. In advanced cases, however, there may even be latency prolongation. VEP changes are typically associated with slowed down sural nerve conduction as a sign of incipient mercury-induced sensory polyneuropathy. While aetiologically non-specific, these neurophysiological changes may in individual cases be due to exposure to a neurotoxic noxa provided that (a) there is evidence of significant exposure, (b) the clinical picture is compatible with intoxication, and (c) differential diagnosis has ruled out other causes. In group estimation of exposure, any possible connection between neurophysiological anomalies and neurotoxic exposure should be considered relative to evidence of a dose–response interdependence.

#### 28 Standard examination VEP procedures are insufficient – J. Chlubnova, J. Kremlacek and M. Kuba (Hradec Kralove)

In an effort to improve neuro-ophthalmological diagnostic procedures, the authors continue developing more specific stimuli for selective stimulation of separate visual pathway subsystems. Hence, reactions to centrifugal radial motion ‘expansion’ (E-VEPs) were added to their currently used set of visual evoked potentials, pattern-reversal visual evoked potentials (P-VEPs) and motion-onset VEPs (M-VEPs). The stimulus was designed so as to decrease the pattern spatial frequency and to increase the motion velocity towards the visual field periphery (with respect to the physiological properties of the retina). To prove the stimulus efficiency, the authors compared E-VEP parameters with VEP results to monocular stimuli in a selected group of 100 patients (in 6 unipolar leads, Oz, Or, Ol, 5 cm to the right and left of the Oz position, Cz, Pz and Fz). The E-VEPs were found to have the highest interpeak amplitudes of all the VEPs tested ( $P < 0.001$ ). Moreover, in 5% of the cases the E-VEP was the only distinct (and reproducible) reaction. Despite the high correlation of the dominant negative peaks in the M-VEPs and E-VEPs (unidirectional and expanding motion), 12% of the patients were found to have only the E-VEPs selectively impaired (prolonged latency). Thus, additional examination of the reactions to expanding motion (E-VEPs) can increase the sensitivity of VEP examination for about 12%. However, the specificity of the E-VEP changes has yet to be proved.

#### 29 Electrophysiological changes related to magnesium therapy in anxious-depressive disorders – D. Gayer, E. Libigerova, J. Chlubnova, J. Kremlacek and M. Kuba (Hradec Kralove)

Electrophysiological readings were evaluated in anxious-depressive patients as part of a randomized double-blind placebo-controlled study relative to magnesium therapy. Twenty-nine patients (mean age  $42 \pm 10$  years, 16 on placebo, 13 on magnesium) were examined twice, once before and once after a 5 week period of treatment. VEPs of the primary and secondary visual cortex (pattern-reversal VEPs, motion-onset VEPs in response to unidirectional linear motion and to centrifugal motion, ‘expanding’ radial pattern) were recorded from Oz and lateral temporo-occipital leads. VEPs from cognitive cortical areas were tested in unipolar Pz, Cz and Fz leads. EEG frequency analysis in the eyes-closed mode was also employed. The cognitive task (oddball paradigm) consisted of the recognition of either non-coherent motion or a normal face (a scrambled human face was displayed as a non-target stimulus). Twenty-seven sex- and age-matched healthy subjects served as controls. Significant differences in the group of patients and changes related to magnesium therapy were only found in the cognitive VEP parameters. An increase of the P300 amplitude was found in the human-face target stimuli in patients after treatment with magnesium (from  $9.1 \pm 3.8$  to  $11.2 \pm 3.5$   $\mu\text{V}$ ) together with a significant lowering of the non-target P300 amplitude (from  $7.2 \pm 4.1$  to  $3.8 \pm 3.8$   $\mu\text{V}$ ) in coherent/non-coherent motion stimuli (not found in the placebo group). Both changes can be regarded as a positive influence of magnesium over the patients’ cognitive functions. The intensity of reactions to the target stimuli was found to be increased as distinct from decreased reactions to non-important stimuli which should be filtered out during the cognition process.

#### 30 Utilization of visual evoked cognitive potentials – M. Kuba, J. Kremlacek, J. Szanyi, J. Chlubnova, D. Gayer and F. Vit (Hradec Kralove)

The use of cognitive evoked (event-related) potentials (ERP) can improve the diagnosis of some psychiatric disorders and help to evaluate therapeutical effects. Unlike auditory ERP, a wide enough spectrum of visual stimuli can offer a more complex insight into cognitive processes. However, there are some limitations. The most serious problem is posed by considerable inter- and intra-individual variability (mainly in highly complex cognitive tasks), the variation coefficient being twice as large as in primary VEPs, e.g. pattern reversal. It is essential to maintain standard conditions of examination (time, glycaemia, and constant psychic state). Protracted ERP examination increases the number of blinking-related artifacts, more so in the fronto-central areas than in occipital primary VEPs. In the oddball paradigm, target stimulus signalling with any kind of motor activity (pushing a button) leads to P300 contamination. Hence, emotionally potent stimuli (e.g. human faces) which can do without the subjects’ active co-operation are preferable. According to the authors’ data including the simultaneously recorded time of reaction to target stimuli, the cognitive process is better represented by the negative peak preceding the P300, the latency of which is much more constant. As specification of a ‘norm’ in ERP is still rather complicated, longitudinal intra-individual evaluation of changes seems to be more reliable for clinical purposes.

#### 31 Electrophysiological findings in migraine – J. Szanyi, G. Wabernitzek, J. Kremlacek, M. Kuba and J. Chlubnova (Hradec Kralove)

According to recent EP studies, abnormal cortical information processing is in progress in the migraine-affected brain during attack-free periods. A fundamental, probably protective, feature of the brain function – response habituation while the stimulus is repeated – is thus impaired. Visual evoked potentials (VEP) and EEG frequency spectrum were examined in 26 patients suffering from migraine (5 with and 21 without aura) during attack-free periods, as well as in 27 normal controls. Transient pattern-reversal VEPs and two variants of motion-onset VEPs failed to display any significant differences between the migraine group and controls. Since the standard recording time was less than 1 min for each of the specified VEP examinations, it may have been too short to exhibit the envisaged VEP habituation in normal subjects. No correlation was found between the EEG frequency spectrum parameters and the migraine descriptors in patients. Using the oddball paradigm, visual evoked event-related potential (ERP) (recognition of coherent/non-coherent motion) and emotional passive ERP (recognition of normal and scrambled face pictures) were also studied. In standard ERP, no significant differences in P300 latencies or peak-to-peak amplitudes were noted between migraineurs and controls. The only intergroup dissimilarity observed was found in the emotional passive ERP. The control group exhibited a significant amplitude reduction in the non-target response as distinct from the target response ( $P < 0.004$ ). However, this lowering was not present in migraine sufferers ( $P < 0.2$ ), probably due to decreased habituation selectively present in the higher cortical processes.

#### 32 Functional MRI estimation of ERP generators – R. Jech, E. Ruzicka, A. Nebuzelsky, J. Krasensky and Z. Seidl (Prague)

To localize ERP (event-related potentials) generators with more accuracy, the authors compared ERP and fMRI (functional MRI) results. Ten healthy volunteers (6 men, 4 women) were assigned an oddball type task and asked to focus attention on rare target stimuli (horizontal black and white stripes, 22%) pseudo-randomly appearing among standard stimuli (vertical black and white stripes, 78%), proceeding in two ways on spotting the target stimulus by (a) subtracting the number 2 from 100 (mental task), or (b) performing rhythmical movements of the right-hand fingers (motor task). Functional MRI was analyzed using cross-correlation between the ‘box-car’ function and the dynamic course of the signal in