

Building a base- building a system

Finnish 400m hurdles in the
making



Background

400mh 55.01

Politics

National junior coach 2009 hurdles

National coach 2011 W400/400h

National coach 2016 M/W 400mh/400m

Junior and senior coaching

Education and testing

Philosophy: Focus on the coaches!



Finnish 400m/400mh/4x400m

HISTORY

2021 World Champion W 400mh U20 Nairobi

Heidi Salminen

2022 World 4. U20 W4x400m Cali

2022 FR 400mh W 54.50 Viivi Lehikoinen

2022 FR 400mh M U18 51.43 Antti Sainio

2022 all time best average / 10 runner:

400mh W 58,38

400mh M (52,50)

400m W 53,67

400m M 47,45



Finland facts

Population: 5,5 million

North-South 1200km

Athletics clubs 182

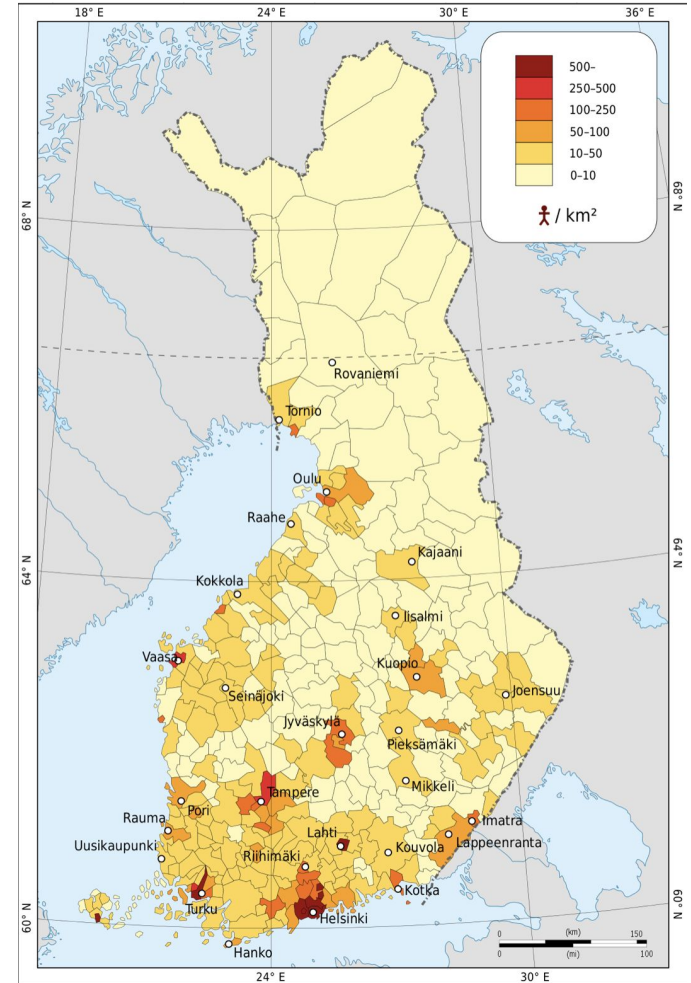
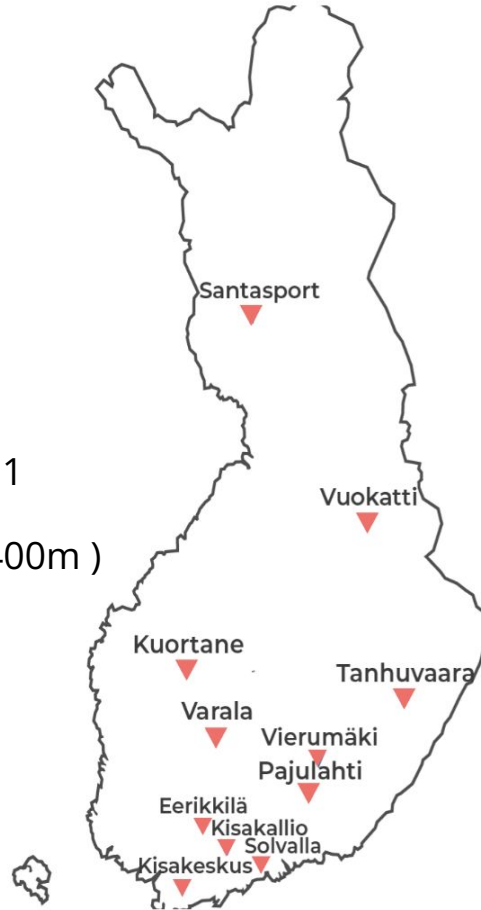
Sports Institutes in Finland x 11

Indoor tracks 15 (5x300m,2x400m)

Climate -20→ +20

400m 2022: M 606, W 583

400m 2022 : M 46, W 79



National program

POLICY:

EDUCATION- focus on the coach

TRAINING

- focus on the athlete

- a few challenges: Speed, base, culture.

TESTING - individual

COMPETITION - focus on the team / athlete



EDUCATION

- Coaches-Education →70 coaches
- webinars, training camps, open dialogue
- Mentoring the training plan
- Sharing knowledge

TRAINING

- 6 Training Camps at the institutes (thu-sun)
+ South Africa / Portugal
- Athletes about 40 + 20 coaches
- Training camp coaches x 4 - former athletes
and experienced coaches -> funding from
the institutes



Competition

National competition plan

→ 300m hurdles

→ 400m hurdles 17 years

International competition plan

Relay competition plan

Nordic teamwork



Foto:SUL

TESTING

Finnish Institute of High Performance Sport (KIHU) in Jyväskylä - collecting data

At home- On training camp

- Why do you test?
- Make sure you develop
- Keep it simple
- Get it into everyday training



TESTINGSCHEDULE

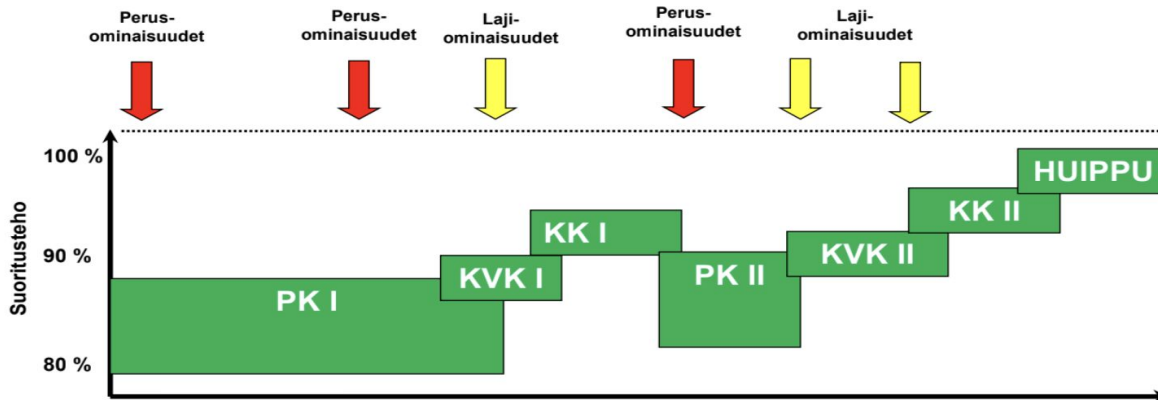
General testing

- Vo2 maks
- Interval test
- Basic strenght
- Mobility

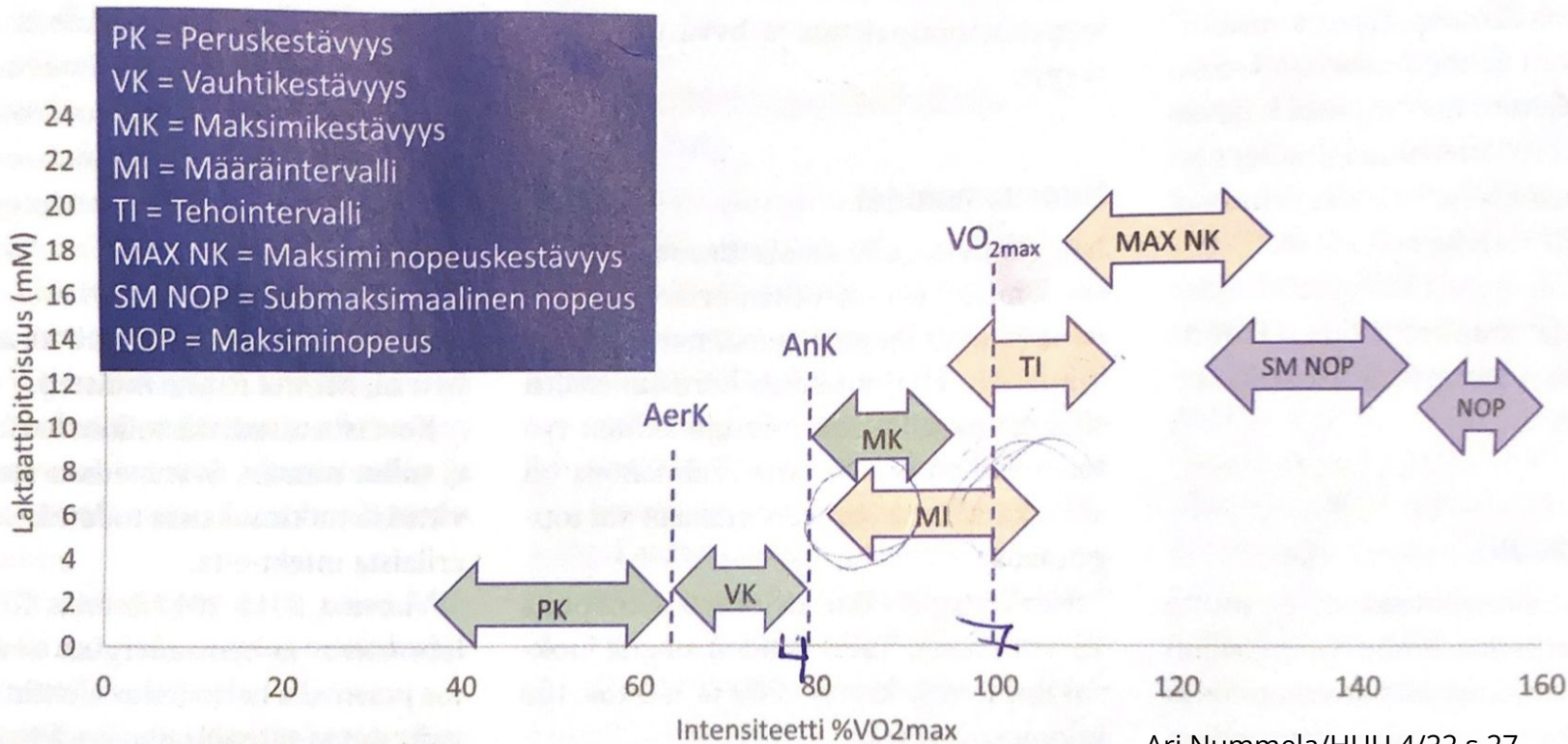
Specific testing

- Running stride analysis (stride length, frequency, contact time) **Mission: find the 400m / 400mh stride!**
- Speed testing
- Anaerobic capacity testing MART - test
Jumpstest

General training Specific training → General → Specific



Harjoitusten intensiteettialueet



Speed + Endurance = Speed endurance

Aerobic stays aerobic!

From General to specific endurance training in 400m hurdles

Basic intervals/ → **Intensive Intervals** → **Speed endurance** → **Maximum SE**

Extensive Intervals

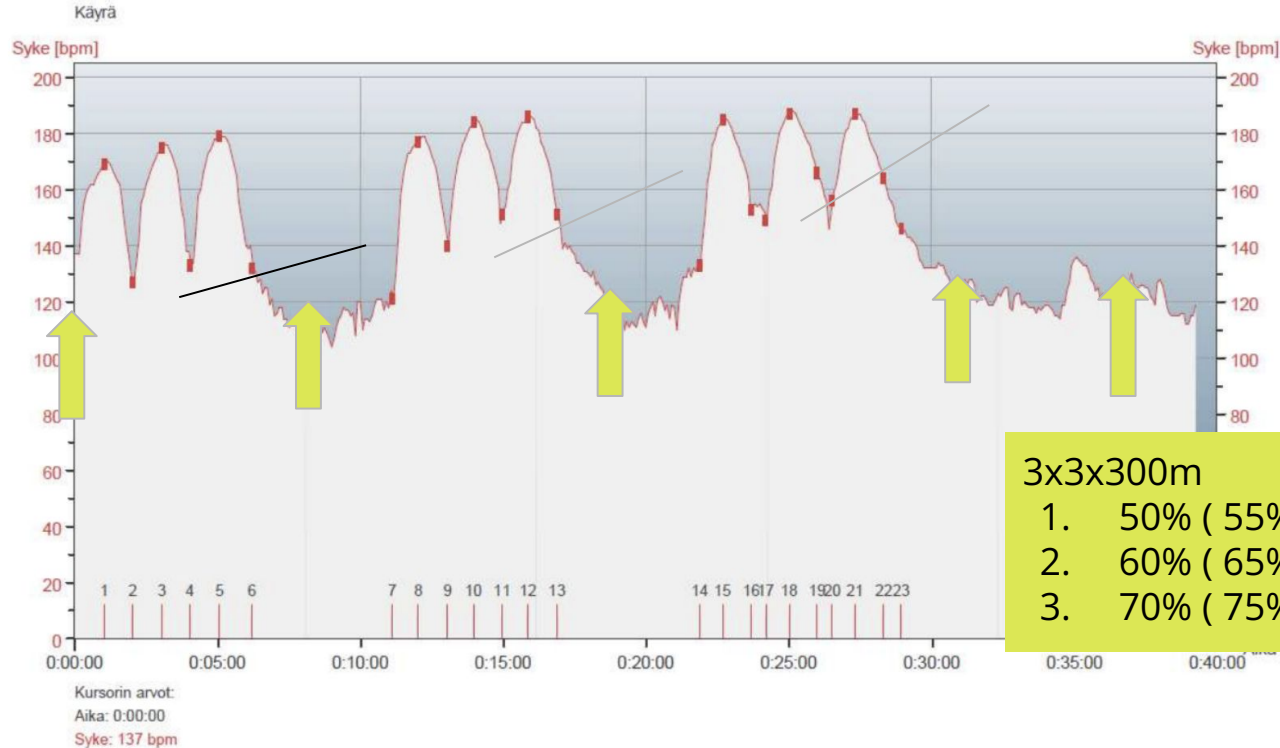
4-7mmol
50-75% of distance
max
Aerobic base and
economy
Lactate removal

7-12 mmol
75-85%
anaerobic economy
V02 maks
Lacatate removal

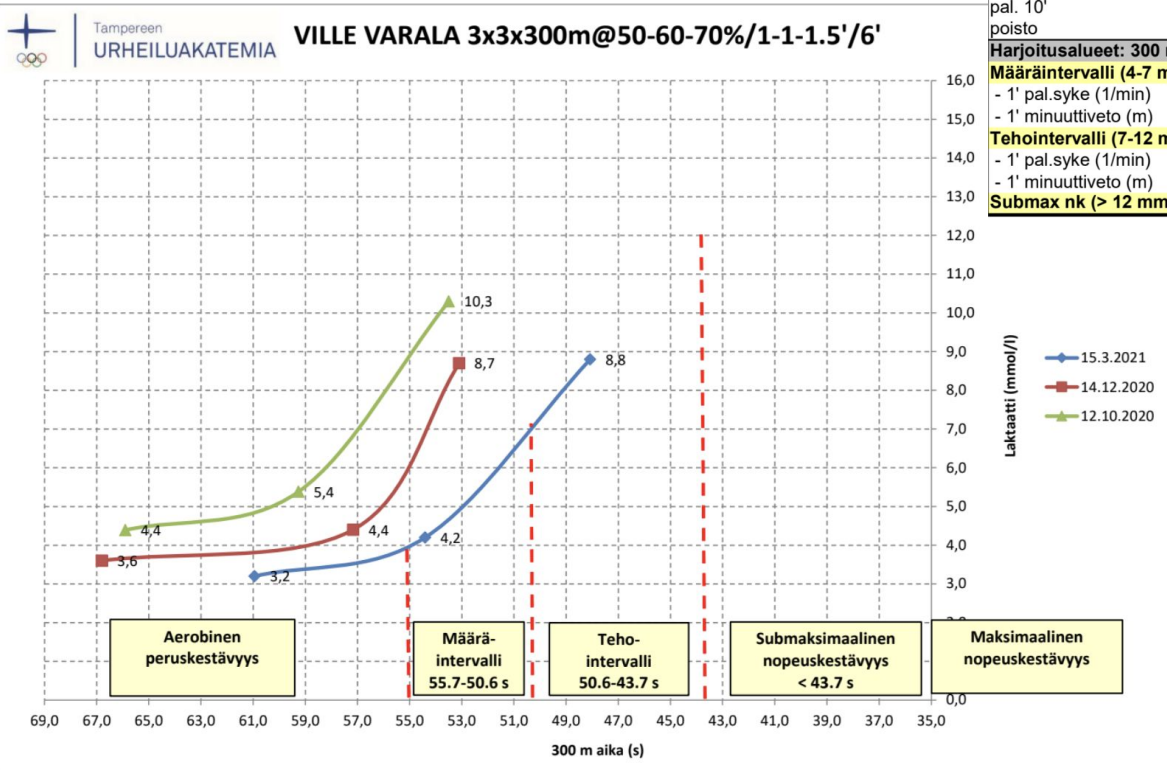
13-20 mmol
85-95%
anaerobic capacity
Vo2 maks
lactate adaption
stamina

21-27 mmol
anaerobic
intensity and
capacity

Interval training - the right pace for you



The improvement

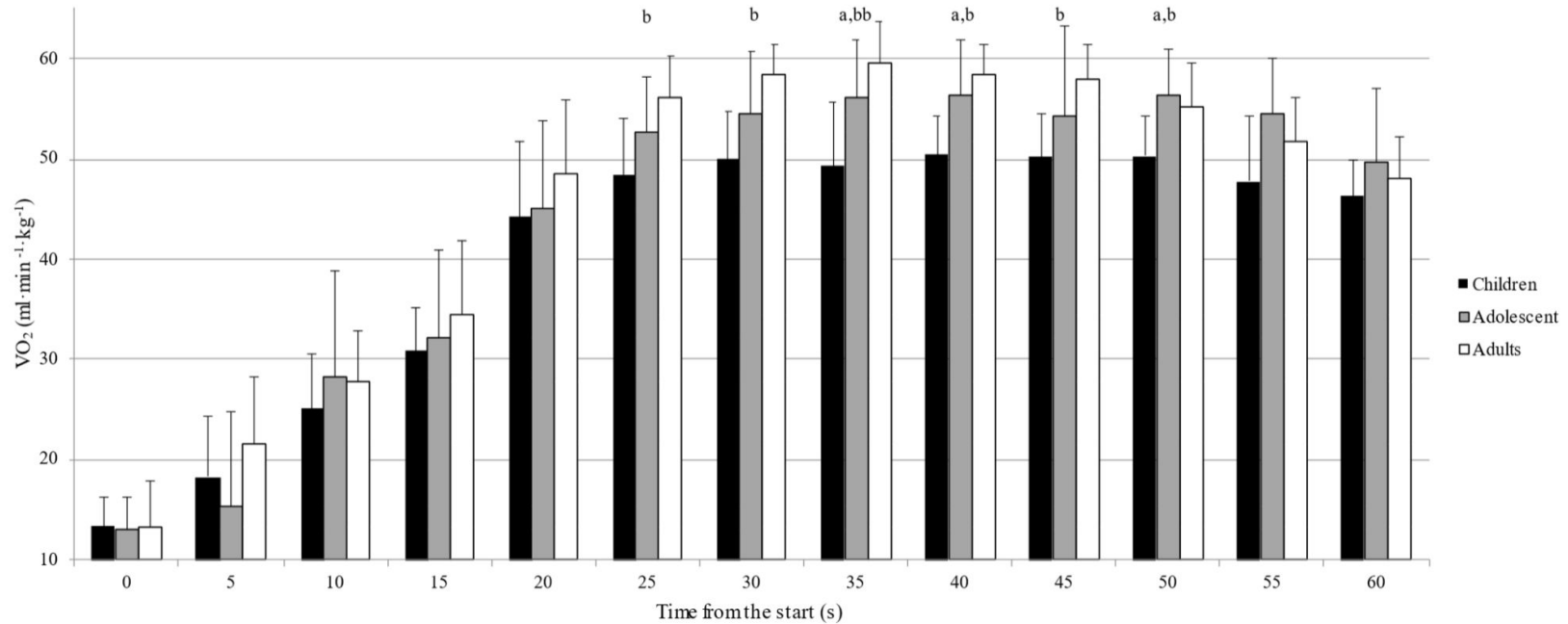


| Laktaatti (mmol/l) | | | |
|---|-------------|-------------|-------------|
| lepo | 2,1 | 0,9 | 2,2 |
| 1. sarja | 3,2 | 3,6 | 4,4 |
| 2.sarja | 4,2 | 4,4 | 5,4 |
| 3. sarja | 8,8 | 8,7 | 10,3 |
| pal. 10' | 8,0 | 7,4 | 8,5 |
| poisto | 0,08 | 0,13 | 0,18 |
| Harjoitusalueet: 300 m vedot (s) | | | |
| Määräintervalli (4-7 mmol/l) alaraja | 55,7 | 62,0 | 68,5 |
| - 1' pal.syke (1/min) | 144 | 127 | 136 |
| - 1' minuuttiveto (m) | 323 | 290 | 263 |
| Tehointervalli (7-12 mmol/l) alaraja | 50,6 | 54,7 | 57,4 |
| - 1' pal.syke (1/min) | 156 | 154 | 153 |
| - 1' minuuttiveto (m) | 356 | 329 | 314 |
| Submax nk (> 12 mmol/l) alaraja | 43,7 | 50,0 | 51,5 |

Interval training examples (4-7mmol)

- 4-6x 600-1000m / 2min
- 3x5x1min / 1min // 6min
- 2x6-8x200m / 60-65% / 30-40" r// 6min

Vo2 maks testing



vo2 maks test for 400m runners

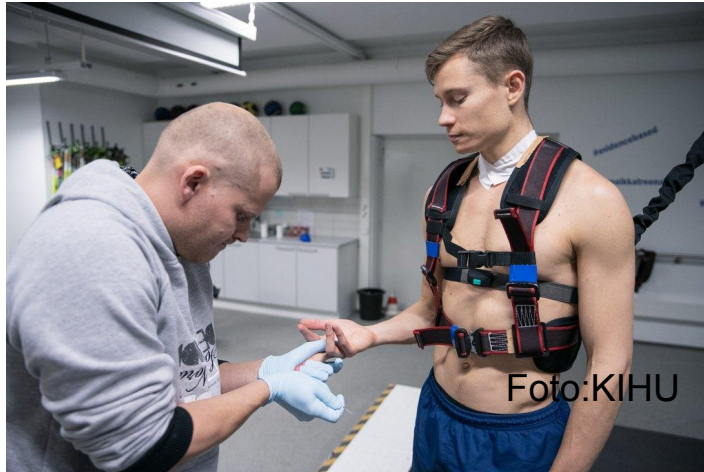
Testing Protocol

- Running 1min , every minute the pace increase
- Goal to run 10 min
- Men Start at 12km/h
- Women start at 9-10km/h

1. 9km/h
2. 10km/h (6.00)
3. 11km/h (5.30)
4. 12km/h (5.00)
5. 13km/h (4.37)
6. 14km/h (4.17)
7. 15km/h (4.00)
8. 16km/h (3.45)
9. 17km/h (3.32)
10. 18km/h (3.15)
11. 19km/h (3.09)
12. 20km/h (3.00)
13. 21km/h (2.52)

VO2 maks at 9-10 min

- maximum heart rate
- recovery lactates at 1-4-7-10 min



Facts:

Polish Olympic team 4x400m (2000)
61.9 ± 3.7 ml/kg/min
(Slowinska and Majda 2002)

Thomas Schönlebe 73 ml/kg/min
(Schäfer 1989).

Running stride analysis



- Running stride analysis (stride length, frequency, contact time)
- Mission: find the 400m / 400mh stride !
- The longest stride in the highest speed with the best technique at the moment and start from that
- 400mh speed is submaximal
- Technical index
- Stride length left/right

| VETO | | NOPEUS | | | KESKIARVOT | | | | | |
|---------------|----|---------|---------|----------|------------|---------------|-------|-------|------|--------|
| % | nr | le 30 m | le 30 m | ask.tih. | ask.pit. | suht.ask.pit. | kont. | lent. | teho | indeks |
| | | s | m/s | Hz | m | m | ms | ms | % | cm/ms |
| 86 % | 1 | 3,311 | 9,06 | 3,91 | 2,32 | 1,29 | 100 | 156 | 55,2 | 2,31 |
| 91 % | 2 | 3,113 | 9,64 | 4,25 | 2,27 | 1,26 | 94 | 141 | 49,8 | 2,41 |
| 95 % | 3 | 1,989 | 10,06 | 4,36 | 2,31 | 1,28 | 90 | 139 | 53,7 | 2,55 |
| 99 % | 4 | 2,862 | 10,48 | 4,57 | 2,29 | 1,27 | 87 | 132 | 52,8 | 2,65 |
| 100 % | 5 | 2,838 | 10,57 | 4,70 | 2,25 | 1,25 | 85 | 128 | 50,1 | 2,64 |
| NOPEIN | | 2,838 | 10,57 | 4,70 | 2,25 | 1,25 | 85 | 128 | 50,1 | 2,64 |
| PISIN | | 3,311 | 9,06 | 3,91 | 2,32 | 1,29 | 100 | 156 | 55,2 | 2,31 |
| 31.3.2018 | | 2,832 | 10,59 | 4,70 | 2,26 | 1,25 | 85 | 128 | 50,2 | 2,65 |

Stride length in 400m hurdles

1. 12 ka = 2,68m
2. 13 ka = 2,45m
3. 14 ka = 2,27m
4. 15 ka = 2,13m
5. 16 ka = 2,00m
6. 17 ka = 1,88m
7. 18 ka = 1,72m
8. 19 ka = 1,60m



Foto: SUL

Training for the 400m hurdle - Specific training

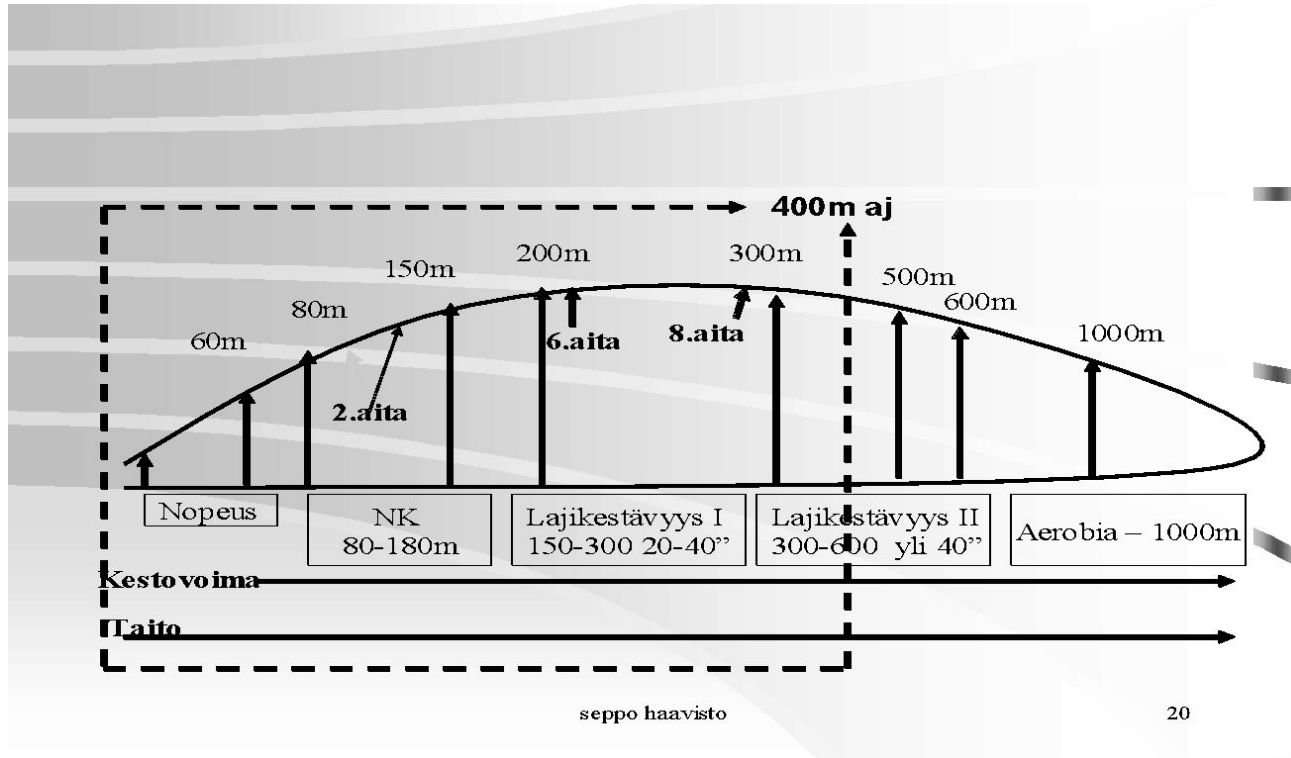
Recover from training

In short maximum effort runs we use ATP / CP and in efforts over 5 sek the anaerobic glycolysis start to take over and we produce lactate. (Newsholme 1984) and we are paying back the oxygen debt through the aerobic metabolism. But how fast do we recover?

Mero 1987:

1. 10 min aerobic test, CP down 50-60% : recovery 5min
2. 3x300m/5min/3min maximal effort, down 74%: recovery approx 72 h
 - long distance runners recovered faster, fast units uses more CP i maximal efforts
 - nopeat solut käyttävät enemmän KP lyhyessä maksimaalisessa suorituksessa kuin hitaat
3. 3x40m 100% / 5min / down 12,5%: recovery at 40 min approx 10% over the starting level
4. 20m+40m+60m / 30", down 54,5%: rec 40 min almost complete (n 85%)

Training for the 400m hurdles



Short rest - Recovery - Adaption

Work 120% of VO_{2max}

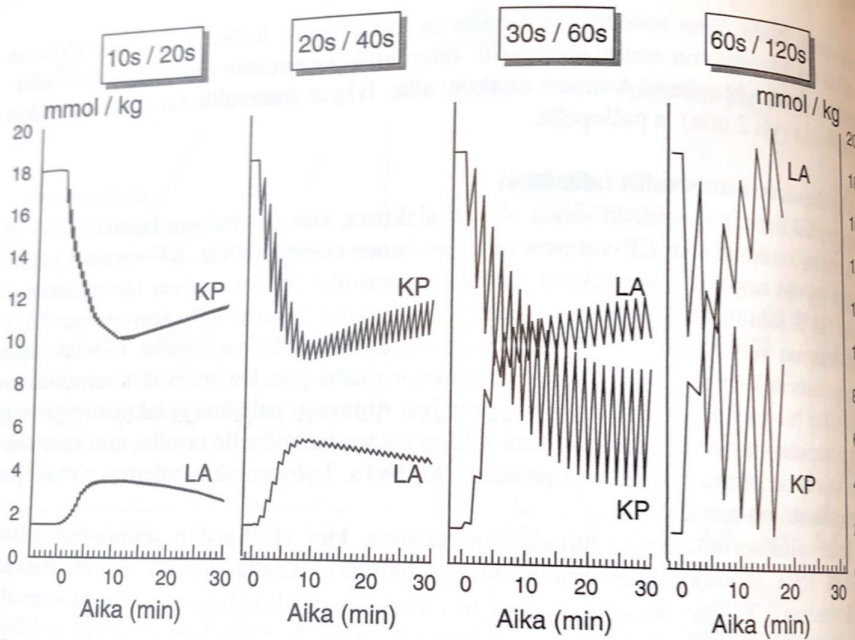
10s / 20s r

20 s/ 40 s r

30s/ 60 s r

60s /120s r

Picture: Lactate accumulation vs decrease of creatine phosphate Reserve



Kuvio 3.18. Laktaatin kasautuminen ja KP-varastojen tyhjeneminen 30 minuutin intervallikuormituksissa. Neljässä eri kuormituksessa työjakson pituus vaihtelee 10 s:sta 60 s:iin työn ja palautuksen suhteen ollessa 1:2 ja intensiteetti noin 120% VO_{2max} :stä (mukaeltu Saltin & Essén 1971).

Speed sessions

Ex 1

- 3x4x60-80m/ 3-4 min rest
- 15-20m run in + H1 (
- rythm runs 4-6 strides with (for women) 17, 16 or 15 stride length
- Competition speed during training season

Ex 2

- 2x3-4x80-100m/ 3-5min// 8-10 with 1-2 almost full length hurdles (32-34 m)
- Competition pace

Ex 3

- Competition speed to H1-H2 -H3 aso
- full recovery



Training examples

Intensive intervals with hurdles

- 2x3-4 x 200m H6-H11 / 4-5 min //
- 500-400-300 (with H7-10 at the end) - 200m -100m and←--back
 - recovery 5-2 min // 10-15 min
- 2x6x100m / 1min / last 100m pace and stride

Submaximal work (pre-seson and competition)

- 300m 85-90% / 4min + 200m H (H 11-7) // 8-10 min // 200m / 3min + 150m (H11-8) // 150m / 2min + 100m H

Variation submax/maximum

- 8H->350m/25-30min + 7H -> 350m / 3' +150-200m ALL OUT
- 3x300m = 300m /



Thank you for your patience!



Foto: KIHU