



MEDIZINISCHE
FAKULTÄT

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Institut für Medizinische Psychologie

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1. LEITUNG

Prof. Dr. phil. Kerstin Krauel (Vertretungsprofessur)
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2. HOCHSCHULLEHRER/INNEN

Prof. Dr. phil. Kerstin Krauel
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3. FORSCHUNGSPROJEKTE

Projektleitung: Prof. Dr. Bernhard Sabel
Projektbearbeitung: Luisa Fricke
Förderer: Stiftungen - Sonstige - 01.05.2020 - 30.09.2024

The influence of eye yoga on vascular regulation and neuroplasticity in vision loss

In glaucoma which leads to neuro-visual damage of retina, optic nerve or brain, vision can be partially restored by rehabilitation, but underlying neurovascular plasticity mechanisms are unclear.

Because long-term mental stress is a main cause of glaucoma, we conducted a randomized, controlled trial to study if relaxation using eye-yoga exercises combined with breathing meditation can improve visual field and eye movement dysfunction and normalize the typical vascular dysregulation.

While regarding the visual field analysis no significant improvements were detected in controls, vision recovery was observed in eye-yoga patients ($p=0.001$).

An interim analysis suggests that relaxation induced by eye-yoga and meditation is helpful to recover visual field loss and neurovascular regulation. The final conclusion need to wait the RCT completion.

Projektleitung: Prof. Dr. Bernhard Sabel
Projektbearbeitung: Wanshu Zhou
Förderer: Haushalt - 01.01.2018 - 31.05.2024

Vascular dysregulation in glaucoma: retinal vasoconstriction and normal neurovascular coupling in altitudinal visual field defects

Purpose: Vascular dysregulation (VD) is a major factor in glaucomatous visual defect progression. However, little is known if neurovascular coupling (NVC) is impaired in glaucomatous retinal vessels and how it relates to vessel morphology and altitudinal visual field defect depth. To better predict the glaucomatous visual defect progression and possible vision restoration and establish personalized intervention, we need to further study the role of VD and NVC in glaucoma.

Methods: Using a dynamic vessel analyzer (DVA) we quantified retinal vessel diameters and dilation responses following neuronal activation by flickering light stimulation in primary open angle glaucoma (POAG) patients (n=30) and age-matched, healthy controls (n=22). Vessel dilation dynamics was measured as a function of vessel branch level (diameter) and degree of visual field impairment.

Results: In larger blood vessels average arterial and venous retinal vessel diameter was significantly smaller in glaucoma. However, when inducing neuronal activity by exposing the retina to flickering light, both arterial and venous dilation reached normal values despite having smaller diameters. This was largely independent of visual field depth.

Conclusions: Because dilation/constriction is normal, VD in glaucoma cannot be explained by impaired NVC but is rather caused by vasoconstriction. This may permanently limit energy supply to retinal (and brain) neurons and, depending on the extent of deprivation, lead to either long-term hypo-metabolic, surviving "silent" neurons or to cell death. The results we found will help with the establishment of predictive model based on VD in glaucoma progression and possible restoration in follow-up studies.

Projektleitung: Prof. Dr. Bernhard Sabel
Projektbearbeitung: Zheng Wu
Förderer: Haushalt - 16.11.2015 - 30.04.2024

Spacetime in the Brain: rapid brain network reorganization in visual processing and recovery

Purpose: Although it is known that optic nerve damage, for example after glaucoma or optic neuropathy, a *local* event, alters *global* functional connectivity networks (FCN) in the brain resting state, it is unknown if and how visual deprivation affects the dynamics of transient and rapid brain FCN changes. The synchronization between brain regions is essential for the integration between visual and non-visual modalities in time and space, and if a patient detects - or fails to detect - visual stimuli is rather variable and may depend on the FCN response to visual stimuli.

Methods: In patients with optic nerve damage (n=19) and healthy subjects (n=14), the ability to detect super-threshold stimuli was related to parameters of the "event related network analysis (ERNA) based on graph theory immediately following successful (hits) or unsuccessful stimulus detections (misses). Graph-based features of transient and dynamically synchronized networks were described following stimulus onset to compare different visual field states of normal and partially damaged visual field sectors (areas of residual vision, ARVs).

Results: Compared to controls, hits in the *intact* visual field sector in patients were associated with connectivity topology changes characterized by less cluster, but more large scale connections with low efficiency. In areas of residual vision, hits in patients evoked a network dynamic change with weaker node strength and less clustering, shorter characteristic path length and poorer small-world-ness than hits in their intact field. These rapid FCN topology changes happened primarily in high alpha and beta band in the late "cognitive processing stage (300-600 ms).

Conclusion: Patients with optic nerve damage have a weaker processing balance of functional integration and segregation during the cognition which reduces local and global information interactions. FCN fluctuations are thus a physiological ...

Mehr hier

4. VERÖFFENTLICHUNGEN

BEGUTACHTETE ZEITSCHRIFTENAUFsätze

Jia, Shuwen; Mei, Xiaolin; Chen, Lilin; Chan, Lok Hin; Tsang, Celia; Suen, Venus; Li, Tingni; Zaw, Myo Win; Liu, Amanda; Thompson, Ben; Sabel, Bernhard A.; Woo, George; Leung, Christopher K. S.; Yip, Shea-ping; Chang, Dorita H. F.; Cheong, Allen M. Y.

Glaucoma Rehabilitation using ElectricAI Transcranial Stimulation (GREAT) - study protocol for randomized controlled trial using combined perceptual learning and transcranial electrical stimulation for vision enhancement
Trials - London : BioMed Central, Bd. 25 (2024), Artikel 501, insges. 18 S.

[Imp.fact.: 2.0]

Mei, Xiaolin; Tsang, LaiLin; Jacques, Theodore; Sabel, Bernhard A.; Leung, Christopher Kai Shun; Chan, Jonathan Cheuk Hung; Thompson, Benjamin; Cheong, Allen Ming Yan

Glaucoma rehabilitation using electricAI transcranial stimulation (GREAT) - optimizing stimulation protocol for vision enhancement using an RCT

Translational Vision Science & Technology - Rockville, Md. : ARVO, Bd. 13 (2024), Heft 9, Artikel 25, insges. 13 S.

[Imp.fact.: 2.6]

Teixeira da Silva, Jaime A.; Daly, Timothy; Türp, Jens Christoph; Sabel, Bernhard A.; Kendall, Graham

The undeclared use of third-party service providers in academic publishing is unethical - an epistemic reflection and scoping review

Naunyn-Schmiedeberg's archives of pharmacology - Berlin : Springer, Bd. 397 (2024), insges. 13 S. ;

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[Imp.fact.: 3.1]

Thein, Julia; Linnhoff, Stefanie; Voges, Jürgen; Galazky, Imke; Zähle, Tino

Enhancing attentional performance in Parkinson's disease - the impact of combined deep brain stimulation of the substantia nigra pars reticulata and the subthalamic nucleus

The American journal of medicine - New York, NY : Excerpta Medica, Bd. 137 (2024), Heft 7, S. 673-676

[Imp.fact.: 5.1]

Thompson, Benjamin; Morrone, Maria Concetta; Bex, Peter; Lozama, Anthony; Sabel, Bernhard A.

Harnessing brain plasticity to improve binocular vision in amblyopia - an evidence-based update

European journal of ophthalmology - Thousand Oaks, CA : Sage Publishing, Bd. 34 (2024), Heft 4, S. 901-912

[Imp.fact.: 1.4]

DISSERTATIONEN

Zhou, Wanshu; Vorwerk, Christian; Kotliar, Konstantin

The Role of Vascular Dysregulation in Long-COVID and Glaucoma - Cause of Vision Loss and Mechanism of Restoration

Magdeburg: Otto-von-Guericke-Universität Magdeburg, 2023, Dissertation Universität Magdeburg 2024, IX, 80 Blätter