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robiological processes of BD and may be applied in diagnostics and therapy selection, e.g., using machine learning approaches.

No conflict of interest

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P.0278
Structural brain abnormalities associated with cognitive impairments in bipolar disorder

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Cognitive impairment has been highlighted as a core feature of bipolar disorder (BD) that often persists during remission. The specific brain correlates of cognitive impairment in BD remain unclear which impedes efficient therapeutic approaches. Emerging evidence points to cognitive heterogeneity among BD patients with some being globally impaired while others retaining relatively normal cognitive capacity [1,2]. The aim of the study was to cluster a large group of BD patients into cognitively impaired and normal and investigate structural brain abnormalities associated to cognitive deficits.

Remitted BD patients (n = 153) and healthy controls (HC n = 52) underwent neuropsychological assessment and a structural MRI scanning at 3T at Copenhagen University Hospital, Rigshospitalet. We first performed a hierarchical cluster analysis (HCA) to cluster the BD patients according to their cognitive performance based on four cognitive measurements: processing speed, sustained attention, verbal learning and memory, and working memory and executive functions. The neurocognitive subgroups were compared to each other and with healthy controls in terms of regional cortical thickness and volume within the dorsal prefrontal cortex (PFC), total hippocampal volumes and shape, and total cerebral white matter and cortical gray matter volume and thickness. We used the FreeSurfer image analysis suite v7.1.0 [3,4] to perform a vertex-wise analysis of the dorsal PFC and extract volumetric measures. The FSL FIRT software [5] was used to perform a vertex-wise analysis of the hippocampal surface. Age, sex and the total intracranial volume computed by the automated FreeSurfer segmentation were used to remove the effect of these factors from all structural analyses.

The HCA analysis identified two clusters of BD patients: cognitively impaired (CI n = 91) and cognitively normal (CN n = 62). The CI patients had lower cognitive performance across all four tested cognitive domains compared to both CN patients (p < 0.001) and HC (p < 0.001). There were no differences between CN and HC in any of the cognitive domains. The CI patients displayed greater left dorsomedial prefrontal thickness (superior frontal gyrus) compared to CN patients (p = 0.016) and HC (p = 0.02). Hippocampal grey matter volume and shape were similar across patient subgroups and HC. At a whole brain level, CI patients had lower cerebral white matter volume compared to both CN (p = 0.006) and HC (p = 0.01) groups, but there was no significant difference when comparing the patient subgroups with each other or with the HC in total cortical grey matter volume or average cortical thickness. Across all participants, lower white matter volume correlated with more impaired neuropsychological test performance.

Taken together, our findings associate cognitive impairment in BD with cerebral white matter deficits, factor which may lead to increased neurocognitive effort to maintain symptom stability, a compensatory processes responsible for the neuroplastic morphological changes in dorsomedial PFC in these patients.

No conflict of interest

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Neural underpinnings of depressive and post-traumatic symptomatology in covid-19 survivors: a voxel-based morphometry study

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Background: A high prevalence of depression, anxiety, insomnia and PTSD has been reported in COVID-19 survivors [1]. This is similar to what previously observed in other Coronavirus-related diseases such as SARS and MERS [2]. The pathophysiology of post-infection neuropsychiatric symptoms is likely to be multifactorial, with a role played by inflammatory and immunological factors [3], but it is still largely unknown; we thus investigated COVID-19 survivors via 3T MRI imaging to identify neural underpinnings of post-infection neuropsychiatric symptoms in order to further elucidate their complex pathophysiology.

Methods: Covid-19 survivors were recruited during an ongoing prospective cohort study at IRCCS San Raffaele Hospital in Milan; psychopathology was initially measured via several self-report questionnaires (Impact of Events Scale-Revised (IES-R), Zung Self-Rating Depression Scale (ZSDS), 13-item Beck’s Depression Inventory (BDI)); subsequently patients (n=28) underwent 3T MRI scanning (Philips 3T Ingenia CX scanner with 32-channel sensitivity encoding SENSE head coil). T1 weighted images were processed using Computational Anatomy Toolbox (CAT12) for Statistical Parametric Mapping 12 (SPM12) in Matlab R2016b: segmentation into Gray Matter, White Matter and cerebrospinal fluid, bias regularization, non-linear modulation and normalization to MNI space were performed; measures of Total Intracranial Volume (TIV) were obtained and images were smoothed with an 8-mm full width at half maximum Gaussian filter. Multiple regressions were performed using SPM12 software package: with no a priori regions of interest selected, whole-brain gray matter volumes were used as dependent variables, psychometric scales scores as independent variables, and age, sex and TIV as nuisance covariates.

Results: After VBM regression analysis covarying for age, sex and TIV, ZSDS Index scores were inversely correlated with gray matter volume in the Bilateral Anterior Cingulate Cortex (MNI 2, 24, 28, cluster level pFWE = 0.045, k=767); furthermore 3 cluster were identified comprising again the anterior cingulate cortex and the insular cortex bilaterally in which IES-R scores were inversely correlated with gray matter volumes (Cluster 1: MNI -30, 9, 3, cluster level pFWE = 0.005, k=1284; Cluster 2: MNI 36, -3, -3, cluster level pFWE = 0.037, k=773; Cluster 3: MNI 9, 30, 28, cluster level pFWE = 0.038, k=766). No other statistical significant result was found.

Conclusions: Our study identified an inverse correlation between anterior cingulate cortex volumes and depressive symptomatology, measured via ZSDS, and between bilateral insulae and anterior cingulate cortex volumes and the degree of distress in response to the traumatic event, measured via the IES-R. Analogous findings have already been reported in patients with Major depression [4] and PTSD [5], and our study confirms the role of volumetric reductions of these brain regions in depressive and post-traumatic symptomatology. Given the nature of our study it is not possible to infer whether the reduction of gray matter volume is a consequence of the Covid-19 infection itself or, as it appears more likely, precede the infection acting as predisposing factor for the subsequent development of depressive and post-traumatic symptomatology.

No conflict of interest

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P.0281

Cholinergic manipulations in the ventral tegmental area and hippocampal theta rhythm in urethane-anesthetized rats

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Introduction.

Theta electroencephalographic rhythm is one of the most interesting electrophysiological phenomena - highly synchronized electrical activity of the hippocampus, which plays a key role in processes important to the right functioning of human beings such as learning and memory, spatial navigation, cognitive processes and REM sleep. Theta registrations in deep narcotic rats are used in studies of selected structures of the rhythm control system. The structures participating in induction and regulation of theta rhythm include the brainstem, medial septum and hippocampal formation, and they constitute “the theta rhythm synchronization system”. Our research indicates that this system also includes the midbrain ventral tegmental area (VTA). VTA ap