Disruption of the thalamo-cortical system in schizophrenia: a meta-analysis of resting-state functional connectivity

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Background:
Schizophrenia is a brain disease characterized by abnormal resting-state functional connectivity (rs-FC). More specifically, communication among large-scale intrinsic brain networks covering the thalamo-cortical system is impaired. However, due to the lack of quantitative meta-analyses, no consistent patterns of network dysfunction across studies have emerged so far.

Methods:
Forty-six studies comparing seed-based rs-FC between patients with schizophrenia and healthy controls (in total 1680 patients and 1792 controls) were included in the meta-analysis. Seed regions were categorized into a priori defined functional brain networks. A multilevel kernel density analysis (MKDA) was conducted for each seed network to identify brain regions with consistent and specific hyper- and hypoconnectivity with these networks in schizophrenic patients.

Results:
Connectivity between the salience network and both ventral and dorsal striatum was reduced in patients. Connectivity of both frontoparietal and default mode networks was reduced with the thalamus.

Conclusions:
Results provide evidence that in schizophrenia, two important pathways of the cortico-thalamic system are impaired: 1) thalamo-cortical connectivity with default mode and frontoparietal networks and 2) cortico-striatal connectivity with the salience network, which in turn modulates the thalamo-cortical system. Data suggest a substantial re-organization of the thalamo-cortical system in schizophrenia spectrum.