

# New Aspects to Overtraining - Unexplained Underperformance Syndrome Jürgen Steinacker

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# The case

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**32 years old athlete**

**September 2009 pain in the right jaw and cephalgia, multiple examinations by practitioner and specialist without findings, tooth 1/7 revised.**

**During the months before no bites of insects or other severe infection despite in july heavy cold.**

# Complaints

**Training load was reduced gradually  
more and more**

**Fatigue after training increased,  
performance and maximal force  
decreased**

**Regeneration was not possible**

**Complaints increased**

**At a given work load puls rate increased**

# Training and First diagnosis

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**Training for 22 years**

**15 units and 20 hours per week**

**reduction down to 3 units and 4 hours per week**

Working diagnosis

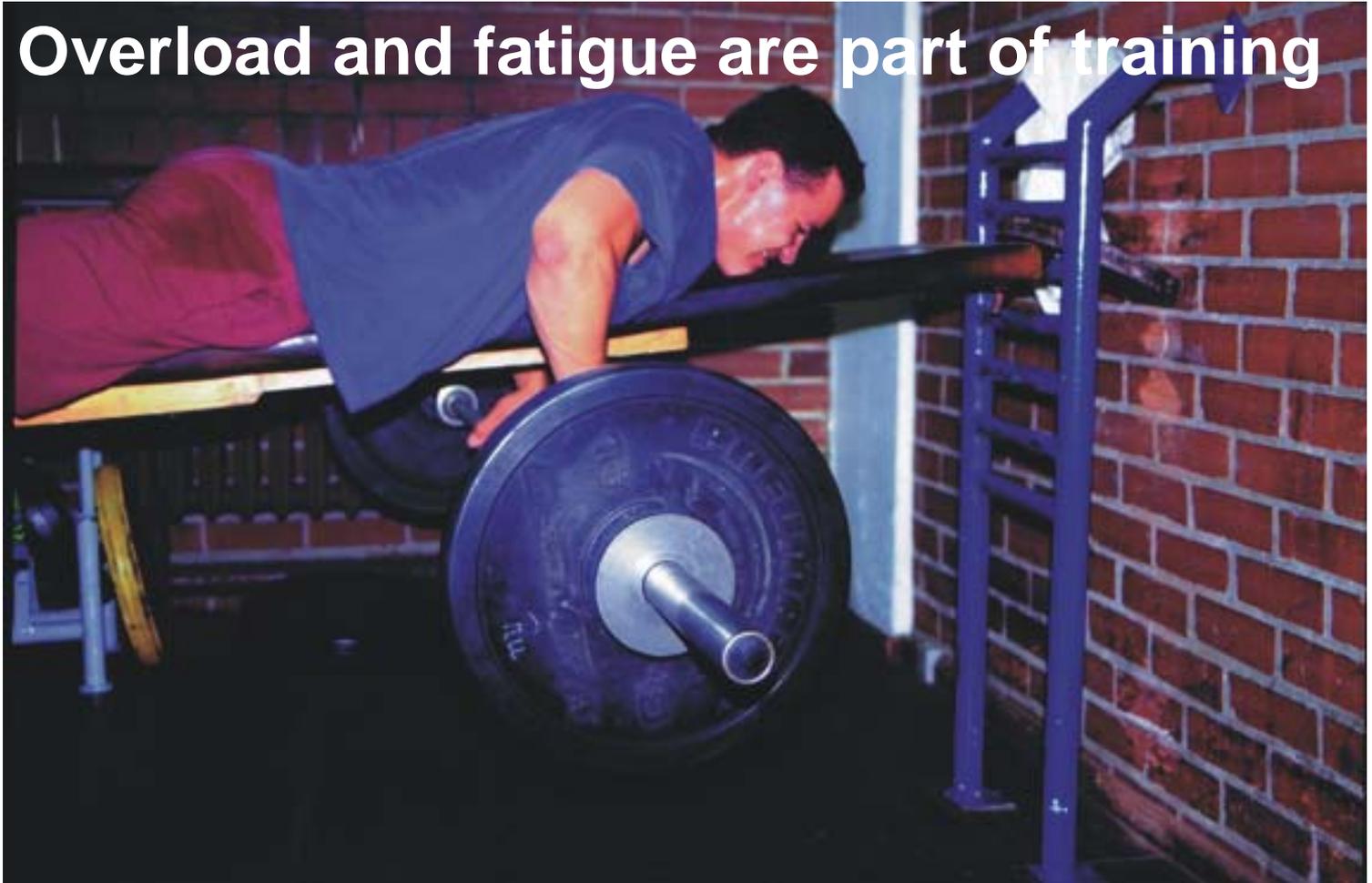
**Overtraining**

or **UPS:**

Unexplained underperformance syndrome

# Why speak about overtraining? My athletes need more training!

**Overload and fatigue are part of training**



# UPS: Unexplained underperformance syndrome

A prolonged decrease in performance or trainability and increased fatigue for more than several weeks to months in an athlete -

which can not be attributed to another defined pathology and when the previous training was more than 5-7 times or more than 10 hrs per week.

# Fatigue is part of physical training

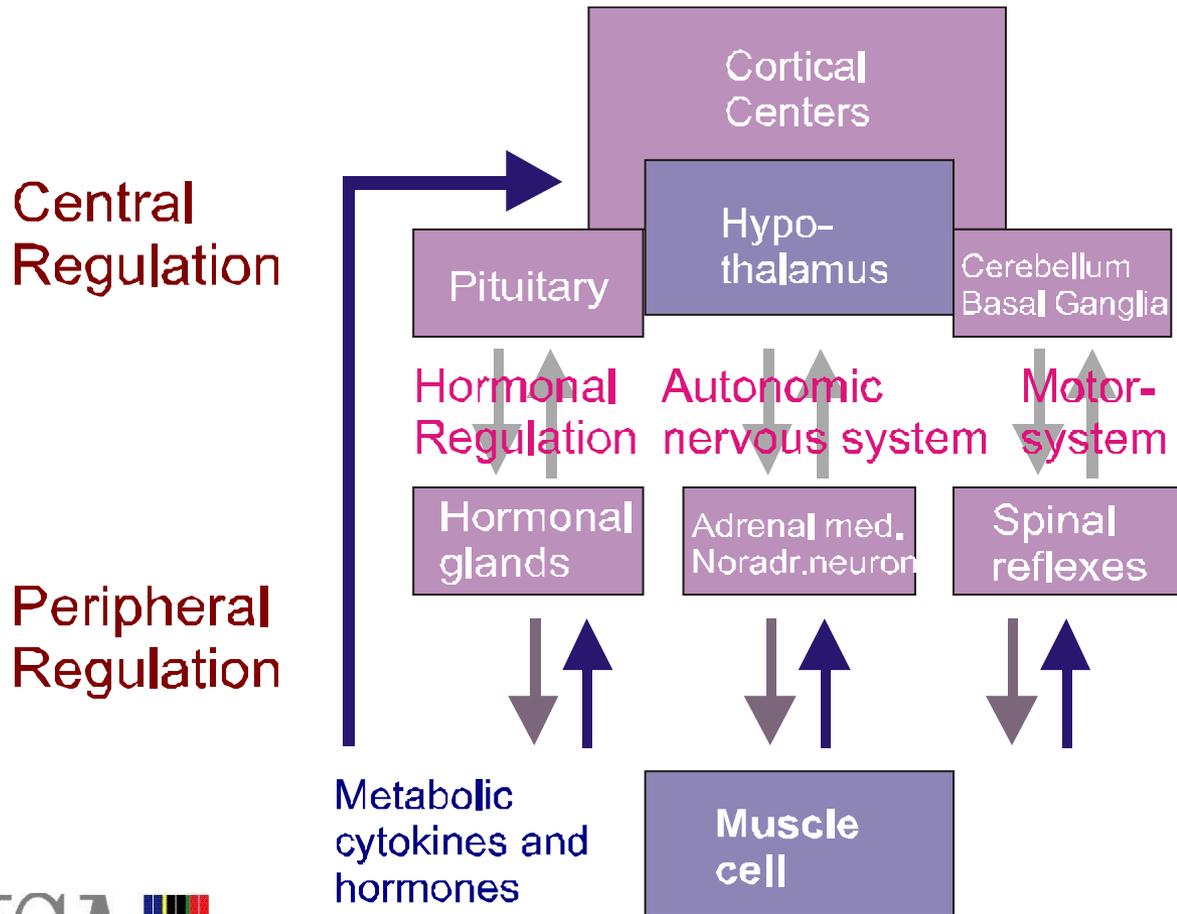
## Peripheral fatigue (local fatigue)

- Muscular fatigue
- Limited by organ capacities
- May be compensated by effort
- Typical for normal training processes

## Central fatigue

- Mood disturbances
- Hypothalamic dysfunction
- Mental-psychological overload

# Training, overreaching and overtraining



3 phases model  
acc. to Lehmann et al.1997

Overtraining

Overreaching

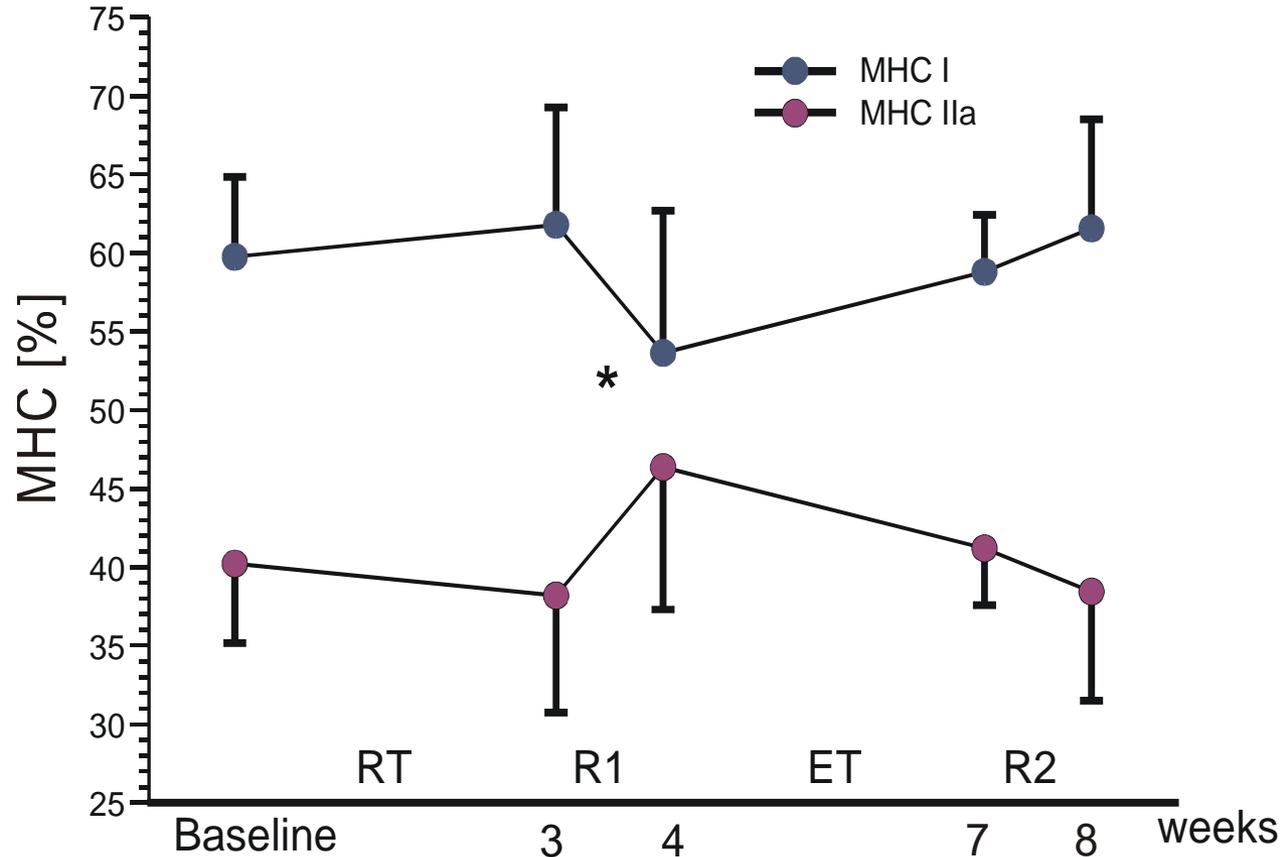
Training

# Time domain: functional overreaching and the overtraining syndrome

ECSS Position Statement 'Task Force',  
Meeusen R, Steinacker JM et al.  
Europ J Sport Science 2006; 6: 1-14

PROCESS	TRAINING (overload)		INTENSIFIED TRAINING	
				
OUTCOME	ACUTE FATIGUE	FUNCTIONAL OR (short-term OR)	NON-FUNCTIONAL OVERREACHING (extreme OR)	OVERTRAINING SYNDROME (OTS)
RECOVERY	Day(s)	Days – weeks	Weeks – months	Months - ...
PERFORMANCE	INCREASE	Temporary performance decrement (e.g. training camp)	STAGNATION DECREASE	DECREASE

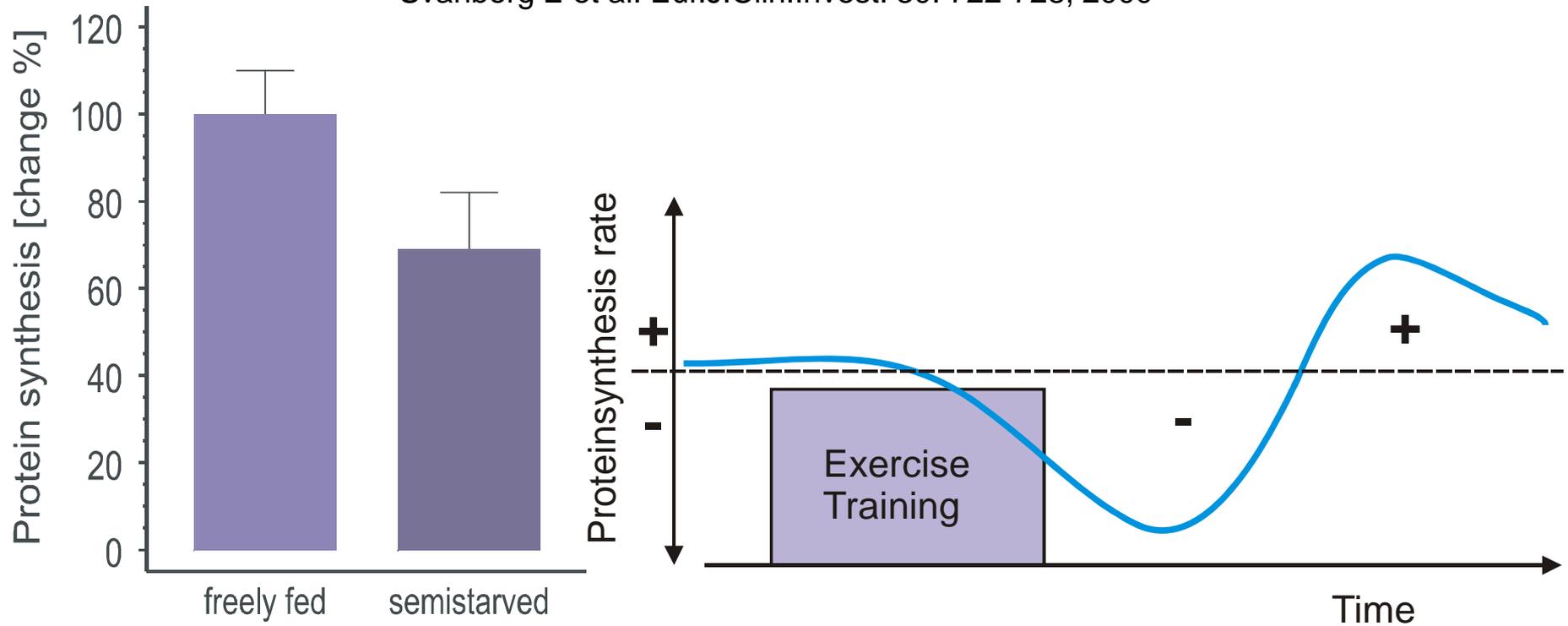
# Fiber type transformation during training occurred only during the rest periods



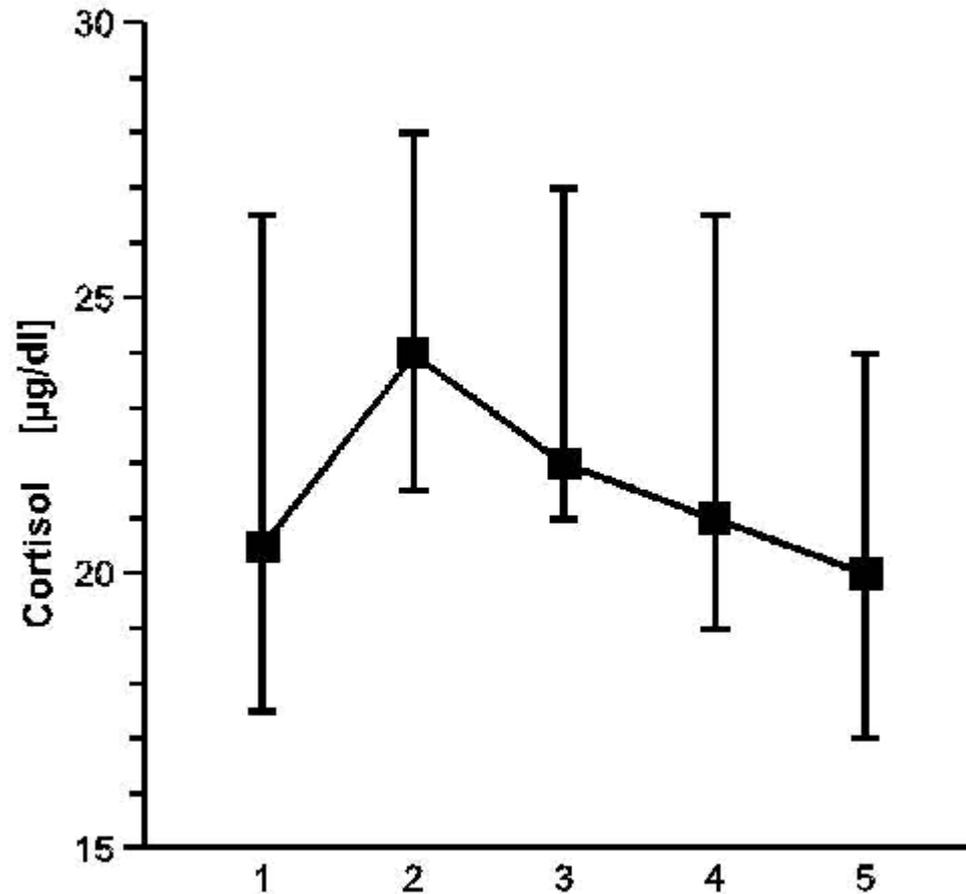
Liu Y, W Lormes, C Baur, JM Steinacker (2003) Effects of high resistance and low intense endurance training on myosin heavy chain isoform expression in highly trained rowers. *Int J Sports Med* 24: 264-270.

# Semistarvation alters protein synthesis rate

Svanberg E et al. Eur.J.Clin.Invest. 30: 722-728, 2000

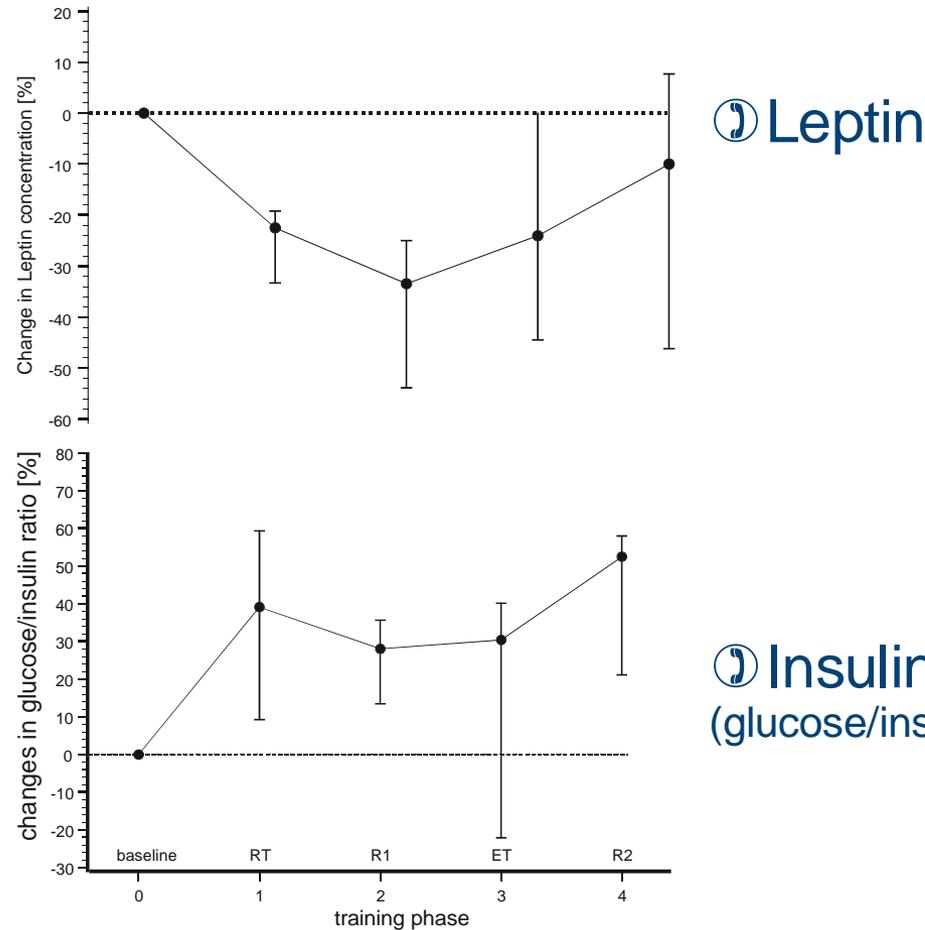


# Basal Cortisol increases during phases of intensive training



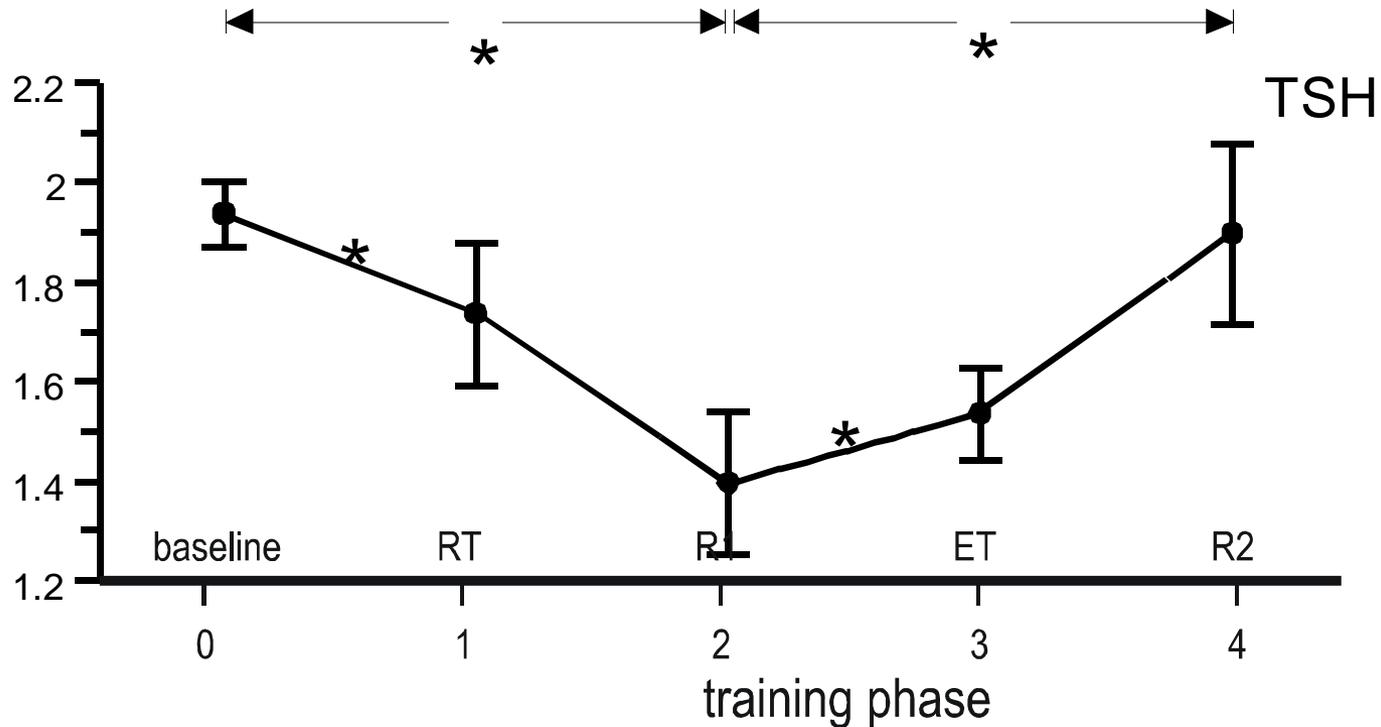
# Leptin and insulin resistance in overreaching

Modified after: Simsch et al. Int J Sports Med 23: 422-427 (2002)

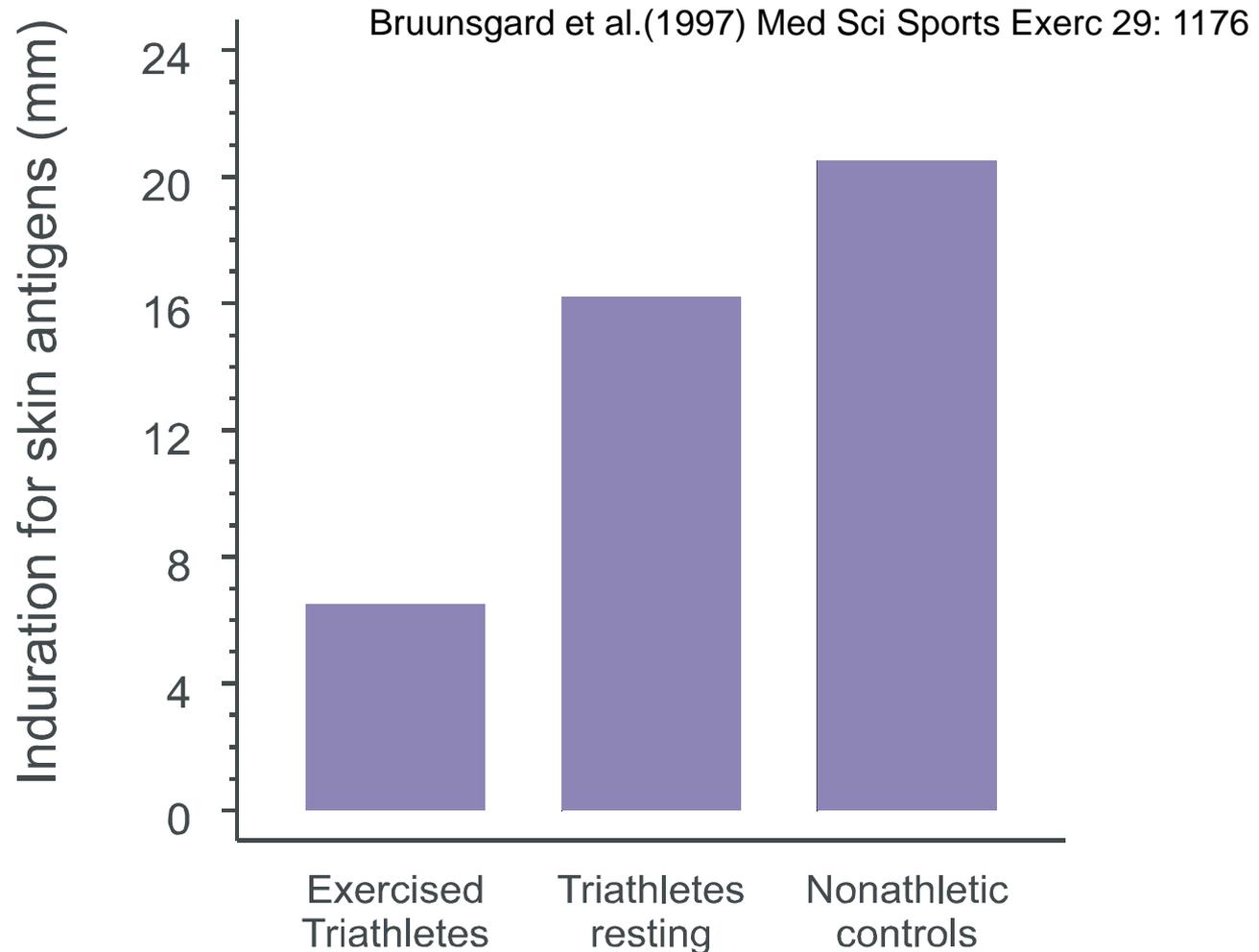


# Thyroid axis responds to training load

Simsch et al. Int J Sports Med 23: 422-427 (2002)



# Immune reaction is lower during training



# J-Curved relationship between infect rate and training load

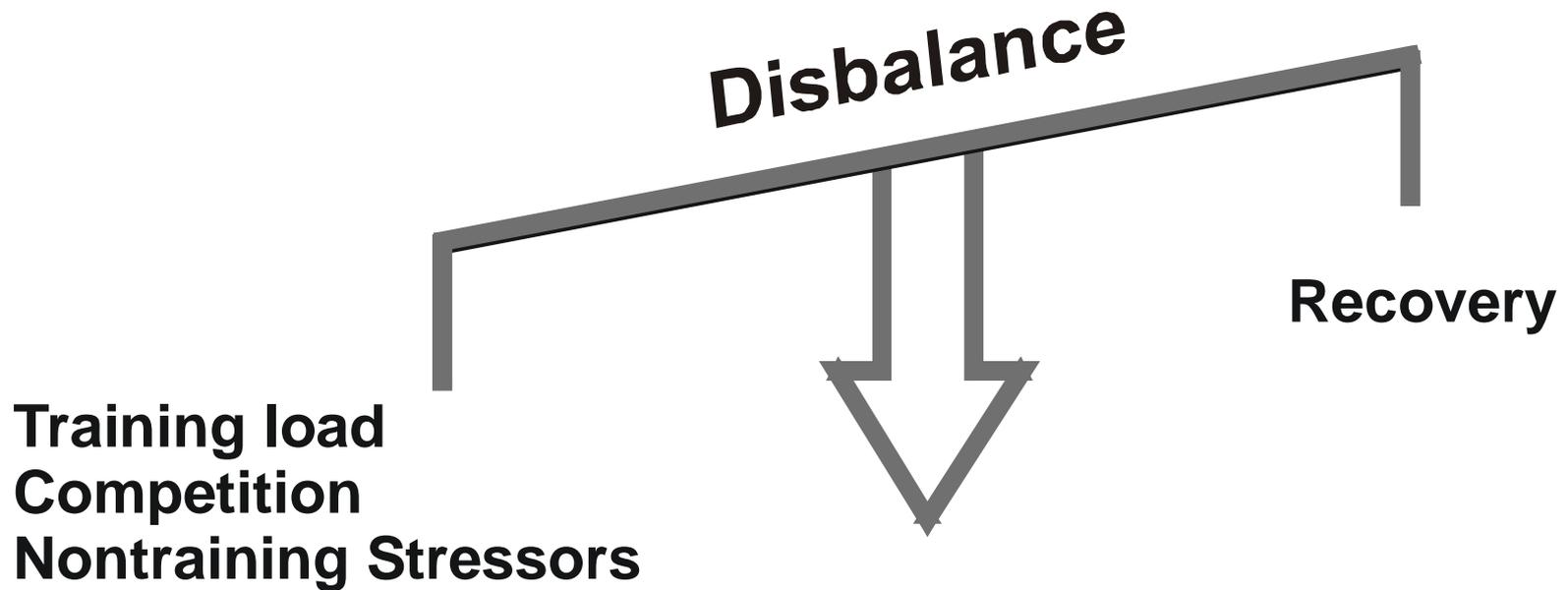
Pedersen et al. (2001) Exerc Immunol Rev 7: 18



# Hyperinflammation?

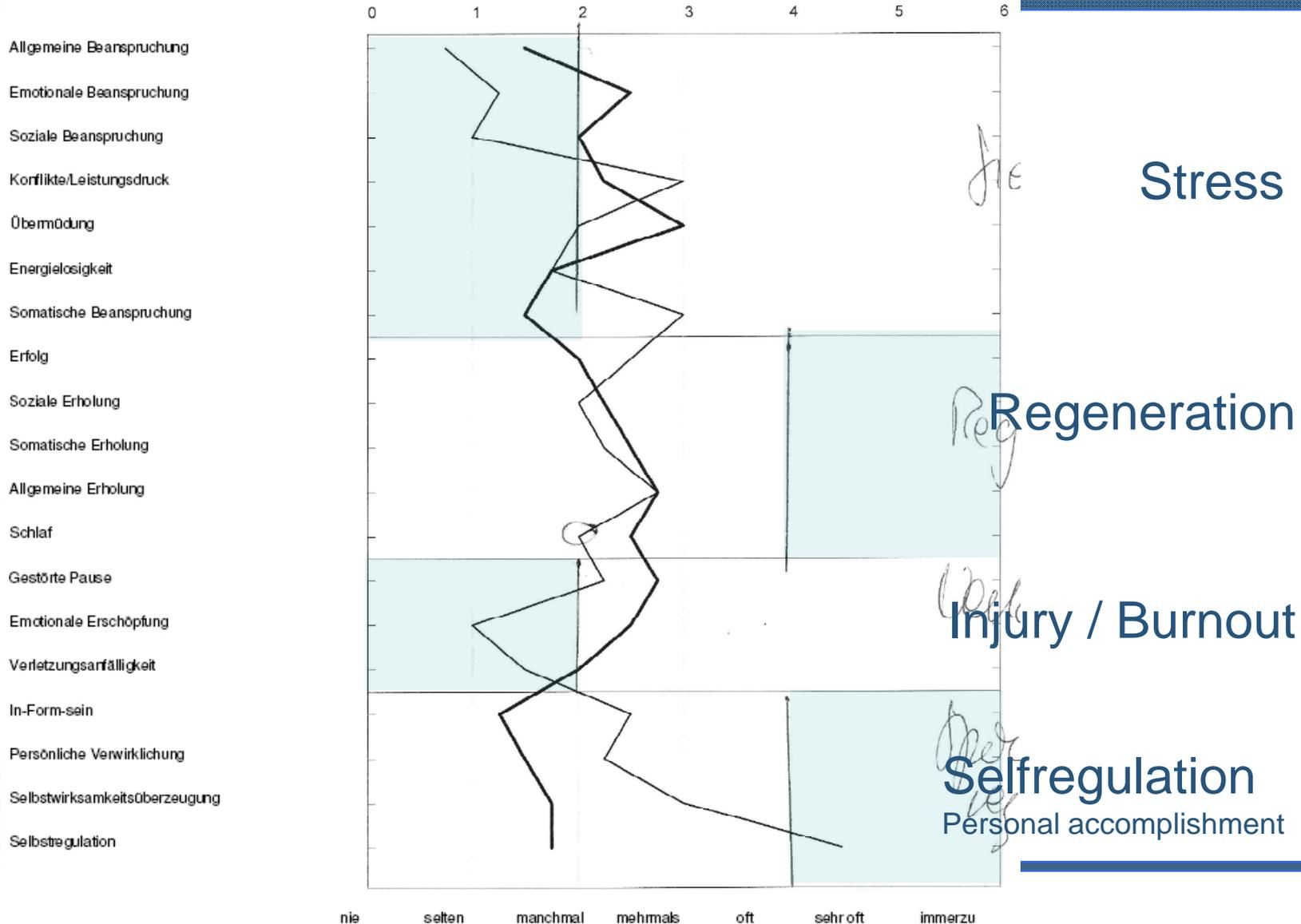
- **Damage is caused by training**
  - Stress and damage causes Hyperinflammation
  - Hyper inflammatory Damage Associated Molecular Patterns are activated (DAMP)
- **Damage is caused by pathogens**
  - Pathogens may cause activation of Pathogen Associated Molecular Patterns (PAMP)
- **Hyperinflammation causes metabolic stress and reduced immune function**

# Stress and recovery balance



# Stress / recovery balance

Kellmann et al. (2001). Sport Psychologist 15: 151



# UPS / overtraining and burnout

## Different pathogenesis of UPS and burnout

### UPS:

Training > 10 hrs / week

### Burnout:

Appraisal of demands

Appraisal of ability to deal with demands

Attempts to cope

Exhaustion

## Non-functional overreaching and overtraining have mood disturbances

Exhaustion, lethargy and negative mood

## UPS may have common symptoms of burnout

## Treatment is similar



Cresswell & Eklund, in press-a; Maslach 1982; Raedeke, 1997; Schutte, Toppinen, Kalimo & Schaufeli, 2000



# Diagnostic workup: make it explainable

- **History including training history**
- **Physical examination**
- **Exercise test: maximal performance**
- **Laboratory: exclusion of significant other illnesses**
  - No specific lab value for UPS / OTR established
  - TSH, Leptin, HOMA
  - Zytokine patterns?
- **Psychological questionnaires**
  - RESTQ-Sport
  - POMS, HADS

# Therapeutic measures: Medicine

- **Information and therapeutic visits / talks**
  - Use of daily log book
- **Treatment**
  - Infections
  - Injuries
  - Allergies / Asthma
- **General measures:**
  - Inhalation, physical therapy
- **Psychological intervention**
  - Training of relaxation techniques



# Therapeutic measures: Sport

- **Stop training for certain time**
  - Days, weeks
- **Start exercise trials**
  - duration first <30 min, later <60 min
  - Heart rate < 40 % HRmax or < 120/min
  - Variable training programme, no Monotony
  - Short intensities (2-3 min) and strength training often better tolerated (depends on sport)
- **Games help to reintroduce pleasure**
- **Recovery to training gradually**

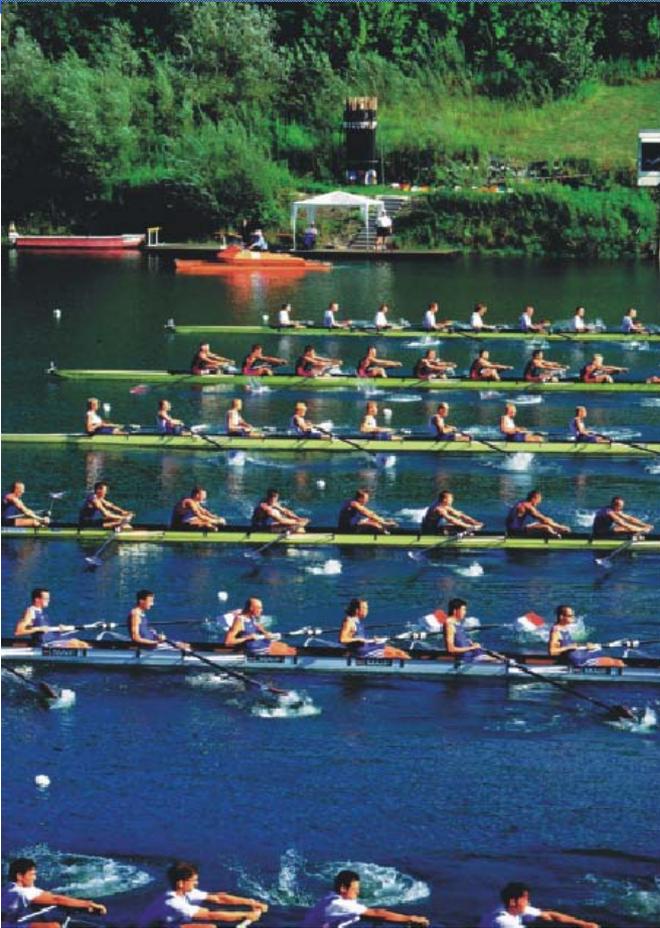
# Therapeutic measures: psychosocial and environment

- **Sleep**
- **Social activities outside of sport**
  - Friends, theatre, dancing, swimming, sauna, ...
- **Change of environment**
  - Days off, vacation
- **Partner and family related problems should be solved**
- **Problems in profession should be solved**

# Therapeutic measures: nutrition and environment

- **Carbohydrate rich nutrition**
- **Fluid intake**
- **Intake of vegetables and fruits**
  
- **Avoid training in unsafe or stressful conditions**
  - Avoid exhaustion
  - Very cold weather, wind, rain, ...

# Thanks to / Cooperations



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