

Cognitive neurology

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The short aphasia-check-list: an economical screening for detecting aphasia

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Introduction In clinical practice an economical diagnosis of aphasia is important for identifying patients who are in need of speech therapy and/or pharmacotherapy. However, most aphasia tests require too much time for General Practitioners. We developed the “Short-Aphasia-Check-List” (German: Kurze-Aphasie-Check-Liste, ACL-K), which is a short but sensitive test for detecting aphasia in brain-damaged patients.

Methods In the normation, study 148 aphasic patients (AP, mean age=62.7yrs. SD=15.2) and 104 controls (CG, mean age=57.9yrs. SD=17.2) were included. All subjects were tested with the longer German test-battery “Aphasia-Check-List” (ACL, Kalbe et al., 2002), and the AP with the Aachen-Aphasia-Test (AAT). For the ACL-K those subtests of the ACL were selected that suited best for a quick but sensitive diagnosis of aphasia.

Results A combination of four subtests was chosen: a colour-figure-test (modification of Token Test), a verbal fluency task (supermarket), a reading task and a rating for verbal communication. The test administration takes approx. 10 minutes. Due to a significant age, effect ($p<.001$) age-corrected scoring was defined for the supermarket task. After subtests were weighted, (considering statistics and contents) the maximal transformed score of the ACL-K is 40 points. With a cut-off of 33 points (<33 =impaired), sensitivity of the ACL-K is 94.7%, specificity 98.1%. On the basis of the AP scores, the “pathological range” under 33 was subdivided into intervals for mild (26–32), moderate (15–25), and severe (0–14 points) language impairment that corresponded well to the impairment severity in the AAT.

Conclusion The Short-Aphasia-Check-List (ACL-K) is an economical, valid and very sensitive instrument to detect aphasia and describe its severity.

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Cerebral blood flow SPECT imaging in right hemisphere-damaged patients with hemispatial neglect

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Background Hemispatial neglect is characterised as a failure by the patient with stroke to attend to contralesional space. It is hypothesised to be a result of damage to a network involving the frontal, parietal, and cingulate cortices, basal ganglia, and thalamus.

Methods The aim of this preliminary study was to verify this model of neglect in 22 right hemisphere-damaged acute stroke patients using single photon emission-computed tomography (SPECT). Presence of a single right-sided vascular brain lesion was confirmed on CT and/or MRI. Hemispatial neglect, assessed with a battery of drawings, line bisection, and line and shape cancellation tests, was observed in 12 cases.

Results Patients with neglect (compared with those without neglect) had more extensive hypoperfusion in the frontal and parietal cortex, as well as striatum and thalamus. Left-sided hypoperfusion in the parietal cortex and the thalamus was also significantly associated with neglect on SPECT imaging. Performance on three out of five tasks of psychological assessment commonly used to detect the presence of hemispatial neglect was exclusively linked with damage of the parietal cortex of the right hemisphere, while the line cancellation test might be attributable to the lesion of the right striatum.

Conclusions This findings support the model attributing hemispatial neglect to a unilateral defect in a cortico-striato-thalamo-cortical loop. CBF SPECT imaging may provide a reliable description of the brain pathology associated with hemispatial neglect.

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Cognitive deficits in depressed and non-depressed Parkinson's disease patients

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Introduction Neuropsychological deficits, as well as, depression are the most frequent and important non-motor findings in patients with Parkinson's disease (PD). The major aim of the study was to determine if there was a specific association between depression and cognitive impairment in PD.

Methods A consecutive series of 102 patients with idiopathic PD: major depressed ($n=31$, mean age=55.6±2.1), minor depressed ($n=29$, mean age=58.3±1.8) and non-depressed PD patients ($n=42.58$, 1±2.9) matched by age, sex, education, and severity of PD were included in the neuropsychological investigation. The Wechsler Adult Intelligence Scale-Revised form (WAIS-R) was applied as a measure of the global cognitive functioning. Also, the frontal sensitive tasks were included in the protocol: fluency tests, Trail Making Test (TMT) and the computerized Cambridge Neuropsychological Test Automated Battery (CANTAB).

Results The depressed PD patients were inferior on WAIS-R subtests: Picture Completion Task ($p=0.001$), Block design ($p=0.01$), and Symbol Digit Modalities ($p=0.007$). The significant differences between minor depressed and non-depressed PD patients were obtained on fluency tasks ($p=0.004$), attentional set shifting task ($p=0.011$) and spatial working memory test ($p=0.041$). Also, it was shown that the depressed PD patients were inferior to the non-depressed PD subjects on problem-solving tasks ($p=0.020$).

Conclusions The present study showed the specific cognitive pattern of impairment in depressed PD patients in frontostriatal sensitive tasks, with additional deficits recorded in visuo-spatial memory domain. The findings differed in comparison to frontostriatal profile of deficits usually seen in PD patients.

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Quantitative EEG changes during cognition tasks in patients with cognitive impairment.

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The linear changes of ongoing quantitative EEG were studied in elderly subjects with cognitive impairment during five different conditions: two resting conditions (eyes open and eyes closed) and three cognition tasks (verbal, non-verbal and fluency). Separate analysis of all frequency bands took place. 21 subjects, mean age 75.4 years (SD=7.2) were divided into 4 matched groups: controls, subjects with subjective memory complaints, subjects with Mild Cognitive Impairment (MCI), subjects with Alzheimer's disease (AD).

The eyes closed resting condition: AD patients showed significant power differences in all frequency bands compared to controls. No statistical difference was detected between other groups and controls. The eyes opened resting condition: Only AD patients demonstrated a statistically significant lack of normal EEG reactivity in comparison with the controls ($p<0.01$).

The verbal and non-verbal tasks: MCI and AD patients had comparable significant low reactivity of theta and alpha bands. The MCI subjects showed significant increase in beta 2 and gamma frequencies ($p < 0.01$) when compared to controls. Performance of fluency task showed no significant EEG spectral value differences between the groups. Cognition tasks during ongoing qEEG-registration can be used to reveal significant abnormalities even in cases of subtle cognitive impairment, i.e. in MCI patients.

Cognition tasks during ongoing qEEG-registration reveal significant abnormalities even in cases of subtle cognitive impairment.

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Depression in epilepsy and migraine: a comparative study in children

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Objective This study was designed to compare the severity of depression occurring in children with migraine and epilepsy.

Backgrounds Comorbidity of depression with the general medical conditions is common. Studies have identified high rates of mood disorder in children with various neurological disorders, including migraine and epilepsy. Migraine and epilepsy might share a common pathophysiology. Children with migraine have 3% to 7% incidence of epilepsy. Comorbidity of depression with epilepsy and migraine may provide clues to pathophysiology and any shared mechanisms of the two disorders.

Design and methods We administered Arabic Children's Depression Inventory (ACDI) and Child Depression Inventory (CDI) to 20 children with migraine, 20 children with primary generalized tonic clonic seizures (GTCSs) and 20 age- and sex-matched healthy control children. The age range of all children was 7–15 years. Demographic, socio-economic, and number of attacks were examined in relation to depression scores.

Results Depression scores on both the CDI and ACDI were significantly higher in the epilepsy and migraine groups than in the control group. There was no statistically significant difference between the mean scores of the CDI and ACDI in the epileptic (53.9 ± 15.2 & 54.2 ± 16.7) and migraine children (47.7 ± 9.8 & 48.4 ± 11.6) $p > 0.05$.

Conclusion Epileptic and migraine children have equally high depression severity.

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Déjà vu, jamais vu? Capgras syndrome between perception and memory

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Capgras delusion, the belief that an identical impostor has replaced a close relative, has been increasingly reported in brain-damaged patients. The syndrome challenges models of face-person recognition system because of its paradox of identifying a person and at the same time denying its authenticity. This clinical condition has recently become the focus of lively speculations (Ellis and Lewis, 2001).

Fred (a fictitious name) presented with progressive dementia hallmarked since onset by persistent Capgras delusion concerning his wife. Time passing Fred produced multiple reduplications of her. The disease progressed to several delusional misidentifications (including mirror misidentification of himself) and eventually gave way to a full-blown frontal syndrome. Formal assessment of face processing ability disclosed selective impairment in familiarity judgment, with a strong tendency to falsely recognize unfamiliar people.

We surmise that richness and fluidity of Person Identity Nodes (PINs) related to highly familiar people, characterized by multiple exposures and multi-modal experiences, lead to intrinsic fragility of matching of continuously changing, multifaceted perceptual information with already stored representations ("exemplar semantics"—Gentileschi et al., 2001). Linking of successive temporal perceptual experiences to a unitary person representation may be impaired by frontal damage, thereby producing reduplication.

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Qualitative differences of "Theory of Mind" (ToM) impairments in Schizophrenia

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Introduction "Theory of Mind" (ToM) refers to the ability to see the world from another person's point of view and hence be able to understand their mental states. Evidence suggests that schizophrenics have a deficit in ToM. Here, we are trying to further investigate the nature of this deficit.

A quantitative and qualitative data analysis is performed to elucidate whether ToM-deficits observed in schizophrenics are either due to problems in attributing mental states (emotions, thoughts, intentions) to others per se, or to a misinterpretation of perceived inner worlds of others.

Methods To date, 16 schizophrenics (mean age 28.8 years; SD 9.6) have been compared with 10 age and education-matched controls on their performances in modified and self-developed ToM tests and neuropsychological measures.

Results Schizophrenics were slightly impaired in some cognitive tasks whereas they exhibited highly significant deficits in ToM tasks. Their difficulties were most prominent ($p < 0.001$) in a task requiring the subject to attribute thoughts to others (patients: median=12.0; range 6–15; controls: median=15.5; range 12–16; max=16) as well as in a task involving recognition of emotions (patients: mean=21.9; SD=2.2; controls: mean=25.7; SD=1.1; max=28). In another ToM task, patients tried to imagine themselves in another person's shoes (patients: median=16.0; range 8–16; controls: median=16.0; range 15–16; max=16), but scored lower ($p < 0.001$) (patients: mean=9.1; SD 3.9; controls: mean=14.6; SD 1.3; max=16) because of misinterpretations of the characters' actual mental state.

Conclusion Slightly cognitively impaired schizophrenics exhibit clear impairments in ToM measures. This deficit however is not due to a general inability of attributing mental states to others but rather to a tendency to misinterpret them.

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Decision-making in obesity: A study with gambling task

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The Gambling Task (GT) is a test that was devised to detect impairments in personal and social decision-making. Evidences of failure in making long-term advantage choices were found in patients with pre-frontal cortex damages, obsessive-compulsive syndromes and in substance abusers. Aim of the study was to investigate if also severely obese people could show an “impulsive” behaviour that doesn’t take care of long-term disadvantages.

We utilized a PC-implemented version of GT: Participants were all presented with four decks of cards (labelled A, B, C and D) and a loan of 2000 \$. They were told to try to maximize the profit on the 2000 \$ by choosing one card at a time from any of the four decks. Additionally, they were informed that some of the decks were worse than others and to try to avoid them. They didn’t know when the task would be stopped (after 100 choices).

We tested a group of 10 patients affected by severe obesity (BMI >34), who were not identified as “pathological” to usual psychological test evaluating personality and food behaviours. The group of control consisted of 27 young adult people with a normal weight.

Our results show a different pattern of performance between the groups: Controls make a constant increase of advantageous choices during the task, while obese didn’t, rather showing random shifting between the two kinds of decks.

These preliminary data seem to give evidence of impulsivity in decisional behaviours of obese people, which are not revealed by traditional psychometrical tests.

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Therapy of attentional deficits by telerehabilitation: improvements and their stability

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The Fachklinik Herzogenaurach in cooperation with Dr. Hein GmbH developed a software package for telerehabilitation, which allows composing an individual neuropsychological training program. The patient can perform this training program in the clinic or at home. The therapist supervises and adapts the training on the basis of a continuous feedback on the performance of the patient.

To check the practicability and the effects of this system we performed a control group study in a matched pair crossover design with outpatients suffering from acquired brain lesions with persisting attentional deficits. N=62 subjects had been assigned to two groups (A and B). Group A got 11 weeks of training while group B has been waiting. Then the treatment plan changed. During the training, the participants met the therapist

in the clinic once a week. Neuropsychological and medical examinations took place before, between and after the two training periods.

Because of dropouts N=40 subjects remained in the study. The effectiveness of the training is sustained by the fact that in the first part of the study considerably more subjects in the training group reached their neuropsychological therapy goals than did members of the control group. 64% of these subjects could keep their improvements. 56% of the subjects in the training group who did not reach their therapy goal during the training period could reach this goal afterwards. No negative, but positive medical and psychosocial side effects could be proven.

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Effect of Cavinton on cognitive functions in Parkinson’s disease

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Neuroprotective effect is the most significant among the therapeutic actions of vinpocetine. It is related to the inhibition of operation of voltage dependent neuronal Na (+)-channels, indirect inhibition of some molecular cascades initiated by the rise of intracellular Ca (2+)-levels and inhibition of adenosine reuptake.

The **aim** of the study was to test the effect of Cavinton (vinpocetine) on cognitive impairment in Parkinson’s disease (PD). A 3-month open trial with Cavinton was carried out in 15 patients (58–72 yrs) with PD (Hoehn & Yahr stage I) and mild cognitive deficit (MMS>20). Cavinton was given orally in tablets (10 mg) 3 times daily. All other treatment remained unchanged. The patients were examined before and after treatment course by a battery of neuropsychological tests (Digit Span Forward; 10 Words Learning Test; Digit Span Backward; Trail Making Test; Stoop Test; Similarities; Verbal Fluency) and Sung Depressive Scale. After Cavinton treatment the MMS total score was increased with 1.5 points (p>0.05). A significant (p<0.05) improvement in test for long-term memory and some tests for executive functions (Stoop Test, Verbal Fluency) was found. The mood state was not changed. There were no significant side effects in patients.

Conclusion was drawn that Cavinton is suitable for treatment of patients with PD presenting cognitive deficit. The favourable effect of Cavinton on the cognitive functions could be connected with its complex effect.

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Changes in complex attention in multiple sclerosis patients receiving interferon-beta-1b

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Patients with multiple sclerosis (MS) have consistently been found to display attention deficits on more complex tasks requiring mental tracking or visuomotor tracking. Significant improvement of complex attention, concentration as well as visual learning and recall was recently reported after 1 year of treatment with interferon-beta-1 b (INF beta-1b) (Barak & Achiron, 2002).

The objective of present study was to explore the effect of INF-beta-1b on different attention characteristics from simple auditory span to aspects of attention closely related to working memory and executive functions.

Subjects were 24 women with relapsing-remitting MS, mean age 35 years (20–53). They were tested at the beginning of the treatment and at 14th–16th week of INF-beta-1b application, 10 of them underwent third assessment at 32nd–36th week. The neuropsychological battery included Digit Span, Digit Symbol, Trail Making Test (A, B), Paced Auditory Serial Addition Test (PASAT) and Stroop Test.

The results demonstrated significant improvement of concentration (Digit Symbol), complex attention and speed of information processing (PASAT) as measured by number of correct responses and number of omissions at rate 3 sec of stimulus presentation.

It appeared that reduced speed of information processing and working memory capacity was improved after INF-beta-1b treatment.

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Depression in patients with Parkinson's disease

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Introduction Depression is common and may occur at any stage in the history of Parkinson's disease. Its rate in patients with Parkinson's disease vary because of differences in definition of depression, difficulties in distinguishing between features of depression and those of Parkinson's disease, methods of assessment, and patient population studied.

Objectives To measure the rate and severity of depression among patients with Parkinson's disease (PD), and its correlation with motor disability, age, sex, and other variables.

Methodology 54 patients with PD were matched for age and sex with 52 healthy controls, depression was diagnosed by using ICD-10 criteria and its severity was rated by Beck Depression Inventory while the motor disability of PD was made according to Hoehn and Yahr scale.

Result Patients group was significantly more depressed than the control group (42.59% Vs 7.69%, $P < 0.001$) and there is a probable correlation between the severity of depression and severity of motor disability ($P < 0.05$).

47% of depressed patients were in the age group (50–59) years, and the rate of depression was nearly equal between sexes.

Conclusions Parkinsonian patients suffer a degree of depression that cannot only be attributed to the reaction to motor disability, but there is an underlying neurochemical disturbance.

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Neuropsychological and neurological correlates pre-verbal forms of speech communication (baby-prattle and childish babble) in diagnostics of morpho-functional clinico-neural disorders with young children

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Modern development of neuropsychological diagnostics of higher psychic function disorders both with adults and children (at different cerebral pathology—from slight cerebral dysfunction to its acute manifestations at morpho-functional lesions) is characterized by quite high resolvability of neuropsychological qualitative factorial analysis and quantitative evaluative me-

thods. Application of the latter in the infant neurological practice prevails with the early-aged children.

Neuropsychological analysis and psycholinguistic evaluation of pre-verbal communication (baby-prattle and childish babble) with early-aged children (6–12 months) in the diagnostics of morpho-functional disorders of nervous system functioning may gain special significance, as in this very period innate reflexes (on which bases diagnostics of child's nervous system disorders is being carried out) become too extinct and conditioned reflexes manage not to develop entirely. Neurological "diagnostic vacuum" (author's definition) arises, determining the faults of diagnostics of different central nervous system (CNS) parts functional and organic disorders. Pre-verbal communication (particularly childish prattle), which may play important diagnostic role in evaluation of functional state of cerebral structures and blocks of brain, begins to rapidly develop within this very period of child's development.

During our research the goals of the development of neuropsychological, clinico-neural, psycholinguistic correlates and pre-verbal communication forms (baby-prattle and childish babble) complex evaluation, as well as the study of neuropsychological mechanisms of cerebral dysfunction in the acts of baby-prattle and childish babble in accordance with data of additional methods of verification of morpho-functional disorders (MR-imaging, Doppler ultrasound, electroencephalogram (EEG), Echoencephalogram, and etc.) were accomplished within the framework of neurological-neuropsychological diagnostic and rehabilitation centre.

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Computer simulation of alternative splicing underlying the strength of a glutamatergic synapse

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Introduction A hypothetical model of the mechanisms involved in the process of memory formation and forgetting at the level of a glutamate synapse is presented. The process of memorizing and forgetting is described by means of two independent variables: retrievability and stability.

Methods Alternative splicing is proposed as the basis of the regulation of the synaptic strength. In the model, the population of N-methyl-D-aspartate (NMDA) receptors changes its properties during the learning process. Object Pascal is used to implement a mathematical model of the synapse and to simulate the changes of the properties of the synapse in time in the learning process.

Results The computer model developed along the concept of the two independent variables of memory makes it possible to simulate synaptic properties such as conductivity, sensitivity, spacing effect, desensitisation, forgetting, phosphorylation, the number of the NMDA and AMPA (alpha-amino-3-hydroxy-5-methyl-4-isoxazolepropionic) receptors, and other parameters.

Conclusion The computer implementation makes it possible to easily analyse and verify the model at both conceptual and mathematical level, and provide guidance to experimental research, determining what sort of new data might serve falsification or corroboration of the model. This is a new, original explanation of the mechanisms involved in the memory formation at the molecular level. This model can explain both short-term and long-term memory formation. The changes in the population of NMDA receptors in the postsynaptic membrane are necessary for the memory formation.

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Clinicopsychological syndromatics and circadian profile of arterial blood pressure (ABP) under angioencephalopathy

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