Elevated Between-Network Connectivity following Divergent Thinking
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Background: Previous study explored the functional localization of creativity in human brain based on Alternative Uses test (AUT) in task-based fMRI (1). Since the creativity is an automatic process, the network connectivity may alter its baseline status after the divergent thinking. Recent study reported the changes of resting-state functional connectivity (RSFC) of default-mode network (DMN) after divergent thinking(2). However, we considered that brain reorganizations following divergent thinking could impact multiple networks beyond DMN. Therefore, we conducted a global survey on the RSFC alterations after divergent thinking.

Methods: 30 healthy volunteers (12 males, age: 20-50 y/o, all right-handed) were recruited and scanned in a 3T PRISMA scanner. Each session included 2 resting task, before (Rest1) and after (Rest2) the creative task AUT. During AUT, participants were asked to think the usage of pictures for 15 minutes. Functional images were preprocessed using AFNI in a standard procedure. The global RSFC search was based on the paired correlation from the AAL templates and the seed-based correlation was also applied for DMN network (AlphaSim corrected p<0.05).

Results: After AUT, the DMN presented broadened spatial extent of RSFC (upper panel), without significant changes in connectivity strength (data not shown). From the global survey of 114 AAL regions (lower right) between two resting scans, the elevated correlation was found resided in angular-visual connectivity or the connectivity between posterior cingulate and basal ganglia (putamen/pallidostriatum).

Conclusions: We compared global interactions of RSFC before and after 15-min AUT. We found that connectivity strength remained unchanged within DMN but the connectivity between DMN and sensory systems increased after divergent thinking tasks.

Reference: