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COGNITIVE REHABILITATION IN DISORDERS OF CONSCIOUSNESS WITH TRANSCRANIAL DIRECT CURRENT STIMULATION

Angelakis E, Konstantinidi M, Sakas D

Department of Neurosurgery, Medical School, National and Kapodistrian University of Athens

Abstract

INTRODUCTION: Disorders of consciousness (DOC) range from Unresponsive Wakefulness Syndrome (UWS, formerly known as Vegetative State) where patients show no signs of conscious/purposeful interaction with the environment, to Minimally Conscious State (MCS) where reproducible but not consistent interaction is apparent, and may last for months, years, or even a lifetime. To date, there is no therapeutic intervention for these patients who are expected to either recover spontaneously or not recover at all. Transcranial Direct Current Stimulation (tDCS) is a non-invasive technique that applies small electrical currents through the brain that depolarize or hyperpolarize the underlying neural cell membrane depending on its polarity. Effects of tDCS include cognitive improvement in healthy volunteers as well as clinical improvement in several neurological disorders, like stroke-induced aphasia, motor and visual deficits, cognitive deficits due to TBI or Parkinson's Disease. Multiple sessions of tDCS are considered to affect LTP and LTD mechanisms.

MATERIAL - METHOD: Patients with DOC were treated with anodal tDCS (25 cm2 sponge electrode, 2 mA) over the left primary motor area of the hand while they received verbal movement commands. tDCS was applied for 30 minutes daily with a mean number of 33 sessions totally (range: 14-59). Patients were assessed with the JFK Coma Recovery Scale – Revised (CRS-R). All patients had been stable with no signs of clinical improvement at least for the last 2 months before participation.

RESULTS: At the end of participation some patients improved their cognitive status, some showing signs of consciousness that were not present before treatment, while others regained full consciousness.

CONCLUSIONS: A significant number of patients that were not improving clinically for at least two months prior to tDCS showed clinical improvement after 10-20 sessions. This case series study shows that tDCS holds promise in the rehabilitation of DOC. Its non-invasive and side-effect-free nature, together with the portable and inexpensive equipment makes tDCS an excellent candidate for large longitudinal controlled studies for the rehabilitation of DOC.

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THE NEURAL SUBSTRATE OF REASONING: AN fMRI STUDY

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Abstract

OBJECTIVE: This was a functional magnetic resonance imaging (fMRI) study aimed at providing insight into the neural substrate of human reasoning ability.

MATERIAL-METHOD: We scanned 15 subjects with fMRI, using an event-related design, while they engaged in reasoning tasks based on arguments, which were either valid statements (Aristotelian) or paradoxes. Participants were required to draw a logical conclusion concerning the accuracy of the valid syllogisms or the paradoxes. In the current study, we compared the reasoning tasks with an additional task (control task), in which the subjects had to examine the correctness of the spelling of several arguments.RESULTS: Clusters of significant activation for deductive reasoning were located in left middle frontal gyrus and bilateral posterior parietal cortex. Clusters of significant activation for paradoxes were located in left inferior frontal gyrus, inferior temporal gyrus and bilateral superior frontal gyrus. What's more, compared to the reasoning tasks, the control task resulted in significantly greater activation of clusters in the right supramarginal gyrus and bilateral middle frontal gyrus.

CONCLUSIONS: These results indicate that deductive reasoning mainly engages a left lateralized fronto-parietal brain system, whereas paradoxes engages a left fronto-temporal brain system. Our findings are consistent with previous studies and provide additional insight into the neural substrates of deductive reasoning.

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COGNITIVE RETRAINING AS A PSYCOTHERAPEUTIC TOOL AND VICE VERSA: A CASE STUDY

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Abstract

We report a right-handed, 32 years old patient who suffered a severe traumatic brain injury (TBI) resulting in extensive epidural hematoma in the right fronto-temporo-parietal lobes and subdural hematoma in the left frontotemporal lobes. He was referred to the Brain Injury Day Treatment Unit of ELEPAP Athens one-year post injury. His initial neuropsychological assessment revealed severe cognitive deficits in a wide range of cognitive domains with language and memory being the most prominent. More specifically, he exhibited difficulties in perception and information processing, which in combination with his disorganized speech, resulted in a great state of confusion. His cognitive deficits were accompanied by behavioral disturbances, such as perseverations, agitation, irritability and outbursts. His state of confusion resulted in a total denial to comply with any verbal and/or behavioral cues he was provided with, making his participation in any group/peer and individualized activity almost impossible. Despite the strong emphasis on building a strong therapeutic alliance with his counselor through weekly counseling sessions and everyday peer interaction, the results were still poor. In order to engage him in the rehabilitation process, some tailor made cognitive exercises were provided, based on his preserved mental strengths, aiming at helping him excel and work independently. As a result, he felt less, stressed, more competent and more aware and open to discuss his everyday problems during his weekly meetings with his counselor. In time he got more malleable and could fully participate in the rehabilitation process.

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INTERPRETATION OF COMPOUND WORDS BY PATIENTS WITH ALZHEIMER'S DEMENTIA

Kambanaros M.

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Abstract

OBJECTIVE: The present study tested the comprehension and production of two-constituent compound words at the single-word level for Greek (e.g., pondikopayitha 'mouse trap'). The Compound Word Test (CWT: Kambanaros, 2014), measured on a range of psycholinguistic variables, was used to assess the comprehension, definition, and production of compositional noun–noun compounds in four individuals diagnosed with AD (mean age: 79 years). Their results were compared to a neurologically healthy group matched for chronological age and education. Comprehension was probed in relation to the word's constituents, for which semantic interpretation involved explaining the meaning of the compound. Production of compound words was tested using a picture confrontation naming task.

MATERIAL – METHOD: The present study tested the comprehension and production of two-constituent compound words at the single-word level for Greek (e.g., pondikopayitha 'mouse trap'). The Compound Word Test (CWT: Kambanaros, 2014), measured on a range of psycholinguistic variables, was used to assess the comprehension, definition, and production of compositional noun–noun compounds in four individuals diagnosed with AD (mean age: 79 years). Their results were compared to a neurologically healthy group matched for chronological age and education. Comprehension was probed in relation to the word's constituents, for which semantic interpretation involved explaining the meaning of the compound. Production of compound words was tested using a picture confrontation naming task. RESULTS: Each subtest of the CWT had a total score of 30. For the parsing (comprehension) subtest the mean score was 22.13. For the definition (explaining subtest), the mean was 14.25 and for the naming subtest the mean was 22.3.

CONCLUSIONS: The results revealed that individuals with AD had less difficulty recognizing the compound constituents but showed a significant deficit in deriving the compound meaning but naming compounds from pictures was relatively intact. The findings suggest a dissociation between linguistic and conceptual knowledge in the early stage of AD for compound words.

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SUCCESSFUL OUTCOMES IN SEVERE TRAUMATIC BRAIN INJURY AFTER NEUROPSYCHOLOGICAL REHABILITATION: A CADE STUDY

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Abstract

We report a case involving a 33-year- old, right-handed, male patient who suffered a severe closed traumatic brain injury (TBI) (GCS: 5/18). Neuroimaging findings showed gliotic lesions in the left anterior temporal lobe with severe left hippocampal atrophy. The left anterior temporal lobe is involved in the organization and categorization of verbal material, speech comprehension and the left hippocampus has predominant involvement in verbal memory. Baseline neuropsychological (NP) evaluation showed impairments predominantly in attention, verbal fluency, executive function, verbal, non-verbal and prospective memory. In addition, he exhibited behavioral difficulties including irritability, misinterpretation, suspiciousness and anger outbursts. The patient underwent a holistic day treatment rehabilitation program (5 hours/day, 4 days/week) for 12 months at the Brain Injury Day Treatment Unit of ELEPAP Athens. Post NP evaluation showed significant improvement in attention, verbal fluency (semantic and phonemic), verbal, prospective and visuospatial memory and in certain domains of executive functions, such as planning, problem solving, cognitive inhibition and mental flexibility. Despite the extent of the lesions, the patient significantly improved both in behavioral and cognitive domains and eighteen months after his TBI, he was able to return to his work, and reached adequate levels of daily functionality.

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BRIEF ASSESSMENT OF EXECUTIVE FUNCTIONS IN SCHIZOPHRENIC PATIENTS WITH FRONTAL ASSESSMENT BATTERY (FAB)

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Abstract

OBJECTIVE: Executive functions include the capacity to formulate goals, plan and organize goal-directed behaviour, and carry out goal-directed behaviour. They constitute the core deficit in schizophrenic illness and have been related to structural and functional deficits, and cognitive impairments. The Frontal Assessment Battery (FAB) is a short tool for the assessment of executive functions consisting of six subtests that explore different abilities related to the frontal lobes. The aims of our study, was to evaluate the clinical usefulness of the FAB in identifying executive dysfunction in psychiatric patients, and second to derive values from a sample of schizophrenic patients and provide normative data for them.

METHODS: The study involved 55 schizophrenic patients and 53 controls. We performed FAB and Mini Mental State Examination (MMSE) in both groups and correlated the scores with sex and age. Using Pearson's R, we estimated correlations between the FAB and MMSE scores.

RESULTS: The FAB global score was significantly lower in the schizophrenic patients group, compared to psychiatric patients group. Negative correlation between the FAB scores and the age was also evident. No difference in the MMSE scores between two groups was found.

CONCLUSION: The FAB is giving helpful information for the executive functioning of schizophrenic patients. Furthermore, normative data may improve the accuracy in the use of the FAB both for clinical and research purposes in schizophrenia disease.

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ISSUES AFFECTING THE NEUROPSYCHOLOGICAL INTERVENTION FORMULATION: A PEDIATRIC CASE STUDY

Karra N [1], Dimos O [1], Saleptsi E [1], Varotsi K [1], Karatosidi CS [1], Tourkantoni N [2], Kattami C [1]

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Abstract

We report a case-study of an 11.5 years-old male pediatric oncology patient, in order to discuss the necessity of considering multiple factors during the formulation of the intervention. He was diagnosed with an extensive and exceptionally malignant brain tumor (WHO Grade IV sarcoma) in the left occipitoparietal region with lung metastases, at the age of seven months. He underwent multiple surgeries, chemotherapy, irradiation therapy and v/p shunt placement. Follow-up imaging revealed tumor relapse in the right frontal region at the age of four, for which he underwent craniotomy and total resection. Finally, a surgery for v/p shunt replacement was performed after infection. He presented with multiple neurological deficits (gait disturbance and postural instability, right hemiparesis, motor and visuomotor coordination difficulties, fine and gross motor skills difficulties). He was referred for a neuropsychological evaluation and rehabilitation intervention. His performance revealed severe deficits in the domains of processing speed (>-2sd), visuospatial perception (>-2sd), verbal and visual memory (between -1sd and -3sd), and executive functions (>-2sd). Interestingly, attention abilities were intact (between -0.5 and +0.5 standard deviation from the normative mean). Clinical observations during the assessment did not reveal the typical behavioral, emotional and functional profile of brain injury (apathy, disinhibition, emotional fluctuations), though a wide range of compensatory strategies were observed. Finally, his environment reported good functionality in daily living. With the initiation of the intervention and introduction to novel and unpredictable situations, the abovementioned cognitive deficits, as well as emotional and behavioral disturbances raise questions regarding the formulation of the intervention.

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MOTOR AND LANGUAGE DEFICITS CORRELATE WITH RESTING STATE FUNCTIONAL MAGNETIC RESONANCE IMAGING NETWORKS IN PATIENTS WITH BRAIN TUMORS (FAB)

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Abstract

OBJECTIVE: Evidence of preoperative resting state functional magnetic resonance's (RS-fMRI) validation by correlating it with clinical preoperative status in brain tumor patients is scarce. Our aim was to validate the functional relevance of RS-fMRI by investigating the association between RS-fMRI and preoperative motor and language function performance in patients with brain tumor.

MATERIAL-METHOD: 69 patients with brain tumors were prospectively recruited. Patients with tumors near pre-central gyrus (n=49) underwent assessment for apparent (paresis) and subtle (finger tapping) deficits. Patients with left frontal tumors in the vicinity of the inferior frontal gyrus (n=29) underwent assessment for gross (aphasia) and mild language (phonological verbal fluency) deficits. RS-fMRI results were extracted by spatial Independent Component Analysis (ICA).

RESULTS: Motor group: paretic patients showed significantly (P=0.01) decreased BOLD-signal in ipsilesional pre-central gyrus when compared to contralesional one. Significantly (P<0.01) lower BOLD-signal was also observed in ipsilesional pre-central gyrus of paretics when compared with the non-paretics. In asymptomatic patients, a strong positive correlation (r=0.68, P<0.01) between ipsilesional motor cortex BOLD-signal and contralesional finger tapping performance was observed. Language group: patients with aphasia showed significantly (P=0.01) decreased RS-fMRI BOLD-signal in left BA 44 when compared with non- aphasics. In asymptomatic patients, a strong positive correlation (r=0.72, P<0.01) between BA 44 BOLD-signal and phonological fluency performance was observed.

CONCLUSIONS: Our results showed significant affection of RS-fMRI BOLD-signal of motor and language networks in the vicinity of tumors implying the usefulness of the method for assessment of the underlying functions in brain tumors patients.

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THE CONTRIBUTION OF NEUROPSYCHOLOGY IN AWAKE CRANIOTOMY: PRILIMINARY RESULTS

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Abstract

OBJECTIVE: Aim of the modern oncological neurosurgery is to maximize the extent of tumor resection, with a parallel minimization of postoperative neurological deficits; therefore, localization of "eloquent" cortex is essential. Intraoperative Electrical Stimulation (IES) during awake craniotomy is considered the "gold standard" for functional mapping in tumor surgery. In this report we present our preliminary results from a 30-patients series that underwent awake craniotomy.

MATERIAL-METHOD: During a 2.5-years period, glioma patients (22 left /8 right hemisphere) underwent awake craniotomy for tumor excision. Bipolar IES conducted with the following parameters: amplitude ranged from 2mA to 6mA, frequency was set at 60 Hz, spatial diameter of stimulation was 0.5mm and the time of stimulation was 1-2 for motor and 4-5 seconds for cognitive-language mapping. Motor and language responses detected through motor and language naming tasks, conducted by a neuropsychologist thought out the operation. RESULTS: Negative motor (upper/lower limbs, tongue arrest, oculomotor apraxia), positive motor (upper limb, fingers, face twitches) and positive sensory (paresthesias) responses were elicited when stimulating premotor areas, primary motor and somatosensory cortex respectively. Speech arrest, phonemic, semantic and anomic errors, and perseverations were produced when left frontal, temporal and inferior parietal lobule areas were stimulated at cortical and subcortical level. Immediate post-operative assessment showed functional deterioration in 50% of patients; 3 months postoperatively all patients but 2 reached their preoperative status.

CONCLUSIONS: Awake craniotomy allows resection of tumors in eloquent areas with an acceptable risk of permanent postoperative deficit and should be performed in cooperation with expert clinical neuropsychologists.

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COGNITIVE DYSFUNCTION IN TYPE II DIABETES MELLITUS: IS ALZHEIMER'S DISEASE TYPE 3 DIABETES?

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Abstract

Type II Diabetes Mellitus (Type 2 DM) is a modern-day epidemic. While the deleterious effects of Diabetes Mellitus on the retinal, renal, cardiovascular and peripheral nervous systems are widely acknowledged, less attention has been given to the effects of diabetes on neurocognitive functions. Recent literature has, however, shown that both type 1 and type 2 diabetes mellitus have been associated with reduced performance on multiple neuropsychological domains and with structural abnormalities on neuroimaging. With an aging population and the growing epidemic of diabetes, complications related to Central Nervous System functioning and neurocognition may prove challenging for future public health implications. Although the exact pathophysiology of neurocognitive dysfunction in diabetes is not completely understood, hyperglycemia, vascular disease and insulin resistance seem to play significant roles. Furthermore, evidence from recent studies has indicated a close pathophysiological relationship between Alzheimer's Disease (AD) and Type 2 Diabetes Mellitus (DM2). This includes factors such as impaired insulin signaling, insulin resistance, advanced protein glycation and oxidative stress Moreover, T2DM and AD patients have similar amyloid beta deposits both in the pancreas and the brain. As a result, several researchers have proposed AD to be a Type 3 DM. In this presentation we will provide an overview of the recent neuropsychological and neuroimaging literature related to this topic.

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APPLYING ANODAL TDCS IN A PATIENT WITH MULTIPLE SYSTEM ATROPHY

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Abstract

OBJECTIVE: To evaluate the effects of anodal tDCS on cognitive functions in Multiple System Atrophy.

MATERIAL- METHOD: We applied anodal tDCS in a patient with MSA-P. The battery of neuropsychological tests included measures of the general mental status (MMSE), sustained visual attention and concentration (TM-A), processes of shifting and divided attention (TM-B), verbal-auditory memory and learning (RAVLT), visuomotor activity and processing speed (DSST-WAIS-III), Fluency Test (Phonemic & Semantic) and executive functions (VFT phonemic & semantic). tDCS was applied in 10 sessions. Clinical evaluations were performed at baseline, day 11, day 30 and at day 90.

RESULTS: MMSE improved by 15,4% at 11 days, 3,4% at 1 month, and 11,5% at 3 months.

A positive effect was seen in the speed of information processing and visuomotor coordination (DSST-WAIS-III) (increase by 20,8%, 16,7% and 4,1% at day 11, 1 month and 3 months respectively). In the domain of verbal memory and learning (RAVLT) the score increased from baseline to post-intervention by 61,5% and then decreased by 42,3% and 23,1% at 1 month and 3 months respectively. Visual scanning and concentration (TMT-A), as well as phonemic and -semantic fluency (VFT) scores were of no statistical significance.

CONCLUSIONS: Our data suggest that tDCS has a beneficial effect on cognitive performance in MSA-P, mainly relying on the modulation of functional links connecting the default mode network, cerebellar and limbic networks.

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TRAINING MY DRAGON: IMPLEMENTING A NOVEL MODEL OF BOOSTING LEARNING SKILLS AND ABILITIES FOR TEENAGE STUDENTS TARGETING ON EXECUTIVE FUNCTIONS

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Abstract

In our services a considerable number of students, self - report "learning difficulties". None of them fulfils the criteria of any kind of learning disability but at the same time, all of them self-report considerable difficulties in every day functioning regarding their ability to complete home-work or to get prepared for tests and exams. For students and their parents, the most profound factor for these difficulties is stress. But in a closer look we easily understand that even though stress is indeed present and it is profound, nevertheless, it cannot explain all the difficulties or even when students come with stress control as their primary goal, even if we design a prevention or psychotherapeutic program this is usually not enough. It seems that even among high functioning students, we can spot a considerable number of them who would benefit from training targeting specific skills or abilities that are considered to be related directly to executive functions. Our presentation explains in terms of every – day life, which and how executive functions are related to learning procedures. We also explain how we used our knowledge about executive functions to develop a novel model of academic coaching, which is flexible enough to take into consideration each student's needs, goals, background and personality.

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DOES TIME SINCE INJURY INTERFERE WITH SEMANTIC KNOWLEDGE IN CHRONIC MODERATE-TO-SEVERE TBI

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Abstract

OBJECTIVE: To investigate whether individuals with chronic moderate-to-severe TBI differed on Semantic Knowledge (SK), as compared to non-injured controls; and the association between SK and Time Since Injury (TSI), and if there is a difference on SK based on TSI in chronic TBI.

MATERIAL-METHOD: The group with chronic TBI consisted of 33 males with a primary diagnosis of moderate-to-severe closed head injury (age range=18-51), with a TSI median of 3 years (TSI range = 1-18). The control group consisted of 24 males matched on age and education. The Peabody Picture Verbal Test (PPVT) was used to measure SK.

RESULTS: Individuals with TBI scored significantly lower on the SK as compared to the matched controls ($p<.001$), even though the two groups were matched on education. A significant positive moderate correlation was found between the PPVT and TSI (0.01) in survivors of TBI. A median split analysis was conducted on the TSI median of the 3 years thus creating two groups of participants with TBI. Significant differences were found ($p<0.05$) between the two groups; individuals with chronic TBI with a TSI of greater than 3 years scoring lower on the PPVT.

CONCLUSIONS: These findings suggest that TBI may affect one's semantic knowledge, a measure of crystallized intelligence and that decline continues for years post injury. These findings support the notion that TBI may have a degenerative effect on cognitive function and highlight the need for further exploration of SK in TBI.

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NATURALIZING ART: A REVIEW OF THE INTERDISCIPLINARY FIELD BETWEEN NEUROIMAGING AND AESTHETICS

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Abstract

The new field of Neuroaesthetics introduced by the neurobiologist Semir Zeki (1999) along with the discovery of the Mirror Neuron System (Rizzolatti et al., 2001) enhanced the relations between Art and Neuroscience. Following Zeki, many neuroscientists started posing the question: "What happens in the brain when we experience art?". In the same spirit, neuroscientists also addressed other problems related to aesthetics: some employed paintings or movie shots as mere stimuli to better understand brain while experiencing art (i.e. Ed.Vessel, G. Star, N. Rubin, 2012); while others employed brain imaging techniques (i.e. functional Magnetic Resonance Imaging) to study the concept of "aesthetic pleasure" (i.e. Ishizu and Zeki 2011, 2014). In the majority of the neuroimaging experiments investigating aesthetic perception, the observers/spectators were presented with paintings or music inside an fMRI scanner in order to detect the brain regions activated during aesthetic appraisal (positive or negative). In other neuroimaging experiments, observers/spectators were exposed to mimed, symbolic and meaningless hand gestures -conditions that spectators are normally faced with during experiencing different kinds of art- which have contributed with complementary results on the perceptual process. Recently, the term Embodied simulation was introduced (V. Gallese, 2017) in order to describe the brain mechanism that underlies the experience of abstract art. The proposed announcement reviews the current neuroimaging data with respect to the neural interrelations between art and cognitive functions and argues that art may well be a "behavioural complex, an inherited tendency to act in a certain way" (Dissanayake, 1992).

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EFFECTIVENESS OF A HOLISTIC DAY TREATMENT REHABILITATION PROGRAM FOR PATIENTS WITH ACQUIRED BRAIN INJURY IN THE CHRONIC PHASE IN GREECE

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Abstract

INTRODUCTION: Most ABI survivors exhibit a variety of chronic neurobehavioral sequelae, as well as impaired self-awareness, hindering independent functioning and social re-integration. A great amount of evidence-based studies has suggested that ABI survivors are best treated by holistic day treatment programs, offering integrated, multidisciplinary rehabilitation. However, there is limited research regarding the effectiveness of holistic rehabilitation in ABI patients in the chronic phase.

OBJECTIVES: The primary aim of the current study was to evaluate the effectiveness, in cognitive functioning, self-awareness and independence in daily activities, of a day treatment program treating Greek outpatients with ABI in the chronic phase.

PARTICIPANTS AND METHODS: A prospective study with 30 ABI patients in the chronic phase (mean=6,5 years since injury, SD=5,8) who underwent a holistic day treatment program (5 hours/day, 4 days/week) for 12 months and 10 controls (mean=8,8 years since injury, SD=7,8) who did not receive rehabilitation. The effectiveness of this intervention was evaluated with performance on neuropsychological (NP) testing, altered self-awareness and changes regarding independence in activities of daily living.

RESULTS: NP functioning significantly improved for the rehabilitation group. In addition, after rehabilitation, patients showed better awareness of their difficulties especially in the cognitive and behavioral domain, and improvement in daily activities according to the proxy. In the control group, no significant change was observed at NP testing, awareness or daily activities.

CONCLUSIONS: The findings support that holistic day treatment rehabilitation programs can improve cognitive functioning, increase self-awareness and consequently enhance functionality in daily living in ABI patients even in the chronic phase.

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A CASE OF SEVERE TRAUMATIC BRAIN INJURY WITH POOR INITIAL MRI PROGNOSIS: WHAT CAN WE EXPECT FROM INTENSIVE COGNITIVE REHABILITATION?

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Abstract

The current case study demonstrates the unexpected extend of recovery, after systematic and intensive cognitive rehabilitation, of a 46 years old male who sustained a severe traumatic brain injury (TBI), following a car accident. He was transferred comatose to the Emergency Department via ambulance intubated with a Glasgow Coma Scale score of 3/15. Initial CT findings revealed multiple frontal bilateral cerebral haemorrhagic contusions, a large right frontotemporal parietal subarachnoid hemorrhage (SAH), diffuse brain swelling in the right hemisphere and multiple skull fractures. Gradient-recalled-echoT2*-weighted and susceptibility-weighted imaging (SWI) revealed multiple bilateral cerebral microbleeds (CMBs) within the brain parenchyma, suggesting diffuse axonal injury (DAI). On admission to the Brain Injury Day Treatment Unit of ELEPAP Athens, two years after his TBI, he was presented with mental slowness, fatigue, mutism, lack of initiation/apathy, lack of eye contact and exhibited strikingly unexpected behavioral outbursts. The patient was unable to undergo a neuropsychological assessment or to attend intensive rehabilitation program in a group setting due to the aforementioned difficulties. Thus, an individualized cognitive rehabilitation program was provided according to his cognitive deficits as well as functional limitations. Despite the presence of severe axonal injury on early MRI, the patient regained the ability to communicate, his mental stamina was increased, behavioral outbursts were eliminated, he was able to focus on a task or conversation maintaining eye contact and exhibited appropriate emotional regulation. Marked improvements are possible after systematic cognitive rehabilitation, even for chronic TBI patients with a poor prognosis according to the initial MRI findings.

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ASSESSMENT OF TRAUMATIC BRAIN INJURY CHRONIC EFFECTS: UNCINATE FASCICULUS DIFFUSION TENSOR METRICS AND CORRELATION WITH VISUAL AND VERBAL EPISODIC MEMORY PERFORMANCE

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Abstract

OBJECTIVE: To investigate the hypothesis that the episodic visual and verbal memory impairment associated with chronic moderate to severe traumatic brain injury is related to changes in the diffusion tensor imaging (DTI) properties of the uncinate fasciculus (UF).

MATERIAL – METHOD: A group of 13 TBI male participants with chronic TBI (median post-injury period of 76 months) was subjected to comparable evaluation with a matched group of 14 neurologically-healthy controls. Fractional anisotropy, as well as mean, radial and axial diffusivity values were obtained. A battery of visual and verbal episodic memory recall and recognition tasks was administered as part of a lengthy neuropsychological battery.

RESULTS: As anticipated, healthy controls outperformed TBI participants in visual and verbal recall tasks. No group differences were recorded for recognition tasks. Verbal recognition performance scores of participants with TBI were correlated with mean (r=-0.62, p=0.024 at a=0.05) and radial (r=-0.52, p=0.068 at a=0.05) diffusivity of the right UF. Visual recall performance scores of participants with TBI were also correlated with mean (r=-0.7, p=0.008 at a=0.05) and radial (r=-0.64, p=0.017 at a=0.05) diffusivity of the right UF. No such correlations were established for healthy controls.

CONCLUSIONS: Moderate to severe traumatic brain injury survivors are experiencing deficits in recall tasks of visual and verbal episodic memory several years after injury. DTI metrics analysis indicated that TBI-induced microstructural changes at the right uncinate fascicle correlate with verbal recognition and visual recall performance.

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THE TOWER OF LONDON TEST: GREEK NORMATIVE DATA FOR USE WITH URBAN POPULATION AND ANALYSIS OF THE INFLUENCE OF DEMOGRAPHIC VARIABLES

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Abstract

OBJECTIVE: The Tower of London Test (TOL) is a neuropsychological tool designed to evaluate executive functions (EF). The purpose of this study was to collect Greek normative data for the TOL and to explore potential influence of demographic variables on the TOL performance.

MATERIAL - METHOD: TOL was administered to 301 healthy individuals (132 men, 169 women; minimum-maximum age: 16-86 years old; mean age= 44.56 years (SD= 18.15); mean educational level= 13.15 years (SD= 3.37); handedness right= 93.9%) as part of a neuropsychological battery. Participants were classified into five age groups: 16-25, 26-39, 40-50, 51-59, 60-70 and 71-86 years. The sample was further classified into three educational levels: 0-6, 7-12 and 13-18 years. Several TOL variables were calculated and one-way analyses of variance were performed to explore the relationship between TOL performance and age, sex and educational level.

RESULTS: Significant differences on TOL performance were found among age groups. Overall, the 26-39 years group performed better as compared to the 60-70 and the 71-86 years groups. Elderly participants underperformed on Total Execution and Completion Time, as well as on Total Rule and Time Violations as compared to the younger age groups. Sex was not significantly related to TOL performance. Participants with 0-6 years of education underperformed as compared to the participants of the higher educational level group (13-18 years).

CONCLUSIONS: Our study presents TOL normative data for the Greek urban population and further confirms the relationship of age and education to the TOL performance.

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GUIDELINES FOR DETECTING HEPATIC ENCEPHALOPATHY AT ONSET IN LOCAL OUTPATIENTS

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Abstract

Hepatic Encephalopathy (HE) is a frequent form of neurological deterioration mainly observed in cirrhosis, with obscure prognosis and clinical manifestations. Recent advances in the neuropsychological assessment of outpatients across countries have permitted the establishment of relatively valid diagnoses of minimal hepatic encephalopathy (MHE) with covert cognitive impairment, undetected on routine clinical examination, but with fatal consequences at a functional level. Utilizing validated neuropsychological tools combined with clinical indicators of disease, neurophysiological measures and brain imaging data is advantageous for an objective detection at an early stage and for initiating treatment trials. At the absence of a reference population mean and normative standards in the local outpatient population with asymptomatic disturbance, a flexible and easily quantifiable neuropsychological battery is deemed necessary as a sound methodology to identify the pattern of cognitive impairment and eliminate alternative diagnoses. A local battery testing multiple domains of cognition which are impaired in MHE such as attention, working memory, executive functions and fine motor skills is highly recommended. In the general features, diagnostic cut-off scores, well-standardized parallel versions and adjustments for a range of demographic factors and premorbid performance should be included. Towards the establishment of a widely accepted consensus in the detection of MHE, the cross-cultural applicability of the battery in the local population should also be considered.

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FAKE NEWS AND UNDERLINED NEUROCOGNITIVE MECHANISMS

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Abstract

The notion of fake news and its effect on the public has been widely publicized. Fake news consists of deliberate misinformation spread via traditional print or online social media and may contain false, misleading, imposter, manipulated or fabricated content. Repeating a false claim increases its believability, giving the illusion of truth effect. Multiple neuropsychological theories of awareness emphasize in the process of representation and interpretation of information (meta-representation process), as well as in the cognitive enrichment and subsequent processing (meta-cognitive process). Neuropsychological theories of awareness emphasize the role of an error-monitoring system, which consists of an internal representation of the desired outcome, a feedback related to the outcome, and a comparison between the desired and final outcome. According to the cybernetic model, lack of awareness of one's goals leads to disorders of willed action characterized by negative symptoms, such as apathy, while lack of awareness of one's intentions leads to self-monitoring disorders. We may hypothesize that internal representation of the desired outcome, can be based on biologically determined self- or other-deceptive mechanisms. In other words, humans are biased information-seekers that prefer to receive information that confirms their existing views or imagination. The anterior cingulate plays a key role in distinguishing between imagery and perception. In addition, intentions are involved in the monitoring system from the prefrontal cortex, through the hippocampal-endorhinal cortex and the cingulate, and are completed in the basal ganglia and supplementary motor area. Underlined neuropsychological processes, probably based on biologically determined self- or other-deceptive mechanisms, may serve in the development, and even the conservation, of at least some of the social behaviors related to the fake news phenomenon. These underlined neuropsychological mechanisms may support the human tendency for biased information-seeking, or even the evolutionary persistence of that fake news phenomenon.

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NEUROPSYCHOLOGICAL EVALUATION OF CHRONIC LITHIUM EFFECTS ON COGNITIVE FUNCTIONS

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Abstract

OBJECTIVE: Nowadays, the continuous increase of neurodegenerative disorders indicates the need for using new medication that could delay the neurodegeneration. Lithium, a widely-used mood stabilizer in Psychiatry has already shown its neuroprotective and neurotrophic role leading to the conclusion that it might enhance cognitive functions in neurological or psychiatric disorders. The present study examines the influence of long-term medication with lithium on cognitive functions of humans.

MATERIAL – METHOD: The neuropsychological profiles of three groups, euthymic patients with bipolar disorder undergoing chronic treatment with lithium (Li), matched euthymic patients treated chronically with valproic acid (VPA) and a matched healthy control group, were compared (N=24). Cognitive functions were assessed with the use of 7 tests of the CANTAB Eclipse neuropsychological battery (Cambridge Cognition Ltd). Participants, also, underwent a clinical assessment.

RESULTS: The results concerned a test which evaluates the quality of decision making. Li patients seemed to have a better strategy, in comparison with the VPA patients, as they chose to gamble on the more likely outcome. They also, gambled more on the trials with the more chances of winning compared to the healthy controls, showing a better performance. Moreover, Li patients had higher reaction times in a working memory test than the healthy group.

CONCLUSIONS: The results reflect better quality of decision making in Li patients. We consider these results as a significant contribution in the evaluation of lithium's neuroprotective effect in a behavioural level, especially in a cognitive area in which lithium's effect is relatively unexplored.

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COGNISTAT: CULTURAL APPROAPRIATENESS AND CLINICAL UTILITY FOR THE GREEK ELDERLY

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Abstract

OBJECTIVE: The cultural appropriateness of the Cognistat for the Greek elderly and its clinical utility for Greek elderly patients with all-cause dementia was examined in the present study.

METHOD: The Greek version of Cognistat was administered to healthy elderly persons recruited from the community (n= 88, male: 43%, Mage =69.4, SDage=4.3) and patients with all-cause dementia (n= 22, male: 38%, Mage =76.4, SDage=9.4). The effects of demographic characteristics (age, education, sex) on performance were assessed with stepwise multiple linear regression analyses. A linear stepwise discriminant analysis was further conducted to determine whether Gognistat Total Composite scores discriminate healthy participants from patients with all-cause dementia.

RESULTS: Greek healthy elderly persons had a mean performance 72.5 (out of 88) on the Cognistat Total Composite score. Age and education contributed significantly to the overall performance, accounting for 36% of its variance [$F(2, 67) = 23.86$, $p < 0.00$]. The discriminative accuracy of the Cognistat for elderly with and without dementia was very high, as the overall cross-validated classification accuracy for the entire sample was 90%.

CONCLUSIONS: The Cognistat is well accepted by the Greek elderly and it is a useful tool for both evaluating overall cognition in healthy elderly and identifying elderly persons with all-cause dementia.

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CAN BRIEF NEUROPSYCHOLOGICAL TESTS PREDICT THE DRIVING BEHAVIOR OF PATIENTS WITH PARKINSON'S DISEASE (PD)?

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Abstract

OBJECTIVE: Goal of the present research was to explore the predictive value of brief neuropsychological tests in driving behavior of PD individuals under low and high traffic conditions on a rural driving environment.

METHODS: Nineteen PD individuals (Age:63±11,1years) and forty-two cognitively intact individuals (Age:59,5±8,7years) participated in the study. Participants completed neuropsychological measures, including Mini-Mental State Examination (MMSE), Montreal Cognitive Assessment (MoCA), Clock Drawing Test (CDT), Frontal Assessment Battery (FAB), Trail Making Test- Trails A & B (TMT A & B), assessing general cognitive ability and executive functions. All individuals underwent a driving simulator experiment, where parameters of driving behavior were measured: average speed, lateral position, average reaction time and headway distance.

RESULTS: By applying t-test for independent samples, significant differences were found between PD patients and the control group in average speed ($p<0,01$) and in average reaction time ($p=0,002$) under high traffic conditions on rural road. A regression model using PD individuals, with the neuropsychological tests as predictors, explained 38% of the variance in headway distance under high traffic conditions and thus identified the predictive value of CDT, TMT A and TMT B.

CONCLUSION: The results of the present study indicate that the driving behavior of PD individuals differed significantly from those of healthy individuals. Neuropsychological tests may have a predictive value. Future studies should include a larger sample size and additional assessments of executive functions.

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Quantitative connected speech analysis in a case of non-fluent/ agrammatic Primary progressive Aphasia

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Abstract

OBJECTIVE: Primary progressive aphasia (PPA) is a neurodegenerative syndrome characterized by a selective loss of language functions. In the nonfluent/agrammatic variant (nfvPPA), speech is slow and hesitant. Utterances are shorter, less complex and contain grammatical errors. Single word production deficits in PPA have been extensively examined. However, connected speech analysis has only recently begun to be systematically studied. The aim of the present study was to investigate connected speech deficits in a Greek-speaking person with nfvPPA.

MATERIAL - METHOD: Participant LJ is a 60-year-old right-handed man, with 6 years of formal education. At the time of the study, he had a FTLD-modified CDR score of 9 (MMSE=17/30). A narrative sample was collected using the "cookie theft" picture from BDAE and analyzed following the procedures described by Saffran et al. (1989) for quantitative production analysis (QPA). QPA summary measures, percentages of dysfluent variables and counts of errors were computed. LJ's scores were compared to a healthy control group included in a study by Varkanitsa (2012). T-values were calculated using the Crawford and Howell's method (Crawford and Garthwaite, 2012).

RESULTS: Speech rate was 40.37 words per minute. Dysfluencies included silent pauses, filled pauses, false starts, sound distortions and repetitions (23%, 20%, 3%, 2% and 1% of total words produced). LJ produced less nouns ($p<.05$) and adverbs ($p<.025$), but more pronouns ($p<.0005$) and verbs ($p<.05$) compared to controls. He used less narrative words ($p<.05$) and more single word utterances ($p<.0005$).

CONCLUSIONS: This case study reports differences between an individual with nfvPPA and healthy controls in lexical selection and discourse productivity measures. It serves as an example of how connected speech analysis may be used for the evaluation of multiple linguistic levels not captured by traditional aphasia tests.

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THE ROLE OF EXECUTIVE COGNITION IN THE PREDICTION OF HIV MEDICATION ADHERENCE

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Abstract

OBJECTIVE: Highly Active Antiretroviral Therapy improved clinical outcomes of HIV infection. However, suboptimal medication adherence may result in the development of drug-resistant strains and viral replication. Aim of the present study is to explore whether executive cognition predicts antiretroviral adherence among HIV individuals beyond and above demographic variables, disease characteristics, motor and overall cognitive functioning.

MATERIAL-METHOD: 76 HIV individuals completed a comprehensive executive function test battery, along with measures of verbal memory, motor functioning, processing speed, visuospatial perception, picture naming and overall cognitive performance. Medication adherence was assessed via a visual analogue self-report scale recording the amount of prescribed doses taken during the past month. First, a stepwise linear regression was conducted to examine the ability of executive test performance to predict medication adherence. Subsequently, execute test performance was entered at the final step (5th block) of a hierarchical regression model in order to assess their additional predictive power on medication adherence.

RESULTS: Performance on two executive cognition measures was associated with medication adherence, explaining 14.7% of its variance. In the hierarchical regression model, 21.5% of the variance in medication adherence reports was explained by treatment complexity (number of pills taken) and visuospatial functioning, whereas the addition of executive performance added unique variance, increasing the amount of variance explained through the model to 37.1%.

CONCLUTIONS: Assessment of executive functioning suggests a promising effort in order to increase the predictive ability of medication adherence among HIV individuals.

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THE "MELETI" COGNITIVE REHABILITATION PROGRAMME: CLINICAL AND NEUROPSYCHOLOGICAL ASSESSMENT OF PARTICIPANTS

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Abstract

OBJECTIVE: The "Meleti" Cognitive Rehabilitation Programme has been developed by the Cognitive Rehabilitation Unit of the Psychiatric Hospital of Attica and includes 40 hourly sessions of cognitive and social cognition exercises. It aims at the improvement of everyday functioning of individuals suffering from psychotic disorders through the remediation of their cognitive functioning. The Programme includes pre- and post-treatment sessions assessing both the symptoms and cognitive functions of participants.

METHODS: We present the clinical and neuropsychological assessment domains and the respective clinical and cognitive tools used during the "Meleti" programme.

RESULTS: The clinical evaluation of participants includes the assessment of symptoms, functioning, self-esteem and cognitive complaints. During a clinical interview conducted by the psychiatrists of the Unit the following inventories and rating scales are being administered: 1. Clinical Global Impression Scale (CGI), 2. Positive and Negative Syndrome Scale (PANSS), 3. Global Assessment of Functioning Scale (GAF), 4. Strauss-Carpenter Scale, 5. Personal and Social Performance Scale 6. Rosenberg self-esteem scale, 7. Subjective Scale to Investigate Cognition in Schizophrenia (SSTICS). The cognitive assessments are conducted by the psychologists of the Unit which use computerized and non-computerized batteries and assess the following cognitive domains: 1. Psychomotor Speed 2. Judgement, 3. Intelligence, 4. Attention, 5. Immediate Memory, 6. Working Memory, 7. Verbal Learning, 8. Visual learning, 9. Cognitive Flexibility, 10. Cognitive Planning, 11. Brief Cognitive Screening, 12. Social Cognition.

CONCLUSIONS: The "Meleti" Cognitive Rehabilitation Programme includes a thorough assessment of symptoms and cognition of participants which contributes to the individualization and evaluation of their treatment

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WISCONSIN CARD SORTING TEST PERFORMANCE IN A HEALTHY GREEK SAMPLE: RELATIONSHIP TO AGE, SEX AND EDUCATION

Liozidou A [1,2], Sirigonaki K [3], Babili I [4], Zourna C [4], Kroupi C [4], Etairidou G [4], Pavlou G [4], Anifantaki T [4], Makropoulou A [4], Fioranti E [4], Andreakos N [4], Zalonis I [4]

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Abstract

OBJECTIVE: We aimed to investigate the relationship of demographic variables to Wisconsin Card Sorting Test (WCST) performance in a healthy Greek sample.

MATERIAL – METHOD: Data for this study were obtained from the database of the Greek normative study of the WCST. The sample included 360 participants (142 men, 218 women; minimum-maximum age: 16-86 years old; mean age: 44.62 years (SD=16.77); mean educational level: 13.03 years (SD=3.38); handedness: right=93.9%). All scoring dimensions of the WCST were calculated. Descriptive analyses were performed to examine distribution of age within our sample and 4 age groups were formed: 16-29 years (n=92), 30-45 years (n=90), 46-56 years (n=91), 57-86 years (n=87). Multiple regression analyses were performed to assess the influence of age, sex and education on the WCST performance of our sample.

RESULTS: Younger participants performed better than the elderly participants on all scores except for Total Number Correct, while participants with more than 12 years of education outperformed those with equal or less than 12 years of education on % Errors, % Perseverative Responses, % Perseverative Errors, % Conceptual Level Responses, Number of Categories Completed and Learning to Learn. Women scored better than men in one scoring dimension (% Non-Perseverative Errors).

CONCLUSIONS: Our findings are in line with previous studies suggesting the strong relationship of age to WCST performance. Higher education within our sample indicated better WCST performance, while sex had the weakest relationship to WCST performance. WCST scores should be interpreted within the context of Greek patients' demographic variables.

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KORSAKOFF SYNDROME IN A PATIENT WITH MULTIPLE SCLEROSIS

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Abstract

A 46-year-old woman presented with acute onset diplopia, opthalmoparesis, confusion and gait instability. She had a positive history for probable Multiple Sclerosis (MS), depression and alcohol use. During the hospitalization she progressively developed cognitive problems. Confabulation was the most prominent. She underwent imaging and laboratory testing including thiamine levels which resulted lower than the normal levels. The brain imaging showed demyelinating like lesions, her EEG showed diffuse arrhythmias and her CSF was normal. She was supplemented with vitamin B1 and eye movement was restored within 48 hours.

Extended neuropsychological testing revealed disorientation in time and place, a severe amnesic syndrome both on verbal and non-verbal tasks, borderline performance in the phonemic fluency, extremely low performance in the semantic fluency and in the tasks of attention and processing speed. During executive functions testing the patient exhibited perseverance, inability to form abstract concepts as well as to shift and maintain set and to utilize feedback. Intellectual testing placed her at the low average. Patient produced autobiographical confabulations in response to questioning and had anosognosia. Visual naming and word repetition was intact, as well as speech articulation and comprehension.

Overall, neuropsychiatric manifestations can be part of the clinical spectrum of MS. To our knowledge this is a rare occurrence of Korsakoff Syndrome with MS. It could be speculated that the inflammatory process in the MS brain, when combined with alcohol use, could exacerbate a Korsakoff-like cognitive profile, which so far is atypical for classical MS.

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EXECUTIVE FUNCTIONS IN HIV SEROPOSITIVE PATIENTS: PROTECTIVE EFFECTS OF HIGHER COGNITIVE RESERVE

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Abstract

OBJECTIVE: Recent data suggest that cognitive reserve may modulate the adverse effects of HIV infection on cognitive functioning; however, the protective effects of cognitive reserve on executive functions remain unclear.

MATERIAL AND METHOD: 99 native Greek speaking (male = 76.4%) cART treated HIV-infected patients without major neurological, psychiatric or HCV/HBV comorbidity, underwent comprehensive neuropsychological assessment by a Greek standardized battery of cognitive tests assessing premorbid intelligence, attention, information processing speed, learning and memory, visuospatial function, and executive functions. Participants had M (SD) age = 39.78 (9.12), education = 13.93 (3.36), years since diagnosis = 6.77 (5.36), Nadir CD4 count = 312.77 (176.50), Current CD4 count = 677.81 (272.23). Participants were grouped according to Centers for Disease Control (CDC) clinical stages (A= 60, B=17, C= 22). Moreover, we calculated cognitive reserve (CR) for participants in each CDC stage based on education level, estimated premorbid IQ (Vocabulary scale T –WASI) and occupational attainment. Based on these variables participants were classified as having either high or low cognitive reserve.

RESULTS: We found significant differences in favour of the high CR group on the Stroop color – word task, verbal fluency task, including strategy utilization (clustering and switching processes) and on mental processing speed.

CONCLUSIONS: The study provides evidence that high CR may exert a protective effect on executive functions (cognitive flexibility, response inhibition, initiation and mental shifting, processing speed) and strategies (shifting and switching). These findings support the cognitive reserve theory for interpreting individual differences in susceptibility to HIV related neuropathology.

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COGNITIVE FLEXIBILITY IN THE CONTEXT OF BEHAVIOURAL PERSISTENCE IN THE RAT

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Abstract

OBJECTIVE: Animal models of obsessive-compulsive disorder (OCD) facilitate exploration of the still elusive OCD pathophysiology. Valuable as they are in the study of OCD pharmacology, models must integrate evidence suggesting a dimensional conceptualization of OCD. This is feasible if they are utilized in areas where the clinical data present controversy suggestive of distinct OCD subtypes. Such an area is the relationship between OCD and cognitive flexibility. Using a model of directional persistence that was developed and extensively tested for pharmacological isomorphism with OCD in our laboratory, we screened animals for high / low spontaneous directional persistence (SDP). We then compared them on cognitive flexibility using an animal analogue (Birrell & Brown, 2000) of the Wisconsin and CANTAB IED tests.

MATERIAL – METHOD: 12 High and 12 Low SDPs male Wistars (N=30) were assessed in the 7 stages of a rat IED test based on odour and texture discriminations.

RESULTS: Our results replicated control performance in Birrell & Brown (2000) for the dependent variables of discrimination, reversal, intra-dimensional and extra-dimensional shifts, affirming the validity of the test in our laboratory. Comparisons between High and Low SDPs for these variables yielded no group differences.

CONCLUSIONS: Results are in line with a number of clinical OCD studies assessing flexibility and at odds with the rest. This suggests that current OCD models need to be evaluated for cognitive flexibility, so that their congruence with particular OCD subtypes can be assessed. Alternatively, this may suggest the need for reevaluation of current neuropsychological and laboratory flexibility tests.

Birrell JM & Brown VJ (2000). Medial frontal cortex mediates perceptual attentional set shifting in the rat. Journal of Neuroscience, 20(11), 4320-4324.

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SHORT ASSESSMENT OF EXECUTIVE FUNCTIONS IN GREEK HIV – PATIENTS USING THE FRONTAL ASSESSMENT BATTERY

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Abstract

OBJECTIVE: The introduction of combination antiretroviral therapy (cART) has transformed HIV from a fatal disease to a chronic condition. However, although patients may be relieved of physical symptoms, studies have consistently shown the persistent existence of cognitive impairment, even in patients undergoing cognitive treatment, commonly referred as HIV – associated dementia. More specifically, findings show deficits in executive functions, resembling patterns more prominently found in frontal lesions. The advent of these findings showcase the need for appropriate neuropsychological screening tests in order to assess cognitive function in HIV patients. In this study, we assess the implications of introducing the FAB (Frontal Assessment Battery) to a simple, fast screening process.

METHOD: We gathered data from 2 groups: a patient group consisting of HIV infected patients undergoing cART treatment at the AHEPA hospital in Greece, and from a control group. They patients underwent a short neurocognitive evaluation. We administered 3 short, fast screening tests: FAB, MOCA (Montreal Cognitive Assessment) and MMSE (Mini Mental State Exam).

RESULTS: Consisting with preexisting finding, HIV patients consistently scored lower than the control group in the executive function tasks. All 3 test were found to be highly correlated with each other, with MOCA being a predictor factor for FAB scores. In measuring the 3 tests' sensitivity to HIV associated cognitive impairments, we found that FAB was the most sensitive among the three.

CONCLUSIONS: Our goal was to examine the utility of the FAB test when screening for cognitive deficits in HIV patients. We found that FAB can be a valuable tool in neuropsychological assessment, but given the varied nature of the HIV patients' cognitive profile, it should be accompanied with an extensive battery of tests

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CHRONIC ANTIPSYCHOTIC INDUCED METABOLIC SYNDROME IN THE RAT: MODIFICATION OF ADIPOCYTES FOLLOWING BEHAVIORAL MANIPULATIONS: A PILOT STUDY

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Abstract

OBJECTIVE: It is critical to understand the mechanism through which antipsychotics influence energy expenditure, inducing metabolic syndrome (MetS). This mechanism must involve changes in thermogenesis via brown adipose tissue (BAT). This study aimed to examine the distribution and activity of BAT, using microPET/CT scanning and stimulate the "britening" process, which transforms white adipocyte cells into cells with BAT-like characteristics, following environmental manipulations.

MATERIAL - METHOD: 24 female Sprague-Dawley rats were subjected to one of two drug conditions [DRUGTx: 1. Olanzapine (DRUGTx-OL) vs 2. Vehicle (DRUGTx-VEH), n=12]. OL dose was chosen according to Andersen and Pouzet model for schizophrenia (Andersen et al, 2001). Animals from each drug condition were subjected to one of 4, 25-day behavioural treatments [BEHTx: a. control (BEHTx-CON), b. cold exposure (BEHTx-CE), c. Environmental Enrichment (BEHTx-EE), d. Chronic Unpredictable Stress (BEHTx-CUS); n=3]. Measures taken were Standardized Uptake Value (SUV) and total BAT volume (TBATV). The biomarker corticosterone was also monitored. Descriptive statistics were used (final N=19).

RESULTS: Group means across the micro PET/CT sessions were calculated. An increase in SUV mean was noted after DRUGTx, with a reduction after BEHTx. An increase in TBATV means was observed in all groups after DRUGTx, with a reduction after BEHTx. However, the VEH-EE group demonstrated increased TBATV after BEHTx. Corticosterone (ng/ml) concentration tended to be lower in DRUGTx-OL groups.

CONCLUSIONS: Chronic OL treatment followed by BEHTx seemed to modify BAT activity in the predicted direction and also influence corticosterone levels. These results confirm the appropriateness of the methods used for further investigation of our main hypotheses.

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SELF-MONITORING AND NEURAL CORRELATED BRAIN STRUCTURES

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Abstract

OBJECTIVE: Self-monitoring is a crucial component of human empathy with regard to the formation and repair of social relations. Several studies have brought to light possible neural substrates associated with self-monitoring but the information that they have provided is inconclusive. We therefore studied a large group of demented patients to assess the crucial brain structures for the self-monitoring function.

METHODS: We screened 77 patients with dementia of various types by means of Voxel-based Morphometry (VBM) analysis to assess possible volume reduction in the brain structures and by means of subscales of the Revised Self-Monitoring Scale (RSMS) to estimate the decrease of socio-emotional expressiveness and modification of self-presentation. Regression analysis is employed to investigate the correlation between gray matter (GM) loss and lack of self-monitoring.

RESULTS: The socio-emotional expressiveness score was associated with decreased grey matter volume in the right olfactory cortex and right insula while self-presentation scores associated with grey matter volume reduction in the olfactory cortex bilaterally, right insula, right temporal pole, right inferior frontal gyrus, left superior frontal gyrus and left rectus gyrus.

CONCLUSIONS: Our results suggest that demented patients present decreased ability of self-monitoring process probably due to impaired insula and OFC and their disconnection from structures of the salience network.

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EFFECTS OF WORKING MEMORY TRAINING ON COGNITIVE FLEXIBILITY IN BOTH MEN AND WOMEN PARTICIPANTS

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Abstract

OBJECTIVE: The study aims to investigate the effect of working memory training on cognitive flexibility in both men and women participants.

MATERIAL – METHOD: Ninety-five healthy participants were divided into three groups (matched for demographic variables, schizotypy, impulsivity and baseline cognitive flexibility): a) fully adapted group (participants were fully trained with an executive working memory task, the Letter Number Sequencing task, for six consecutive days), b) partially adapted group (participants were partially trained with the same task for six consecutive days) and c) control group (participants did not receive cognitive training). Following training, all participants were tested in another cognitive flexibility task; the Intra-Extra Dimensional Set Shift Task (ID/EDS).

RESULTS: Results showed that the fully adapted group had improved performance on the ID/EDS test, since they made fewer attempts to complete the stages of the test and marginally significantly fewer errors, compared with both the other two groups, who did not differ between each other. There were also significant correlations between the tests used. Specifically, it was found that the number of errors in the Wisconsin Card Sorting Task (WCST) was negatively correlated with the number of errors in the ID/EDS test. Also, it was observed that the Raven test correlates negatively with the number of errors in the WCST and also positively with the number of errors and trials needed to complete the stages of the ID/EDS task.

CONCLUSIONS: These findings could have significant implications in the development of therapeutic approaches for the improvement of cognitive deficits in neuropsychiatric disorders.

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THE PREDICTIVE VALUE OF PREMORBID ADJUSTMENT REGARDING COGNITIVE DYSFUNCTION IN SCHIZOPHRENIA

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Abstract

OBJECTIVE: Premorbid adjustment (PA) in academic and social domain is a key-predictor of cognitive performance in schizophrenia. Prior studies provided inconsistent findings regarding the differential relationships of PA domains with post-illness cognition. Multivariate associations of academic and social PA in each developmental stage (childhood, early and late adolescence) with post-onset cognitive variables were explored. Furthermore, possible differential relationships of PA domain deterioration courses with post-onset cognitive dysfunction were investigated.

MATERIAL – METHOD: Seventy-five schizophrenia patients were evaluated with Premorbid Adjustment Scale (PAS). General cognitive ability, verbal IQ, verbal memory and learning, processing speed, working memory, executive function and premorbid IQ were assessed. Canonical Correlation Analysis (CCA) was employed to examine the relationship between academic and social PA with post-onset neurocognitive variables.

RESULTS: CCA revealed that poorer academic PA across childhood and early adolescence was related to worse post-onset verbal IQ, working memory, verbal learning and executive function, while academic PA deterioration between early and late adolescence was associated with poorer verbal learning and executive function and, as further analysis indicated, predicts IQ decline.

CONCLUSIONS: Academic PA was exclusively associated with post-onset cognitive impairment. New evidence emerged for the specificity of each developmental period academic malfunctioning in predicting post-illness cognition. Early premorbid academic maladjustment possibly constitutes the onset of a cognitive dysmaturational process which results to post-diagnosis impaired cognition.

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DESCRIPTION OF A MULTIMODAL IMAGING TOOL (PET/MR/EEG) FOR EARLY SCHIZOPHRENIA DIAGNOSIS – TRIMAGE PROJECT

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Abstract

Schizophrenia is a severe mental disorder, characterized by profound disruptions in thinking, affecting language, perception, and the sense of self. Schizophrenia disorders manifest themselves early in life, affecting approximately 1% of the European adult population. This causes a high social and economic burden on European societies. In most of the cases, early diagnosis, can lead to effective treatment, and people who are affected can live a productive life and be integrated in society. Consequently, there is a strong need for an imaging tool that facilitates the diagnosis of schizophrenia early during development. The purpose of this study is to present the results and development of the European FP7-Health-2013: TRIMAGE project, which aims at building an original PET/MR/EEG imaging system for early diagnosis of brain disorders. The 1.5T brain-dedicated MRI scanner is already under operational testing procedures. For comparison reasons, a clinical trial was carried out in 25 subjects (13 healthy control and 12 schizophrenic patients) using an existing clinical MRI scanner. The PET system, with FOV=16.2cm and PET ring diameter of 24cm, is under the final stage of construction, while Monte Carlo simulations, using anthropomorphic computational models, were carried out in order to evaluate the PET system. Finally, the PET/MRI system will be a complete trimodal system since it will incorporate a commercially available state-of-the-art EEG system (32 channels) that has already been tested in the hybrid PET/MRI environment. The proposed system will be fully operational by the end of the project in December 2018.

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COGNITIVE FUNCTIONS AND SCHIZOTYPAL TRAITS IN UNAFFECTED RELATIVES OF SCHIZOPHRENIA PATIENTS: NON-LINEAR EFFECTS OF FAMILIAL LOADING

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Abstract

OBJECTIVE: Schizophrenia can be classified into familial and sporadic, according to the genetic loading carried. The comparison of unaffected relatives with familial ("multiplex") vs. sporadic ("simplex") background, has revealed discrepant findings on the cognitive endophenotypes of the disorder, possibly because schizotypal traits were not accounted for. The present study aimed to examine differences in the cognitive performance between unaffected multiplex and simplex relatives of schizophrenia patients and control individuals, taking into consideration the effects of schizotypal traits.

MATERIAL-METHOD: "Simplex" (n=65), "multiplex" (n=35) relatives and controls (n=114) were evaluated for a range of cognitive functions and schizotypal traits with the Schizotypal Personality Questionnaire, SPQ). Between-group differences in a) SPQ scores were examined with analyses of covariance (Covariate: age) and b) neurocognitive performance were examined with multivariate analyses of covariance (Covariates: age, SPQ Paranoid and Negative schizotypy scores).

RESULTS: Both groups of relatives scored higher on Paranoid and Negative schizotypal dimensions compared with controls (all Ps <.001). Controls outperformed multiplex relatives in strategy formation and set-shifting and simplex relatives in psychomotor speed, set shifting and executive working memory (all Ps <.005).

CONCLUSIONS: Although both groups of relatives had high negative and paranoid schizotypy, simplex relatives presented with deficits in more cognitive domains, which is counterintuitive given the higher genetic loading of the multiplex group. If this was not due to self-selection bias (i.e. mostly the highest functioning multiplex relatives volunteering for the study), it possibly reflects the prevalence of protective factors in unaffected multiplex relatives.

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