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Therapeutic interventions after experimental brain trauma: The good and the not-so-good

Introduction: Traumatic Brain Injury (TBI) affects two million people in the United States each year and several million more worldwide, making it a significant health care issue. Motor vehicle accidents and falls resulting in a blow to the head are the typical causes of TBI in the general population, whereas blasts and shrapnel from improvised explosive devices are the leading causes for military personnel in active war zones. Brain traumas range from mild to severe with the former being the case in the majority of occurrences and generally not displaying marked behavioral symptoms, while the latter occurs less often, but presents significant motor and/or cognitive dysfunction, as well as agitation and aggression. Numerous preclinical therapies have been evaluated, but have not translated to the clinic.

Methods: In this presentation, two therapeutic interventions that are used in my laboratory will be discussed. The first is Environmental Enrichment (EE), a preclinical model of neurorehabilitation that has been shown to confer motor, cognitive, and histological benefits after TBI. The second is the use of Antipsychotic Drugs (APDs). Because agitation is common after TBI, patients are provided APDs so that they can be safely managed. The use of chronic as well as intermittent APD administration will be discussed, as well as their combination with EE. The data presented are derived from anesthetized adult male/female rats that received a cortical impact of moderate severity or sham injury and were then randomly assigned to EE or standard (STD) housing.

Results: The results generally show that motor and cognitive function is significantly improved in the EE vs. vehicle control groups and that APDs impede functional recovery.

Conclusions: EE can be considered a robust preclinical model of neurorehabilitation. Moreover, the use of APDs, especially haloperidol and risperidone after TBI should be used sparingly to reduce compromising recovery and/or attenuating the efficacy of neurorehabilitation.

Biography

Anthony E Kline, PhD, is a Professor in the Departments of Physical Medicine and Rehabilitation, Critical Care Medicine, and the Safar Center for Resuscitation Research at the University of Pittsburgh. His research includes neurobehavioral recovery and learning after Traumatic Brain Injury (TBI). Therapeutic strategies that include pharmacotherapy and environmental enrichment are utilized alone or in combination in an attempt to restore function and/or attenuate TBI-induced deficits. Another interest is the evaluation of pharmacological agents that may alter TBI and to elucidate potential mechanisms for the observed effects.

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