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EN 585.685 Methods in Neurobiology
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Question/Biological Problem

Alzheimer's disease is a progressive brain disorder that slowly deteriorates memory and thinking skills. Development of beta-amyloid plaques and tau tangles in Alzheimer's disease contributes to damaging and killing nerve cells. There is a growing list of research correlating sleep with Alzheimer's disease. A recent study more specifically correlates sleep disruption with beta-amyloid plaque build-up in the brain [1].

AIM: To build a model to study the relationship of sleep and amyloid plaque build-up

Research Model and Plan

- Sleep and wake cycles will be mimicked and modulated by administering various neurotransmitters that are known to be associated with sleep modulation [2]
- IPSCs are the most appropriate cell line for this study because samples can be easily obtained from adults and cultured in-vitro to induce pluripotency and differentiate into neuronal cells.
- Using IPSCs is also beneficial over immortal cells as they maintain characteristics of normal cells

References:

1. Winer, J. R., Mander, B. A., Kumar, S., Reed, M., Baker, S. L., Jagust, W. J., & Walker, M. P. (2020, September 3). *Sleep disturbance Forecasts β-Amyloid Accumulation across subsequent years*. Current Biology. Retrieved September 14, 2021, from https://www.sciencedirect.com/science/article/pii/S0960982220311714.
2. Yokoi, R., Okabe, M., Matsuda, N., Odawara, A., Karashima, A., & Suzuki, I. (2019, May 29). *Impact of sleep-wake-associated neuromodulators and repetitive low-frequency stimulation on human ipsc-derived neurons*. Frontiers in neuroscience. Retrieved September 14, 2021, from https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6549533/.