

Comparison of two different O₂-delivery systems during exercise in patients with chronic hypoxia



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Backgrounds

Results from studies using a transnasal high-flow oxygen delivery system (TNI®) suggest advantage regarding the oxygenation compared to conventional O₂-therapy (LTOT) [1-3]. We assume an identical O₂-consumption during identical exercise load. Therefore, solely the O₂-delivery system would make the differences in blood gas analysis (BGA) parameters.

Aim of the study was to verify the feasibility, safety and clinical significance of TNI® in comparison to LTOT at 40% O₂-admixture each.

Method

14 patients (pts) (7 females, 7 males, age:69,14±1,74 years, BMI:26,21±1,69 kg/m², VC: 69,64±2,93 %, FEV1:57,36±6,99 %, Diff.capacity: 41,83±5,56 %,) with chronic respiratory failure (PaO₂: 61,1±1,90 mmHg) and indication for a long-term O₂-therapy. Standardized treadmill (er2000 custo-med, Germany) six-minute walk test (6MWT) [4] in a prospective, open, randomized study. First, all pts completed 6MWT on room air (basis). Then, they underwent consecutive 6MWTs applying TNI® and/or LTOT in a random order (Figure 1). Between each 6MWT pts had a resting time of 30 minutes in the sitting position. We collected data from Borg-dyspnoea-scale (BDS) scores and BGA immediately before each 6MWT and at maximum workload (Wlm) and also measured walking distance (m), workload performance (Watt), energy expenditure (kJ).

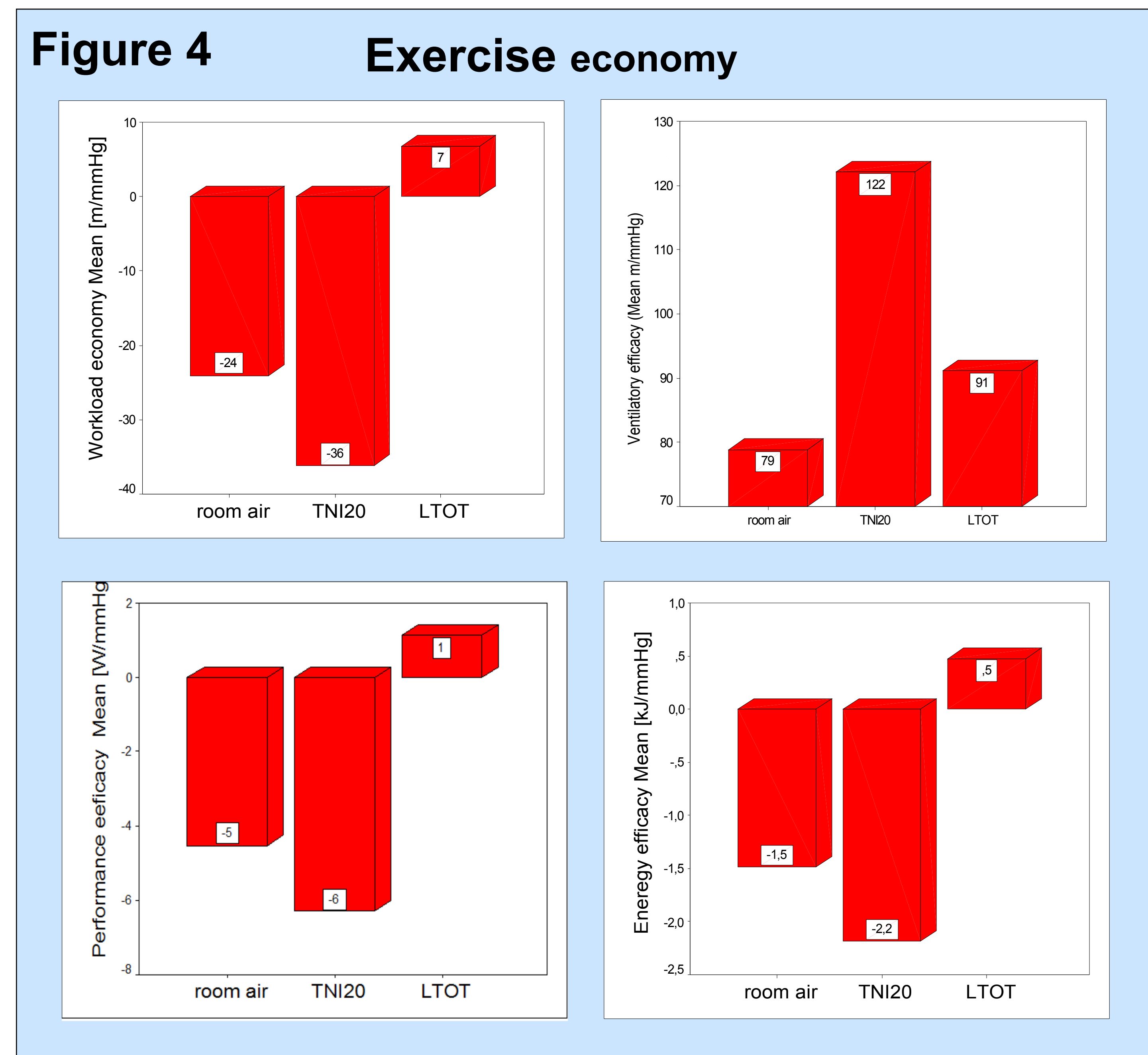
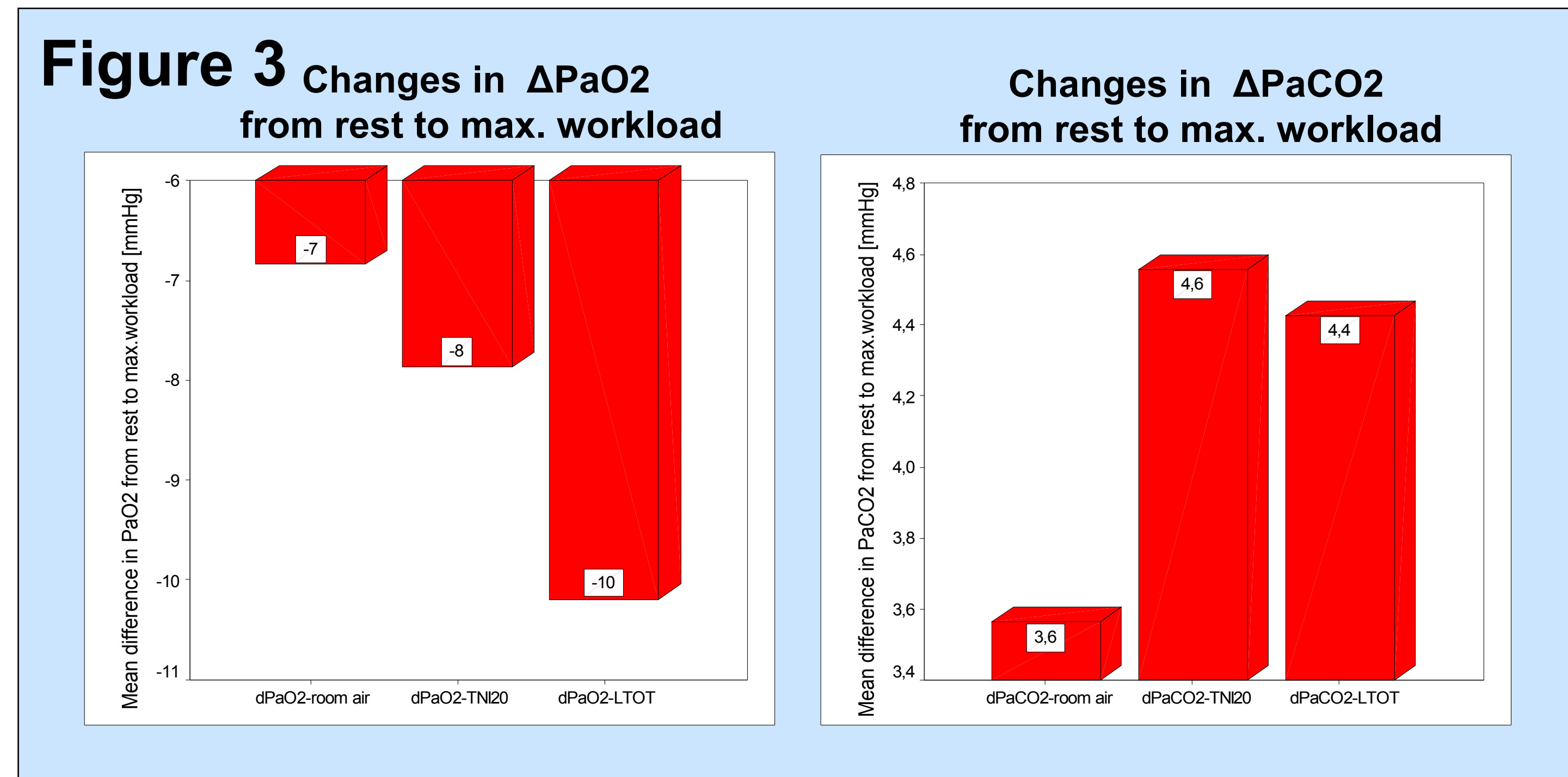
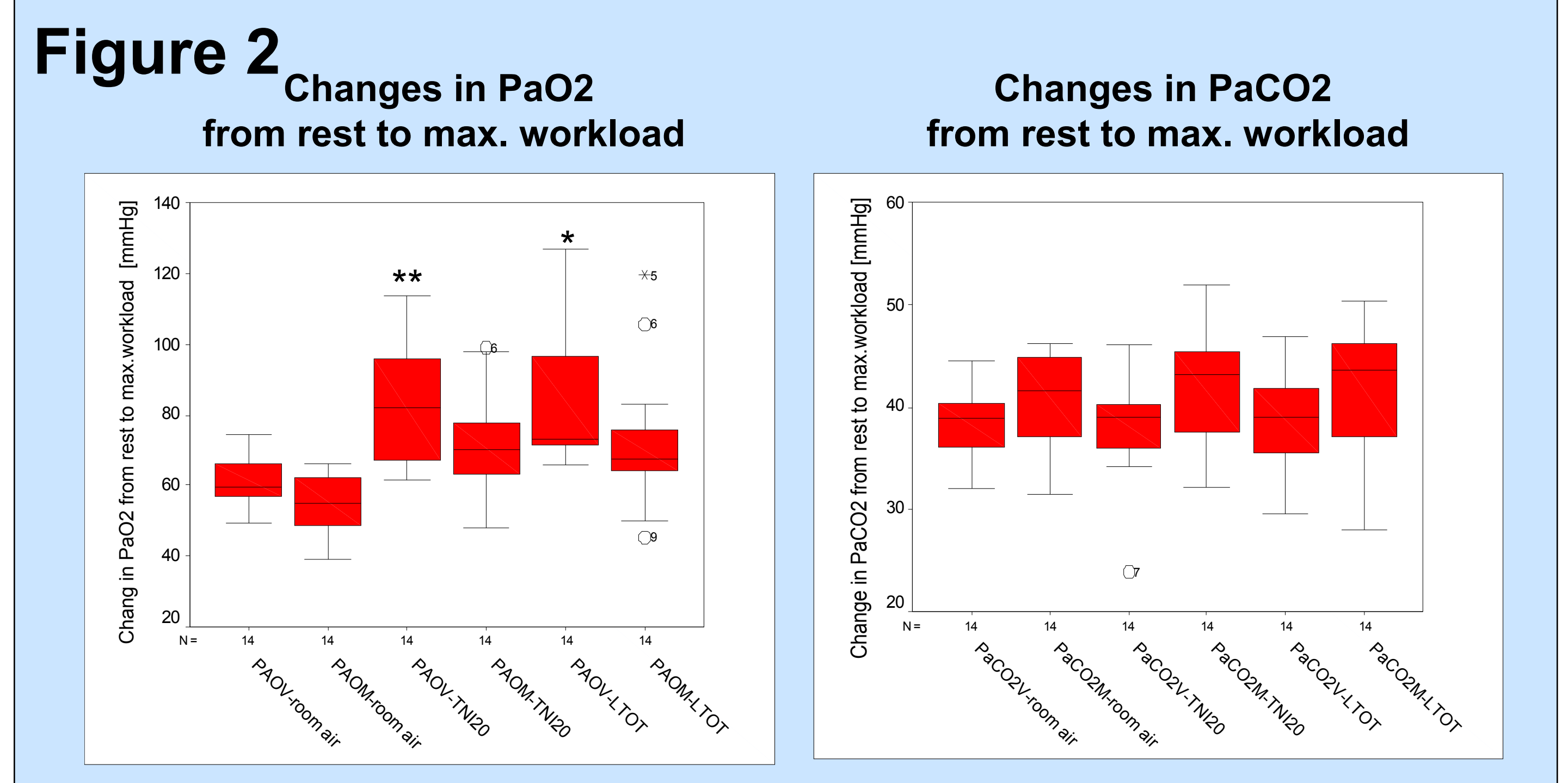
Primary outcome measures were ΔPaO₂ and ΔPaCO₂ from rest to Wlm and their relation to walking distance (m/ΔPaO₂), exercise performance (Watt/ΔPaO₂) and energy expenditure (kJ/ΔPaO₂). Statistical probes included ANOVA and two tailed student's t-test. Data are presented as mean±SE.

Results

Walking distances during basis-, TNI®- and LTOT-6MWT were 182,14±18,49 m, 235,71±21,93 m and 232,86±21,08 m respectively. BDS scores increased from rest to Wlm by 5,58±0,62 (basis), 2,67±0,51 (TNI®) and 3,38±0,59 (LTOT) scores.

ΔPaO₂ from rest to Wlm was higher during LTOT compared to TNI® (-10,19±3,74 mmHg vs. -7,80±4,4 mmHg respectively) at identical workload performance (43,21±3,08 Watt).

Workload economy, performance- and energy efficacy was better during TNI® vs. LTOT (36,14±25,76 vs. -6,82±23,42 m/mmHg; 6,29±4,35 vs. 1,13±4,03 Watt/mmHg and 2,18±1,57 vs. 0,48±1,41 kJ/mmHg respectively. Nine pts preferred TNI, 3 pts preferred conventional O₂-therapy, 2 had no preference.



Conclusions

- TNI® was a safe and comfortable way to deliver O₂ to pts with hypoxia during exercise and
- was equivalent with conventional LTOT in regard of blood gas measures, walking Distance, workload performance.
- TNI® was by trend superior in regard to workload economy, performance- and energy efficiency as well as ventilatory efficacy compared to LTOT.

Reference

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