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Scientific Tracks & Abstracts

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Session Chair
André Mainville
Laval University, Canada

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Neuroinflammatory mechanisms of posttraumatic Epilepsy

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Traumatic brain injury (TBI) occurs in as many as 64–74 million people worldwide each year and often results in one or more post-traumatic syndromes, including depression, cognitive, emotional, and behavioural deficits. TBI can also increase seizure susceptibility, as well as increase the incidence of epilepsy, a phenomenon known as post-traumatic epilepsy (PTE). Injury type and severity appear to partially predict PTE susceptibility. However, a complete mechanistic understanding of risk factors and biomarkers for PTE is incomplete. Accumulating evidence supports a significant role for neuroinflammation in the post-traumatic epileptogenic progression. Notably, substantial evidence indicates a role for astrocytes, microglia, chemokines, and cytokines in PTE progression. Microglia and astrocytes are activated and altered after TBI. Cytokines interleukin-1α, TNF and complement C1q are secreted by microglia and can induce the A1 astrocyte phenotype. Astrocytes suffer gap junction uncoupling and present both impaired neurotransmitter clearance and metabolic recycling from synapses. Cytokines interleukin-6, interleukin-1β, transforming growth factor beta, and chemokine CCL2 are secreted in high concentration creating a neuroinflammatory milieu. The cellular alterations and neuroinflammatory factors interactions ultimately contribute to the epileptogenic progression following TBI.

Recent Publications

1. Arisi, GM; Mukherjee, S; Mims, K; Hollingsworth, G; Oneil, K; Shapiro, LA. Neuroinflammatory mechanisms of post-traumatic epilepsy. J Neuroinflammation, 17, p. 193, 2020.
2. Foresti, ML; Arisi, GM: campbell, JJ; mello, LE. Treatment with CCR2 antagonist is neuroprotective but does not alter epileptogenesis in the pilocarpine rat model of epilepsy. Epilepsy & Behavior, 102, p. 106695, 2020.
3. Arisi, G M.; Foresti, M L.; Katki, K; Shapiro, L A. Increased CCL2, CCL3, CCL5, and IL-1β cytokine concentration in piriform cortex, hippocampus, and neocortex after pilocarpine-induced seizures. J Neuroinflammation, 12, p. 129, 2015.

Biography

Gabriel M. Arisi has more than twenty years of neuroscience research practice ranging from histology to molecular biology. A co-discoverer of caramboxin, a neural toxin presents in star fruit. He also contributed for the demonstration of the chemokine CCL2 as a biomarker of neural tissue damage. He has ten years' experience in teaching for medical, biomedical and nurse graduate students. He is proficient in electron and light microscopy and in molecular biology techniques such as immunohistochemistry and multiplex assays.

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Impact of improved sleep quality and mood on acute and sustained phases of insulin release among pre-diabetes: An observation from Yoga and Walking based RCT

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Abolished phases of insulin release, the acute phase of Insulin Release (APIR) and sustained phase of Insulin Release (SPIR), are projected as the prime cause for impaired fasting glucose and/or impaired glucose tolerance, resulting in spiking the blood glucose close to type 2 diabetes threshold, resulting in the diagnosis of pre-diabetes. In addition, disturbed sleep for longer than 6 months is itself identified as a reason for impaired fat and glucose metabolism hiking the incidence of pre-diabetes and T2DM among young adults. Studies explored physical activity of any form as effective in improving APIR, SPIR, sleep quality and low mood, thereby preventing or managing Type 2 Diabetes Mellitus (T2DM). Hence this study compared the effect of yoga or walking on APIR, SPIR, sleep and depression among pre-diabetes. Adults with pre-diabetes (N=42) were randomized into yoga (n=20) or walking group (n=22). Yoga group underwent yoga therapy, and active control group were involved in walking for 45 minutes a day for 5 days a week for 12 weeks. Fasting blood glucose, serum insulin at 0th, 10th (APIR) and 90th minute (SPIR), sleep and depression and resultant habit changes like mood, diet, activity, and energy were assessed at baseline and after 12 weeks. Study result showed a significant reduction in FBS and mood ($p<0.01$*) and improved APIR and SPIR ($p<0.05$*), as influenced by improved sleep dynamics ($p<0.05$) among subjects of the yoga group as compared to the latter. Although, Univariate linear regression depicted no influence of mood [R2: 0.107; ($F(1,21)= 2.13$, $p=0.07$] but a great influence of improved sleep dynamics among the study population [R2: 0.797; ($F(1,21)= 15.83$, $p<0.01$*]. Current study result manifests yoga as a much effective physical activity than walking in improving phases of insulin release, which is stipulated as being complemented by sleep quality index, thereby preventing the onset of T2DM.

Recent Publications

1. Kurian J, Bhat R. Impact of State Anxiety, Mindfulness on Cardiac Autonomic Variables in Healthy Adults: A Correlational Study. Sci Forschen. 2019.
2. Kurian J, Vijayakumar V, Mooventhan A, Mavathur R. Effect of yoga on plasma glucose, lipid profile, blood pressure and insulin requirement in a patient with type 1 diabetes mellitus. Journal of Complementary and Integrative Medicine. 2021 Sep 1;18(3):649-51.
3. NAGARATHNA R, Kurian J, Vijayakumar V, NAGENDRA HR, MAVATHUR RN. 1160-P: Does Yoga Reduce the Risk of Conversion from Prediabetes to Diabetes by Improving Acute Phase Insulin Release? An Observation from an RCT. Diabetes. 2021.

Biography

Jintu Kurian is working as a Research officer in Molecular Bioscience Lab of Anvesana Research Laboratories under S-VYASA University, a Deemed-to-be-University located in Bangalore, Southern part of India. Her area of research is on expediting the application of Yoga and exploring the mechanisms by which yoga works in preventing, managing or reversing Pre-diabetes and Type 2 Diabetes. Research work of her also focuses on comparing Yoga as a physical activity with other forms of physical activities like walking and aerobics.

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The effects of transcranial direct current stimulation on gait in patients with Parkinson's disease: A systematic review

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[2]Shahid Beheshti University, Tehran, Iran

Background: Gait problems are an important symptom in Parkinson's disease (PD), a progressive neurodegenerative disease. Transcranial direct current stimulation (tDCS) is a neuromodulatory intervention that can modulate cortical excitability of gait-related regions. Despite an increasing number of gait-related tDCS studies in PD, the efficacy of this technique for improving gait has not been systematically investigated yet. Here, we aimed to systematically explore the effects of tDCS on gait in PD, based on available experimental studies.

Methods: Using the PRISMA approach, PubMed, Web of Science, Scopus, and PEDro databases were searched for randomized clinical trials assessing the effect of tDCS on gait in patients with PD.

Results: 18 studies were included in this review. Overall, tDCS targeting the motor cortex and supplementary motor area bilaterally seems to be promising for gait rehabilitation in PD. Studies targeting the dorsolateral prefrontal cortex or cerebellum showed more heterogeneous results. More studies are needed to systematically compare the efficacy of different tDCS protocols, including protocols applying tDCS alone and/or in combination with conventional gait rehabilitation treatment in PD.

Conclusions: tDCS is a promising intervention to improve gait in PD. Anodal tDCS over motor areas showed a positive effect on gait, but stimulation of other areas was less promising. However, heterogeneities of methods and results make it difficult to draw firm conclusions and require systematic exploration of tDCS protocols to optimize efficacy.

Keywords: transcranial direct current stimulation, gait, Parkinson's disease

Recent Publications

1. Pol F, Baharlouei H, Taheri A, Menz HB, & Forghany S (2021). Foot and ankle biomechanics during walking in older adults: A systematic review and meta-analysis of observational studies. Gait Posture. 26 (89),14-24.
2. Pol F, Salehinejad MA, Baharlouei H, & Nitsche MA (2021). The effects of transcranial direct current stimulation on gait in patients with Parkinson's disease: A systematic review. Translational Neurodegeneration, 10 (1), 22.
3. Esfandiari A., Mostamand J., & Baharlouei H. (2020). The Effect of Quadriceps Kinesiotaping on the Dynamic Balance of Young Healthy Women After Fatigue: A Randomized Controlled Trial. Journal of Bodywork and Movement Therapies, 24(4), 462-467.

Biography

Hamzeh Baharlouei is teaching courses in Neurological Physiotherapy at Isfahan University of Medical Sciences for the past 10 years. He recently graduated from Ahvaz Judishapur University of Medical Sciences in Ahvaz, Iran where he researched the effect of transcranial direct current stimulation (tDCS) on balance in older adults. On top of other publications his research in this field has been resulted in two systematic reviews on the effect of tDCS on balance in healthy young and older adults and on gait in patients with Parkinson's disease, the results of which have been published in Neurophysiologie Clinique and Translational Neurodegeneration. His research interests lie in older adults, neurological physiotherapy, gait and balance, and neuromodulation.

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Sour aversion in frontotemporal dementia: A case report and review on physiologic-anatomic mechanisms

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Frontotemporal dementia (FTD) is a common cause of early-onset dementia and accounts for approximately 5-10% of all cases of dementia. FTD is characterized by a broad range of behavioural and personality changes manifested in apathy, emotional blunting, impulsiveness, and social withdrawal which, in turn, is associated with severe neural loss, predominantly involving frontal and temporal lobes. Eating abnormalities are assumed as one of the main symptoms for the diagnosis of behavioural variant FTD. They include overeating, profound alteration in appetite, especially sweet craving, and changes in eating habits. consequently, there may be significant weight gain due to overeating, especially high carbohydrate intake. Feeding disturbances may correlate with the loss of postsynaptic serotonin mostly located in the frontal lobe, hypothalamus, and striatum. we describe a case with a diagnosis of probable bvFTD that demonstrated progressive cognitive decline, more prominent in executive function and language domains. She had suffered from a lack of interest in activities; impairment in social behaviours and change in eating habits. These symptoms markedly affected her daily function. The examination showed severe ideomotor and ideational apraxia, difficulty in sequencing, frequent semantic paraphasia, absent of primitive reflexes including grasp. This pattern of atrophy explains the difficulty in the naming of objects and very low MoCA score. Neuropsychological assessment with Montreal Cognitive Assessment (MoCA) revealed severe impairment in all cognitive domains with a total score of 2 out of 30. The brain MRI of our patient had demonstrated asymmetric anterior temporal atrophy, which was more prominent on the left side. The unique presentation of our patient might reflect damage to limbic structure which is likely to be involved in unpleasant food perception for sour tastes.

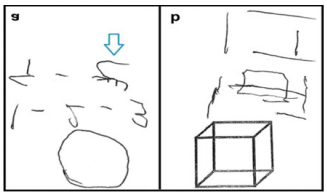

Figure 1: Clock drawing test (A) and copying a cube (B) showed significant impairment in executive/visuospatial function. In addition, the clock drawing test showed conceptual disorder (i.e., the concept of the clock is not perceived). The patient drew a circle with relative normal couture, while she wrote the numbers (i.e., 1 to 4 and the distorted letter form of five in Persian) outside the circle. The arrow represents the letter form of "5" in Persian without its dots (the true form of "five" in Persian is "پنج")

Recent Publications

1. Ahmed, R. M., Irish, M., Kam, J., Van Keizerswaard, J., Bartley, L., Samaras, K., … Piguet, O. (2014). Quantifying the eating abnormalities in frontotemporal dementia. JAMA Neurology, 71(12), 1540 1546.
2. Almasi-Dooghaee, M., Rohani, M., Imani, A., Nadjafi, S., & Zamani, B. J. N. S. (2021). The role of transcranial sonography in differentiation of dementia subtypes: An introduction of a new diagnostic method, Neurological science, 42(1), 275-283.
3. Avery, J. A., Liu, A. G., Ingeholm, J. E., Riddell, C. D., Gotts, S. J., & Martin, A. (2020). Taste quality representation in the human brain. Journal of Neuroscience, 40(5), 1042–1052.

Biography

Taravat Vahedi is a first-year psychiatry resident at Roozbeh Hospital, Iran. She is aspiring to become a Psychologist.

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Neuroscience of sleep and memory applied at school settings

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Sleep is a key factor in memory consolidation. During sleep, information is reactivated, transferred, and redistributed to neocortical areas, thus favoring memory consolidation and integration. While they occur spontaneously, these reactivations can also be induced using external cues linked to the acquired information. Another important process that takes place during sleep is synaptic downscaling. During wakefulness the constant encoding of new information leads to an increase in the net synaptic strength in the brain that saturates learning, downscaling during sleep allows new encoding after waking up. Here, I will present our findings of the effect on consolidation of using an odor previously linked to the acquired information at school to reactivate memory during night sleep, and preliminary data of applying naps at school for strengthening acquisition. Furthermore, I will discuss the possibilities and limitations of their implementation in a school setting.

Recent Publications

1. Vidal, V.; Tassone L. M.; Moyano, M. D.; Capurro, L.; Malacari, R.; Brusco, L. I.; Ballarini, F. M. & Forcato, C. "Short naps in school settings improve memory acquisition of a biology lesson" (in preparation).
2. Vidal, V.; Tassone L. M.; Moyano, M. D.; Vera, R.; Brusco, L. I.; Ballarini, F. M. & Forcato, C."Effects of information relevance on memory consolidation in a high school setting" (in preparation).
3. Bonilla, M.; Vidal, V.; Leon, C. S.; Urreta Benitez, F.; Brusco, L. I.; Flores Kanter, E.; Vázquez Chenlo, A.; Bauza, C. & Forcato, C. (2022). “Differential effects of the covid-19 pandemic situation between young and older adults over recall and recognition” (in revision).

Biography

Vanessa Vidal is a Licentiate in Biology from Universidad Nacional de La Plata (Buenos Aires, Argentina). She is doing her PhD in the Laboratorio de Sueño y Memoria at the Instituto Tecnológico de Buenos Aires (Buenos Aires, Argentina). In her PhD, she is studying the implementation in school of tools derived from the research in sleep and memory neuroscience. Her research intends to bring novel evidence that helps to promote the implementation of tools such as naps at school and targeted memory reactivation during night sleep to improve memory processes at school.

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