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Altered functional networks post chemotherapy in a pediatric population

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Due to the growing number of survivors of childhood leukemia, it is important to understand the effects of chemotherapy treatment on cognition in the developing brain. It was hypothesized that patients treated with chemotherapy would show decreased functional connectivity compared to healthy controls. Five survivors of hematologic and solid tumors (12.8±3.7 yo) previously treated with chemotherapy and 15 healthy controls (17.4±4.84 yo) were recruited for this study. Patients were roughly six years post chemotherapy at the time of the study. Each subject underwent a structural MPRAGE and a resting state functional MRI using a 3.0T Siemens scanner. Subjects were asked to lie still with their eyes closed for the resting state sequence. A seed-based analysis was performed using the CONN toolbox for SPM. Patients showed decreased functional connectivity within the salience network when compared to controls. In particular, there was decreased connectivity to the frontal pole (p=0.0), the superior frontal gyrus (p=0.0), the putamen (p=0.0), and the cuneus (p=0.0). Patients showed a slight increase in connectivity within the default mode network, in particular to the frontal pole (p=0.001) and the precuneus (p=0.002). Patients also showed an increase in connectivity in the dorsal attention network (p=0.002) and the fronto-parietal network (p=0.001). Patients have altered functional networks compared to controls, which is most likely the result of chemotherapy treatment. The decrease in connectivity within the salience network could result in the lowered self-awareness, as well as decreased ability to concentrate and attend to important stimuli which has been described by patients.

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