CIRCADIAN PATTERNS OF FREE-WHEEL RUNNING IN YOUNG AND OLD MICE

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The mammalian circadian clock operates on a 24-hour cycle and regulates physiological, endocrine, and metabolic responses to changes in the environment. Aging disrupts this circadian process, increasing risk for development of age-associated diseases. Free-wheel running is not only an indicator of circadian rhythm, but also a strong predictor of survival from age-related diseases (i.e. cardiovascular disease). Thus, understanding the impact of age on free-wheel running can lead to a better understanding of disease progression. We analyzed free wheel running in both male and female C57BL/6J mice at young (3-6 months) and old (18-21 months) ages exposed to standard 12h light/dark cycle. Running wheel data was recorded hourly for 10 days. As expected, young female mice ran more than male mice, and old mice ran less than young mice. Regulation of wheel running demonstrated that older mice of both sexes had a delayed start time in activity patterns. Young mice began running immediately at lights off (signaling the start of their active period) and ran consistently throughout the dark phase with peak activity in the first 2 hours. In contrast, older mice had a delayed response to light with peak activity not occurring until hours 4-6 of the dark cycle and nightly activity ending 2 hours before lights on. Ongoing work will assess the central (brain) and peripheral (muscle, cardiac) regulation of free-wheel running in aging. Together, we demonstrate the importance of studying molecular mechanisms underlying circadian misalignment in older individuals to identify ways to combat age-associated disease with circadian misalignment.

THE IMPORTANCE OF MAINTAINING PHYSICAL ACTIVITY FOR TRANSITIONS BETWEEN COGNITIVE STATES: A COORDINATED ANALYSIS

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Although existing research shows that physical activity (PA) protects against cognitive decline, it is unclear if maintenance of PA throughout older adulthood influences the timing of onset or transitions through cognitive states. Further understanding of modifiable lifestyle factors that protect against cognitive changes characteristic of both normal aging and pathological aging, such as Alzheimer's disease and other dementias, is imperative. Data were drawn from fourteen longitudinal studies of aging from Europe and America (total N=53,069). Controlling for demographics and chronic conditions, multi-state models were independently fit between datasets to investigate the impact of PA (computed based on Metabolic Equivalent of Task Method) on the likelihood of transitioning through three cognitive states, while also accounting for death as a competing risk factor. Random effects meta-analysis of transition probabilities indicated that more PA was associated with a reduced risk of transitioning from normal cognition to mildly impaired cognition (HR=0.90, CI's=0.84, 0.97, p=0.007) and death (HR=0.24, CI's=0.06, 0.92, p=0.04), as well as an increased likelihood of transitioning from severe impairment back to mild impairment (HR=1.09, CI's=1.01, 1.17, p=0.03). Engagement in national minimum recommendations for PA (~150 minutes/week) increased total life expectancy for 70 year old males and females by 4.08 and 5.47 years, respectively. These results suggest that engaging in at least 150 minutes of physical activity per week in older adulthood contributes to delays in onset of mild cognitive impairment, substantially increases life expectancy, and may also diminish the symptoms that contribute to poor cognitive performance at the severely impaired stage.

HEAVY ALCOHOL CONSUMPTION IN MIDLIFE IS ASSOCIATED WITH ACCELERATED BRAIN AGING SIX YEARS LATER

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Excessive alcohol consumption is associated with cognitive decline, exacerbated brain atrophy, and dementia in older adults, but associations with midlife brain health are less well understood. We hypothesized that heavy drinkers would have older-looking brains in late midlife. We examined alcohol consumption at mean age 56 (range 51-59) in 364 men from the Vietnam Era Twin Study of Aging (VETSA) and their predicted brain age at mean age 62 (range 56-67). We created five midlife alcohol consumption groups based on drinks consumed over the past two weeks: never, former, light (1-14), moderate (15-28), and heavy (>28). Participants underwent structural magnetic resonance imaging at mean age 62. Predicted brain age was measured using the Brain-Age Regression Analysis and Computation Utility software (BARACUS). Models adjusted for age, scanner, race/ethnicity, SES, smoking, health, depressive symptoms, alcohol dependence, general cognitive ability at age 20, and non-independence of twins within pairs. Heavy drinkers had a significantly older predicted than chronological brain age (M= 5.93, SE= 0.88) compared to each of the other four groups (p's < 0.05). There were no significant differences among the never (M= 2.88, SE= 0.98), former (M= 2.76, SE= 0.74), light (M= 3.00, SE= 0.94), or moderate (M= 5.93, SE= 0.88) consumption groups. Heavy alcohol consumption at age 56 was associated with an approximately 3-year greater predicted brain age difference at age 62. There was no evidence of protective effects of light/moderate drinking over non-drinking. The neurotoxic effects of excessive alcohol may exacerbate brain aging in late midlife.

LIVING-APART-TOGETHER RELATIONSHIPS: EXPLORING OLDER ADULT BLACK WOMEN'S PERSPECTIVES ON CAREGIVING EXCHANGES

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Recent research suggests that the preference for living-apart-together (LAT) relationships, where individuals are