

Organisatie van fysieke training voor patiënten met COPD.

Dr Peter Klijn
Klinisch inspanningsfysioloog
Merem Behandelcentrum Heideheuve!

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<http://www.merem.nl/heideheuve/>

Specialistisch centrum voor mensen
met chronische longaandoeningen en
kinderen met overgewicht



American Journal of Respiratory
and Critical Care Medicine/AJRCCM

**Nonlinear exercise training in advanced COPD is superior to
traditional exercise training: a randomized trial.**

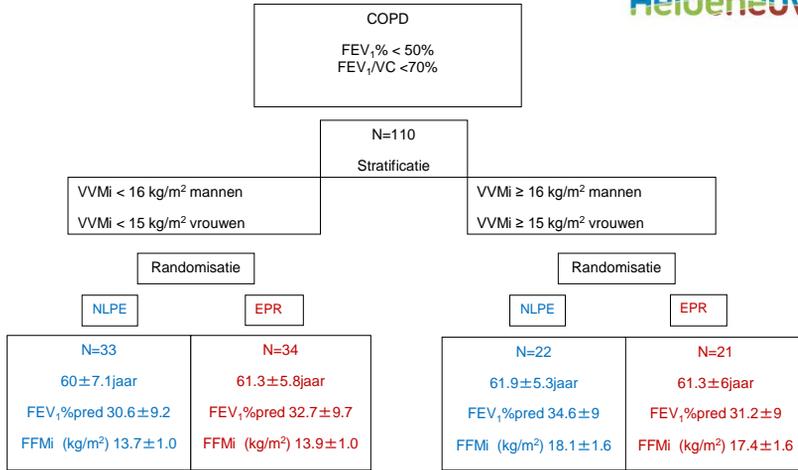
http://www.atsjournals.org/doi/abs/10.1164/rccm.201210-1829OC#.VEzPR_mG9QE



Nederlands
Tijdschrift
voor
Geneeskunde

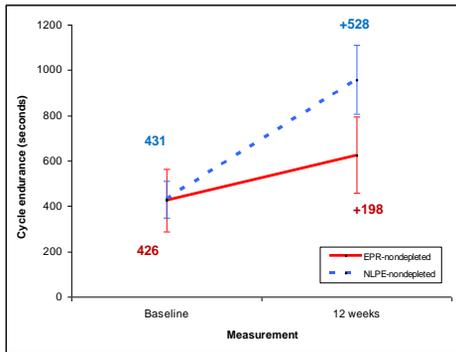
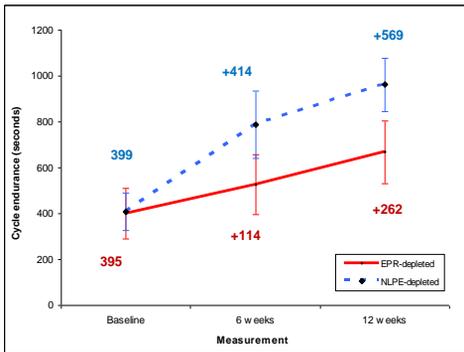
**Inspanningstraining bij ernstige COPD.
Minder hard trainen geeft meer effect.**

<https://www.ntvg.nl/artikelen/inspanningstraining-bij-ernstige-copd>



Klijn et al; Am J Resp Crit Care Med 2013, 188(2)

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CWT	EPR (n=55)	NLPE (n=55)	Difference (95% CI)
Time, s	+238 s	+539 s	300.6(197 - 404)
End Sp _{O2}	90.7	89.2	-1,5 (-5.2 - 2.2)
dyspneu	6,4	5,5	-0,9 (-1,6 - -0,1)
leg fatigue	6.5	4.7	-1.8 (-2.6 - -1.0)

Klijn et al; Am J Resp Crit Care Med 2013, 188(2)

CWT Depleted patients	EPR (n=34)	NLPE (n=33)	CWT Non-depleted patients	EPR (n=21)	NLPE (n=22)
First training period	15% (n=5)	42% (n=14)	End of training	24% (n=5)	64% (n=14)
Second training period	25% (n=7)	52% (n=16)			

CRQ-score	EPR (n=55)	NLPE (n=55)	Difference (95%CI)
dyspnea	+0.94	+1.90	0.96 (0.57 – 1.35)
fatigue	+0.90	+1.64	0.74 (0.39 – 1.10)
emotions	+0.83	+1.32	0.48 (0.19 – 0.78)
mastery	+0.87	+1.39	0.52 (0.21 – 0.84)

Klijn et al; Am J Resp Crit Care Med 2013, 188(2)



Pulmonary rehabilitation for chronic obstructive pulmonary disease (Review)

McCarthy B, Casey D, Devane D, Murphy K, Murphy E, Lacasse Y

- Pulmonary rehabilitation:
 - relieves dyspnoea and fatigue, improves emotional function and enhances the sense of control.
 - important component of the management of COPD and is beneficial in improving health-related quality of life and exercise capacity.
- Future research studies should focus on identifying which components of pulmonary rehabilitation are essential, its ideal length and location, the degree of supervision and intensity of training required and how long treatment effects persist.

This is a reprint of a Cochrane review, prepared and maintained by The Cochrane Collaboration and published in *The Cochrane Library* 2015, Issue 2

<http://www.thecochranelibrary.com>

Exercise training

- Cornerstone of pulmonary rehabilitation.
- Non-responders
 - 1/4 to 1/3 do not improve their exercise capacity following pulmonary rehab
 - Noise, Nuisance or Normal phenomenon?
- Individual needs

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Exercise training

- The aim of exercise prescription in PR is to address the multiple contributors to exercise limitation
 - Dyspnea
 - Fatigue
 - Anxiety
 - Gas exchange abnormalities
 - Altered respiratory mechanics
 - Cardiovascular limitations
 - Respiratory and peripheral muscle dysfunction
 - Fat-free mass depletion
 - Aging

Klijn et al; Am J Resp Crit Care Med 2013, 188(2)

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Exercise training

- The aim of exercise prescription in PR is to address the multiple contributors to exercise limitation.
- Do the right thing.
- Do the right thing right.
- Evidence based efficacy (Grade A).

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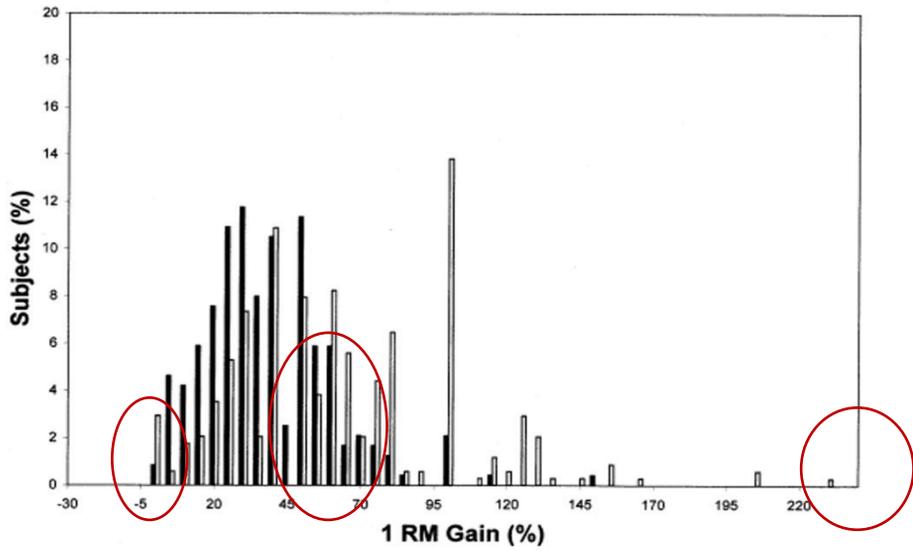
	Evidence Statement	Evidence Category
Health benefits	Engaging in regular exercise and reducing sedentary behavior is vital for the health of adults.	A
Reversibility of training effects	Training-induced adaptations are reversed to varying degrees over time upon cessation of a program of regular exercise.	A
Heterogeneity of response	There is considerable variability in individual responses to a standard dose of exercise.	A
Exercise regimen	Cardiorespiratory and resistance exercise training is recommended to improve physical fitness and health.	A
	Flexibility exercises improve and maintain and joint range of movement	A
Exercise adoption and maintenance	Neuromotor exercises and multifaceted activities (such as tai ji and yoga) can improve or maintain physical function, and reduce falls in older persons at risk for falling.	B
	Neuromotor exercises may benefit middle aged and younger adults	D
	Theory-based exercise interventions can be effective in improving adoption and short-term adherence to exercise.	B
Risks of exercise	Moderate-intensity exercise and exercise that is enjoyable can enhance the affective responses to exercise, and may improve exercise adherence	B
	Supervision by an experienced health and fitness professional and enhance exercise adherence	C
	Exercise is associated with an increased risk of musculoskeletal injury and adverse CHD events.	B
	The benefits of exercise far outweigh the risks in most adults.	C
Preexercise screening	Warm-up, cool down, flexibility exercise, and gradual progression of exercise volume and intensity may reduce the risk of CVD events and musculoskeletal injury during exercise.	C
	Consultation with a physician and diagnostic exercise testing for CHD may reduce risks of exercise if medically indicated, but are not recommended on a routine basis.	C
	Consultation with a well-trained fitness professional may reduce risks in novice exercisers and in persons with chronic diseases and conditions	D
	Screening for and educating about the forewarning signs or symptoms of CVD events may reduce the risks of serious untoward events.	C

Table evidence categories: A, randomized controlled trials (rich body of data); B, randomized controlled (limited body of data); C, nonrandomized trials, observational studies; D, panel consensus judgment. From the National Heart Lung and Blood Institute (263).

Quantity and Quality of Exercise for Developing and Maintaining Cardiorespiratory, Musculoskeletal, and Neuromotor Fitness in Apparently Healthy Adults: Guidance for Prescribing Exercise.

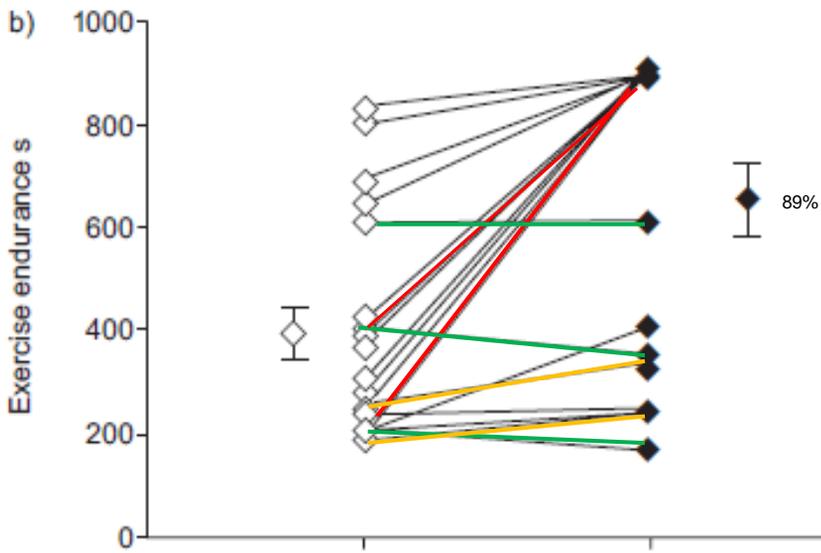
Garber et al., Medicine & Science in Sports & Exercise. 43(7):1334-1359, July 2011.

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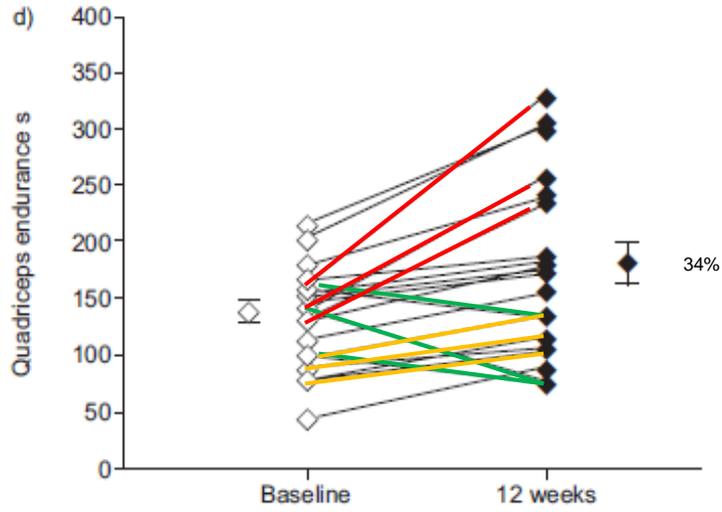


Hubal et al., Variability in muscle size and strength Med Sci Sports Exerc 37 2005

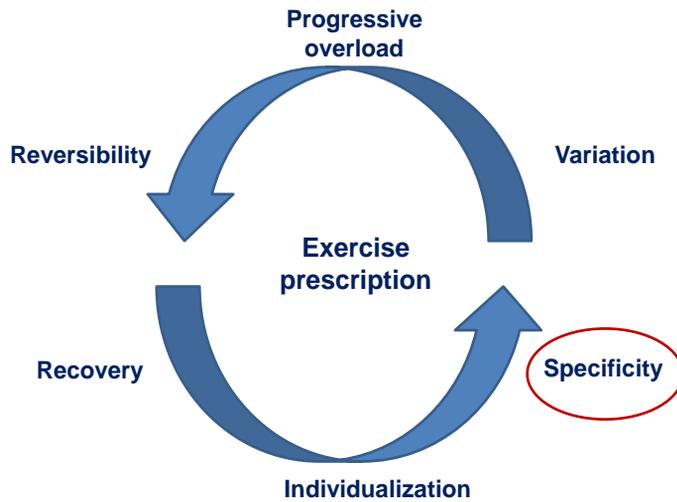
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De Man et al., ERJ 34 2009



De Man et al., ERJ 34 2009



ACSM Guidance for Prescribing Exercise.
Garber et al., Medicine & Science in Sports & Exercise. 43(7) 2011.

ACSM position stand. Progression models in resistance training for healthy adults.
Med Sci Sports Exerc 2009

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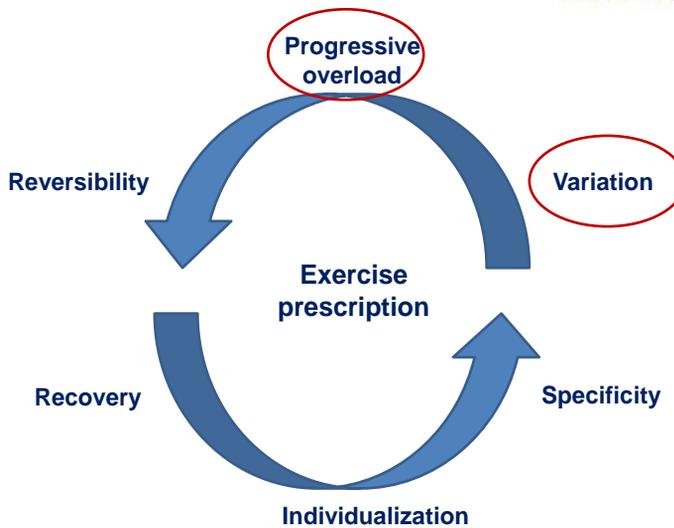
Needs analysis

- Physiological requirements
 - Aerobic energy system
 - Anaerobic energy system
 - Leg endurance
 - Leg strength
- Biomechanical requirements
 - Knee and hip muscles
 - Many submaximal contractions
- Individual deficiencies



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Nonlinear periodized exercise training Behandelcentrum **Heideheuve!**

Energy system cycle training	Repetition range	Resistance training
Aerobic	≥ 20	Muscular endurance
1-3 x (3-10) min 50-60% W_{peak} 1-3min	12-15	↑ ↓ Strength
(15-30) x 30 sec >95% W_{peak} 30 sec	8-10	
Anaerobic	8-10	
4-8x (2-7)min 65-80% W_{peak} 2-5 min	4-6	
6-10x (90-120)sec 85-95% W_{peak} 1-3 min	1-3	
COMPENSATION	1 x (5-10) min 50% W_{peak}	

Klijn et al; Am J Resp Crit Care Med 2013, 188(2)

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Nonlinear periodized exercise training Behandelcentrum **Heideheuve!**

Volume	Exercise	Intensity	Rest
Training 9			
• 2-4 series 4 min	cycling	50%	2 min
• 2 series 20-30 Repts	LP	30-39% 1-RM	1 min
• 2 series 12-15 Repts	CP LE	40-49% 1-RM	1 min
Training 10			
• 3-5 series 3 min	cycling	70%	2 min
• 3 series 8-10 Repts	LP CP LE	50-65% 1-RM	2 min
• 1 series 5-10 min	cycling	50% Wmax	
Training 11			
• 2-4 series 4 min	cycling	50%	2 min
• 2 series 20-30 Repts	LP	30-39% 1-RM	1 min
• 2 series 12-15 Repts	PD LE	40-49% 1-RM	1 min
Training 12			
• 3-5 series 3 min	cycling	70%	2 min
• 3 series 8-10 Repts	LP PD LE	50-65% 1-RM	2 min
• 1 series 5-10 min	cycling	50% Wmax	

Klijn et al; Am J Resp Crit Care Med 2013, 188(2)

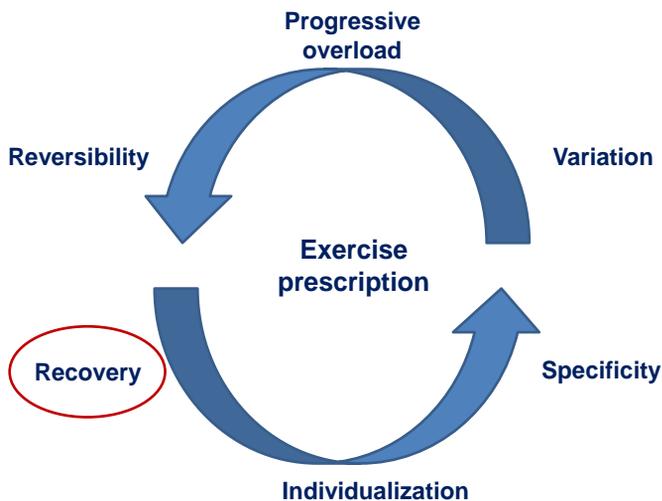
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Nonlinear periodized exercise training Behandelcentrum **Heideheue!**

Volume	Exercise	Intensity	Rest
Training 9			
• <u>2-3 series 6 min</u>	cycling	50%	2 min
• 2 series 20-30 Reps	LP	30-39% 1-RM	1 min
• 2 series 12-15 Reps	CP LE	40-49% 1-RM	1 min
Training 10			
• 3-5 series 3 min	cycling	<u>75%</u>	2 min
• 3 series 8-10 Reps	LP CP LE	50-65% 1-RM	2 min
• 1 series 5-10 min	cycling	50% Wmax	
Training 11			
• 2-3 series 6 min	cycling	50%	2 min
• 2 series 30-40 Reps	LP	30-39% 1-RM	1 min
• 2 series 12-15 Reps	PD LE	40-49% 1-RM	1 min
Training 12			
• <u>2-3 series 5 min</u>	cycling	<u>70%</u>	3½ min
• 3 series 8-10 Reps	LP PD LE	50-65% 1-RM	2 min
• 1 series 5-10 min	cycling	50% Wmax	

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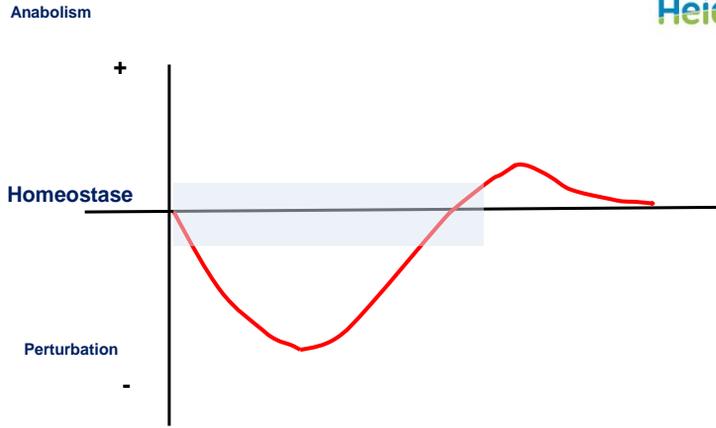
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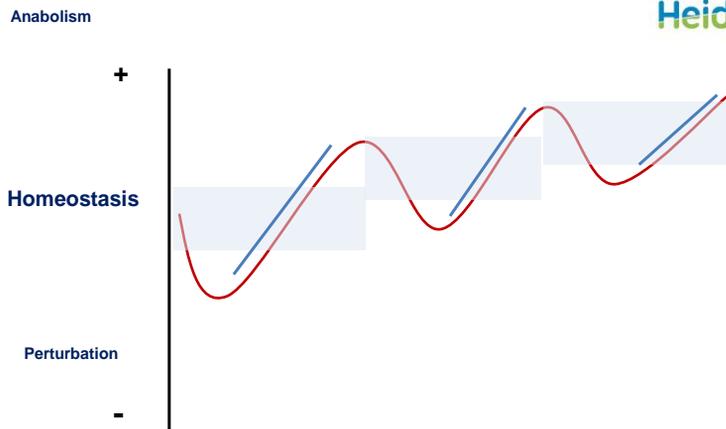
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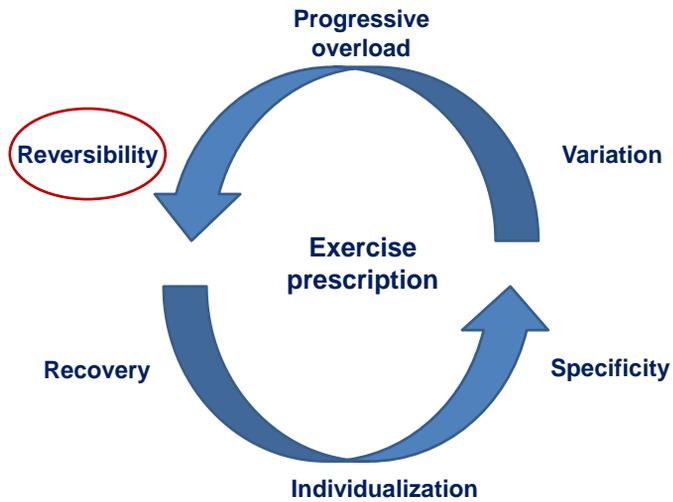
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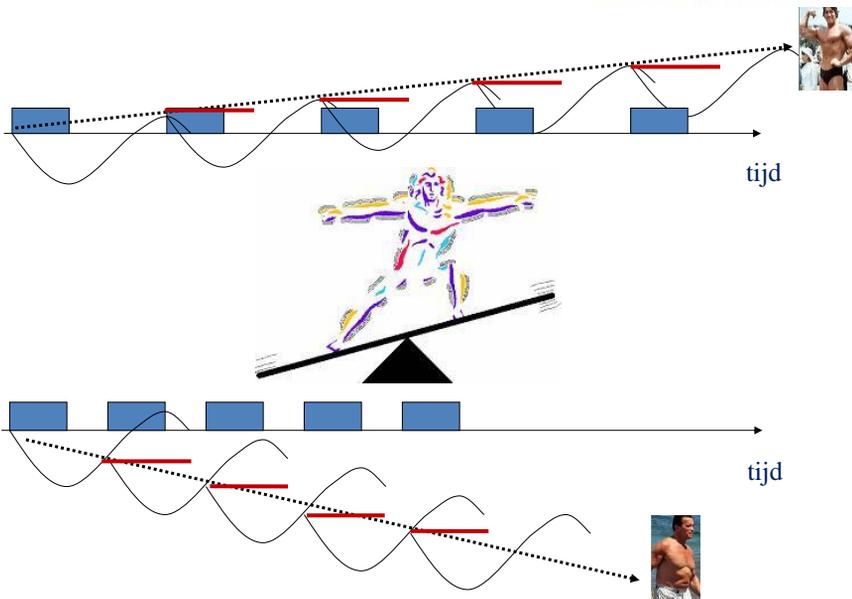
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- Nonlinear periodized exercise
 - organizational strategy
 - Klinisch
 - Optimaliseren van herstellvermogen
 - Functie → participatie
 - Poliklinisch
 - 1^e / 2^e lijn

 - 0^{de} lijn
-

Smart rehab!

