PERIOPERATIVE NEUROCOGNITIVE DISORDER: MRI CHANGES IN THE BRAIN AFTER SURGERY

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Perioperative Neurocognitive Disorder (PND)

- Formerly known as Postoperative Cognitive Decline (POCD)
- Decrease in cognitive ability after surgery with testable decreases in memory, executive function, and motor coordination in 20-40% of immediate postoperative patients
- Patients usually recover within a month, though there are cases lasting much longer

Anesthesiol Clin. 2015 Sep;33(3):517-50

Perioperative Neurocognitive Disorder (PND)

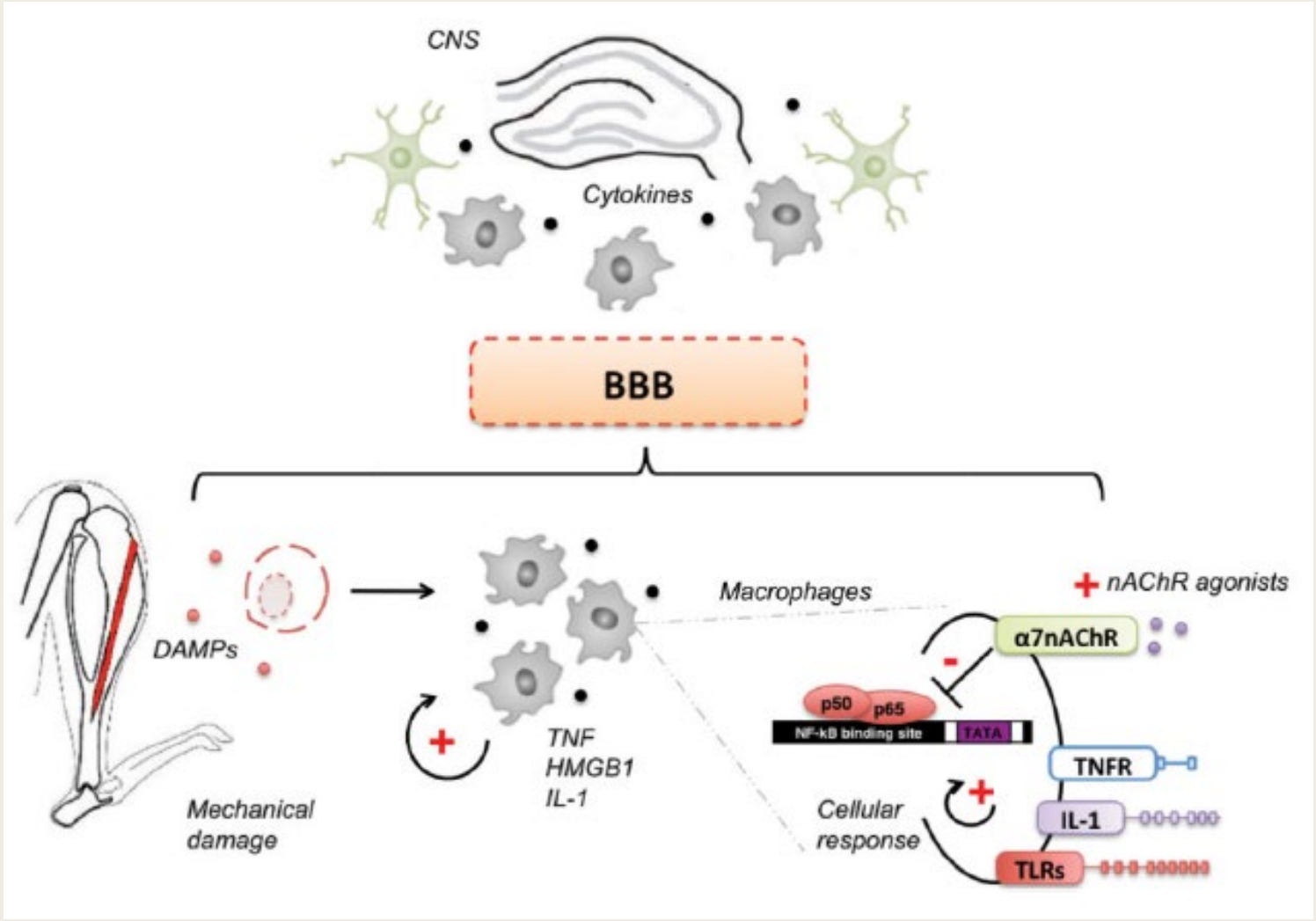
- This is a syndrome, not a disease with one single etiology
  - *It's more like a fever than influenza*
- Occurs more frequently in patients 60 years of age and older
- Occurs more frequently in patients undergoing cardiac surgery

Why it matters

- Associated with early exit from the workforce, decreased quality of life, and premature mortality
- Our society is getting older, and an increasing number of the elderly undergo surgery every year
- Not well studied and as such there’s a lot of room for improvement

Purpose and methods of this study

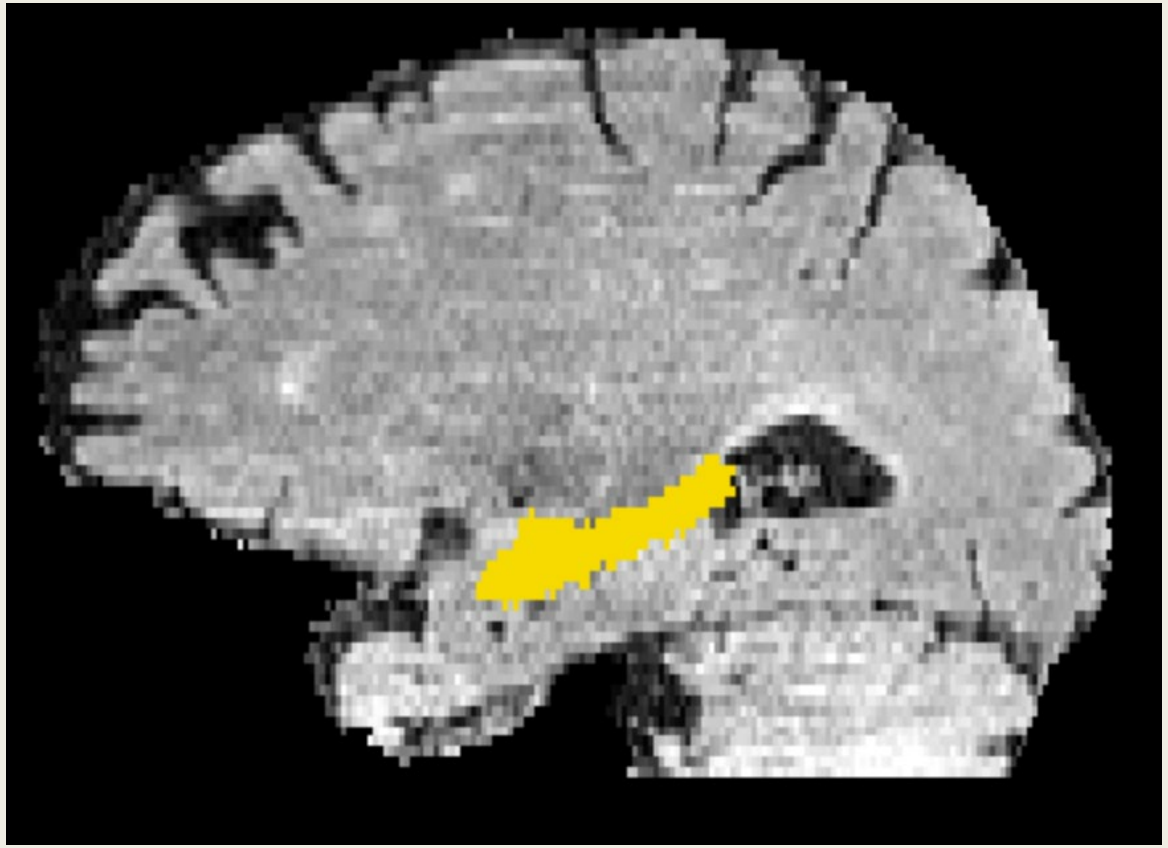
- Pilot study to explore the effects of cardiac surgery on various MRI scans of the brain before and after surgery
- Four patients MRI scans at one week prior, one week after, and three months after cardiac surgery
- MRI sequences used:
  - *Fluid-attenuated inversion recovery (FLAIR)*
  - *Magnetization-prepared 180 degrees radio-frequency pulses and rapid gradient-echo (MP RAGE)*
  - *Sampling perfection with application-optimized contrasts using different flip-angle evolution (SPACE)*

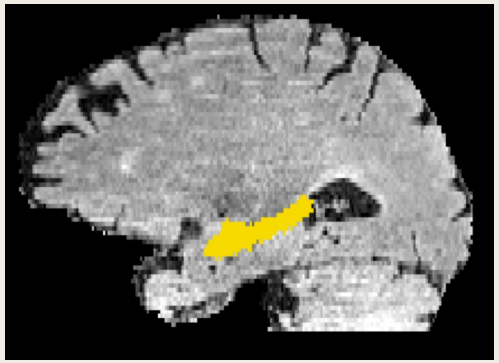


Ann Neurol. 2011 Dec;70(6):986-95.

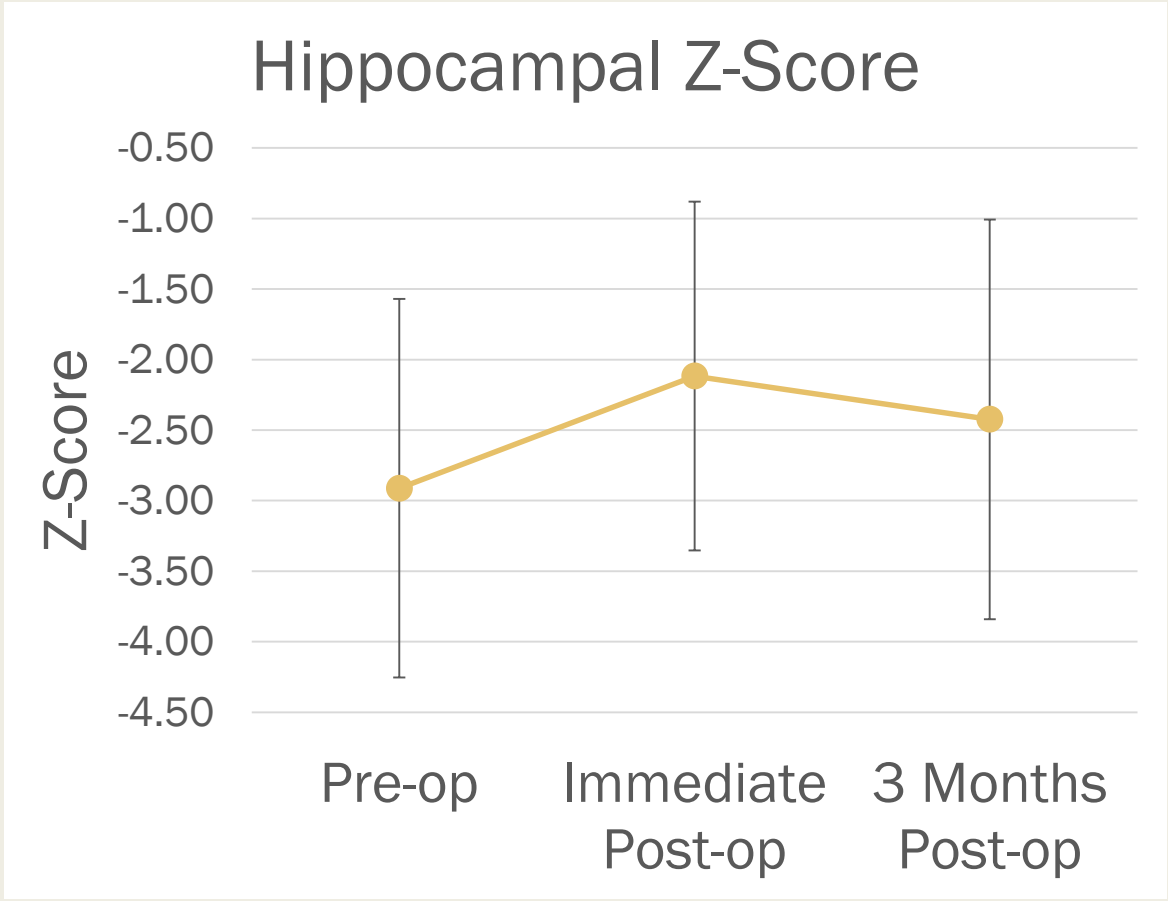
Hippocampal Signal Changes

- Hippocampal mask applied for regional analysis
- Constant mask in MNI space, inverse transformation applied to determine area in subject space





- This is a comparison of the average hippocampal pixel Z-score as compared to white matter
- MRI Signals are not reliable for comparison between scans
- A probability map was used to determine the 500 most likely pixels to be white matter. The average and standard deviation of these pixels was used to determine a Z-score for the hippocampus
- To determine statistical significance of the changes in hippocampal signal, we will need an N of about 26 individuals.
  - *Alpha of 0.05 and beta of 0.20, using SPSS and G-power*



Summary

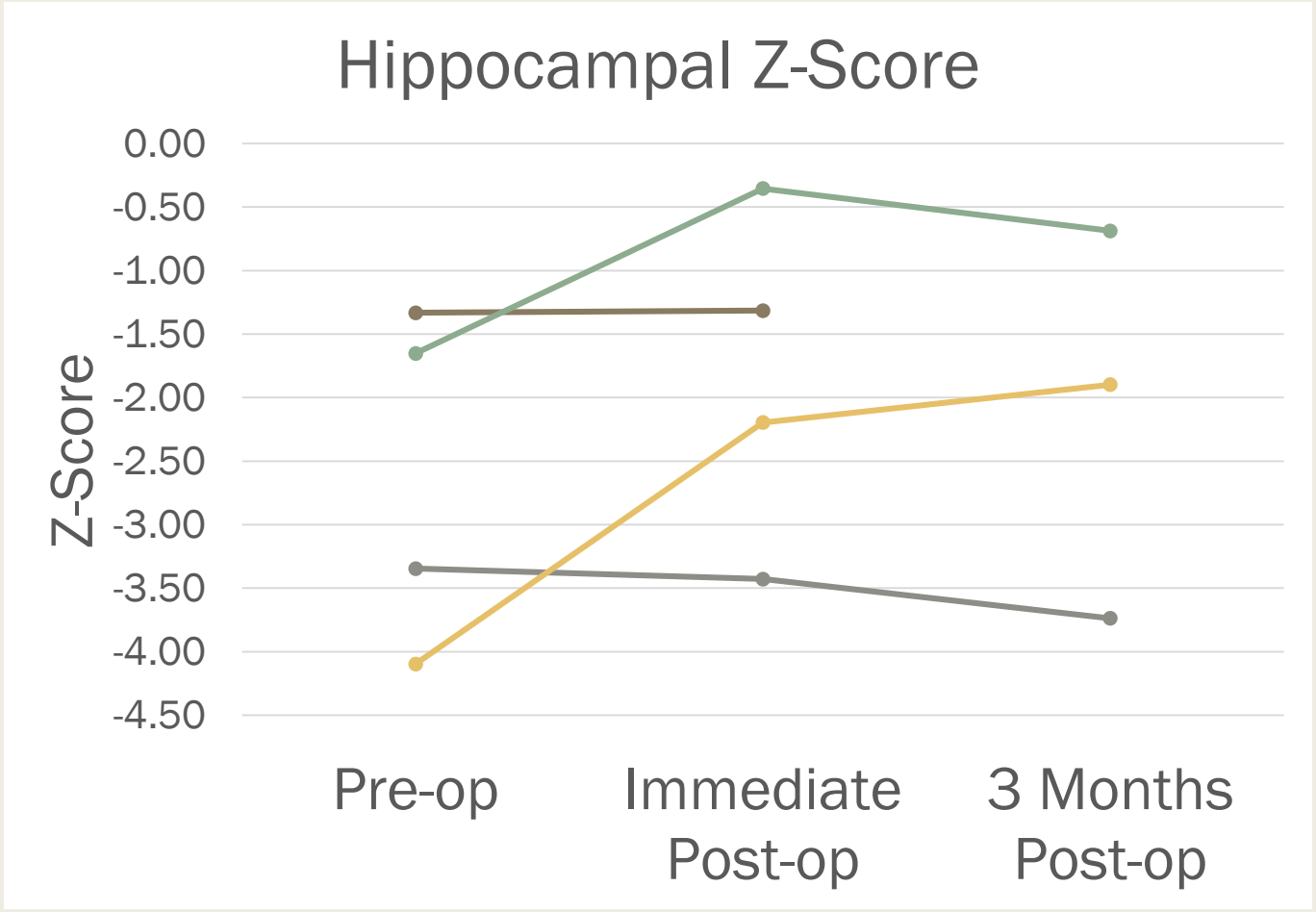
- Promising, though not statistically significant, trends that could provide some insight into PND
- Imaging “pipeline” in place to analyze incoming study participants

FAER MSARF

- Subdivision (FAER) of the American Society of Anesthesiologists (ASA) provided the funding for this work

- Thanks to
  - *Dr. James Ibinson MD PhD - Advisor (UPMC)*
  - *Dr. Sweeney, Dr. Baker (FSU)*

Questions?


Hippocampal Z-Score
Z-Score
0.00
-0.50
-1.00
-1.50
-2.00
-2.50
-3.00
-3.50
-4.00
-4.50
Pre-op
Immediate Post-op
3 Months Post-op