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Brain Functional Correlates of Psychopathology and Neurocognition in Young Adults

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Patients with major depressive disorder (MDD) demonstrates a relatively higher relapse risk and exhibit considerable clinical and biological heterogeneity with possible distinct neurophysiological mechanisms. In this chapter, we adapt an approach of neural circuit taxonomy and will demonstrate brain network-based correlates of clinical symptom subtypes in MDD. First, anhedonia might encompass negative-affect-circuit dysfunction and reward processing dysfunctions. Structural covariance of brain grey matter morphologies within the salience and limbic networks, and among the salience-limbic-default mode-somatomotor-visual networks are reflective of anhedonia in depression. Second, hyper-activation of default-mode network and lowered functioning of fronto-parietal network underlie thought rumination. Third, altered functioning of salience network could contribute to difficulty distinguishing relevant salient cues and anxious avoidance. Fourth, hyper-activation of limbic network and increased connectivity with default-mode network might contribute to heightened negative bias and negative affect. Fifth, hypo-functioning of fronto-parietal network and dorsal attention network might underlie inattentiveness and cognitive dyscontrol. Finally, limbic, salience, fronto-parietal, and subcortical networks including the thalamus orchestrate in suicidality of MDD.

Keywords: Major depressive disorder, Neural circuit taxonomy, Magnetic resonance imaging, Functional brain network, Precision psychiatry