

## Publication

Association between changes in cerebral grey matter volume and postoperative cognitive dysfunction in elderly patients: study protocol for a prospective observational cohort study

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**Author(s)** Goettel, Nicolai; Mistradis, Panagiota; Berres, Manfred; Reinhardt, Julia; Stippich, Christoph; Monsch, Andreas U.; Steiner, Luzius A.

**Author(s) at UniBasel** [Monsch, Andreas U.](#) ;

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Cognitive decline is frequently observed in elderly patients after major surgery. The pathophysiology of postoperative cognitive dysfunction (POCD) remains unclear. The aim of our investigation is to identify potential associations between brain volume change and POCD in elderly patients undergoing major surgery.; This is a prospective observational cohort study approved by the regional ethics board. We intend to compare specific brain volumes (hippocampus, lateral ventricle, total grey matter volume, regional cortical thickness) on magnetic resonance imaging and cognitive functions determined by a neuropsychological assessment battery in 70 study participants aged  $\geq 65$  years before and 3 and 12 months after major noncardiac surgery. Thirty volunteers will be included as matched nonsurgical controls. The primary endpoint of the study is the change in hippocampal volume over time in patients with and without POCD. The secondary endpoint is the correlation between the change in cerebral volume and cognitive function. We will follow the STROBE guidelines for reporting the results of observational studies.; We hypothesize that surgery under general anesthesia is associated with a loss of cerebral grey matter, and that the degree of postoperative cognitive dysfunction correlates with the extent of atrophy in areas of the brain that are relevant for cognitive functions. The validation of reproducible anatomical biomarkers, such as the specific brain volumes examined in our cohort, may serve to evaluate the effect of preventive strategies and treatment interventions for POCD in follow-up studies.; Clinicaltrials.gov NCT02045004 . Registered 22 January 2014. Kofam.ch SNCTP000001751. Registered 21 April 2016 (retrospectively registered).

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