260-2017-04-21-alzheimers-hipp

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Prelude

Today's Topics

- Learning and memory
  - Alzheimer's Disease
  - Hippocampus

Alzheimer's Disease (AD)

- Chronic, neurodegenerative disease affecting ~5 M Americans
- Cognitive dysfunction (memory loss, language difficulties, planning, coordination)
- Psychiatric symptoms and behavioral disturbances
- Difficulties with daily living
- (Burns and Iliffe 2009)

AD progression

(Burns and Iliffe 2009)

AD

- Post-mortem exams show beta amyloid plaques and neurofibrillary tangles

AD

- Treatments include
  - Acetylcholinesterase (AChE) inhbitors (e.g. Aricept)
  - Glutamatergic partial antagonists (e.g., Memantine)

New hope for treatment, (Kaufman et al. 2015)

Memory systems in the brain

(Squire 2004)

Hippocampus

https://upload.wikimedia.org/wikipedia/commons/5/5b/Hippocampus_and_seahorse_cropped.JPG

Hippocampus features

- Dense in NMDA receptors
- Central "hub" in network
- (Battaglia et al. 2011)

Hippocampus roles

- Formation, storage, consolidation of long-term episodic or declarative memories
- Stores info for later transfer to cortex
- Spatial navigation
  - Place cells
  - Grid cells
  - Head-direction cells

Spatial precision of place cells

(Kjelstrup et al. 2008)

Human analogue – (Maguire et al. 2000)

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Hippocampal volume in food-caching birds

(Sherry et al. 1989)

Main points

- Hippocampus "hub" in brain's storage of specific information about places, events, facts
- Damage to hippocampus or medial temporal lobe (MTL) region can impair formation of new memories

Next time

- Speed of nervous system conduction lab

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