



NEXUS FIBRE EFFECT ON CYCLING PERFORMANCE

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Nexus fibre contains three metals: titanium, platinum and aluminium. By incorporating these three elements into the core of the fibre a Nexus garment emits infra red radiation, this in turn, due to the unique properties of the fibre, is proven to influence the biochemical pathways of an organism.

More specifically, Nexus fibre promotes the re-organisation of water molecules in cellular tissue. These properties have been observed to improve the performance in athletes.

The aim of this study is to evaluate the use of Nexus Apparel on cycling performance. Specifically the test was on young cyclists.

MATERIALS AND METHODS

The study was conducted on 6 cyclists under the age of 23. Average age of 19.7, average height of 179.5cm, average weight of 65.3kg; they were divided in groups of three people (group A and group B).

Before the start of this study all the 6 athletes had to undergo the “agonistic sportive qualification” (ECG effort test and echocardiogram), these tests concluded that all the athletes were in good health and able to perform agonistic sportive activities.

The athletes were subjected to a bicycle ergometer maximal test (using a particular bicycle ergometer - SRM High Performance) with breath analysis using a specific automatic system (Vmax Spectra Sensormedics).

The cardiac frequency was registered during the whole test with a cardifrequencimeter linked to a personal computer.

The values that have subsequently been analyzed for the study were:

- 1) Cardiac frequency at the second anaerobic limit
- 2) VO2 Max
- 3) Watt Power measurement at the second anaerobic limit

This way during the first test were determined the frequency range for every kind of training

Long training was conducted at 80-85% of the cardiac frequency limit

Medium training was conducted at 90.95% of the cardiac frequency limit

STUDY PROTOCOL

The 6 athletes were subjected to 2 tests, one week after the other:

Measurement of height and weight

Impedanciometry at rest and measurement of these values: TBW, ICW, ECW

Warm up and training simulation for 60 minutes on bicycle ergometer Lode Excalibur Sport with constant temperature and humidity levels (T: 20°C, H: 51%) composed this way:

- 1) 10 min slow pace
- 2) 20 min medium pace
- 3) 5 min slow pace
- 4) 20 min medium pace
- 5) 5 min slow pace

At the end of the test 100cc of water was given to every cyclist.

After this testing phase the cyclists were submitted to an incremental test on a bicycle ergometer SRM High Performance (starting from 100 watts and increasing by 10 watts every 30 seconds) and analysis of the expired gas breath - to - breath using an automatic system (Sensormedics).

Registration of the data was conducted to calculate of the anaerobic limit.

After 45 minutes from the end of the incremental test there was another measurement of the weight together with the impedanciometry analysis in order to measure the level of liquids that were lost during the exercise. Impedanciometry analysis was measured with Impedancimetre Dietosystem Human Plus II. During the first test the athletes from group A wore Nexus clothes, meanwhile the athletes from group B used normal clothes. During the second test (1 week later) the athletes from group A used normal clothes and the athletes from group B used Nexus clothes.

The athletes were invited to wear the clothes starting from the evening of the day before the test, also sleeping with them.

All the athletes complied to the protocol. The Placedo clothes appeared identical to the Nexus clothes

RESULTS

All the result of the study is in the following table:

Group A: Athletes 1-2-3; Group B: Athletes 4-5-6

Tab.1: impedanciometry Group A and B with normal clothes

	Athlete1	Athlete2	Athlete3	Athlete4	Athlete5	Athlete6	Average
Weight b	63.2Kg	58.7 Kg	62,8 Kg	67.3 Kg	70.9 Kg	69 Kg	65,32 kg
Weight a	61,9Kg	57.0 Kg	61,4 Kg	65.4 Kg	69.1 Kg	67.2 Kg	63,67 kg
Weight	-1,3Kg	-1,7 Kg	-1,4 Kg	-1.9 Kg	-1.8 Kg	-1.8 Kg	-1,65 kg
TBW b	42,64 l	39,35 l	42,16 l	45.36 l	47,27 l	47.65 l	44,08 l
TBW a	41,51 l	37,77 l	40,95 l	43.74 l	45.87 l	46.26 l	42,67 l
TBW	-1,13 l	-1,58 l	-1,21 l	-1,62 l	-1,4 l	-1.49 l	-1,41 l
ICW b	27,73 l	26,15 l	26,88 l	27,83 l	31,22 l	31.17 l	28,50 l
ICW a	26,90 l	25.22 l	26,16 l	27,29 l	30,63 l	30.45 l	27,77 l
ICW	-0.83 l	-0,93 l	-0,72 l	-0,54 l	-0,59 l	-0.72 l	-0,73 l
ECW b	14,87 l	13.20 l	15,28 l	17.53 l	16,05 l	16.48 l	15,56 l
ECW a	14,61 l	12.55 l	14,79 l	16.45 l	15,24 l	15,81 l	14,91 l
ECW	-0,26 l	-0,65 l	-0,49 l	-1,08 l	-0,71 l	-0.67 l	-0,65 l

Tab. 2: impedanciometry With nexus clothes

	Athlete1	Athlete2	Athlete3	Athlete4	Athlete5	Athlete6	Average
Weight b	63.8 Kg	60.6Kg	61 kg	67.6 Kg	69 Kg	69.2 kg	65.2 kg
Weight a	62.4 Kg	59.4 kg	59.5 Kg	66 Kg	67 Kg	67.8 Kg	63,68 kg
Weight	-1,4 Kg	-1.2 Kg	-1.5 Kg	-1.6 Kg	-2 kg	-1.4 Kg	-1,52 kg
TBW b	42,95 l	39.88 l	41,23 l	45.80 l	46,71 l	47.59 l	44,03 l
TBW a	41,66 l	38,90 l	39,93	44.63 l	45,09 l	46,58 l	42,80 l
TBW	-1,29 l	-0,98 l	-1,3 l	-1,17 l	-1,62 l	-1,01 l	-1,23 l
ICW b	28,10 l	25,57 l	27,25 l	27,88 l	30,60 l	29,55 l	28,16 l
ICW a	27,66 l	25,18 l	26,78 l	27,51 l	29,87 l	28,87 l	27,65 l
ICW	-0,44 l	-0,39 l	-0,47 l	-0,37 l	-0,73 l	-0,68 l	-0,51 l
ECW b	14,85 l	14.31 l	13,98 l	17.92 l	16,11 l	18,04 l	15,88 l
ECW a	14,00 l	13,62 l	13,15 l	17.12 l	15,22 l	17,71 l	15,13 l
ECW	- 0,85 l	- 0,69 l	-0,83 l	-0,80 l	-0,99 l	-0,33 l	-0,75 l

Tab. 3: Comparison Δ weight, tbw, icw, ecw between nexus clothes (n) and normal (a).

	Athlete1	Athlete2	Athlete3	Athlete4	Athlete5	Athlete6	Average
weight a	-1,3Kg	-1,7 Kg	-1,4 Kg	-1.9 Kg	-1.8 Kg	-1.8 Kg	-1,65 kg
Weight n	-1,4 Kg	-1.2 Kg	-1.5 Kg	-1.6 Kg	-2 kg	-1.4 Kg	-1,52 kg
TBWa	-1,13 l	-1,58 l	-1,21 l	-1,62 l	-1,4 l	-1.49 l	-1,41 l
TBWn	-1,29 l	-0,98 l	-1,3 l	-1,17 l	-1,62 l	-1,01 l	-1.23 l
ICWa	-0.83 l	-0,93 l	-0,72 l	-0,54 l	-0,59 l	-0,72 l	-0,73 l
ICWn	-0,44 l	-0,39 l	-0,47 l	-0,37 l	-0,73 l	-0,68 l	-0,51 l
ECWa	-0,26 l	-0,65 l	-0,49 l	-1,08 l	-0,71 l	-0,67 l	-0,65 l
ECWn	-0,85 l	-0,69 l	-0,83 l	-0,80 l	-0,99 l	-0,33 l	-0,75 l

By Analysing tab.3 it's possible see differences between the analysed parameters (weight, TBW, ICW, ECW). It was observed that there was a higher reduction of total body water (TBW) when using normal clothes compared to using Nexus clothes, with an average difference of 0.18 litres.

This difference is even higher if we analyse the 2 different compartments where our body water is stored: ICW (intra cellular water) and ECW (extra cellular water) where we can find a difference of 0.22 litres for ICW and 0,10 litres for ECW.

When the athletes used Nexus clothes their body lost less 'total body water' inside the organism we found a greater balance between sodium and potassium ions that allowed the muscular cells to remain better hydrated.

Tab. 4: Comparison maximal test normal clothing (a) – Nexus (n)

	Athlete1	Athlete2	Athlete3	Athlete4	Athlete5	Athlete6	Average
VO2 max a	4802 ml	4241	4897	5296	5318	4930	4914
VO2 max n	4871	4610	4822	5345	5242	5026	4986
Δ VO2 max	69	369	-75	49	-76	96	72
VO2 max/k a	75,6	72.1	78	78.7	75	71.4	75.1
VO2 max/k n	76,3	75	79	79.3	76	72.8	76.4
Δ VO2 max/k	0,7	2.9	1	0.6	1	1.4	1,3
Fc max a	192	189	182	183	188	189	187.2
Fc max n	187	186	186	185	193	187	187.4
Δ Fcmax	-5	-3	4	2	5	-2	-0.2
Watt max a	355	295	365	355	365	365	350
Watt max n	380	298	360	365	373	385	360.2
Δ Watt max	25	3	-5	10	8	20	10.2
Watt/Kg a	5,6	5	5,8	5.3	5.1	5.3	5.35
Watt/Kg n	6	4,8	5.9	5.4	5.4	5.6	5.52
Δ Watt/kg	0.4	-0.2	0.1	0.1	0.3	0.3	0.17
Lactate max a	9,2	10	11,7	8.9	6.4	12.1	9.72
Lactate max n	11.3	8.2	12.2	9	8.6	11.7	10.16
Δ Lactate max	2.1	-1.8	0.5	0.1	2.2	-0.5	0.44
Lactate reg. 6 m. a	7,4	6.3	8,2	4.9	6.4	9.1	7.05
Lactate reg. 6 min. Nexus	8.1	5.8	8.9	5.4	7.4	9	7,43
Δ Lactate regain 6 min.	0.7	-0.5	0.7	0.5	1	-0.1	0.38
VO2 So. a	4396	3960	4631	5044	5180	4326	4589.5
VO2 So. n	4413	4401	4472	5110	4830	4494	4620
Δ VO2 sog.	17	441	-159	66	-350	168	30.5
VO2so/kg a	75,6	67.3	73.7	74.9	73.1	62.7	71.22
VO2so/kg n	69.2	71.6	73.3	75.8	70	65.1	70.83
VO2so/kg	-6.4	+4.3	-0.4	0.9	-3.1	2.4	-0.39
Fc sog. a	183	181	174	175	181	178	178.7
Fc Sog. n	181	182	176	179	180	176	179
Fc sog.	-2	1	2	4	-1	-2	+0.3
Watt so. a	315	265	320	320	340	300	310
Watt so. n	335	275	322	345	345	320	323.7
Watt so	20	10	2	25	5	20	13.7
Watt so/kg a	5,0	4.5	5.1	4.8	4.8	4.3	4.75
Watt so/kg n	5.3	4.5	5.3	5.1	5	4.6	4.97
Watt s/kg	0.3	0	0.2	0.3	0.2	0.3	0.22
avg Watt a	207	181	206	213	204	214	204.2
avg Watt n	216	183	212	212	219	221	210.5

avg Watt	9	2	6	-1	15	7	6.3
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Tab. 5.Parameters comparison maximal test

	Athlete1	Athlete2	Athlete3	Athlete4	Athlete5	Athlete6	Average
ΔVO_2 max	69	369	-75	49	-76	96	72
ΔVO_2 max/kg	0,7	2.9	1	0.6	1	1.4	1,3
ΔFc max	-5	-3	4	2	5	-2	-0.2
Δ watt max	25	3	-5	10	8	20	10.2
Δ wattm/kg	0.4	-0.2	0.1	0.1	0.3	0.3	0.17
Δ lactate max	2.1	-1.8	0.5	0.1	2.2	-0.5	0.44
Δ lactate rec. 6min	0.7	-0.5	0.7	0.5	1	-0.1	0.38
ΔVO_2 sog.	17	441	-159	66	-350	168	30.5
ΔVO_2 sog/kg	-6.4	+4.3	-0.4	0.9	-3.1	2.4	-0.39
ΔFc sog.	-2	1	2	4	-1	-2	-0.3
Δ watt sog.	20	10	2	25	5	20	13.7
Δ watt sog./kg	0.3	0	0.2	0.3	0.2	0.3	0.22
Δ watt avg.	9	2	6	-1	15	7	6.3

With Nexus clothing it's possible to see an average increase of maximal power (+ 10.2 watt, +0.17 watt/kg), an increase of the power at the anaerobic limit (+13.7 watt, +0.22 watt/kg) and an increase of the average power during the whole test of +6.3 watts.

CONCLUSION

By analysing the results it's possible to see how Nexus clothing, probably thanks to the specific properties of this fabric, can increase the maximal performance in a homogeneous group of cyclists. It was also possible to record that the athletes, during the second period at medium pace of the training simulation, when using Nexus clothing could maintain an higher charge (more watt) while maintaining the same cardiac frequency.

This fact can confirm, even if the testing group was small, that Nexus fabric can promote cellular metabolism and increase the muscular capillarisation, improving the muscle cells oxygenation and consequently their activity and metabolism.

Decreased water and therefore probably decreased potassium loss was recorded when using Nexus clothing, with all the intra cellular hydration results scoring higher.

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