PhD Project Proposal
(Epidemiology / Health Data Science)

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Title	Interplay of metabolism and organ dysfunction on risk of postoperative delirium (POD) and postoperative cognitive dysfunction (POCD)
Background / description	Periopreative neurocognitive disorders (NCD) are frequent after surgery among older people. More than 300 million anesthetic procedures are performed worldwide each year, one third in older adult patients. Between 5-50% are followed by postoperative delirium (POD), and 5-30% by postoperative cognitive dysfunction (POCD). POD and POCD are therefore not solely clinical problems but may substantially contribute to public health burden on a population level. Yet, only a few risk factors have been identified so far (1,2). In the past, we investigated the association of metabolic dysfunction with risk of perioperative NCD. For hypertension and hypercholesterolemia, we found in a meta-analysis no significant association with POCD, but statin use before surgery was associated with a reduced risk (3). In a pooled analysis of 3 cohorts, we found diabetes, but not obesity or hypertension, associated with increased POCD risk (4). In the prospective BioCog study, we found persons with metabolic syndrome (MetS) at increased POD risk (5). Among MetS components, only HDL-C was significantly related to POD. For POCD, a higher pre-operative BMI was identified as a risk factor. Besides metabolism, organ dysfunction may be another factor of relevance for POD and POCD. For example, renal dysfunction has been associated with cognitive decline in population based studies (6-8). One may speculate whether surgery and anesthesia exacerbate existing but subclinical organ dysfunction among older persons, which then lead to POD or POCD. The aim of the current project is therefore to examine the potential interplay of metabolism and organ dysfunction with risk of POD and POCD. Vice versa, the project will also examine the effect of anesthesia and surgery on metabolism and organ function. The project will primarily be based on the BioCog Cohort, which is a longitudinal study on risk factors for POD and POCD in older persons (9). References 1. Deiner S, Silverstein JH. Postoperative delirium and cognitive dysfunction. British journal of anaesthesia 2009;103 Suppl 1:i41-6. 2. Rundshagen I. Postoperative cognitive dysfunction. Dtsch Arztebl Int 2014;111:119-25. 3. Feinkohl I, Winterer G, Pischon T. Associations of dyslipidaemia and lipid-lowering treatment with risk of postoperative cognitive dysfunction: a systematic review and meta-analysis. J Epidemiol Community Health 2018;72:499-506. 4. Lachmann G, Feinkohl I, Borchers F, et al. Diabetes, but Not Hypertension and Obesity, Is Associated with Postoperative Cognitive Dysfunction. Dementia and geriatric cognitive disorders 2018;46:193-206.

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8. Deckers K, Camerino I, van Boxtel MP, et al. Dementia risk in renal dysfunction: A systematic review and meta-analysis of prospective studies. Neurology 2017;88:198-208.
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Tasks	Development of study objectives, hypotheses, and analysis plans, data analysis and interpretation, publication of results
Prerequisits	Strong interest in epidemiology and in biomedical research questions, preferably a master degree in epidemiology and in a biomedical field (medicine, nutrition, biology, biochemistry). Some background and interest in psychology/psychiatry. Strong knowledge in biostatistics and statistical analysis programs (SAS).
Number of available positions	1