Ruprecht-Karls-Universität Heidelberg
Medizinische Fakultät Mannheim
Dissertations-Kurzfassung

Neural correlates of learning and inhibition: Relevance for anxiety and stress-related disorders

Autor:	Tobias Winkelmann
Institut / Klinik:	Zentralinstitut für Seelische Gesundheit (ZI)
Doktorvater:	Prof. Dr. H. Flor

The present dissertation investigated neurobiological correlates of interindividual differences in two mechanisms centrally related to the pathogenesis of anxiety and stress-related disorders: pavlovian conditioning and inhibition.

The first study focused on structural concomitants of acquisition and extinction learning of conditioned fear in 68 healthy young adults undergoing pavlovian cued differential delay conditioning. Differential skin conductance responses during fear acquisition were positively associated with right amygdala volume as computed with the semi-automated segmentation software Freesurfer, while no other subcortical structure volumes were associated with the amount of acquired fear. Moreover, cortical thickness of a cluster within the right ventromedial prefrontal cortex (vmPFC) was significantly positively correlated with a differential autonomic index of extinction learning. Both results were replicated in an independent subsample of 53 subjects. Self-reports of arousal, valence and contingency showed no significant association with subcortical volumes or cortical thickness at any vertex of the cortex. In conclusion, the study underlines the importance of the amygdala in fear processing. In addition, it suggests the involvement of the right vmPFC in the initial inhibition of extinction learning.

The second study examined brain morphology correlates of vagally-mediated resting heart rate variability (HRV). Extending previous findings implicating the anterior cingulate cortex (ACC) in cardiac regulation, we showed in a sample of 30 healthy volunteers, that thickness of the right rostral dorsal ACC is significantly positively correlated with HRV at rest, while no other subcortical structure or cortical cluster was associated with vagal tone.

The two highlighted studies demonstrate associations between prefrontal cortical thickness and two important indices of self-regulatory capacity and adaptability. Moreover, the results are in line with the proposal of conditionability and resting HRV as important mechanisms involved in anxiety and stress-related disorders, providing dimensional correlates of psychopathology.