

UNIVERSITÄT LEIPZIG
 Faculty of Sport Science – Institute for Movement & Training
 Science in Sports II

**National Olympic Committee of Estonia,
 Tallin, 13.-14.03.2015**

**Periodization & Tapering in Sports –
 Actual Aspects and Critical Remarks**

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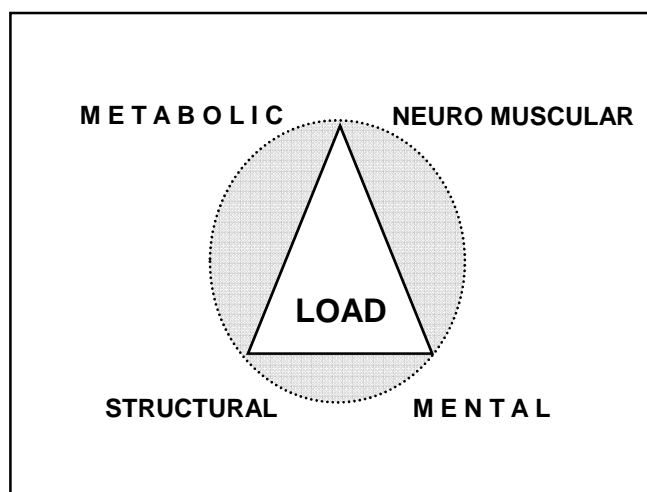
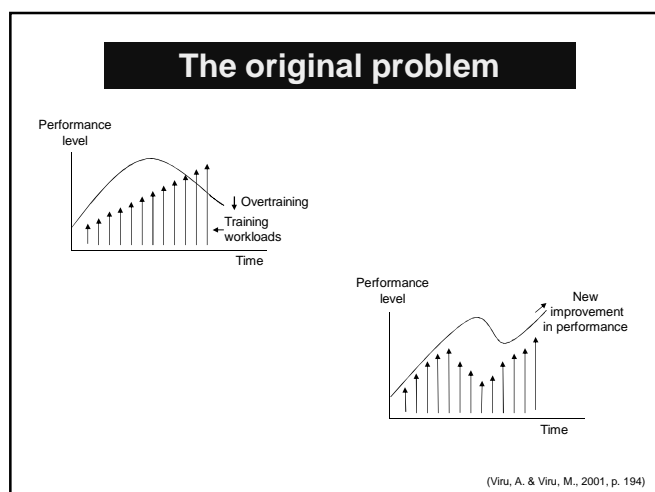
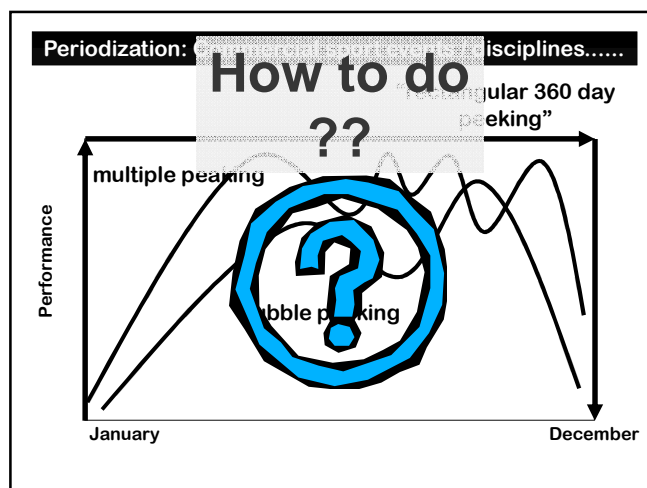
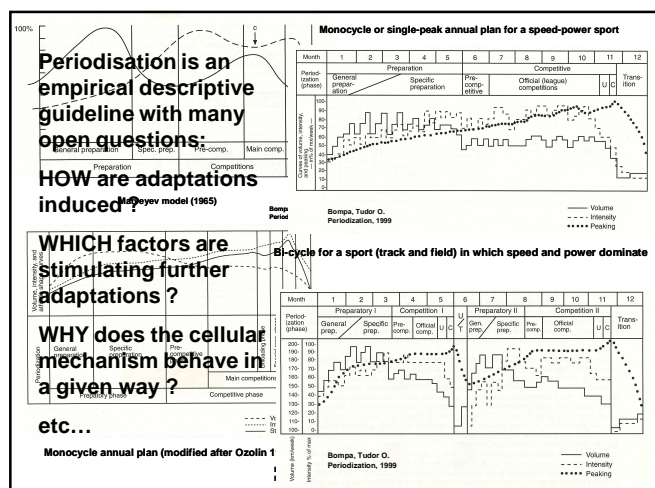
University of Tallin, Estonia 14. March 2015

Periodisation

(Definition from HARRE, based on MATWEJEW)

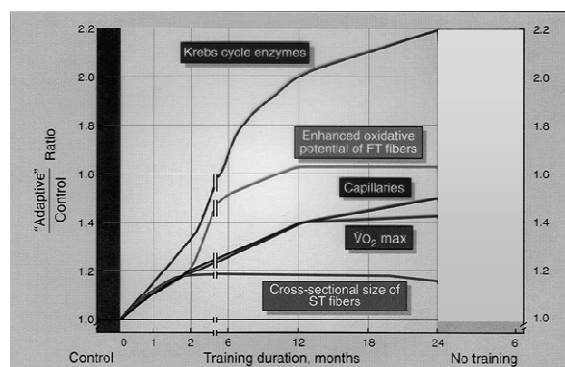
„Periodisation is the continuing result of periodic cycles in the process to create a sport performance ability. Each single periodic cycle is characterized by a licit caused periodic change of (training) aims, tasks and content as well as characterizes therefore the structure of the training“.

(translated from HARRE, 1986, 99ff)



The problem has to respect several aspects

1. The individual (structural) potential of the athlete.
2. How long does a special structure / system need to adapt under SHORT term aspects?
3. How long does a structure / system need to adapt under a LONG term aspect?
4. What is the (adaptation) level where I start from?
5. What is model what stands behind the question of adaptation?



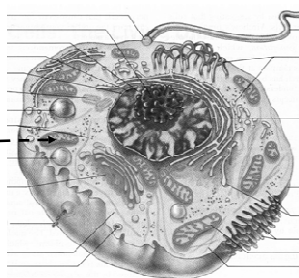
Behaviour of different biological parameters of a group of medium trained persons during a two year period (SALTIN, 1976)

Mitochondria - Powerhouse of the cell

Mitochondria:

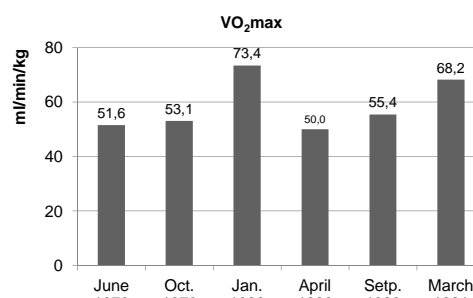
Site of aerobic respiration

- Amount
- Size
- Surface
- Location
- Volume (+ 500%)



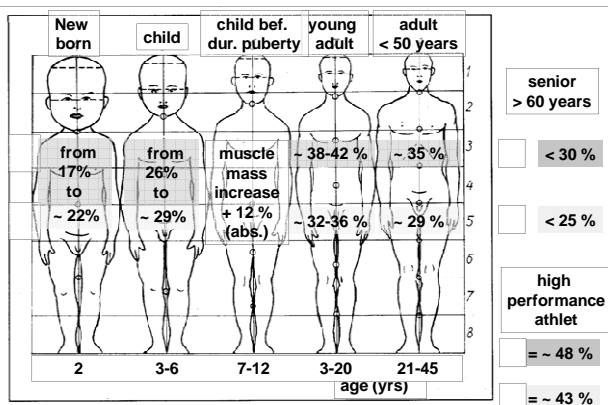
Marieb 1992

Dynamics of VO_2max in an international-level female skier



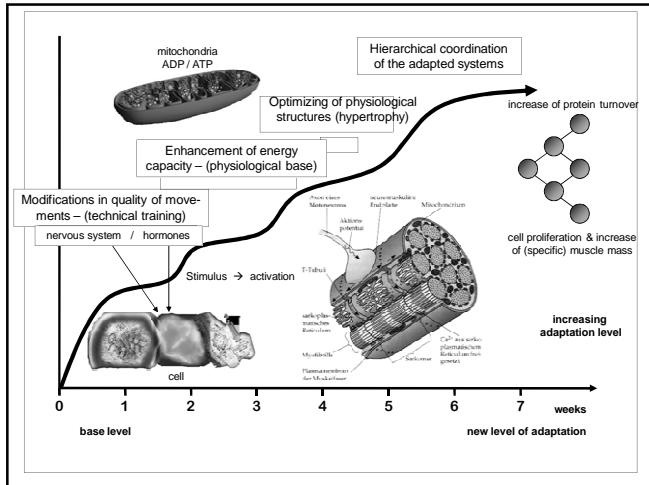
(Viru, A. & Viru, M., 2001, p. 166)

Body composition/ muscle mass in life span



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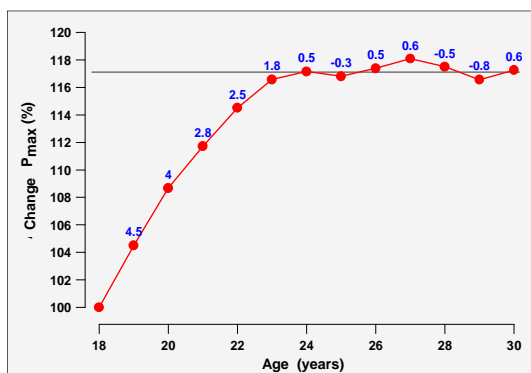
Results of a questionnaire concerning the development of long time performance in 28 sport events (IAT-Leipzig, 1991)

		tech.-acr. sports	endurance sports	combat sports	game sports	force-velocity sports	on water sports	other sports
regular training begin; age (yrs)	M	6,5 0,5	9,4 1,3	9,3 1,0	8,3 2,1	9,3 1,3	10,0 10,0	9,3 1,1
	F	6,2 0,3	9,3 1,4	8,5 0,7	7,0 1,0	9,3 1,5		9,3 1,1
duration (yrs) until								
- level of high performance	M	10,2 0,3	10,1 2,1	10,3 3,4	10,3 1,2	11,0 3,8	11,0 1,0	12,0 2,8
	F	8,3 0,5	9,4 1,7	10,0 4,2	10,3 1,1	11,8 4,0	7,0 1,0	11,0 1,8
- C-squad level	M	9,6 0,8	8,9 2,0	8,4 2,1	8,5 0,7	8,8 0,5	7,0 1,0	10,7 1,8
	F	7,9 1,8	8,6 1,6			9,7 0,7	7,0 1,0	10,0 2,1
- int. junior level	M	11,8 0,6	8,4 1,6	10,5 1,3	12,2 0,9	9,7 0,8	9,0	11,7 2,8
	F	10,8 1,4	9,3 1,9	11,0 0,7	13,5 0,7	9,7	9,0	11,0 2,8
- int. senior level	M	10,8 1,2	10,2 1,8	10,0 1,7	11,7 1,4	10,3 1,6	8,0 1,0	
	F	9,3 1,9	9,8 1,8	9,5 2,8	11,0 1,4	9,7 1,7	7,0 1,0	
- max. individ. performance	M	14,5 2,0	14,6 2,3	14,8 1,0	19,9 2,8	15,8 1,8	15,0 2,2	
	F	12,8 2,2	13,0 2,5	14,0 0,7	18,8 3,0	13,8 3,0	11,5 2,4	

The problem has to respect several aspects

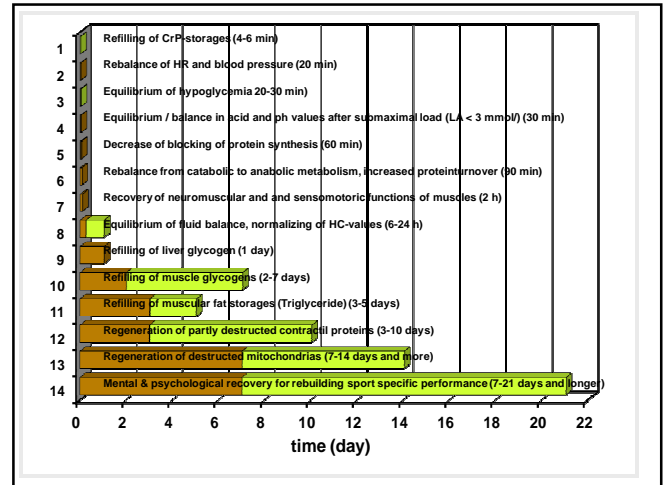
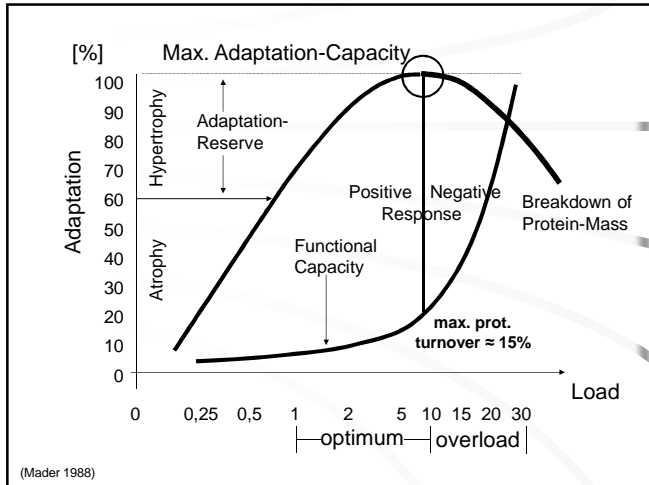
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Annual change (%) of P_{max} depending of age

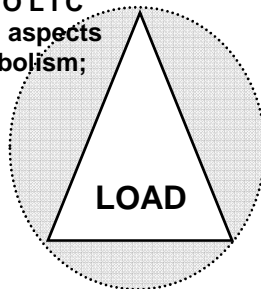


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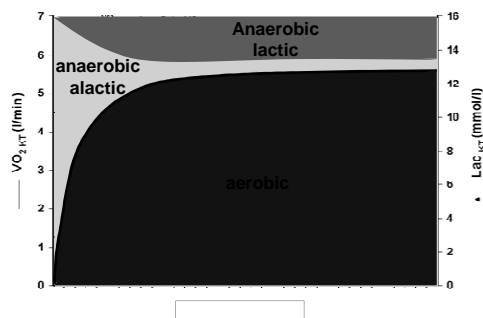
METABOLIC
 → general aspects
 of metabolism;
 → energy
 supply



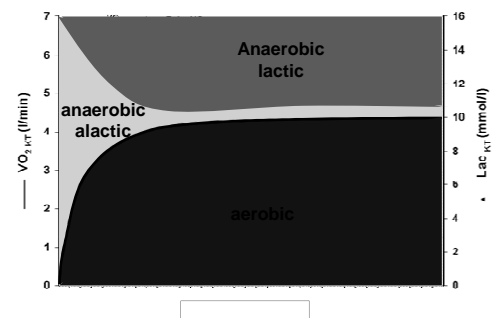
The interaction of the oxidative and the glycolytic system

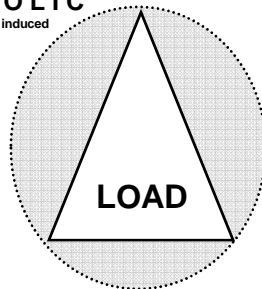
1. Oxidative share needs long time to develop
2. Oxidative share is never too big
3. Glycolytic share needs only short time to increase
4. Glycolytic system is very limited in development
5. Is seldomly too small, mostly too big (specificity of training)
6. None system can be trained independently.

Variation of energy metabolism during year round – early preparation phase



Variation of energy metabolism during year round – competition phase



METABOLIC(possible & training induced
metabolic potential)

How to train?

Consequences for the practice?

Knowledge about the load / energetic profile of the sport / discipline

Individuality of muscles fibers would be good to know

Increase of amount, intensity more seldom

Training load must be orientated at the energy/caloric turnover

Training schedules are recommendations, no bibles.

Effects of moderator variables on overall effect size for taper-induced changes in performance (I)

Categories	Overall Effect Size: Mean (95 % CI)	N	P
Decrease in training volume			
≤ 20 %	-0.02 (-0.32, 0.27)	152	0.88
21 - 40 %	0.27 (0.04, 0.49)	90	0.02
41 - 60 %	0.72 (0.36, 1.09)	118	0.0001
≥ 60 %	0.27 (-0.03, 0.57)	118	0.07
Decrease in training intensity			
Yes	-0.02 (-0.37, 0.33)	63	0.91
No	0.33 (0.19, 0.47)	415	0.0001
Decrease in training frequency			
Yes	0.24 (-0.03, 0.52)	176	0.08
No	0.35 (0.18, 0.51)	302	0.0001

(Bosquet et al, 2007, pp. 1359)

Effects of moderator variables on overall effect size for taper-induced changes in performance (II)

Categories	Overall Effect Size: Mean (95 % CI)	N	P
Duration of the taper			
≤ 7 d	0.17 (-0.05, 0.38)	164	0.14
8 - 14 d	0.59 (0.26, 0.92)	176	0.0005
15 - 21 d	0.28 (-0.02, 0.59)	84	0.07
≥ 22 d	0.31 (-0.14, 0.75)	54	0.18
Pattern of the taper			
Yes	0.42 (-0.11, 0.95)	98	0.12
No	0.30 (0.16, 0.45)	380	0.0001

Effects of moderator variables on effect size (EF) for taper-induced changes in swimming, running, and cycling performance

Swimming

Categories	Mean EF (95 % CI)	N
Decrease in training volume		
≤ 20 %	-0.04 (-0.36, 0.29)	72
21 - 40 %	0.18 (-0.11, 0.47)	91
41 - 60 %	0.81 (0.42, 1.20)*	70
≥ 60 %	0.03 (-0.66, 0.73)	16
Decrease in training intensity		
Yes	0.08 (-0.34, 0.49)	45
No	0.28 (0.08, 0.47)*	204
Decrease in training frequency		
Yes	-0.35 (-0.36, 1.05)	54
No	0.30 (0.10, 0.50)*	195

* P ≤ 0.01; # P ≤ 0.05; ## P ≤ 0.10 (Bosquet et al, 2007, pp. 1359)

Effects of moderator variables on effect size for taper induced changes in swimming, running, and cycling performance

Swimming

Categories	Mean EF (95 % CI)	N
Duration of the taper		
≤ 7 d	-0.03 (-0.41, 0.35)	54
8 - 14 d	0.45 (-0.01, 0.90)##	84
15 - 21 d	0.33 (0.00, 0.65)#	75
≥ 22 d	0.39 (-0.08, 0.86)	36
Pattern of the taper		
Step taper	0.10 (-0.65, 0.85)	14
Progressive taper	0.27 (0.08, 0.45)*	235

Effects of moderator variables on effect size for taper induced changes in swimming, running, and cycling performance

Running

Categories	Mean EF (95 % CI)	N
Decrease in training volume		
≤ 20 %	No data available	
21 - 40 %	0.47 (-0.05, 1.00)##	30
41 - 60 %	0.23 (-0.52, 0.98)	14
≥ 60 %	0.21 (-0.14, 0.56)	66

Categories	Mean EF (95 % CI)	N
Decrease in training intensity		
Yes	-0.72 (-1.63, 0.19)	10
No	0.53 (0.05, 1.01)*	100

Categories	Mean EF (95 % CI)	N
Decrease in training frequency		
Yes	0.16 (-0.17, 0.49)	74
No	0.53 (0.05, 1.01)##	36

Effects of moderator variables on effect size for taper induced changes in swimming, running, and cycling performance

Running

Categories	Mean EF (95 % CI)	N
Duration of the taper		
≤ 7 d	0.31 (-0.08, 0.70)	52
8 - 14 d	0.58 (0.12, 1.05)*	38
15 - 21 d	-0.08 (-0.95, 0.80)	10
≥ 22 d	-0.72 (-1.63, 0.19)	10

Categories	Mean EF (95 % CI)	N
Pattern of the taper		
Step taper	-0.09 (-0.56, 0.38)	36
Progressive taper	0.46 (0.13, 0.80)*	74

Effects of moderator variables on effect size for taper-induced changes in swimming, running, and cycling performance

Cycling

Categories	Mean EF (95 % CI)	N
Decrease in training volume		
≤ 20 %	0.03 (-0.62, 0.69)	18
21 - 40 %	0.84 (-0.05, 1.74)##	11
41 - 60 %	2.14 (-1.33, 5.62)	15
≥ 60 %	0.56 (-0.24, 1.35)	36

Categories	Mean EF (95 % CI)	N
Decrease in training intensity		
Yes	0.25 (-0.73, 1.24)	8
No	0.68 (0.09, 1.27)##	72

Categories	Mean EF (95 % CI)	N
Decrease in training frequency		
Yes	0.95 (-0.48, 2.38)	25
No	0.55 (-0.55, 1.15)##	55

Effects of moderator variables on effect size for taper induced changes in swimming, running, and cycling performance

Cycling

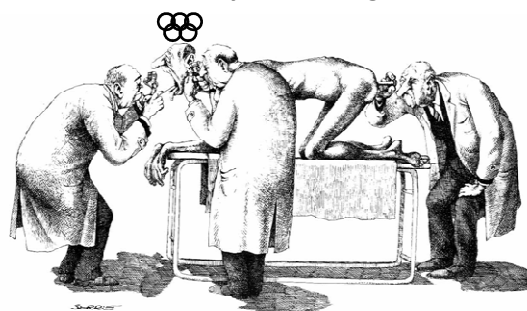
Categories	Mean EF (95 % CI)	N
Duration of the taper		
≤ 7 d	0.29 (-0.12, 0.70)	47
8 - 14 d	1.59 (-0.01, 3.19)	33
15 - 21 d	No data available	
≥ 22 d	No data available	

Categories	Mean EF (95 % CI)	N
Pattern of the taper		
Step taper	2.16 (-0.15, 4.47)	25
Progressive taper	0.28 (-0.10, 0.66) ##	55

Summary:

- Existing points of view about adaptation and periodisation have their origins in the "Russian school"
- It is a phenomenological way of thinking
- It has no respect to biology
- It includes a hypothetic / self full-filling assumption of possible adaptations ("master s teaching")
- Adaptation and periodisation show in athletes very individual responses depending of many other influencing factors (age, level of performance, load tolerance etc.)
- There are only few existing (energy) demand / load profiles and its specific adaptation in disciplines.

There are many more things to do -



let's start with it soon !!!

Thank you very much for your attention !

