Mechanisms of brain rejuvenation

https://neurodegenerationresearch.eu/survey/mechanisms-of-brain-rejuvenation/

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Mechanisms of brain rejuvenation

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1

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Alzheimer's disease & other dementias

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Acquired Cognitive Impairment... Aging... Alzheimer's Disease... Alzheimer's Disease including Alzheimer's Disease Related Dementias (AD/ADRD)... Brain Disorders... Dementia... Neurodegenerative... Neurosciences

Research Abstract

PROJECT SUMMARY/ABSTRACT Cognitive decline continues to be one of greatest health threats affecting the elderly. In fact, aging remains the single most dominant risk factor for dementia-related neurodegenerative diseases, including Alzheimer’s disease. When

considering, the rate at which the human population is aging, it becomes imperative to identify means by which to maintain cognitive integrity by protecting against, or even counteracting, the effects of aging. Presupposed dogma holds that the old brain is unable to combat the effects of aging due to a lack of inherent plasticity that facilitates permanent age-related functional impairments. We, and others, have begun to challenge such dogma by showing that systemic manipulations such as heterochronic parabiosis (in which the circulatory systems of young and old animals are connected) can enhance adult stem cell function in the aged brain. Moreover, my lab recently demonstrated that neuronal and cognitive rejuvenation is possible in the aged brain by systemic administration of young blood plasma, and identified the transcription factor Creb as a critical mediator of brain rejuvenation. While the burgeoning field of rejuvenation research is fast growing, the current focus thus far has been placed on identifying individual blood-borne factors in young blood. However, this approach has left fundamental questions unexplored: 1. How long lasting are the rejuvenating effects of young blood on the old brain? 2. What mechanistic changes does young blood elicit in the old brain to promote rejuvenation? 3. Do the beneficial effects of young blood on the aged brain extend to dementia-related neurodegenerative diseases such as Alzheimer's disease? The purpose of the proposed study is thus to investigate the rejuvenating and therapeutic effects of young blood on the aged brain. Specifically, our hypothesis is that systemic exposure to young blood elicits long lasting rejuvenation of synaptic and cognitive functions, while ameliorating neurodegenerative phenotypes. We will test this theory with three Specific Aims: 1. Characterize the kinetics of brain rejuvenation following systemic exposure to young blood. 2. Identify molecular mechanisms downstream of Creb underlying brain rejuvenation by young blood. 3. Distinguish rejuvenating versus therapeutic effects of young blood in a model of accelerated aging and Alzheimer's disease. Ultimately, these studies will challenge traditional views of brain aging by using the rejuvenating effects of young blood to obtain a mechanistic understanding of the cellular events required for unleashing the latent plasticity within the old brain. The results will also have significant translational potential, revealing pathways that could be targeted for novel therapies to ameliorate dementia-related neurodegenerative diseases such as Alzheimer's disease.

Lay Summary
PROJECT NARRATIVE The research described in this proposal aims to challenge traditional views of brain aging by using the rejuvenating effects of young blood to obtain a mechanistic understanding of the cellular events required for unleashing the latent plasticity within the old brain. The results will have significant translational potential, revealing pathways that could be targeted for novel therapies to ameliorate cognitive dysfunction associated with dementia-related neurodegenerative diseases such as Alzheimer's disease.

Further information available at:

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United States of America

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