Biomarkers of migraine: setting the path

Neuroimaging

Arne May, Dept. of Systems Neuroscience, University of Hamburg
a.may@uke.de
Lauritzen & Olesen, Brain. 1984; Andersen Arch Neurol. 1988; Olesen J Ann Neurol. 1990
Daily fMRI in Migraine: Imaging Data of Migraine Phases

Schulte & May; BRAIN 2016
Hierarchical Alteration of Brain Structural and Functional Networks in Female Migraine Sufferers

Jixin Liu¹, Ling Zhao², Guoying Li¹, Shiwei Xiong¹, Jiaofen Nan¹, Jing Li¹, Kai Yuan¹, Karen M. von Deneen¹, Fanrong Liang², Wei Qin¹, Jie Tian¹

¹School of Life Sciences and Technology, Xi'an University, Xi'an, China, ²The 3rd Teaching Hospital, Chengdu University of Traditional Chinese Medicine, Chengdu, China, ³Institute of Automation, Chinese Academy of Sciences, Beijing, China

migraine n = 43
controls n= 43

Gray matter volumes
Resting-state
Graph theory-based approaches

2021: more than 200 publications
Central effects of erenumab in migraine patients
An event-related functional imaging study

Christian Ziegler, MD, Jan Mehnert, PhD, Katharina Aasrussen, MD, and Arne May, MD, PhD
Neurology® 2020;95:e2794-e2802. doi:10.1212/WNL.0000000000010740

Session1>session2, 27 subjects
**Central effects of Galcanezumab**

Visit 1 > Visit 2 [n = 26]

Galcanezumab reduces hypothalamic activation to trigemino-nociceptive stimuli

\[ P_{\text{uncorrected}} < 0.0005 \approx T > 3.73 \]

**Responder > Non-Responder**

Visit 1 > Visit 2) [n = 15]

Galcanezumab reduces hypothalamic activation significantly more in responders

\[ P_{\text{uncorrected}} < 0.005 \approx T > 3.01 \]

Basedau et al. submitted
Topiramate modulates nociceptive processing in thalamo-cortical networks
Mean pain intensity ratings were not significantly altered under metoprolol. Functional imaging revealed no significant differences in nociceptive processing in both groups.

Using a more liberal and exploratory threshold, hypothalamic activity was slightly increased under metoprolol in patients and migraineurs.

1\textsuperscript{st} study: double blind, randomized, placebo controlled design, $n=26$

2\textsuperscript{nd} study: migraine patients (within-subject design) $n=19$
Summary

• Neuroimaging is capable of delivering biomarkers
  • For the headache type
  • For a better understanding of pathophysiology
  • For a better understanding how medication works
• Cannot be done for individual patients - yet
Thank you for your attention!