# COVID-19 AND OXYGEN

## FC 085 CEREBRAL OXYGENATION DURING EXERCISE ACROSS DIFFERENT STAGES OF CHRONIC KIDNEY DISEASE

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**BACKGROUND AND AIMS:** Cognitive impairment and reduced exercise tolerance are common in patients with chronic kidney disease (CKD), in part due to reduced brain function. Proper brain function relies on sufficient blood flow and oxygen supply by the cerebral vasculature. A reduction in cerebral oxygenation of more than 10% may deteriorate brain function and influence the decision to continue exercise. This study aims to examine the cerebral oxygenation and blood volume during a mild physical stress as an index of brain activation in patients at different stages of CKD and controls without CKD.
**METHOD:** This is a preliminary analysis of an observational study enrolling patients with CKD stage 2–4 (matched for age and sex within the different stages) and controls without CKD. All participants underwent a 3-min intermittent handgrip exercise (HG) at 35% of their maximal voluntary contraction. Changes in prefrontal oxygenation (oxyhaemoglobin—$O_2$Hb) and deoxyhaemoglobin—HHb) and total blood volume (total hemoglobin—tHb) were continuously recorded during HG-exercise by near-infrared spectroscopy (NIRS).
**RESULTS:** A total of 59 participants are included in this preliminary analyses ($n = 11$ controls, $n = 15$ stage 2 CKD, $n = 18$ stage 3 CKD and $n = 15$ stage 4 CKD patients). During HG-exercise, $O_2$Hb significantly increased ($P < 0.001$) and HHb remained relatively unchanged in all groups compared to pre-exercise values. However, this $O_2$Hb increase was progressively lower with advancing CKD Stages (controls: 2.58 ± 1.43; stage 2: 1.51 ± 1.31; stage 3: 1.29 ± 0.97; stage 4: 0.95 ± 0.92; $P = 0.006$) (Figure). During HG, tHb (an index of microvascular blood volume) increased significantly in controls, stage 2 and stage 3 CKD patients ($P < 0.05$) but not in stage 4 CKD patients ($P = 0.100$). As before this tHb increase was progressively lower with advancing CKD stages ($P = 0.030$). Controlling for age differences between groups did not alter the above observations.
**CONCLUSION:** Brain activation/response during a mild physical task appears to decrease with advancing CKD as suggested by the smaller rise in cerebral oxygenation and blood volume. This may contribute both impaired cognitive function and reduced exercise tolerance with advancing CKD.

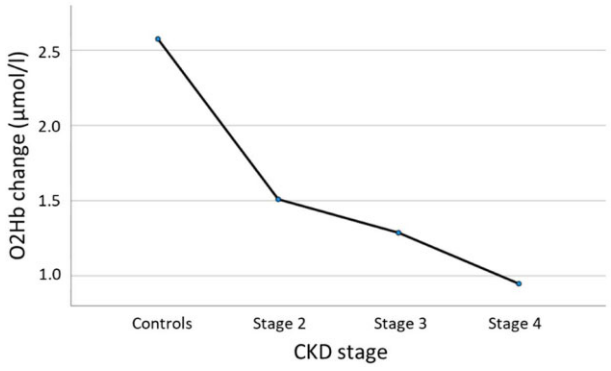


**FIGURE: 1** Average response in $O_2$Hb during handgrip exercise.

## FC 086 IMPROVED IMMUNOLOGIC RESPONSE TO COVID-19 VACCINE WITH PROLONGED DOSING INTERVAL IN HEMODIALYSIS PATIENTS

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**BACKGROUND AND AIMS:** Vaccination against coronavirus disease 2019 (COVID-19) can reduce disease incidence and severity. Dialysis patients demonstrate a delayed immunologic response to vaccines. We determined factors affecting the immunologic response to COVID-19 vaccines in hemodialysis patients.
**METHOD:** All patients within a Swedish hemodialysis network, vaccinated with two doses of COVID-19 vaccine 2–8 weeks before inclusion, were eligible for this cross-sectional study. Severe adult respiratory syndrome coronavirus 2 (SARS-CoV-2) spike protein antibody levels were determined by the EliA SARS-CoV-2-Sp1 IgG test (Thermo Fisher Scientific, Phadia AB) and related to clinical and demographic parameters. Eighty-nine patients were included.
**RESULTS:** Patients were vaccinated with two doses of Comirnaty (BNT162b2, 73%) or Spikevax (mRNA-1273, 23.6%). Three patients received combinations of different vaccines. Response rate (antibody titres >7 U/mL) was 89.9%, while 39.3% developed high antibody titres (>204 U/mL), 47 (43–50) days after the second dose. A previous COVID-19 infection associated with higher antibody titres [median (25th–75th percentile) 1558.5 (814.5–3763.8) U/mL versus 87 (26–268) U/mL; $P = 0.002$], while the time between vaccine doses did not differ between groups ($P = 0.7$). Increasing SARS-CoV-2 antibody titres were independently associated with increasing time between vaccine doses, decreasing serum calcium levels and previous COVID-19 (Table 1).
**CONCLUSION:** In conclusion, a longer interval between COVID-19 mRNA vaccine doses, lower calcium and a previous COVID-19 infection were independently associated with a stronger immunologic vaccination response in hemodialysis patients. While the response rate was good, only a minority developed high antibody titres 47 (43–50) days after the second vaccine dose.

**Table 1. Multiple regression of predictors of SARS-CoV-2 spike IgG response to COVID-19 vaccines**

| | Regression coefficient (95% CI) | P |
|---|---|---|
| (Constant) | 0.015 (−0.507 to 0.537) | 0.95 |
| Type of vaccine | −0.194 (−0.566 to 0.179) | 0.30 |
| Sodium (1 SD) | −0.154 (−0.309 to 0.001) | 0.051 |
| Calcium (1 SD) | −0.233 (−0.4 to −0.067) | 0.007 |
| Treatment time (1 SD) | −0.05 (−0.234 to 0.133) | 0.586 |
| Bodymass index (1 SD) | 0.104 (−0.086 to 0.294) | 0.279 |
| IDBWG (1 SD) | 0.118 (−0.042 to 0.278) | 0.145 |
| Kt/V (1 SD) | 0.009 (−0.159 to 0.177) | 0.915 |
| Vaccine interval (1 SD) | 0.241 (0.039 to 0.443) | 0.02 |
| Interval first dose to sample (1 SD) | 0.027 (−0.142 to 0.197) | 0.750 |
| Previous COVID-19 | 1.078 (0.56 to 1.596) | <0.001 |

## FC 087 EFFECTIVENESS OF COVID-19 VACCINES IN A LARGE EUROPEAN HAEMODIALYSIS COHORT

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**BACKGROUND AND AIMS:** To date, no large-scale study has evaluated the effectiveness of COVID-19 vaccines in hemodialysis patients. We sought to evaluate the effectiveness of vaccines against SARS-CoV-2 infections and death in