Postoperative Neurocognitive Disorders- a common language, and biomarker studies

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Outline:

I. Postoperative Delirium and Cognitive Dysfunction (POCD): Differences, Similarities, Nomenclature

II. Is POCD (or delirium) associated with accelerated Alzheimer’s disease pathogenesis? (MADCO-PC study results)
Delirium- (DSM-V definition)
- fluctuating disturbance in attention/awareness,
- an acute change from baseline,
- with disturbed cognition/perception,
- not due to a pre-existing neurocognitive disorder,
- not in context of severely reduced arousal (i.e. coma)

POCD- Postoperative Cognitive Dysfunction
- a postoperative decline in cognitive function,
- measured with cognitive tests before & after anesthesia/surgery

-Berger M et al, Anesthesiology (In Press), 2018
Postop Delirium & POCD: Timeframe

Silverstein J et al, Anesthesiology, 2007
A Unified Nomenclature for Postoperative Neurocognitive Disorders (PND)

Postoperative Delirium - based on DSM-V delirium criteria, occurs in hospital up to 1 wk postop or hospital discharge (whichever occurs first).

Delayed Neurocognitive Recovery - DSM-V criteria for major or mild neurocognitive disorder, from 1-30 days postop

Postoperative Neurocognitive Disorder (POCD) - DSM-V criteria for mild or major neurocognitive disorder, from 1-12 months postop

## Postop Delirium & POCD: Similarities

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<th>Risk Factors</th>
<th>Postop Delirium</th>
<th>POCD</th>
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<td>Age, depression, pre-op cognitive dysfunction, pre-clinical AD pathology</td>
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Potential Mechanisms of POCD, Delirium

Long-term Cognitive Decline after POCD

Long-term Cognitive Decline after Delirium

Anesthesia/Surgery $\rightarrow$ AD pathology

Alzheimer’s Disease (AD) Pathology as a risk factor for Delirium, POCD

3 Phases of Alzheimer’s disease
1. Preclinical AD (biomarker positive, asymptomatic)
2. MCI (Mild Cognitive Impairment)
3. Dementia due to Alzheimer’s Disease

Delirium & POCD, Alzheimer’s Disease

Alzheimer’s develops over a long time:

Preclinical AD $\rightarrow$ ↑risk for Delirium, POCD

Elevated CSF tau/Aβ ratio $\rightarrow$ ↑delirium risk

Low CSF Aβ levels $\rightarrow$ ↑POCD risk

II. Is POCD associated with an acceleration of AD pathology?

II. Is POCD Associated with an Acceleration of AD Pathology?

MADCO-PC: Markers of Alzheimer's Disease and neuroCognitive Outcomes after Perioperative Care

Primary outcome- correlation between perioperative change in CSF AD biomarker (tau) and continuous cognitive change index (from preop to 6 weeks post-op)
II. The MADCO-PC study

- Patients scheduled for surgery

- Enrollment, baseline cognitive testing

- Pre-Induction CSF + blood samples

- 24 hr post-op CSF + blood samples, delirium screening POD 1-5

- 6 week post-op cognitive testing, CSF + blood samples

- Correlate CSF AD biomarkers, cognitive findings

N=110 surgical patients
II. The MADCO-PC study

Inclusion Criteria:
- Age ≥60
- Having non-neurologic, non-cardiac surgery under general anesthesia, scheduled for >2 hours
- English Speaking

Exclusion Criteria:
- Pregnancy
- Prisoners
- Chronic Anticoagulant Use
- Severe Claustrophobia
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