P1418 / #1611

Topic: AS09 Motor and Sensory Systems

TRANSCRANIAL DIRECT CURRENT STIMULATION OF THE FRONTAL CORTEX AFFECTS SENSORY GATING

Miriam Nokia, Jan Wikgren

University of Jyväskylä, Dept. Of Psychology, Jyväskylä, Finland

Presenting two similar neutral stimuli in a row attenuates responses to the latter stimulus. This is called sensory gating and it allows efficient use of cognitive capacity when presumably less important stimuli are not processed in full. Further, reflexive responses to a disruptive stimulus are also attenuated if it is preceded by a neutral stimulus. This phenomenon reflects sensory as well as motor gating. There is some evidence that stimulation of the neocortex could enhance sensory and sensorimotor gating, but most studies have only assessed one or the other. We examined the effects of transcranial direct current stimulation (tDCS) of the frontal cortical areas on sensory gating in healthy young adults aged 20-30 years. We subjected participants either to sham-tDCS or tDCS for 10 minutes ($<$ 2 mA). Starting approximately 10 minutes after that, we recorded performance in an auditory paired-click (CLICK) task and in an auditory paired-pulse inhibition (PPI) task involving a loud startle stimulus. Both tasks lasted about 20 min and the order was counterbalanced. We measured sensory gating in the CLICK task with electroencephalogram (P50 evoked response) and sensorimotor gating in the PPI task with electromyogram from the eyelid (eyeblink). Sensorimotor gating was enhanced by tDCS. That is, during the PPI task, eyeblinks elicited by the startle stimulus were attenuated more in the tDCS group compared to the sham-tDCS group. Our result supports the notion that sensorimotor gating can be improved with cortical stimulation.

Declaration of Interest Statement: None

https://doi.org/10.1016/j.ibneur.2023.08.1424

P1419 / #2590

Topic: AS09 Motor and Sensory Systems

A VIRTUAL REALITY PLATFORM FOR THE ANALYSIS OF NEURAL CIRCUITS THAT CONTROL GAZE

Carmen Núñez-González [1], Marta Barandela [1], Cecilia Jiménez-López [1], Abraham Segade [2], Tobias Wibble [3], Juan Pérez-Fernández [1]

[1] *CINBIO, Universidade de Vigo, Neurocircuits Group, Vigo, Spain*
[2] *CINTECX, Universidade de Vigo, Department Of Mechanical Engineering, Vigo, Spain*
[3] *Karolinska Institutet, Department Of Clinical Neuroscience, Stockholm, Sweden*

The appearance of image-forming eyes enabled animals to use vision for advanced behavioural repertoires requiring mechanisms to stabilize the world in the retina to prevent image degradation. In vertebrates, visual stabilization is achieved via two reflexes, the vestibulo-ocular reflex (VOR), and the optokinetic reflex (OKR), that generates compensatory movements, by whom vertebrates minimize image blurring. This two reflexes act together compensating head movements disturbance and contribute to robust eye movement control. While the organization of neuronal circuits underlying VOR is well-described across vertebrates, less is known about the OKR and the basic structures allowing visuo-vestibular integration. We use the lamprey, the oldest extant vertebrate, which shows remarkable similarities with other vertebrates in gaze control. To analyse the neuronal pathways underlying visuo-vestibular integration, we developed an innovative experimental setup, using a lamprey eye-brain-labyrinth preparation, which allowed coordinating electrophysiological recordings, vestibular stimulation with a roll-axis-moving platform, and visual stimulation via screens; enabling us to analyse the visuo-vestibular integration in the brain, and monitor the evoked motor responses by video analysis or electromyograms. We have discovered that lampreys have both VOR and OKR, which have additive effects on eye movements, and nystagmus beats, considered to be the origin of saccades. This three types of movements are considered the origin from which all types of eye movements derive. To investigate how gaze stabilizing and goal-directed gaze movements interact, we developed a more complex platform that allows rotational and translational movements on several axes, combined with screens, working as a simple virtual reality. We can apply optokinetic and non-optokinetic visual stimuli combined with different vestibular stimuli, while recording neuronal activity allowing us to analyse the integration and motor responses of complex visuo-vestibular paradigms simulating swimming episodes without the influence of motor commands.

Declaration of Interest Statement: None

https://doi.org/10.1016/j.ibneur.2023.08.1425

P1420 / #1899

Topic: AS09 Motor and Sensory Systems

TRANSCRIPTIONAL PROFILING OF DENTAL SENSORY AND PROPRIOCEPTIVE TRIGEMINAL NEURONS USING SINGLE-CELL RNA-SEQUENCING

Seog Bae Oh [1], Pa Reum Lee [1], Jihoon Kim [2], Junhyong Kim [3]

[1] *Seoul National University School of Dentistry, Neurobiology And Physiology, Seoul, Korea, Republic of*
[2] *University of Pennsylvania, Genomics And Computational Biology, Philadelphia, United States of America*
[3] *University of Pennsylvania, Biology, Philadelphia, United States of America*

The dental sensory and proprioceptive trigeminal neurons are necessary to control masticatory functions. Despite recent studies that classify cell types of the trigeminal ganglion (TG) or dental primary afferent (DPA) neurons, there is still a lack of knowledge about the molecular diversity of DPA neurons and pure proprioceptive sensory neurons located in the brainstem, called the mesencephalic trigeminal nucleus (MTN or Mes5) that makes up the trigeminal system. Here, we performed single-cell RNA-sequencing (scRNA-seq) on DPA neurons and MTN neurons identified by retrograde labeling from the mouse molar teeth and masseter muscle associated with mechanosensation. With high sequencing depth of the transcriptome, our single-cell transcriptome analysis identified five main types of DPA neurons in adult mice and found cell type-specific enriched genes. The DPA neurons possess not only canonical subtypes of TG neurons but also potentially unique features as peptidergic mechanosensitive nociceptors that are silent under