RUHR-UNIVERSITÄT BOCHUM

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IGSN - SYMPOSIUM

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From Bench to Bedside: Advances in Understanding Chronic Pain

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Neural correlates of pain: learning, modulation, and implications for chronic pain

Pain is a multifaceted, subjective experience whose neural mechanisms are only partly understood. Identifying the neural correlates of different pain phenotypes is crucial for advancing translation. Conceptualizing as a learning signal, pain normally shapes behavior to maintain body integrity. When these learning processes become maladaptive, they can contribute to the development and maintenance of chronic pain. However, some individuals are more prone to develop chronic pain, that is a considerable interindividual variability is present and this might be presented in the neural correlates of pain learning. Therefore, an objective marker of pain related learning would hold promise for elucidating the mechanisms of pain learning and, in turn, partially of chronic pain. To move toward objective, brain-based markers, we examine how information linked to pain learning is expressed in resting-state functional brain networks. In line with state-of-the art open science tools, we developed a multivariate predictive model that successfully predicts individual differences in pain related learning. Interpreting the model's components provides insight into distributed regions and networks implicated in pain modulation and learning. Because it is readily implementable with standard resting-state data, this model represents a promising biomarker candidate for clinical and translational pain research, with potential applications in risk stratification and personalized treatment approaches.

Key papers:

Kincses, B., Forkmann, K., Schlitt, F. et al. An externally validated resting-state brain connectivity signature of pain-related learning. Commun Biol 7, 875 (2024). https://doi.org/10.1038/s42003-024-06574-y

Spisak, T., Kincses, B., Schlitt, F. et al. Pain-free resting-state functional brain connectivity predicts individual pain sensitivity. Nat Commun 11, 187 (2020). https://doi.org/10.1038/s41467-019-13785-z

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