Cortical Thickness Abnormalities within the Salience and Reward Networks in Older Depressed Adults with Apathy

Abstract

Background and significance: Apathy is a common comorbidity in late-life depression. Amongst older depressed adults, apathy is associated with a number of adverse outcomes, including increased disability, comorbid illness, and mortality. The etiological substrates of apathy in late-life depression nonetheless remain poorly understood, and little is known about its optimal treatment. To this end, the aim of the current study was to examine cortical abnormalities within the salience (SN) and reward networks (RN), two brain systems that may underlie the syndrome of apathy in older depressed adults.

Methods: We examined the association between apathy severity and cortical thickness of the right insula, caudal anterior cingulate cortex (cACC), rostral anterior cingulate cortex (rACC), medial orbitofrontal cortex (mOFC), and lateral orbitofrontal cortex (lOFC) in 49 individuals with late-life depression before and after 12 weeks of antidepressant treatment with the selective serotonin reuptake inhibitor (SSRI) escitalopram. Apathy severity was quantified using the Apathy Evaluation Scale (AES). Cortical thickness was computed using FreeSurfer. Regions of interest (ROIs) were parcellated using the Desikan-Killiany atlas.

Results: Within the SN, cortical thickness of the insula was significantly associated with response of apathy symptoms to escitalopram, as well as severity of apathy symptoms after 12 weeks of treatment. Thickness of the cACC, which is involved in both salience and reward processing, was not

associated with apathy at any time. Within the RN, thickness of the rACC was significantly related to apathy severity at baseline. Thickness of the mOFC and lOFC was not associated with apathy at any time. Exploratory analyses examining the association between cognitive functions and apathy revealed a relationship between response of apathy symptoms to treatment and several aspects of cognition, including processing speed, executive functioning (i.e., set shifting and source monitoring), and memory (i.e., retrieval of verbal information). *Conclusions*: The results of this study support the premise that apathy is an etiologically distinct syndrome that is common in late-life depression. The neuroanatomical involvement of the insula and rACC suggests a role for disturbances in both salience and reward processing in the clinical expression of apathy in older depressed adults.