

“Significant Differences in Percent Oxygen Consumption and Work Rate at the Anaerobic Threshold (AT1) Between Negative Controls and Post-COVID Young Adults”

Cardiorespiratory Test Performance in Young Adults post SARS-CoV-2 Infection Compared to Negative Controls

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Introduction

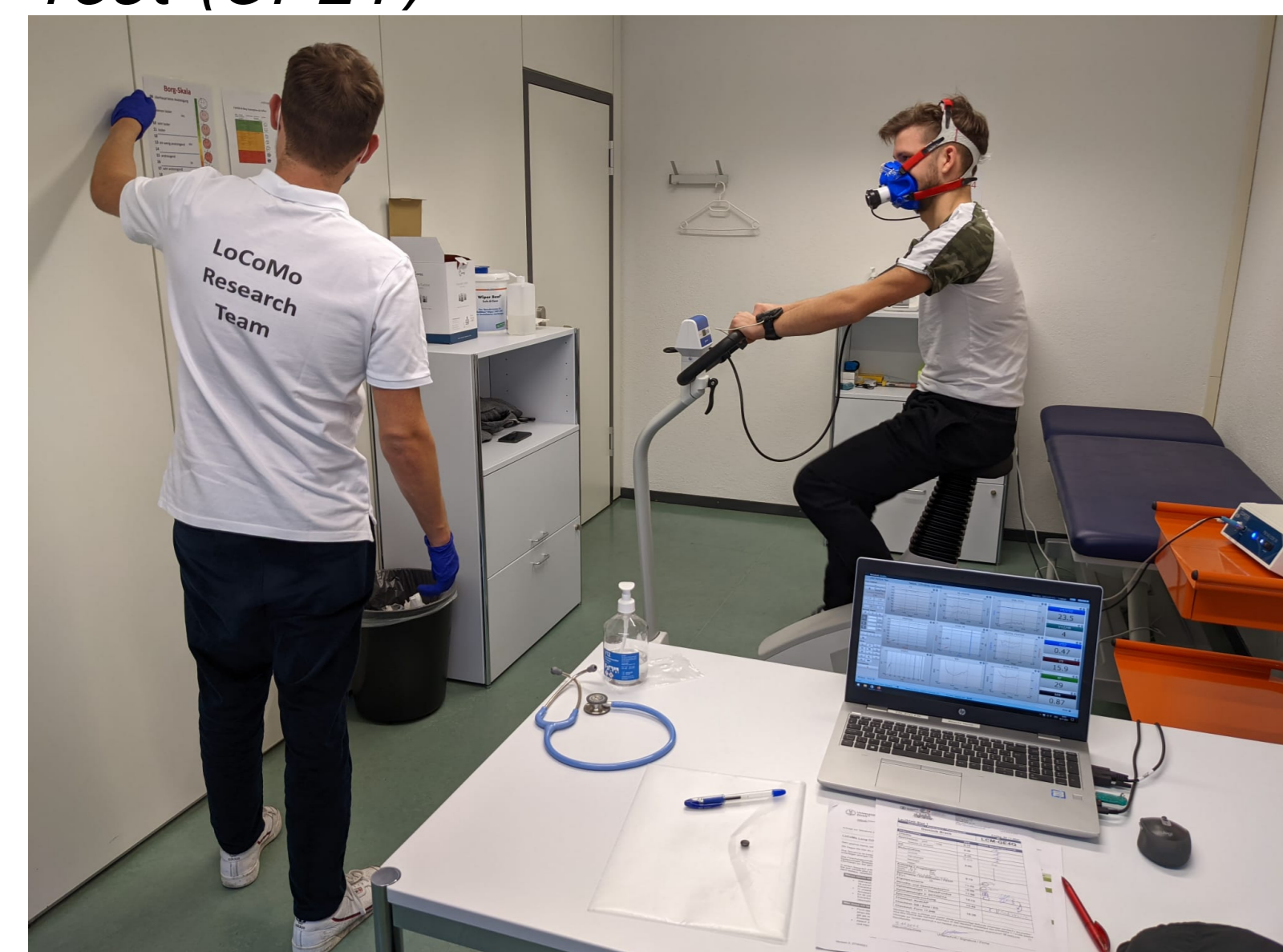
Several reports suggest that SARS-CoV-2 infection sequelae persist months after the acute stage of the infection even in previously healthy young persons. These sequelae can include pulmonary, cardiovascular, neurological, and physical effects. COVID-19 survivors were associated with increased risks of cerebrovascular diseases, such as stroke, arrhythmia related disorders, such as atrial fibrillation, inflammatory heart disease, such as myocarditis, ischemic heart disease [1].

Objectives

“We sought to evaluate cardiorespiratory function in young personnel from the Swiss Armed Forces using a cardiopulmonary exercise test (CPET) and spirometry, and to compare test results in study participants who had a previous confirmed SARS-CoV-2 infection with non-exposed controls.”

Methods

Figure 1: Cardio-Pulmonary Exercise Test (CPET)



As part of the LoCoMo study, military recruits underwent a battery of tests to evaluate their fitness [2]. One of these tests was a standardized cardiopulmonary exercise test performed on a treadmill (Figure 1 & Figure 3). The test measured heart rate, blood pressure, inspiratory and expiratory CO₂ and O₂ concentrations. Another test was

spirometry, which measured lung volume. This includes Forced Expiratory Volume in one second (FEV₁), Vital Capacity (VC), and Forced Vital Capacity (FVC). The data from these tests were analyzed as part of the study (Figure 2).

Figure 2: Spirometry: Pulmonary Function Testing

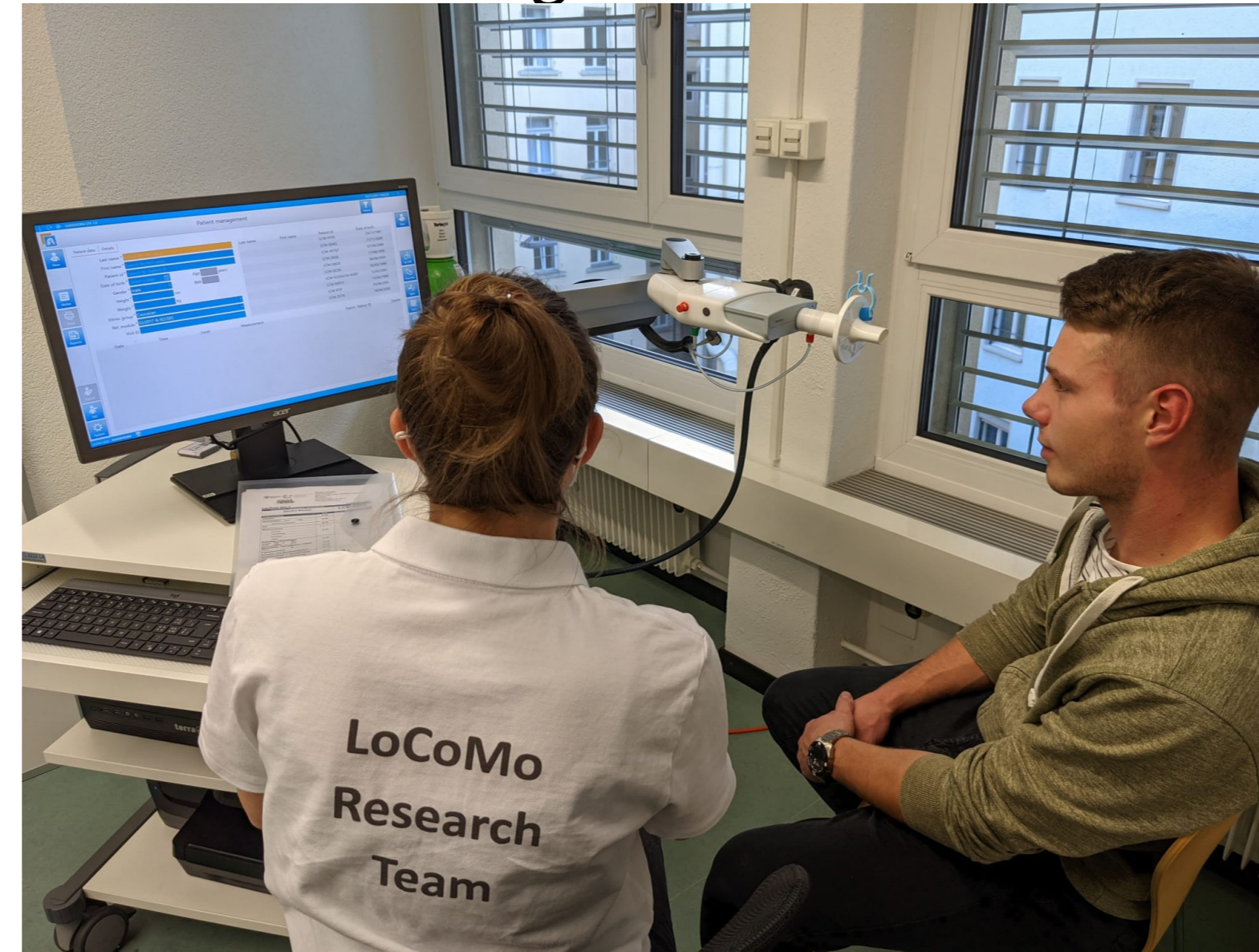
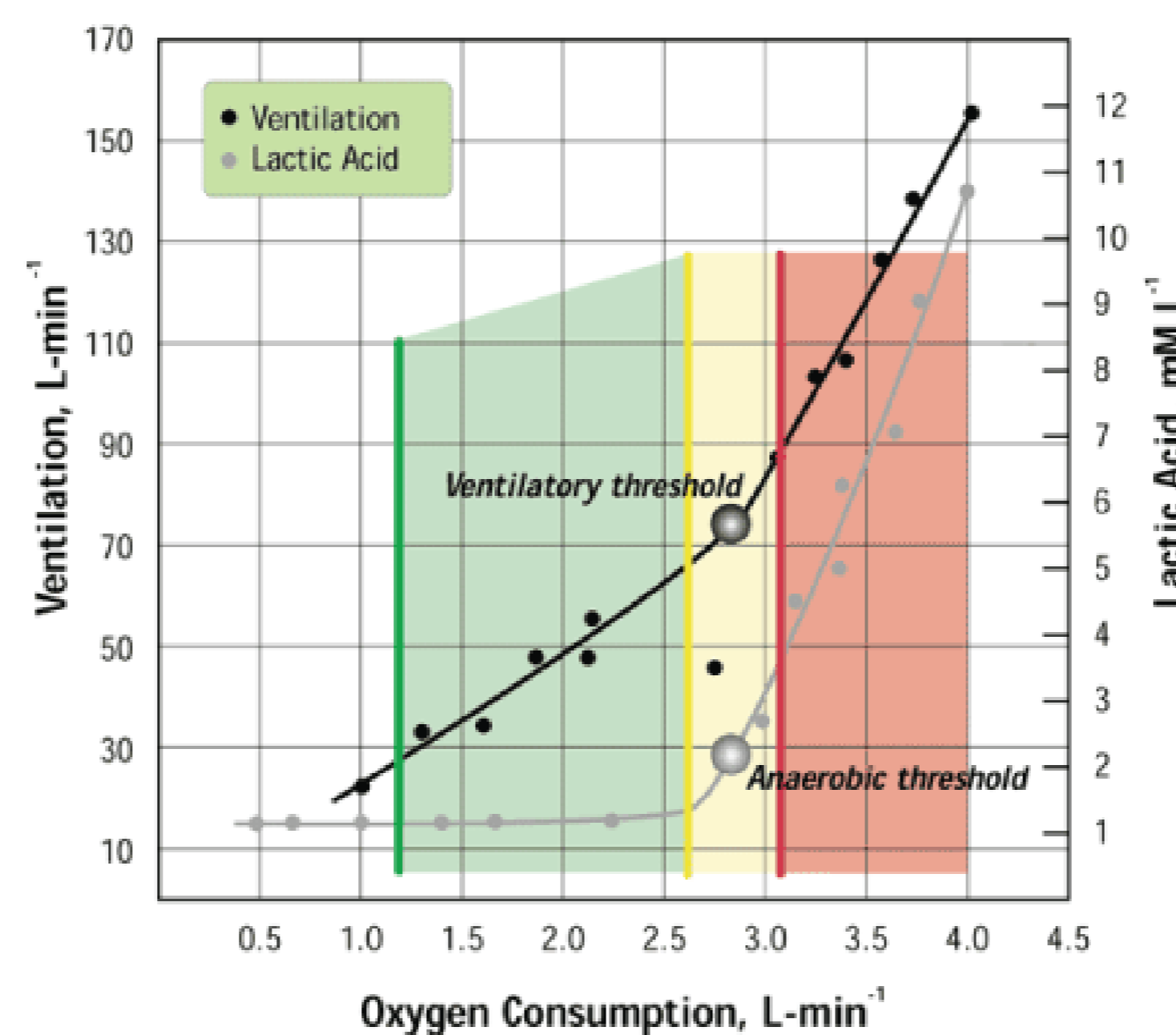


Figure 3: Anaerobic Threshold (AT1) & VO₂max



Results

Table 1: Baseline characteristics

	Control group (n=251)	Non-recent COVID-19 group (n=177)
Age (years)	21 (21–21)	22 (21–24)
Sex	95% Males	94% Males
Days since COVID-19	NA	317 (272–414)
Anti-N	0.064 (0.059–0.067)	3.61 (1.00–10.0)
Vaccinated	191 (76%)	118 (67%)

We evaluated 177 participants who had a SARS-CoV-2 infection more than 6 months previously, 251 controls with negative serology, 19 participants with a recent infection, and 46 asymptotically infected individuals. Baseline characteristics were balanced in all groups. Less than 10% of participants in each group reported having asthma, and more than 75% were physically active at least once a week (Table 1).

No significant differences were found in spirometric measurements, but there was strong evidence of differences in the CPET measures of percent oxygen consumption (p-value: 0.013) and work rate (p-value: 0.014) at the anaerobic threshold

(AT1) between the control and the SARS-CoV-2 infected groups (Table 2).

Next Steps

Further research is required to evaluate the trajectory of symptom persistence beyond one year. A follow-up study with the same participants would be interesting and allow for a long-term comparison to assess the reversibility of the difference in the CPET.

Table 2: Cardio-Pulmonary Exercise Test (CPET)

	Control group (n=251)	Non-recent COVID-19 group (n=177)	p-value
BF.at.VO ₂ .peak	32 (27 - 36)	32 (29 - 36)	ns
SpO ₂ .at.VO ₂	93 (89 - 96)	94 (90 - 96)	ns
VO ₂ .at.VT1	41 (37 - 46)	39 (36 - 43)	0.012
VO ₂ .peak	42 (37 - 47)	41 (36.5 - 46)	ns
VO ₂ .unlated	8 (7 - 9)	8 (7.5 - 9)	ns
WR.at.VO ₂ .peak	86 (76 - 97)	84 (77 - 91)	ns
WR.at.VT1	34 (30 - 39)	32 (29 - 38)	0.014

Note:

BF at VO₂ peak: peak Breathing frequency at maximal oxygen consumption

SpO₂ at VO₂: peak Peripheral oxygen saturation at maximal oxygen consumption

VO₂ unlated: Oxygen consumption during unloaded pedalling

VO₂ peak: Maximal oxygen consumption

VO₂ at VT1: Oxygen consumption at aerobic threshold

WR at VT1: Work rate at aerobic threshold

WR at VO₂ peak: Work rate at maximal oxygen consumption

Conclusion

The study found that young persons infected with SARS-CoV-2 even > 6 months previously had significant differences in cardiovascular fitness and endurance compared to non-exposed controls.

References

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