Corina O Bondi, J Neurol Neurophysiol 2017, 8:2 (Suppl)
http://dx.doi.org/10.4172/2155-9562.C1.046

Effects of chronic unpredictable stress on cognitive and depressive-like behaviors following experimental brain trauma

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Traumatic brain injury (TBI) affects 2 million individuals in the United States each year, and many survivors endure cognitive impairments, while also being vulnerable to neuropsychiatric disorders. Clinical and preclinical research has highlighted the importance of chronic stress as a major risk factor for many psychopathological conditions. In the current study, we are assessing clinically-relevant cognitive-behavioral and anxiety-like dimensions sensitive to both TBI and chronic unpredictable stress (CUS). We hypothesized that moderate TBI produced by controlled cortical impact (CCI) injury, as well as CUS exposure will render cognitive impairments in male rats in an attentional set-shifting test (AST), reduced sucrose preference and open field exploration, blunted weight gain, elevated stress hormones and inflammatory markers. Anesthetized adult male rats were subjected to a CCI (2.8 mm cortical tissue deformation) or sham injury over the right parietal cortex. Rats were then randomly assigned to receive CUS (21 days) or 30 sec of handling (CTRL). Upon cessation of stress, rats were tested for perceived state of anxiety (open field test) and anhedonia (preference of 1% sucrose-water versus regular water). At 4 weeks post-surgery, rats were then tested on the AST, which involves a series of increasingly difficult discriminative tasks to obtain food reward. While TBI and CUS alone impaired behavioral flexibility on AST, as expected, the combination group (TBI+CUS) does not seem to negatively impact exploration in the open field, sucrose preference or AST performance (n=8-12/group). Moreover, serum levels of corticosterone (CORT), and inflammatory markers (IL-1β and TNFα) were paradoxically reduced in the TBI+CUS rats compared to controls, suggesting a putative enhanced resilience in this group. This ongoing project will provide novel outcomes pertaining to cognitive capability, as well as anxiety- and depressive-like symptoms following overlapping chronic stress exposure and the recovery phase of TBI.

Biography

Corina Bondi, PhD, is an Assistant Professor in the Department of Physical Medicine and Rehabilitation and at the Safar Center for Resuscitation Research at the University of Pittsburgh. Her research interests focus on characterizing therapeutic strategies after experimental traumatic brain injury, such as pharmacotherapies and environmental enrichment, for complex cognitive processing deficits and distinct neurobehavioral and neurochemical alterations relevant to psychiatric disorders.

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