

Due to our rapidly aging population, 6.5 million Americans currently have Alzheimer's disease (AD), and this is predicted to increase to almost 14 million in the next 40 years. AD is more prevalent in western societies, and researchers suggest that this may be due to the typical Western diet. In contrast, AD prevalence is lower in Mediterranean region, where a healthier diet could be a contributing factor. Therefore, this research examined the neuroprotective potential of a Mediterranean diet against AD pathologies and inflammation in mice. Our lab designed two experimental rodent diets, one that mimicked a typical Western-style diet, and another that mimicked a typical Mediterranean diet. We examined the lifelong effects of diet on biological markers of AD, including amyloid-beta, a protein that aggregates together to form plaques in the AD brain, and pro-inflammatory cytokines, which are associated with increased inflammation. We hypothesized that the Mediterranean diet has the potential to mitigate these AD pathologies and therefore, could potentially be used as a future preventative strategy for AD.

■ Mediterranean Diet
■ Typical American Diet

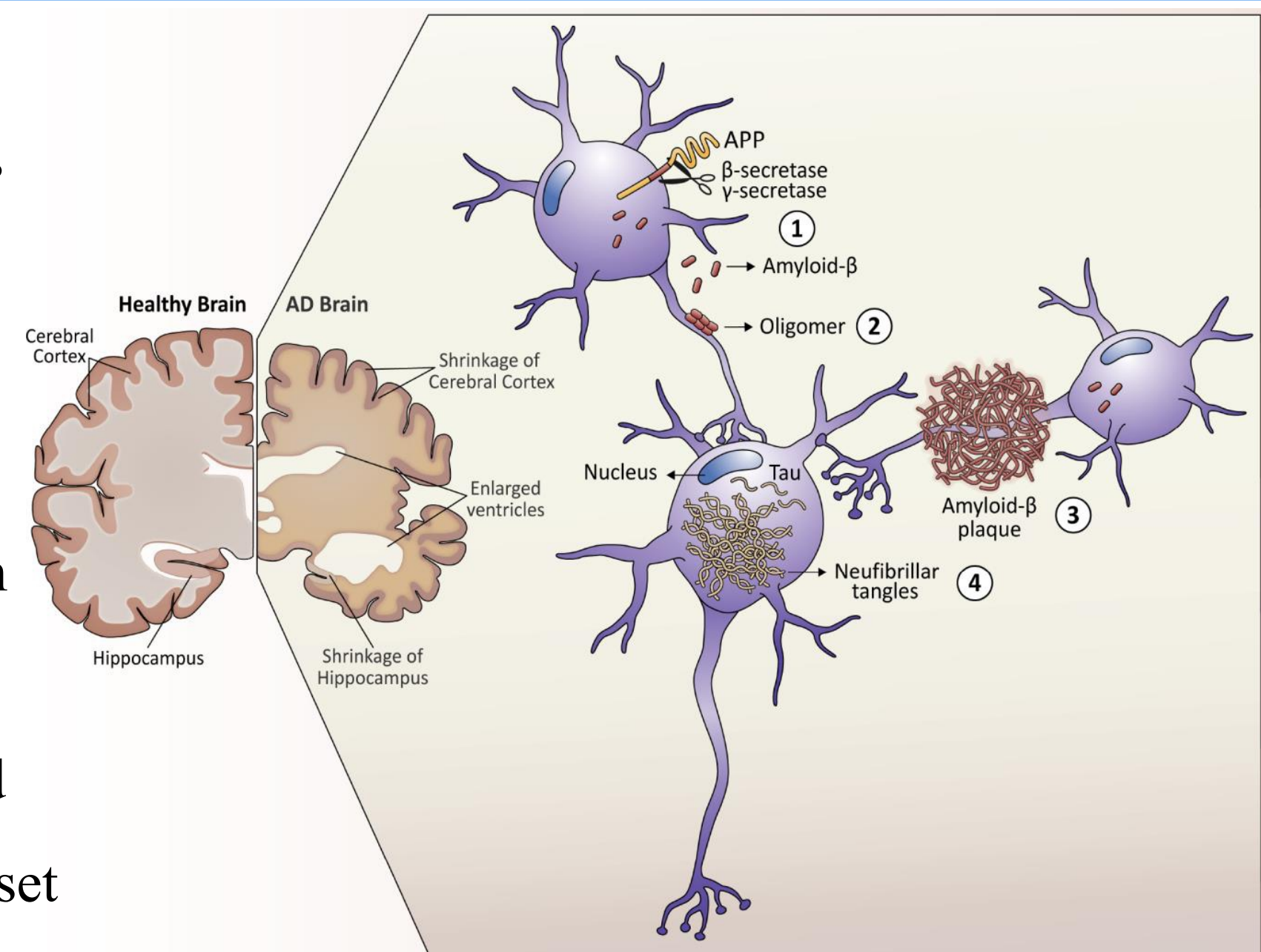
* $p \leq 0.05$

** $p \leq 0.01$

*** $p \leq 0.001$

Introduction

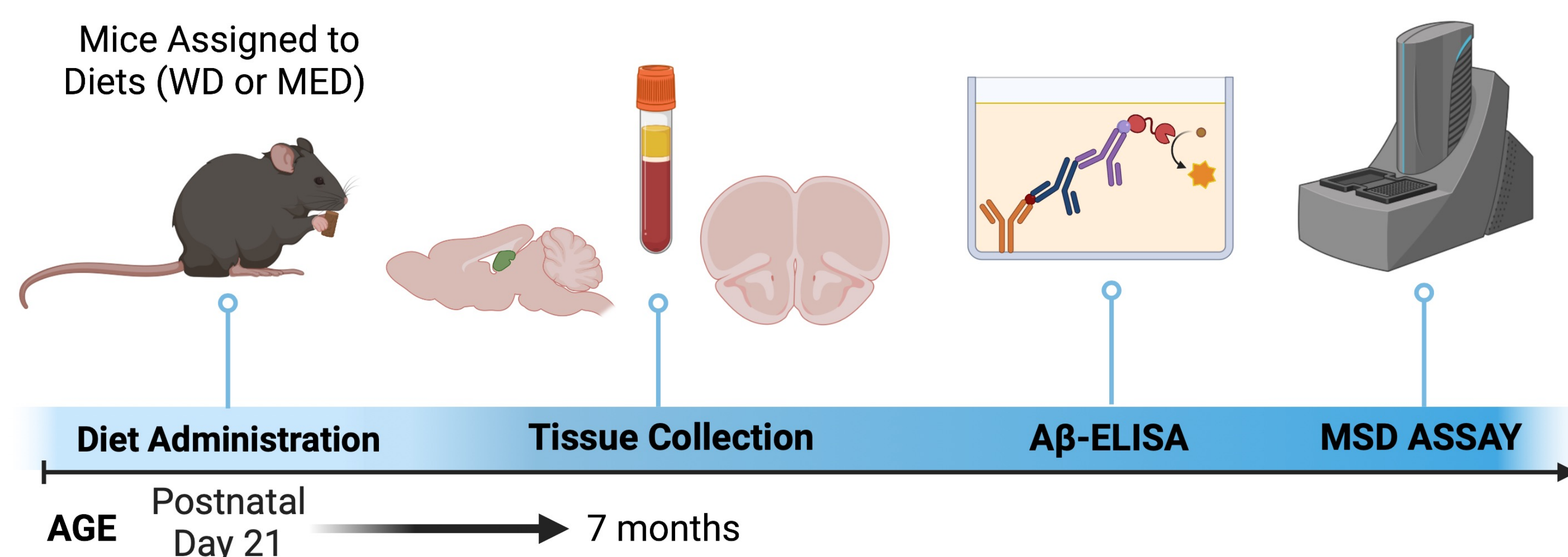
- A hallmark pathology of Alzheimer's disease (AD) is amyloid beta ($A\beta$), a protein that forms via the amyloidogenic cleavage process of the membrane protein, amyloid precursor protein (APP) (LaFerla et al., 2007)
- Soluble, hippocampal $A\beta_{42}$ production has been linked to cognitive dysfunction.
- Dietary intervention strategies could be utilized as a potential $A\beta$ reducing agent prior to the onset or progression of AD.



(Gomez, 2020)

Methods

Key Dietary Components	Mediterranean Diet	Western Diet
Carbohydrate Sources	Brown rice & wheat starch	Corn starch
Fiber Sources	Cellulose, psyllium, inulin	Cellulose
Fat Sources	Olive oil, fish oil & flaxseed oil	Safflower oil, beef fat & butter
Protein Sources	Egg whites, soy & fish protein	Casein (from milk fat)



Funding



Results

Amyloid Beta in the Hippocampus

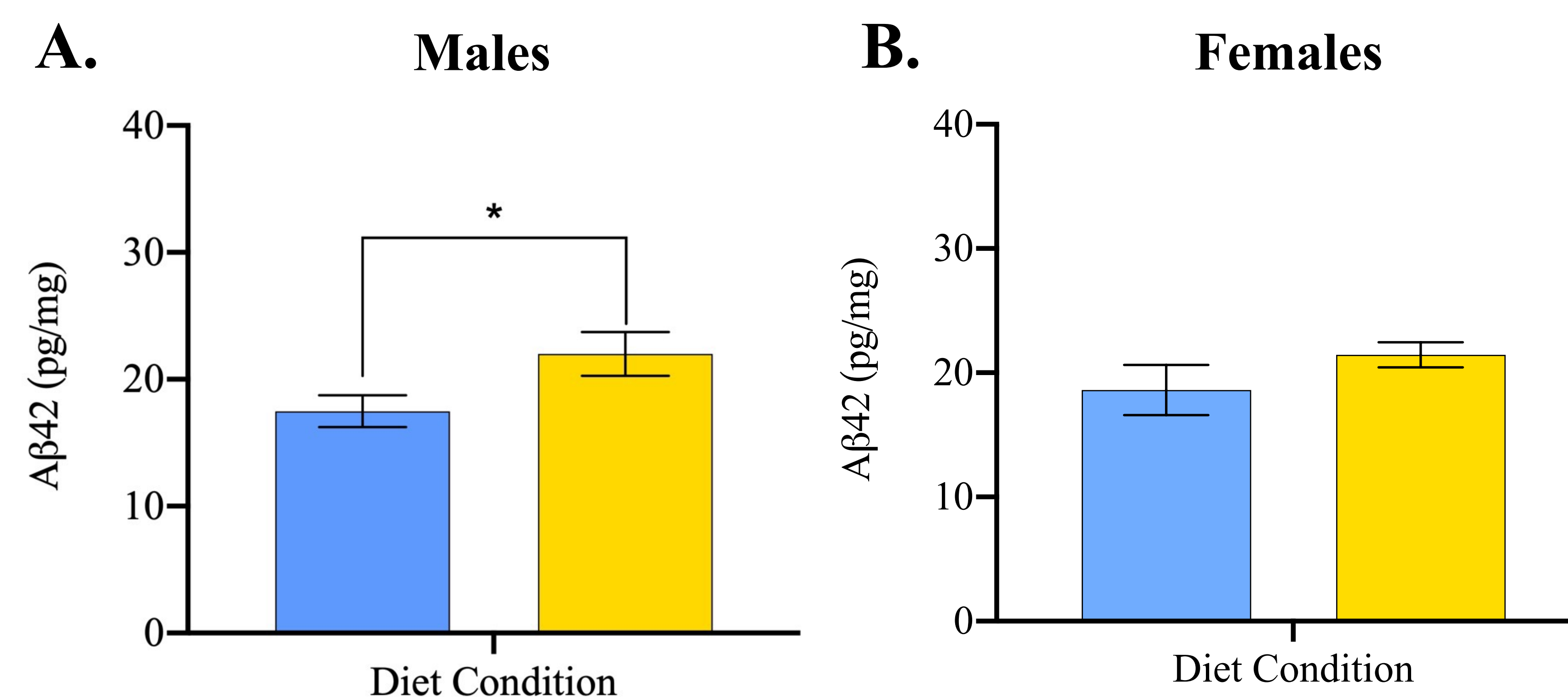


Figure 1. Soluble amyloid beta ($A\beta_{42}$) in the hippocampus of (A) male C57BL/6J mice and (B) female C57BL/6J mice following 6 months of Mediterranean diet (MD) or Western diet (WD) consumption.

Results

TNF-alpha in Serum

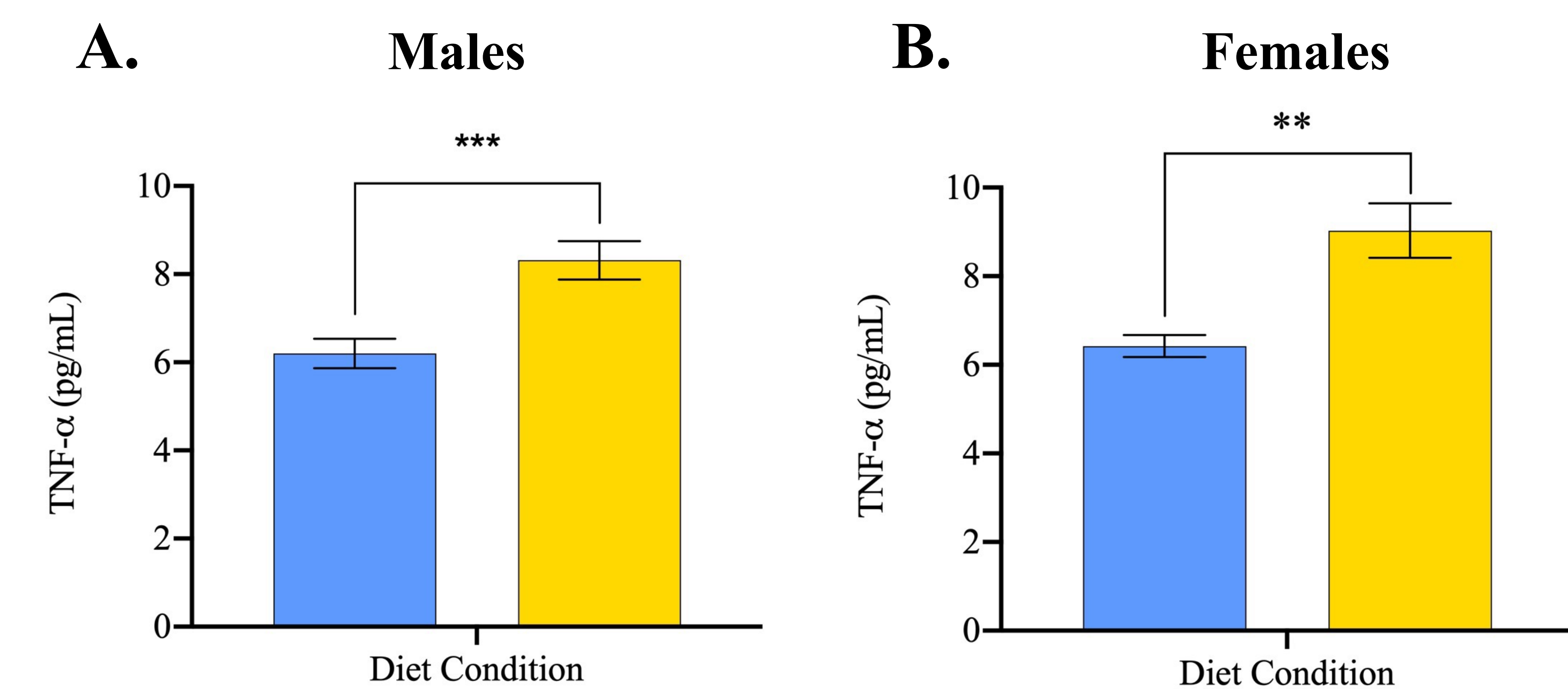


Figure 2. TNF-alpha in serum of (A) male C57BL/6J mice and (B) female C57BL/6J mice following 6 months of Mediterranean diet (MD) or Western diet (WD) consumption.

Conclusions

- Overall, biological markers of AD, including amyloid-beta and TNF-alpha, increased in animals on the WD compared to those on the MED diet
- Other studies have also shown an increase in brain inflammation and amyloid-beta after undergoing a WD (Graham, 2016)
- Studies have also shown an increased production of pro-inflammatory cytokines, including TNF-alpha, in animals that underwent a WD (Li et al., 2018)

Future Directions

- Continued studies on the influence of diet on the development of AD
- Analysis the sex differences in the development of AD pathology in the brain between males and females

References

Graham, L. C., Harder, J. M., Soto, I., Vries, W. N. D., John, S. W. M., & Howell, G. R. (2016). Chronic consumption of a western diet induces robust glial activation in aging mice and in a mouse model of Alzheimer's disease. *Scientific Reports*, 6(1). doi: 10.1038/srep21568

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Amyloid Beta in the Prefrontal Cortex

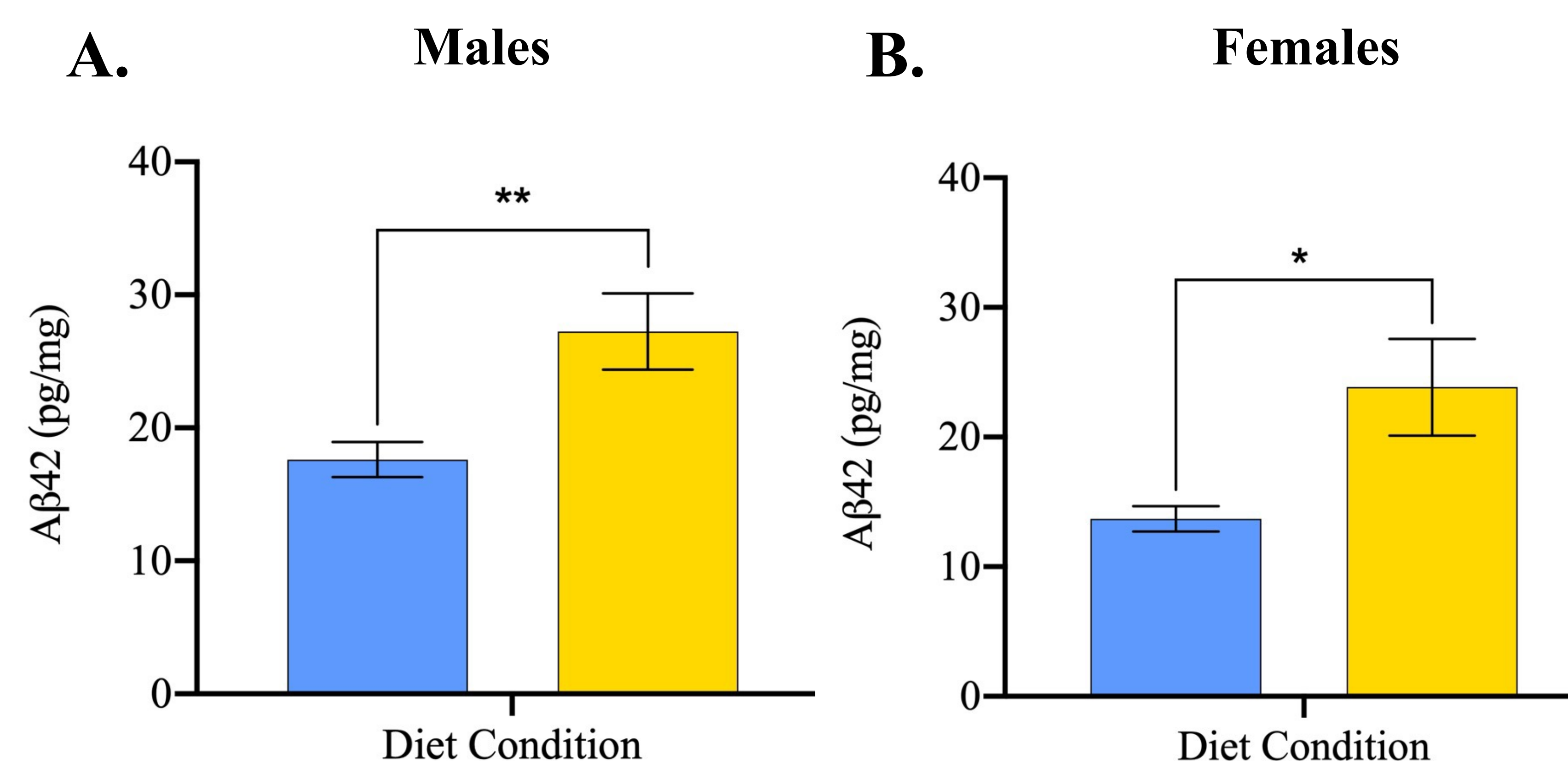


Figure 2. Soluble amyloid beta ($A\beta_{42}$) in the prefrontal cortex of (A) male C57BL/6J mice and (B) female C57BL/6J mice following 6 months of Mediterranean diet (MD) or Western diet (WD) consumption.