Summary

Background: Postoperative delirium is one of the most prevalent complications after surgery in older patients. Because our population is growing older, the incidence of this complication is expected to increase. Defined as a combination of altered consciousness, fluctuant attention, and cognitive dysfunction, it is associated with increased mortality, long-term functional and cognitive decline, and increased costs of care. Although many clinical, psychological, biological and genetic factors may contribute to the development of delirium following surgery, the precise mechanisms involved in the development of delirium are not well understood. There is growing evidence that systemic inflammation and oxidative stress may significantly influence the outcome after surgery and impact on postoperative delirium. Additionally, some psychological risk factors such as executive and attentional deficits, anxiety or neuroticism are likely to have a major impact on the incidence and the severity of postoperative delirium.

The proposed study is designed to determine in details psychological and biological markers contributing, per se or combined, to the development and the evolution of postoperative delirium in elderly patients undergoing major surgery.

Primary objectives: The proposed project aims to characterize a) verbalised content during postoperative delirium, and b) to characterize predictive factors contributing to postoperative delirium with focus on psychological aspects in combination with biological indicators.

Design and time frame: Single-centre, prospective observational study. A total of 1000 patients will be enrolled in this study over a period of 2 years.

Inclusion criteria: All French speaking patients aged 65 years and older who are scheduled for major elective surgery will be approached for this study except neurosurgery, cardiac surgery and carotid surgery.

Observation: The main outcome variable (occurrence of postoperative delirium) will be measured over 5 days following surgery and is expected to occur in about 10% of the patients. Staff clinical nurses will use a validated screening check list to identify patients with signs of potential delirium. The latter will be further evaluated by a scientific collaborator using the Confusion Assessment Method (CAM) and assessments of verbal content by a psychologist.

One day before surgery, a single psychologist will assess cognitive performance and personality traits (anxiety, neuroticism) of all subjects (suspected psychological risk factors). Immediately before surgery a first blood sample will also be drawn for quantification of plasma biomarkers in all patients (suspected biological risk factors). The following markers will be used: Cytokine profile, C-reactive protein, procalcitonin, Stromal Derived Factor 1, Matrix Metalloproteinase 9, reactive oxygen species in lymphocytes. During follow-up, two additional blood samples will be drawn at postoperative days 1 and 5 for the analysis of the same markers. Established pre-, intra-operative and postoperative clinical risk factors will be collected.

Follow-up: Cognitive, emotional and qualitative outcome will be assessed using a standardized telephone interview 30 days after surgery by the same psychologist.

Statistical analysis: Analysis of covariance will be used to compare risk factors among the patients with or without delirium while adjusting for confounding factors. Logistic regression analysis will be used to test the association between a specific risk factor and delirium while adjusting for other confounding factors.

Conclusions: The proposed project, in an original manner, is designed to improve our understanding of combined psychological and biological risk factors contributing to the development and evolution of a major postoperative complication, the postoperative delirium. This project is the first joint effort to understand better the psychological and biological factors underlying the occurrence of postoperative delirium. Our study should contribute to the development of non-invasive, manageable, qualitative diagnostic risk tool for occurrence of postoperative delirium in the elderly. This large multidisciplinary project could be a landmark study and will help design new preventive strategies and/or therapeutic interventions in clinical practice.

Budget: The estimated costs for this project are 579'682 CHF over a time period of three years.