Abstract 5

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**Titel** Peritumoral and contralateral hemisphere microcirculation and oxygenation during vasopressor therapy in anesthetized patients with brain tumors

**Introduction**

Inotropes and vasopressors are widely used to treat decreasing blood pressure during induction of anesthesia and thereby maintain cerebral perfusion pressure (CPP) during craniotomy. Studies suggest that, despite an increase in mean arterial blood pressure (MABP) Near-Infrared Spectroscopy (NIRS) values of cerebral oxygenation decreases after phenylephrine but remains unchanged after administration of ephedrine.1 This difference possibly arise from different influence on cerebral microcirculation and capillary transit-time heterogeneity (CTH).2 Effects of ephedrine and phenylephrine on brain oxygenation and cerebral microcirculation are unknown.3 The objective of this study was to compare the effects of ephedrine and phenylephrine during cerebral tumor surgery. Examining both peri-tumoral area with suspected disrupted blood brain barrier (BBB) and contralateral hemisphere with intact BBB our hypothesis was that phenylephrine was associated with a reduction in brain oxygenation and cerebral microcirculation by altering CTH and decreasing the oxygen extraction fraction compared with ephedrine.

**Methods**

The study was an investigator-initiated, single-center, double-blinded randomized clinical trial consisting of two trials - one with MRI and the other with PET each containing 24 patients with brain tumors scheduled for craniotomy. In both trials patients were randomized to infusion of either phenylephrine or ephedrine during general anesthesia. Cerebral microcirculation was studied with cerebral blood flow (CBF) and CTH, while brain oxygenation was studied with oxygen extraction fraction (OEF) and cerebral metabolism rate of oxygen (CMRO2). MRI and PET scans was effected before and during infusion of either ephedrine or phenylephrine. Surgery was initiated after scanner sequences and subdural intracranial pressure (ICP) was measured in each patient.

**Results**

Pre-liminary results from the MRI trial show statistically significant decrease in NIRS, when infusing phenylephrine compared to ephedrine, in the contralateral hemisphere but no statistically significans was found on CBF, CTH, OEF and CMRO2.

**Discussion**

Based on the two randomized clinical trials with MRI and PET we possibly reproduce results with NIRS shown in previous trials and contribute with valuable information on the cerebral microcirculation leading to further insight on effects of known vasopressors and inotropes in a clinical setting.

**Conclusion**

At the Annual DASAIM Meeting 2018 we will present data concerning the effects of ephedrine and phenylephrine on CBF, CTH, OEF and CMRO2 in the peri-tumoral area compared to the contralateral hemisphere and possibly data from the PET study.

**References**

Figure 1: Continuous MAP, CO, and SctO₂ recordings from two selected patients. (A–C) Recordings during phentolamine treatment. (D–F) Recordings during ephedrine treatment. Both agents were given during the first treatment. Vertical arrows indicate the drug administration time.

Figure 3: Effects of capillary transit time heterogeneity (CTTH) on oxygen extraction. (A, B) Compare the extraction of oxygen from individual capillaries according to commonly accepted Crone-Renkin kinetics when the same flow is distributed across the same number of parallel capillary paths with homogenous (B) capillary flow velocities (arrows), and heterogeneous flow velocities (A), respectively. Transit times in the resting, heterogeneous case were obtained by sampling a gamma distribution with parameters corresponding to recordings of mean and standard deviation of transit times in a rat (Stefanovic et al., 2008). Notice that venous outflow oxygen concentration is affected by the heterogeneity of capillary flows, in spite of identical total blood flows and number of open capillaries.
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Medforfattere Anne G. Vedel, Frederik Holmgaard, Else R. Danielsen, Hanne B. Ravn, Lars S. Rasmussen, Jens Chr. Nilsson
Titel 1H magnetic resonance spectroscopy based assessment of cerebral metabolism according to blood pressure during cardiopulmonary bypass – a secondary outcome from a randomised clinical trial

Introduction
Overt stroke occurs in 1-2 % and covert injury in just above 50 % of patients undergoing cardiac surgery with cardiopulmonary bypass (CPB)(1)(2). Most cerebral complications after cardiac surgery seem to be caused by embolization, but other causes of inadequate blood flow may also be important. In the Perfusion Pressure Cerebral Infarcts (PPCI) trial(3) we compared the volume of cerebral infarction in cardiac surgery patients allocated to either a high or low mean arterial pressure (MAP) during CPB and found no significant difference between groups(2). A secondary predefined objective of the PPCI trial was to compare cerebral metabolism using magnetic resonance spectroscopy (MRS). Hypoxic brain cell dysfunction may be associated with a decrease in N-acetylaspartate-to-creatine ratio (NAA/Cr) or choline-to-creatine ratio (Cho/Cr). Our primary hypothesis in this substudy was that a larger pre- to postoperative decrease in grey matter ∆NAA/Cr would be found in the high-target group, because 1) this specific MRS variable has been reported most sensitive to hypoxia and 2) thus far trends in the PPCI trial suggest worse outcomes in patients allocated the high-target group.

Methods
In a single-center, patient- and assessor-blinded randomized controlled design, we allocated patients 1:1 to a higher (70-80 mm Hg) or lower (40-50 mm Hg) MAP target during CPB with a fixed and similar pump flow of 2.4 L·min⁻¹·m⁻² + 10-20%. Pressure levels were targeted with intravenous norepinephrine administration. MRS was done preoperatively and again on postoperative day 3 to 6 where we determined the change in single voxel N-acetyl-aspartate/Creatine (∆NAA/Cr) and Choline/Creatine (∆Cho/Cr) in both occipital grey matter (GM) and parieto-temporal white matter (WM).

Results
Of the 197 patients randomized in the trial, 77 patients underwent one or more MRS scanning sessions, but only 55 and 42 patients had complete and useful data from GM and WM, respectively (table 1). ∆NAA/Cr in GM was significantly lower in the high-target group (mean (SD) -0.054 (0.085)) than in the low-target group (0.012 (0.056)), unadjusted, P-value 0.003. The mean difference using multiple regression analysis including age and type of surgery as covariates was 0.07 (95% confidence interval 0.03-0.11), P=0.015. No significant difference between groups was found in ∆NAA/Cr in WM or ∆Cho/Cr in GM and WM (table 2).

Discussion and Conclusion
A higher MAP during CPB was associated with a sign of impaired cerebral metabolism, suggesting hypoxia in occipital grey matter. This result is in line with the other findings in the PPCI trial, but three other cerebral metabolism outcomes were not significantly different and the results should be interpreted cautiously, because of the risk of selection bias.

Abstract 34

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Medforfattere Anne G. Vedel, Lars S. Rasmussen, Olaf B. Paulson, Jens C. Nilsson, Hanne B. Ravn
Titel The association between postoperative cognitive dysfunction and cerebral oximetry during cardiac surgery – a secondary analysis of a randomised trial
Introduction
Postoperative cognitive dysfunction (POCD) occurs frequently after cardiac surgery. Near-Infrared Spectroscopy (NIRS) has been used to monitor regional cerebral oxygen saturation (rScO2) and intervention algorithms may minimize cerebral desaturation, but the concomitant effect on the occurrence of POCD is questionable (1). We investigated the relationship between intraoperative rScO2 variables and POCD at discharge from hospital and after 3 months. We hypothesized that time below 10% from rScO2 baseline would be greater in patients with POCD.

Methods
The present study is a secondary analysis of a randomised trial investigating the importance of two distinct levels of mean arterial pressure (MAP) during cardiopulmonary bypass (low MAP; 40-50 mmHg vs. high MAP; 70-80 mmHg) with an identical, fixed blood flow. NIRS data were obtained in a blinded fashion and cognitive testing was performed using the ISPOCD neuropsychological test battery (2). rScO2 baseline, time below baseline and 10% and 20% from baseline were recorded as was the accumulated cerebral desaturation load. We investigated if there were any difference in any rScO2 variable according to POCD. Statistical analysis was performed according to the intervention groups and in the entire study population.

Results
One-hundred and fifty-three patients had complete NIRS and POCD data at discharge and 44 patients (29%) developed POCD (3 months: 148 and 12 (8%). For the entire study population, time below 10% from rScO2 baseline did not differ between patients with and without POCD at discharge (Hodges Lehmann median difference: 0.0 min. 95% CI: -3.11; 1.47, p = 0.88). None of the other intraoperative rScO2 variables differed according to POCD at discharge. Similar observations were done at 3 months. In the high MAP group, time below rScO2 baseline was longer for patients with POCD at discharge.

Discussion
Findings are in line with other minor studies evaluating blinded NIRS recordings that seem to be inconsistent predictors of POCD, indicating that the minor desaturation in the HMAP group may be a chance finding as more pronounced desaturation has been found in this group (3).

Conclusion
We found no association between any intraoperative rScO2 variables and POCD. The present observations question the meaningfulness of applying interventions to minimize the occurrence of POCD.

References

Abstract 16

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Titel Internal carotid artery blood flow enhanced by elevating blood pressure during propofol-remifentanil anesthesia: A randomized, cross-over clinical trial

Introduction
During propofol-remifentanil anesthesia, vasopressors are administered to keep mean arterial pressure (MAP) above the 60 mmHg limit taken to represent the lower limit of cerebral autoregulation. Intraoperative hypotension may elevate the risk of cognitive dysfunction and delirium in elderly patients following major surgery [1] and thus, cerebral
complications could relate to intraoperative cerebral hypoperfusion. This randomized, cross-over clinical trial evaluated whether internal carotid artery (ICA) blood flow would be enhanced by aiming for a higher MAP.

Methods
Twenty-two patients underwent abdominal surgery (age 69 ± 9 years; mean ± SD) during propofol-remifentanil and thoracic epidural anesthesia. The trial was registered at clinicaltrials.gov (NCT03309917) before patient enrolment. The MAP was determined in the radial artery and derived cardiac output (CO) (LiDCOrapid). Duplex ultrasound evaluated ICA flow that was ‘corrected’ for any change in the arterial CO2 tension. The study was conducted from 60 min after incision with a stable infusion of propofol and remifentanil. Evaluations were conducted with MAP stable for at least 3 min at 60-65, 70-75, and 80-85 mmHg, in random order, by adjusting the infusion of noradrenaline. The MAP was not reduced deliberately. Outcomes were predefined with primary outcome change in ICA flow at MAP 60-65 vs. 80-85 mmHg while secondary outcomes were change in ICA flow at MAP 60-65 vs. 70-75 and 70-75 vs. 80-85 mmHg.

Results
An increase in MAP from 62 ± 1 to 72 ± 1 mmHg elevated ICA flow by 8% (95% CI: 2-14; P = 0.0293) and when MAP was elevated to 82 ± 1 mmHg ICA flow increased further by 7% (95% CI: 1-12; P = 0.0327), resulting in a total increase in ICA flow by 15% (95% CI: 9-21; P < 0.0001) while ICA conductance decreased (Fig. 1). At increasing levels of MAP, heart rate was maintained while CO, stroke volume, and total peripheral resistance were elevated (Table 1). The arterial CO2 tension and central venous O2 saturation increased at the highest level of MAP.

Discussion
Anesthesia-induced hypotension appears to attenuate CBF. We take the increase in ICA flow to be in consequence of the higher MAP and CO as noradrenaline has no direct effect on CBF [2]. The results suggest that during propofol-remifentanil anesthesia the lower limit of cerebral autoregulation may be as high as 80 mmHg although the limit likely varies between patients. Yet, ICA conductance decreased when MAP was elevated, indicating that cerebral autoregulation was preserved to some extent.

Conclusion
During propofol-remifentanil and thoracic epidural anesthesia in middle-aged and elderly patients, ICA flow increases when MAP was elevated from 60 to 80 mmHg. Anesthesia-induced hypotension seems to attenuate CBF which may be important for postoperative cerebral complications.

![Graphs showing changes in MAP and ICA flow](image)

Fig. 1. Mean arterial pressure (MAP), cardiac output (CO), internal carotid artery (ICA) blood flow (C), and ICA conductance (D) at a MAP of 60-65, 70-75, and 80-85 mm Hg (n = 21, 22, and 22, respectively). Values are means ± SD. P values represent the overall effect as estimated by a repeated measures mixed model. *P < 0.05 vs. MAP 60-65 mm Hg; †P < 0.05 for MAP 70-75 vs. 80-85 mm Hg.
Introduction

Propofol anesthesia reduces cerebral blood flow (CBF) and mean arterial pressure (MAP) [1] but it is unknown whether the reduction in CBF is aggravated by the often marked reduction in MAP. Cerebral autoregulation is considered to maintain CBF despite moderate changes in MAP but may be influenced by anesthesia. Cognitive dysfunction and delirium are common following major surgery and may relate to intraoperative hypotension [2]. This prospective cohort study evaluated whether phenylephrine treatment of anesthesia-induced hypotension affects internal carotid artery (ICA) blood flow and whether anesthesia affects cerebral CO2 reactivity.

Methods

The study included 27 patients planned for esophageal- or stomach resection (age 65 ± 11 years; mean ± SD) during propofol-remifentanil combined with thoracic epidural anesthesia. The study was preregistered on clinicalTrials.gov (NCT02951273). Duplex ultrasound evaluated ICA flow and radial artery catheterization determined MAP and derived cardiac output (CO) (Nexfin). Evaluations were at rest, following intubation, during anesthesia-induced hypotension at a MAP < 60 mmHg, and after administration of phenylephrine. Phenylephrine was chosen as it has no direct effect on CBF [3]. Further, cerebral reactivity was evaluated by hypoventilation when the patients were awake and by hypo- and hyperventilation during anesthesia and ICA flow was ‘corrected’ for any change in arterial CO2 tension.

Results

When the patients were awake, ICA hypocapnic reactivity was 23 (18-33; median (IQR))% kPa-1 and decreased to 14 (10-22)% kPa-1 (P = 0.007) during anesthesia. Induction of anesthesia reduced MAP, heart rate, stroke volume, and CO while total peripheral resistance was maintained (Fig. 1; Table 1). Induction reduced ICA flow (by 40%; 95% CI: 35-46; P < 0.001) while its conductance was maintained. Conversely, in 24 patients, phenylephrine 0.1 (0.1-0.2) mg increased MAP and total peripheral resistance with maintained heart rate, stroke volume, and CO while infusion of propofol and remifentanil was not changed. Phenylephrine increased ICA flow (by 15%; 95% CI: 1-29; P = 0.0276) with a reduction in its conductance.
Discussion
Anesthesia affected ICA flow and MAP and the reduction in ICA flow was accentuated by hypotension. Thus, a MAP below 60 mmHg seems to be below the cerebral autoregulatory range. Yet, ICA conductance increased during hypotension and decreased in response to phenylephrine suggesting that control of CBF was preserved to some degree.

Conclusion
Propofol-remifentanil combined with thoracic epidural anesthesia reduced cerebral reactivity to CO2. Further, anesthesia reduced ICA flow by about 40% but phenylephrine treatment of anesthesia-induced hypotension elevated ICA flow by 15% indicating that a MAP < 60 mmHg is too low to maintain CBF.

References

![Graph showing changes in mean arterial pressure and ICA blood flow](image)

*Fig. 1. A: Mean arterial pressure and B: internal carotid artery blood flow during normocapnia when awake (n = 26), after intubation (n = 26), and before and after phenylephrine treatment of anesthesia-induced hypotension (both n = 24). Values are mean ± SD. P-values represent the overall effect as estimated by a repeated measure mixed model.

\*P < 0.05 vs. awake. P< 0.05 anesthesia-induced hypotension vs. after phenylephrine.

<table>
<thead>
<tr>
<th></th>
<th>Awake</th>
<th>Induction</th>
<th>Hypotension</th>
<th>Phenylephrine</th>
<th>P-value</th>
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<tr>
<td>Heart rate (min⁻¹)</td>
<td>79 ± 11</td>
<td>66 ± 12*</td>
<td>66 ± 8*</td>
<td>62 ± 9*</td>
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<td>Stroke volume (ml)</td>
<td>102 ± 45</td>
<td>78 ± 23*</td>
<td>72 ± 19*</td>
<td>82 ± 24*</td>
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<td>Cardiac output [l min⁻¹]</td>
<td>7.7 ± 2.8</td>
<td>5.0 ± 1.4*</td>
<td>4.6 ± 1.4*</td>
<td>4.9 ± 1.4*</td>
<td>&lt; 0.001</td>
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<tr>
<td>TPR (mmHg·min ml⁻¹)</td>
<td>16 ± 7</td>
<td>15 ± 6</td>
<td>13 ± 4</td>
<td>17 ± 6†</td>
<td>0.011</td>
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<tr>
<td>ICA TAVMAX (cm·s⁻¹)</td>
<td>52 ± 13</td>
<td>36 ± 9*</td>
<td>36 ± 10*</td>
<td>38 ± 12*</td>
<td>&lt; 0.001</td>
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<tr>
<td>ICA diameter (mm)</td>
<td>5.4 ± 0.9</td>
<td>5.3 ± 0.8</td>
<td>5.2 ± 0.8</td>
<td>5.4 ± 0.9</td>
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<tr>
<td>ICA conductance (ml·min⁻¹·mmHg⁻¹)</td>
<td>3.2 ± 0.9</td>
<td>3.1 ± 1.0</td>
<td>3.6 ± 0.9*</td>
<td>3.0 ± 0.7†</td>
<td>0.004</td>
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<tr>
<td>Arterial CO₂ tension (kPa)</td>
<td>5.0 ± 0.5</td>
<td>5.4 ± 0.8*</td>
<td>5.4 ± 0.7*</td>
<td>5.4 ± 0.6*</td>
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<tr>
<td>Propofol (µg·min⁻¹·kg⁻¹)</td>
<td>-</td>
<td>65 (57-72)</td>
<td>65 (56-77)</td>
<td>65 (56-77)</td>
<td>-</td>
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<tr>
<td>Remifentanil (µg·min⁻¹·kg⁻¹)</td>
<td>-</td>
<td>0.3 (0.3-0.4)</td>
<td>0.3 (0.3-0.3)</td>
<td>0.3 (0.3-0.3)</td>
<td>-</td>
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</table>

Values are during normocapnia when awake, after intubation, and before and after phenylephrine treatment of anesthesia-induced hypotension. Values are mean ± SD or median (interquartile range). Abbreviations: TPR, total peripheral resistance; ICA, internal carotid artery; TAVMAX, time averaged maximum blood velocity. P-values represent the overall effect as estimated by a repeated measure mixed model. For propofol and remifentanil infusion change by phenylephrine was evaluated by Wilcoxon signed rank sum test. *P < 0.05 vs. awake. †P < 0.05 anesthesia-induced hypotension vs. after phenylephrine.
Abstract F

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Titel  Recovery after acute medical or surgical treatment three months after hospital discharge - a prospective cohort study

Introduction

With this study we aimed to investigate cognitive function and functional status at three months after acute admission for treatment at a medical or surgical ward in patients not admitted for intensive care unit treatment. We hypothesized that health-related quality of life, cognitive and physical function would be impaired and that patients would show increased risk of anxiety and depression.

Methods

This is a prospective cohort study in acutely ill patients three months after admission with one of the following diagnoses: Pneumonia, heart failure, pulmonary embolism, acute myocardial infarction, pyelonephritis and patients undergoing emergency open or laparoscopic abdominal surgery, at Zealand University Hospital, Koege, Denmark. Patients were visited at three months after discharge. The following assessments were performed: Repeatable Battery for the Assessment of Neuropsychological Status (RBANS) (the age-adjusted standardized normal score is 100); Chelsea Critical Care Physical Assessment tool (CPAx) (max score is 50). Short Form Health Survey (SF36) (norm component score is 50 (SD 10)); Hospital Anxiety and Depression Scale (HADS) (normal value 0-7); Trail Making Test Part A and B (normal upper limit is 74).

Results

We found a reduced cognitive function: RBANS: 84 (69-96) (median (IQR)). To investigate covariates associated with a difference in cognitive outcome we performed multiple linear regression. We found that patients using a mobilization aid had a 31 point (95% CI -56; -6) lower global cognition score (p=0.017). No other covariates showed significant results. The Trail Making Test Part A took 39 s (29-49) (median (IQR)), Part B took 74 s (56-114). The total HADS score was 3 (1-6) (median (IQR)). For the CPAx we found a median score of 50 (IQR 48.5 - 50). Health-related quality of life (SF-36): Mental Component Score was 53.3 (47.9-61.5) (median (IQR)) and Physical Component Score was 47.2 (36.7-54.3).

Discussion

We found a moderately reduced cognitive function in our cohort. We do, however, not know the baseline status of our patients. In a recent Danish study of ICU patients (1), a reduced RBANS value of 67, corresponding to light Alzheimer’s disease, was found at a three-month follow up. These results indicate that critical illness treated in the ICU may have a more substantial negative impact on cognitive function at three months than acute illness alone.

Conclusion

We found moderately reduced cognitive function three months after discharge from the ward. We found low risk of anxiety and depression, and the self-reported health related quality of life and the physical function was not impaired. Executive function and information processing were not affected.

Abstract 26

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Titel Decrease in Tissue Oxygenation as predictor for Myocardial Injury in Patients undergoing Major Spine Surgery

Background
Myocardial injury after non-cardiac surgery (MINS) is common in patients undergoing major surgery. Many of the events are asymptomatic and associated with a high 30-day mortality risk. Perioperative decrease in tissue oxygenation (StO2) is common in patients undergoing major spine surgery and is associated with complications after spine surgery including creatinine elevation, hypotension and prolonged hospitalization, but the association between decrease in StO2 and myocardial injury has not been examined earlier.

Objective
To describe the association between StO2 and myocardial injury after major spine surgery.

Methods
In a prospective cohort study we included 70 patients undergoing major elective spine surgery at University of California, San Francisco. Cerebral (ScO2) and muscle (SmO2) tissue oxygenation was measured with near-infrared spectroscopy (NIRS) during anesthesia. The primary exposure variable was time weighted area under the curve (TW AUC) for SmO2. High-sensitivity troponin T (hsTnT) was measured in plasma pre-operatively and on the first and second day after surgery to assess the primary outcome of myocardial injury, defined as peak hsTnT 14 ng/L. Secondary outcomes included: MINS, stroke, non-fatal cardiac arrest, myocardial infarction, length of stay, ICU admission, and mortality within 30 days from surgery.

Results
Mean age was 64.8 9.9 years (mean, SD) and 41 (59%) were female. No association was found between TW AUC for SmO2 and peak hsTnT (Spearman’s correlation, rs=0.17, p=0.16) (Figure). A significant difference in ICU admission between lower and upper half of the study population based on TW AUC for SmO2 values was found (Table). A total of 28 (40%) study subjects had MINS, but this was not significantly different between the upper and lower half (p=0.33).

Conclusion
Decrease in SmO2 is not a predictor for myocardial injury but is a potential predictor for postoperative ICU admission.

Figure. Relationship between time weighted area under the curve (TW AUC) for muscle tissue oxygenation (SmO2) and peak value of high-sensitivity troponin T (hsTnT) measured within the first two days after surgery.
Abstract 29

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Medforfattere
Christian S. Meyhoff, Helge B.D. Sørensen, Eske K. Aasvang

Titel
Continuous vital sign monitoring in postoperative patients - protocol for an observational study

Introduction
More than 200 million cases of major non-cardiac surgery are performed worldwide annually. A high percentage of patients undergoing major surgery develop severe postoperative complications (1). Cardiopulmonary vital parameters are measured at least every 12 hour to assess clinical state of the patients (2). However, some patients may deteriorate between the measurements and continuous wireless monitoring may provide early detection (3). The aim of this study is to assess the association between deviating vital parameters and serious postoperative complications.

Methods
A prospective observational study (NCT03491137) of 500 patients enrolled after major abdominal cancer surgery at Rigshospitalet or Bispebjerg Hospital (table). After discharge from the post anaesthesia care unit, a wireless continuous monitoring system will be attached to the patients, recording vital parameters 24/7. The recordings are transferred and stored automatically on a secured central server. Baseline demographics and all Early Warning Scores will be collected. Patients are monitored for 96 hours or until they are dismissed from hospital. Patients will be evaluated daily by an investigator for serious adverse events including assessment of cardiac troponin on postoperative day 1, 2 and 3. Exposure variables are deteriorating vital parameters. Clinical outcomes include mortality, readmission up to 6 months after surgery, transferring to Intensive care unit and several pre-defined serious adverse events.

Perspectives
Continuous cardiopulmonary monitoring may detect abnormal patterns in vital parameters associated with subsequent serious adverse events. Based upon the collected monitoring and clinical data, we aim to develop a clinical support system by utilizing machine learning and pattern recognition, to predict physiological abnormal values before they occur, to allow early intervention and ultimately to prevent adverse outcomes.

<table>
<thead>
<tr>
<th>Inclusion criteria</th>
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<tr>
<td>• Age 65 years or above</td>
<td>• Inability to cooperate</td>
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<tr>
<td>• Elective major cancer surgery in the abdomen; intestine tenue, colon, rectum, esophagus, ventricle, pancreas</td>
<td>• Mini Mental State examination &lt; 24</td>
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<tr>
<td>• Expected duration of surgery ≥ 2 hours</td>
<td>• Allergy to latex or silicone</td>
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<td>• Pacemaker</td>
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