Brain network topology in schizophrenia: mapping the dysfunctional substrates of the illness.
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Abstract:
Current understanding of schizophrenia associates this disorder with alterations in the functional organization of the brain. Resting-state functional connectivity studies have tried to characterize global and local changes induced by this mental illness, but results are still controversial. Recently, network neuroscience, a branch of neuroscience that derives its tools of investigation from graph theory, shed some light on the functional and structural modifications occurring to the brain that can give rise to the recognized symptomatology of schizophrenia. Here, using a novel network analysis of spontaneous low-frequency functional MRI data recorded at rest, we show that the distribution of the connectivity strength among brain regions is spatially more homogeneous in schizophrenic patients with respect to healthy ones. As a consequence, the precise hierarchical modularity of healthy brains is crumbled in schizophrenic ones, making possible a peculiar arrangement of the functional connectome, characterized by several topologically equivalent backbones.
We hypothesize that the manifold nature of the basal scheme of the functional organization within the brain, together with its altered hierarchical modularity, may be causally related to the pathogenesis of schizophrenia.