Alzheimer’s Disease (AD) is the most common form of dementia worldwide, and impacts 6.5 million people within the US today. There are two forms of Alzheimer’s Disease: familiar and sporadic. 
- Familiar AD was modeled with CVN mice
- Sporadic AD was modeled with mice with homozygous targeted replacement of the murine APOE gene with human APOE which has been shown to confer different levels of risk
- APOE2: confers protection against AD
- APOE3: normal level of risk for AD
- APOE4: greatest genetic risk for AD

Females are at greater risk for AD, influenced by the loss of ovarian function and corresponding hormonal changes. Estrogens can reduce inflammation and increase neuroplasticity. Lifestyle factors such as a high-fat diet linked to memory deficits.

There are two forms of Alzheimer’s Disease: familiar and sporadic. Familiar AD was modeled with CVN mice and sporadic AD was modeled with mice with homozygous targeted replacement of the murine APOE gene with human APOE which has been shown to confer different levels of risk. APOE2 confers protection against AD, APOE3 normal level of risk for AD, and APOE4 greatest genetic risk for AD.

Sedentary vs. Voluntary + Enforced Exercise

Exercise has positive effect sizes on brain structure and connectivity.

Genotype, sex, and diet affect general activity levels.

Effect of age and diet in Morris water maze task in APOE model of AD

Exercise partially rescues microglia in CVN mice

High intensity exercise reduces memory deficits and anhedonia

Effect of diet and sex in Morris water maze task in APOE model of AD

Exercise can reduce behavioral symptoms and structural brain changes. The effects of AD are exacerbated through menopause, yet have been observed in AD patients. This increased cardiovascular activity condition was also best in reducing anhedonia, with a significant positive correlation between total amount of exercise and preference for sucrose (Figures B and C).

Overall, the highest-intensity exercise condition was the best in reducing memory impairments and reducing anhedonia, two key symptoms of AD.

Mice underwent either no exercise, voluntary wheel running, or voluntary wheel running as well as treadmill training.
- The treadmill-trained mice show decreased memory deficits (Figure A).
- This increased cardiovascular activity condition was also best in reducing anhedonia, with a significant positive correlation between total amount of exercise and preference for sucrose (Figures B and C).

The treadmill-trained mice show less anhedonia (Figure A). A challenger mice show decreased memory deficits and less anhedonia (Figure B). Exercise can reduce behavioral symptoms and structural brain changes observed in AD.

The effects of AD are exacerbated through menopause, yet have been demonstrated to be mediated with exercise.

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