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*The Association of Blood-Brain Barrier Breakdown with Sleep Apnea and Postoperative Delirium*

**Abstract**

The blood-brain barrier is comprised of cells lining the brain's blood vessels that act as a barrier to restrict passage of systemic pathogens, toxins and/or inflammatory mediators into the brain. Blood-brain barrier (BBB) breakdown can occur after anesthesia/surgery, and is theorized to cause increased neuroinflammation and postoperative delirium, a disorder of acute changes in attention, cognition, and awareness associated with increased mortality and morbidity. One possible risk factor for postoperative delirium is obstructive sleep apnea, a highly prevalent and frequently undiagnosed disorder that causes disrupted breathing during sleep. Since animal models of sleep apnea exhibit BBB breakdown, we hypothesize that sleep apnea is associated with BBB breakdown prior to surgery. We also hypothesize that increased BBB breakdown after surgery is associated with increased delirium severity. In this study, we leverage our cerebrospinal fluid biorepository to determine the extent that sleep apnea severity is associated with increased preoperative blood-brain barrier breakdown markers, and whether increased postoperative blood-brain barrier markers are associated with postoperative delirium severity. These studies will increase our understanding of mechanisms of sleep apnea-related neurocognitive dysfunction and could inform the development of therapies to reduce postoperative delirium for the >16 million older Americans who undergo surgery every year.