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NEWER ADVANCES IN NEUROPSYCHIATRY

Shashita Inamdar
Achieve Concierge, USA

The increasing prevalence of neuropsychiatric disorders in the last 20 years has called for a demand in new diagnostic and treatment options. The World Health Organization (WHO) labels mental disorders as a continuing global burden, with an estimated 300 million affected by depression, 60 million affected by bipolar affective disorder, 21 million affected by schizophrenia and 47.5 million affected by dementia. Conventional methods of using medications to treat such disorders have developed a negative perception over time among patients and in the media. Most medications are now viewed as having addictive characteristics, short and long-term side effects, drug interactions, and at times as being ineffective. With resistance from patients and limited efficacy, clinicians and researchers turn to new and more advanced methods to help those struggling with such disorders. Pharmacogenetics, the study of the role of the genome in drug interaction and response, has allowed us to better understand why one's genetic makeup can enhance or inhibit their response to certain medications. Given insight to the effectiveness of neurotransmitter uptake channels and transporters or certain metabolism rates, clinicians may make more informed and accurate decisions for their patients. Outside of pharmacotherapy, many treatments now look to the process of restructuring the brain to aid the symptoms of neuropsychiatric disorders. Ketamine has gained recent popularity in the treatment of depression and other neuropsychiatric disorders, where it works at the synaptic level to increase neural connectivity, dendritic remodelling and synaptogenesis for long term effect. Neuromodulation methods, such as Transcranial Magnetic Stimulation (TMS), an FDA cleared, and CE marked non-medication treatment, Neurofeedback, an EEG based biofeedback and Hyperbaric Oxygen Therapy (HBOT), have also shown to be leading methods in remodelling the brain to alleviate symptoms and create long lasting change in the brain structure. By addressing not only the chemical component of the brain, but also the electrical, we are able to make far more progress in treating neuropsychiatrist disorders and provide many patients with new hope.

drsinamdar@achieveconcierge.com

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BENEFITS OF ACUTE INTERMITTENT HYPOXIA FOR TREATING SPINAL CORD INJURY

Atiq Hassan
Avalon University School of Medicine, Curacao

Most spinal cord injuries (SCIs) in humans and animals are incomplete and partial recovery arises because of plasticity within neural circuitry. Many experimental therapies have been used to improve recovery after SCI, acute intermittent hypoxia (AIH-brief exposures to reduced O_2 levels alternating with normal O_2 levels) in one of them. AIH treatment elicits plasticity in respiratory and non-respiratory spinal systems in experimental animals. AIH treatment has also been shown to improve walking abilities in persons with chronic incomplete SCI. In this study, I have examined the effect of AIH treatment, alone or in combination with motor training, on functional recovery and the effect of AIH on the expression of plasticity- and hypoxia-related proteins in the spinal cords of SCI rats. Rats were trained to cross a horizontal ladder and foot slip errors were measured before surgery, four weeks post-surgery, each day of AIH treatment, and one, two, four and eight weeks after treatment. AIH treatment consisted of 10 episodes of AIH: (5 min 11% O_2: 5 min 21% O_2) for seven days. Motor training +AIH-treated rats made fewer foot slips on the ladder task compared to normoxia-treated control rats after four days of treatment and this improvement was sustained for 8 weeks post-treatment. Importantly, AIH treatment + motor training also increased the expression of Hypoxia-inducible factor-1α, Vascular endothelial growth factor, Brain-derived neurotrophic factor, tyrosine kinase B receptors and phospho-trkB in spinal motor neurons in SCI rats compared to normoxia-treated SCI rats. Taken together with the promising findings from human SCI studies, the results of this study suggest that AIH has potential as an effective therapy to restore motor function after nervous system injury.

atiqhassan@gmail.com

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ALZHEIMER'S -LIVING WITH THE DISEASE

Caron Leid
Aspen University, USA

When my mother was first diagnosed 17 years ago, at the age of 57, I had a new-born and was propelled immediately into the sandwich generation. There was few a resource or information surrounding living with the disease in the year 2000. The author started journaling her experience more for cathartic purposes, and then had the courage enough to publish it in hopes of helping others. Since then, she has written several journal articles on the topic of Alzheimer's disease and living with the disease. She has appeared on CTV National News; she has worked with the Alzheimer's Society of Canada and has spoken at an International Alzheimer Disease and Dementia Conference in 2015. 17 years of the day to day emotional, mental, and physical management of the disease has provided me a unique perspective and the ability to help educate others. She is presently working on her second book on the disease and revising her first book to include the palliative care experience. She has seen this disease from the beginning and now she is witnessing the end stages first hand. Her mother still resides with her, as their journey toward the end of this disease. She is now an expert in living with the disease as a sandwich generation primary caregiver. She has gone through the disease and all the collateral damage that takes place alongside of it, including compassion fatigue. Since her mother's diagnosis 17 years ago of "Atypical" Alzheimer's disease, and the fact that she has been in palliative care for two years in her home, allows her to research the disease first hand, and show the world that caregiving is an integral part of managing and living with Alzheimer's disease.

caronleid@caronleid.org

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A NEW BATTLE FRONT AGAINST NEUROPATHIC PAIN

Jorge Armando Bernal Zamora
Insitututo Tecnologico de estudios Superioeres
de Monterrey, Mexico

Central Sensitization is a phenomenon of neuroplasticity that has been characterized by the presence of spontaneous or persistent pain, expansion of areas affected by pain, and qualitative sensory disorders that include allodynia and hyperalgesia. The Central Sensitization results from a series of functional and anatomical alterations in the CNS, some of them potentially irreversible, which may be responsible, at least in part, for the persistence of pain after the resolution of the triggering tissue injury. Clinical and experimental evidence shows that noxious stimuli can sensitize the central structures of the nerves involved in the perception of pain. Many outstanding clinical examples of these effects include amputees with pains in a phantom limb that are similar or identical to those felt in the limb before it was amputated, and patients after surgery who have benefited from preventive analgesia that blocks the limb. afferent alluvium induced by surgery and/or its central consequences, chronic low back pain, diabetic neuropathy and degenerative osteoarthritis. The experimental evidence of these changes is illustrated by the development of sensitization, by a phenomenon called WIND up that translates as winding or pushing the expansion of the receptive fields of the neurons of the central nervous system, as well as by the improvement of flexion reflexes and the persistence of pain or hyperalgesia after the contributions of the injured tissues. The perception of pain is not simply a moment-to-moment analysis of noxious afferent input, but involves a dynamic process that is influenced by the effects of past experiences. Sensory stimuli act on neuronal systems that have been modified by previous inputs, and behavior that is significantly influenced by previous memory events. A better understanding of the changes induced by central and peripheral lesions on harmful stimulation should lead to a new and improved clinical treatment for the relief and prevention of pathological pain and not only anti-inflammatory or narcotic analgesics in the treatment of chronic pain.Today we know the phenomenon of central sensitization and its role in the perpetuity of chronic neurophatyc pain like phenomenon reversible and modifiable related to neuropathic pain, we have some medicines thant help susessful en the treatment of neuropathic pain.

berzamja@gmail.com

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COGNITIVE APPROACH TO MEMRISTOR WHICH IS ABLE TO ASSOCIATIVE LEARNING

Hakkı Halil Babacan, Salih Erkan and **Gülçin Arkış**
Istanbul University, Istanbul

Objective: We are at a time when electronic systems are structured in a manner similar to the human brain. The memristor, a neuromorphic circuit designed by Chua in 1971, is a modeling of synaptic learning and associative learning. Neuromorphic circuit elements and memristor can be used in artificial brain formation in the later periods and in the treatment of various lesions, psychiatric and neurological diseases. Scientific publications of memristor related neuroscientists, behavioral scientists, cognitive scientists and psychologists are scarce. The aim of this review is to examine the learning models built on the memristor by cognitive perspective.

Methods: In this study, the learning experiments on the memristor were investigated in the literature and the results were compared.

Results: In conditional learning experiments on the memristor, which is its own memory, the unconditional stimulus and the neutral stimulus represent different types of signals. Before the learning, the signals which are denoted as neutral stimuli cannot give output from the electronic angle. But just like Pavlov's dog experiment, when the signal representing the unconditioned stimulus was presented before learning, the output is taken. When both stimuli were presented in the order of the Pavlov experiment, the output was taken from the neutral stimulus. And after learning, the output can be taken when the neutral stimulus given alone. In this way, the memristors were able to learn conditionally and to achieve synaptic modeling.

Conclusion: It has been found that learning procedures can be applied to hardware devices other than algorithmic devices. The learning experiments on the memristor successfully support the synaptic learning and Pavlov type conditional learning procedures. In some experiments, however, the conditional responses in the memristor do not decrease over time. This can be described as a pathological learning and may reduce the efficiency of the memristor.

halil.babacan24@gmail.com

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THE APPLICATION OF REBONDING OF THE BODY TO A WOMEN'S SUBSTANCE ABUSE PROGRAM

Deanna L Mulvihill
TLI Foundation, USA

Women who have experienced Intimate Partner Violence are at a greater risk of physical and mental health problems, including posttraumatic stress disorder and substance dependence (Campbell, 2002, Ziberman, Tavares, Blume & El Guebaly, 2003). The incidence of alcohol dependence is higher in people with a history of trauma than in those without such history and this risk is intensified for those with PTSD (Diaz, Simatov & Ricker, 2000). Two thirds of women with substance have mental health problems that include PTSD (Ziberman, et al., 2003, Mulvihill et al, 2009). These women have difficulty benefiting from present treatment programs (Miller et al 2000, Chase et al 2003). Alcohol and other substance are used to cope with the symptoms of PTSD (Brady et al. 2005). Both trauma and substance abuse make neurohormonal changes in our body. During a 4-month intersubjective ethnographic study using hermeneutic dialogue and participant observation of women and staff in a treatment center, it was documented that all the women had a history of trauma, including the staff, the trauma of the clients was documented and discussed during the admission assessment but was not considered as part of the treatment plan (Mulvihill, 2009). Both the staff and the client were asked about their understanding of PTSD and what to do if a person showed symptoms. Few knew what to do despite giving personal experience. Many pf the interventions that were part of regular groups were triggering the clients with PTSD (Mulvihill et al 2009). Rebonding of the Body is multimodality structured program which consists of eight 3-hour sessions which was originally developed for children who were sexually abuse (Mulvihill 1988) and has showed promising results with persons who have experience a wide range of traumatic experiences (2016). This promising technique needs clinicians and researchers to build treatment teams to build the evidence for this promising technique.

deannalifestyle@hotmail.com

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PERSPECTIVES OF NANO-INTERVENTIONS IN EARLY DIAGNOSIS AND TREATMENT OF ALZHEIMER'S DISEASE

Jerzy Leszek
Wroclaw Medical University, Poland

The lack of effective treatment for Alzheimer's disease (AD) stems mainly from the incomplete understanding of AD causes. Currently there are several hypotheses which try to explain the early molecular mechanisms of AD pathogenesis. The current pathophysiologic approach is based on several common mechanisms of neurodegeneration, including accumulation of abnormal proteins tau and ABeta), mitochondrial dysfunction, oxidative stress, impaired insulin signaling, calcium homeostasis dysregulation, imbalance of neurotransmitters, early synaptic disconnection and late apoptotic cell death. Considering that AD is a multi-factorial disease with several pathogenic mechanisms and pathways, a multifunctional nanotechnology approach may be needed to target its main molecular culprits. There are still no effective treatments to prevent, halt or reserve AD. To very early diagnosis of AD we need to have affordable, ultrasensitive and selective molecular detection methods. Nanomedicine as a biomedical and pharmaceutical application of nanotechnology for making Nano carriers for instance dendrimers has shown great potential not only for diagnosis but the treatment of many CNS diseases such AD. Ultra-low concentrations of protein biomarkers (eg.ADDL-amyloid-Beta-derived diffusible ligands) which have been implicated in the pathogenesis of AD, is possible to detect, owing to carrier dendrimers. Dendrimers are polymeric molecules chemically synthesized with well-defined shape size and nanoscopic physicochemical properties reminiscent of proteins. Recently an increasing number of studies have been focused on the potential dendrimers to prevent aggregation and fibrillation of proteins involved in neurodegenerative disorders such as AD. Some of dendrimers were demonstrated to cross blood-brain barrier, which legitimized research on these compounds as potential drugs for neurological disorders. Recent our studies have revealed that dendrimers possess the intrinsic ability to localize in cells associated with neuroinflammation (activated microglia and astrocytes) and thus can be used in neuroinflammation therapy. Above/mentioned findings may be significance in the context of potential application of dendrimers as drug carriers or active compounds per se. According to opinion the authors of this presentation, they are promising macromolecules for further investigations on their applicable in neurodegenerative disorders, for instance AD.

jerzy.leszek@umed.wroc.pl

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THE ROLE OF SIMULATION IN IMAGERY RESCRIPTING FOR POSTTRAUMATIC STRESS DISORDER: A SINGLE CASE SERIES

Kathy Looney
University College Dublin, Ireland

Little is known about the mechanisms for change involved in Imagery Rescripting (ImRs), an image-based therapy technique used to target intrusive imagery in post-traumatic stress disorder (PTSD) by imagining alternative endings to traumatic events (Arntz, 2012). The aim of this work was to explore the role of simulation as a mechanism for change in ImRs. Both ImRs and simulation involve the mental construction of a hypothetical event that has not actually happened. It was hypothesised that rescript simulation levels would link to reductions in (1) image intrusiveness and counterfactual thinking associated with intrusive images.

Design: Seven individual cases with a diagnosis of PTSD were followed for the duration of rescripting of one image using a single case experimental design.

Methods: Participants completed continuous Symptom Severity measures and pre-/post- counterfactual thinking measures. All sessions were recorded and coded for goodness of simulation (GOS) as well as additional factors (e.g. rescript believability, vividness).

Results: Using Jacobson and Traux's (1991) Reliable Change Index, participants were divided into high- and low-responders and coding was compared across groups. High-responders rescripts were rated as well-simulated while low-responders rescripts were in the less-well simulated range. Additional factors (e.g. intensity of thoughts/emotions related to original and new imagery elements, level of cognitive and emotional shift and belief in the resultant rescript) were also linked to reductions in Symptom Severity. Individual case analysis supports these results. Participants who experienced the greatest change in symptom severity also experienced the greatest changes in counterfactual thinking, and very tentative support suggests that this was linked to simulation levels.

Conclusions: Tentative support is offered for the role of simulation in reductions in Symptom Severity and counterfactual thinking in ImRs. However, due to limited statistical analysis and small sample size, further research is necessary.

kathy.looney@ucd.ie

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MECHANISMS OF SELF-MAINTENANCE OF CHRONIC INFLAMMATION IN ALZHEIMER'S DISEASE

Jerzy Leszek
Wroclaw Medical University, Poland

Low grade inflammatory reactions are considered important factors that accelerate the progression of Alzheimer's disease. Major receptors of innate immunity, Toll-like receptors (TLRs) and receptor for advanced glycation end-product (RAGE), play a central role in triggering and driving these chronic inflammatory reactions. Signal transduction pathways from TLR and RAGE receptors lead to activation of transcription factors, mainly NF-kB and AP-1, which enhance the synthesis of proinflammatory cytokines. Activation of NF-kB enhances the transcription and expression of additional amounts of RAGE receptor protein in immune cell membranes, which results in increased further activation of this receptor. Many of the RAGE signal transduction pathway proteins can activate proteins from TLR pathways and vice versa. Such RAGE-TLR cross-activation emerges as an important driving force for maintenance of chronic inflammation in Alzheimer's disease, which finally increases the amount of proinflammatory cytokines released. Intractable, self-sustaining inflammatory reactions in the brain tissue, accompanied by an increased level of released proinflammatory cytokines, create a microenvironment for the development of an autoimmune component in neurodegeneration. Lowering the level of RAGE activation should weaken the RAGE-TLR cooperation and could bring about a significant slowdown in the disease progression.

jerzy.leszek@umed.wroc.pl

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THE EFFECTS OF LACK OF REGULATION ON THE DEVELOPMENT OF SPD CHILDREN: HELPING THE CHILDREN FIND THE BALANCE POINT

Odeda Peled
The Integrative Therapy Center, Israel

A neuro-psychological model for understanding regulation disturbances in the interface between brain dynamics and its functional manifestations. This model can serve as a basis for designing a preventive rehabilitative setup. The SPD children's world view dictates an atypical interpretation of situations, with adverse effects on their ability to created internal and external harmony. The child is in a continuous state of emergency, which interferes with his information processing and restricts his availability to deal with daily tasks. Too much energy is drained into search for internal balance in the face of a threat to survival, continuous state of psycho-physiological anxiety. Even after some degree of sensory adaptation and compensatory processes have been developed, the experience of accumulating failure, the inhibitions created are still there. Risks of secondary future varied complex emotional disturbance are prevalent. The road of Life is a multi-layered, integrative model the author has developed for working with such cases. It involves the child's natural environments and promotes a lifestyle in which the child regains control over his life. It inter-relates insight, emotion regulation and adaptive behavior codes. The child learns to profit from supportive environmental clues, to understand his own confusing sensations. During the weekly session we devote much time for playing the play of life. We learn to play and get nourished by the conjoint play. Play, the child's language, enables on to connect to the child's inner experience while at the same time reflects his coping patterns, communicative codes, cognitive style and strategies. The play is a learning space that makes it possible to reveal the person behind the syndrome. Such multidimensional perspective requires of the therapist total listening, to be there with and for the child. Timing is very important in the therapist's moves. Generalization is affected in target programs in the child's natural environments.

odedap@bezeqint.net

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DECISION MAKING IN ACQUIRED ADOLESCENT DEFORMITY: CASE DISCUSSIONS IN THE LIGHT OF KFMC EXPERIENCE AND ROLE OF THE O-ARM® AND NEURONAVIGATION IN THEIR MANAGEMENT

Walid Ismail Attia
National Neuroscience Institute, Saudi Arabia

Introduction: The type and extent of surgeries carried out in the management of adolescent spine deformities still lacks evidence-based medicine proof. It is up to the health care provider's sound judgement and expertise to do what is needed for the patient. Management challenges include yet not limited to; decompression near vital vascular or neural structures, decompression at a blind angle, difficult deformities corrections and difficult trajectories for instrumentation. The use of intraoperative CT quality O-arm and neuronavigation are still tested as aiding tools in such operative modalities.

Methods: Among our 600 + cases operated with guidance of O-arm and Neuronavigation since 2008 , we randomly selected 3 cases of complex spine modalities that were operated upon in our institute by the first two authors to be included in this retrospective study. Cases include traumatic spinal fractures, infective, inflammatory, benign and malignant neoplasms affecting different parts of the spinal column. All of them had technical challenges regards adequacy of decompression or safety of instrumentation. All had undergone a combination of decompression deformity correction, and instrumentation of different modalities and/or bone grafting. In all cases the Medtronic O-arm® and Medtronic StealthStation® were used as intraoperative mapping tools. Discussions are intended to be of interactive nature.

Results: Intraoperative navigation tools were so useful in securing adequate neural decompression, neural and vascular tissue safety together with tough bony purchases of the hardware from the first and only trial of application. Intraoperative CT taken by the o-arm was a useful confirmatory intraoperative test of proper hardware placement.

Conclusion: The intraoperative use of the O-arm and stealthStation is very useful in different modalities of complex spine surgeries. Intraoperative confirmation of the proper hardware placement by intraoperative CT is of utmost value in completing the procedure.

attwali@hotmail.com

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SHARED DECISION-MAKING (AND WHAT TO DO WHEN YOU DISAGREE...)

Andrew J McLean
University of North Dakota School of Medicine and Health Sciences, USA

Life is easy when everyone agrees. How do we maintain therapeutic relationships while disagreeing? How do we find common language and goals? And how do we proceed when we are at an impasse? Managing conflict is a challenge regardless of how many years of practice. This presentation will afford opportunities to review techniques of shared decision-making provider-patient relationship issues and what to do when "stuck".

andrew.mclean@med.und.edu