

Effect of high-intensity interval training in de *nov*o heart transplant recipients – 3-year results from the HITTS randomized controlled trial

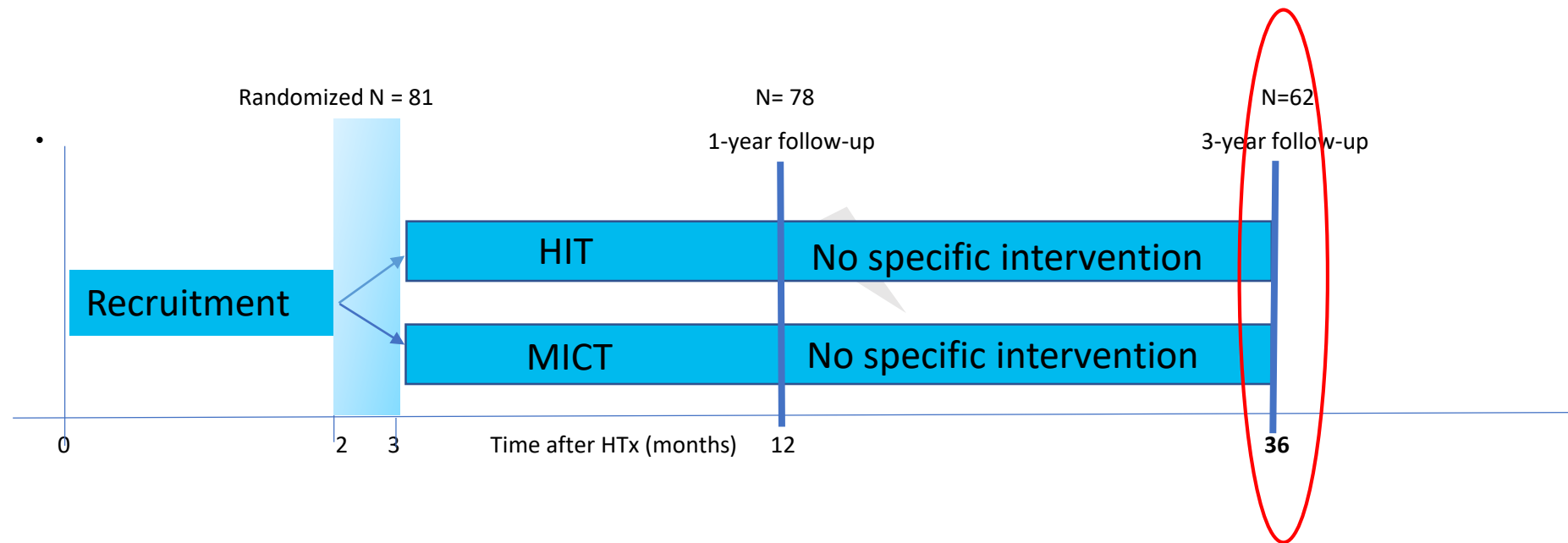
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Purpose and methods

- Long-term effects of commencing high-intensity interval training (HIT) versus moderate intensity continuous training (MICT) early after HTx is unknown
- In this extension of the HITTS trial⁽¹⁾, our aim was to examine whether the benefits of nine months of supervised HIT training persisted **two** years after the end of the intervention



⁽¹⁾Nytrøen K, Rolid K, Andreassen AK, Yardley M, Gude E, Dahle DO, et al. Effect of High-Intensity Interval Training in De Novo Heart Transplant Recipients in Scandinavia: 1-Year Follow-Up of the HITTS Randomized, Controlled Study. *Circulation*. 2019;139(19):2198-211

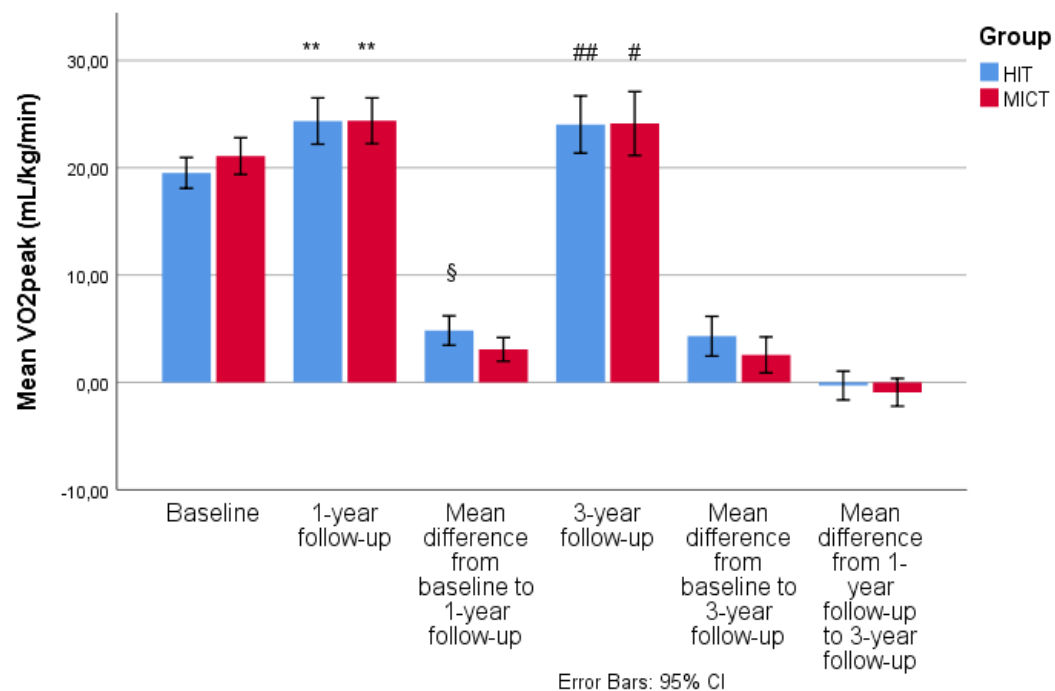
Endpoints

The primary outcome was the long-term effect of HIT vs MICT on aerobic exercise capacity as assessed by VO_{2peak}

Secondary endpoints :

- Muscle strength
- Heart rate response
- Cardiac function
- Body composition
- Biomarkers
- Health-related quality of life

Results primary endpoint



VO_{2peak} (mL/kg/min)

Mean difference [95% CI]

- Baseline to 1-year follow-up
1.8 [0.05, 3.5]
- Baseline to 3-year follow-up
1.7 [-0.7, 4.2]
- 1-year follow-up to 3-year follow-up
0.6 [-1.2, 2.5]

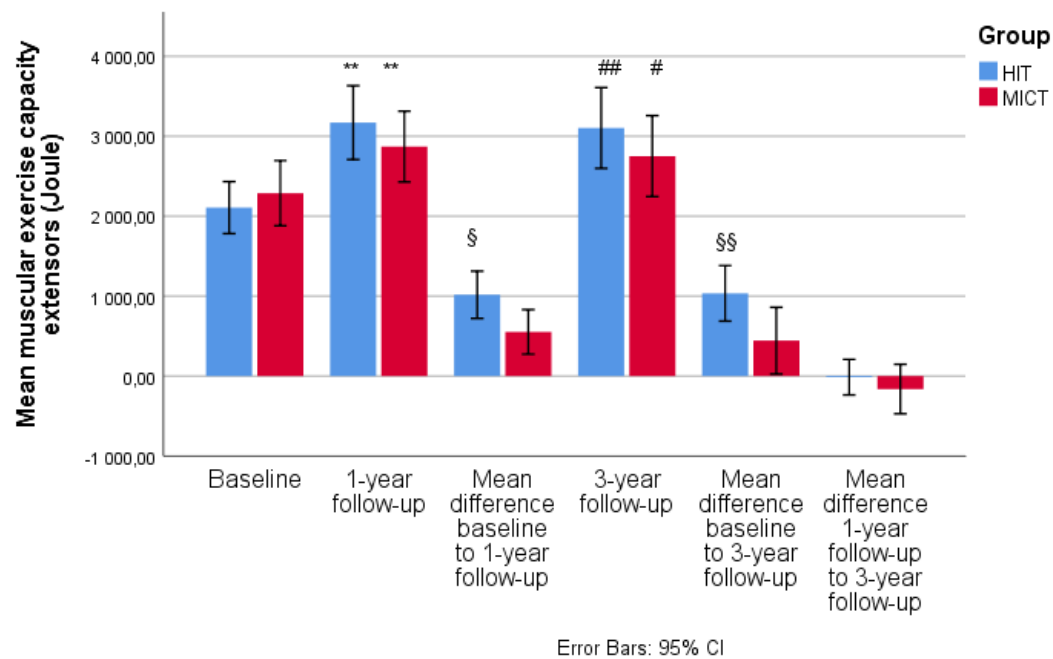
Comparison of high-intensity interval training (HIT) versus moderate intensity continuous training (MICT) on VO_{2peak}.

** Within-group difference from baseline to 1-year follow-up $P < 0.001$.

§ Between-group difference from baseline to 1-year follow-up $P < 0.05$.

Within-group difference from baseline to 3-year follow-up $P < 0.001$, # $P < 0.05$.

Muscular exercise capacity



Comparison of high-intensity interval training (HIT) versus moderate intensity continuous training (MICT) on muscular exercise capacity (Joule).

** Within-group difference from baseline to 1-year follow-up $P < 0.001$

Within-group difference from baseline to 3-year follow-up $P < 0.001$, $^{\#}P < 0.05$

$^{\$}$ Between-group difference from baseline to 1-year follow-up $P < 0.05$

$^{\$\$}$ Between-group difference from baseline to 3-year follow-up $P < 0.05$

Muscular exercise capacity extensors (Joule)

Mean difference [95 %CI]

- Baseline to 1-year follow-up
424 [26, 826]
- Baseline to 3-year follow-up
592 [45, 1139]
- 1-year follow-up to 3-year follow-up
148 [-231, 528]

Other results

	High-intensity interval training (HIT)		Moderate intensity continuous training (MICT)		Mean difference between groups [95%CI]	t-test P value
Variable	Baseline (mean 11 weeks after HTx)	3-year follow-up	Baseline (mean 11 weeks after HTx)	3-year follow-up		
Exercise capacity						
% of predicted VO _{2peak}	55 ± 12	67 ± 16**	58 ± 13	65 ± 20*	5.1 [-1.7, 12.0]	0.140
VO _{2peak} (L/min)	1.50 ± 0.40	2.04 ± 0.62 **	1.67 ± 0.44	2.01 ± 0.64**	0.2 [-.0003, 0.397]	0.053
Anaerobic Treshold (L/min)	1.00 ± 0.29	1.35 ± 0.48*	1.14 ± 0.35	1.22 ± 0.46	0.3 [0.04, 0.5]	0.024
peakHeart Rate (bpm)	127.4 ± 17.5	150.3 ± 19.3**	127.5 ± 22.4	149.7 ± 23.8**	0.7 [-8.3, 9.6]	0.882
Heart function						
Ejection Fraction (%)	55.9 ± 5.6	54.6 ± 5.8	58.3 ± 6.0	57 ± 6.2	0.05 [-4.5, 4.6]	0.984
NT proBNP (ng/L) (median (IQR))	1019 (1250)**	238 (217)	968 (850)	209 (273)**		0.745 ^a
BODY COMPOSITION						
Body mass index	24.6 ± 2.9	27.4 ± 4.0 **	25.4 ± 4.0	27.5 ± 4.3	0.7 [-0.7, 2.0]	0.320
Body fat (%)	24.0 ± 7.7	28.5 ± 9.8*	24.4 ± 9.6	27.6 ± 9.4*	1.21 [-1.9, 4.3]	0.438
HEALTH-RELATED QUALITY OF LIFE						
Physical Component Summary (median (IR))	43 (14)	50 (15)*	44 (9)	51 (17)*		0.703 ^a
Mental Component Summary (median (IR))	59 (13)	56 (10)	56 (10)	57 (12)		0.976 ^a

**Within-group difference $P < 0.001$ *Within-group difference $P < 0.05$ ^aMann-Whitney U-test

Conclusion

- From baseline to 3-year follow-up there was no significant mean difference between the HIT and the MICT group in VO_{2peak}
- From baseline to 3-year follow-up there was a significant mean difference between the groups in muscular exercise capacity and anaerobic threshold in favor of the HIT group
- Early initiation of HIT after heart transplantation appears to have some sustainable long-term effects