

„Die Sehne braucht Zug!“

Präventionssymposium Fußball

Samstag, 5. April 2025

Volksparkstadion | Uwe-Seeler-Allee 9 | 22525 Hamburg





Patellar tendinopathy: an overview of prevalence, risk factors, screening, diagnosis, treatment and prevention

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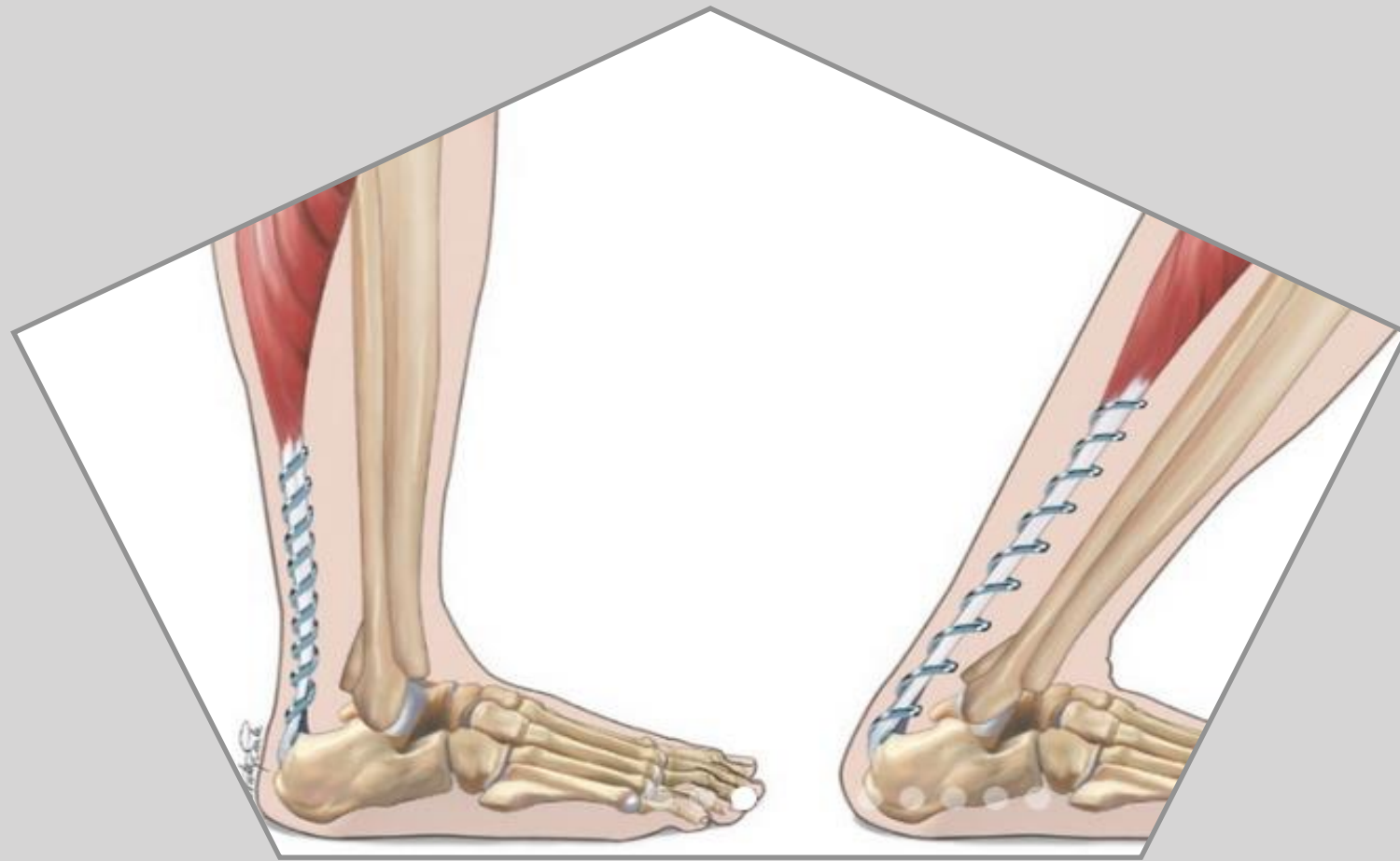
Table 1 Prevalence and risk factors of PT

Authors	Prevalence	Risk Factors
Lian et al. [4]	Volleyball: 45% Basketball: 52% Overall prevalence in these sports: 14.2%	Male gender High weight Tall height Increased number of weight and jump training Increased number of sport-specific training in basketball
Zwerver et al. [5]	The overall prevalence of PT is 8.5% Volleyball: 14.4% Handball: 13.3% Basketball: 11.8% Track and field: 6.9% Field hockey: 5.1% Korf-ball: 4.8% Soccer: 2.5%	Male gender Participating in sports Increased number of training hours Playing surface Young age Higher BMI Tall height
de Vries et al. [8]	Overall prevalence in study’s population (Volleyball and basketball): 13%	Male gender Heavier load on the patellar tendon BMI is not a risk factor Age is not a risk factor
Van der Worp et al. [11]	Overall prevalence in study’s population (Volleyball and basketball): 18.6%	Male gender Increased number of training hours Playing at the national level compared with playing at the regional level Playing volleyball compared with playing basketball Playing position in volleyball but not in basketball Higher age Playing surface BMI and waist-to-hip ratio were not associated

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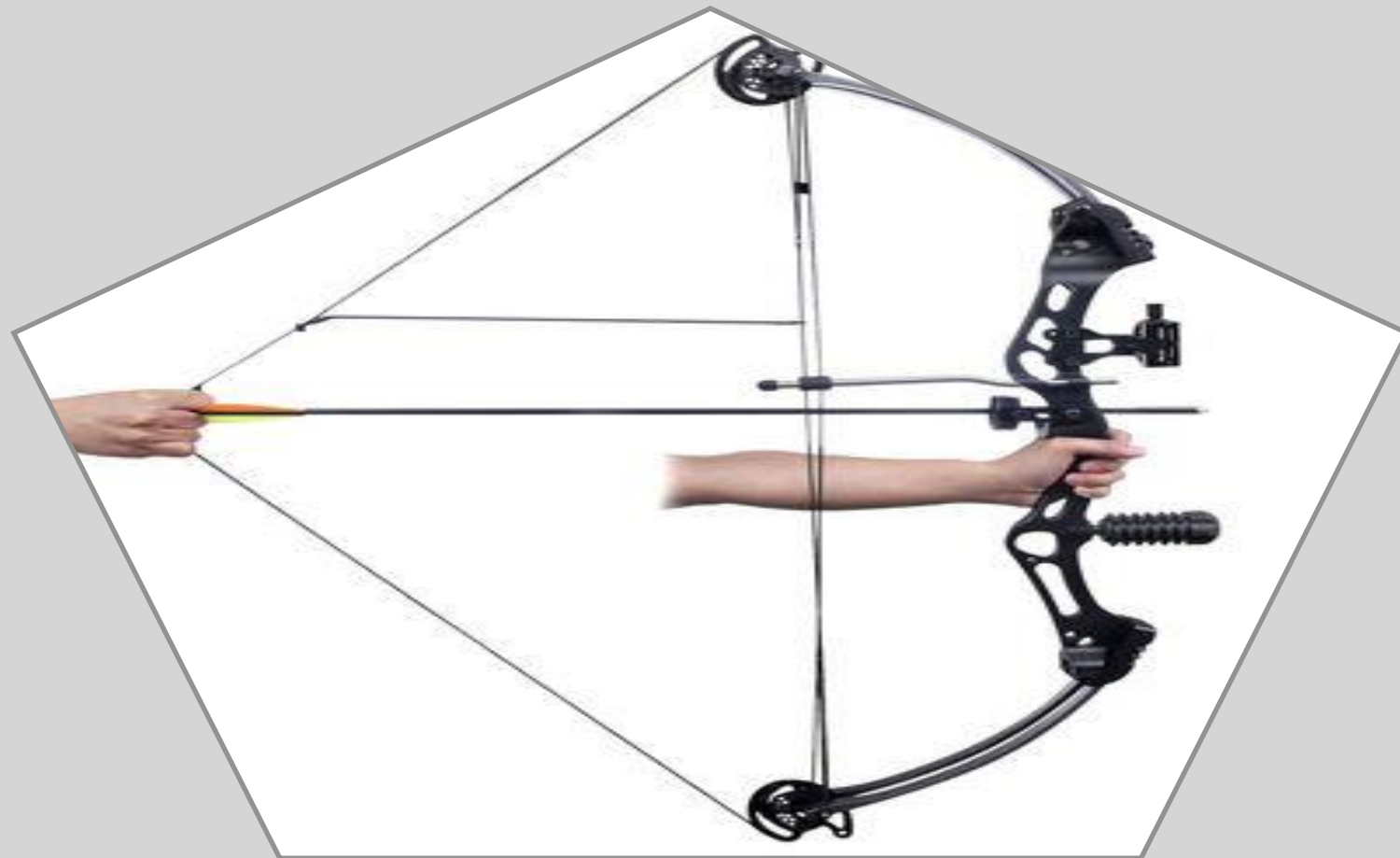
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>> Muskel und Sehne bilden eine funktionelle Einheit (Muscle-Tendon-Unit, MTU)

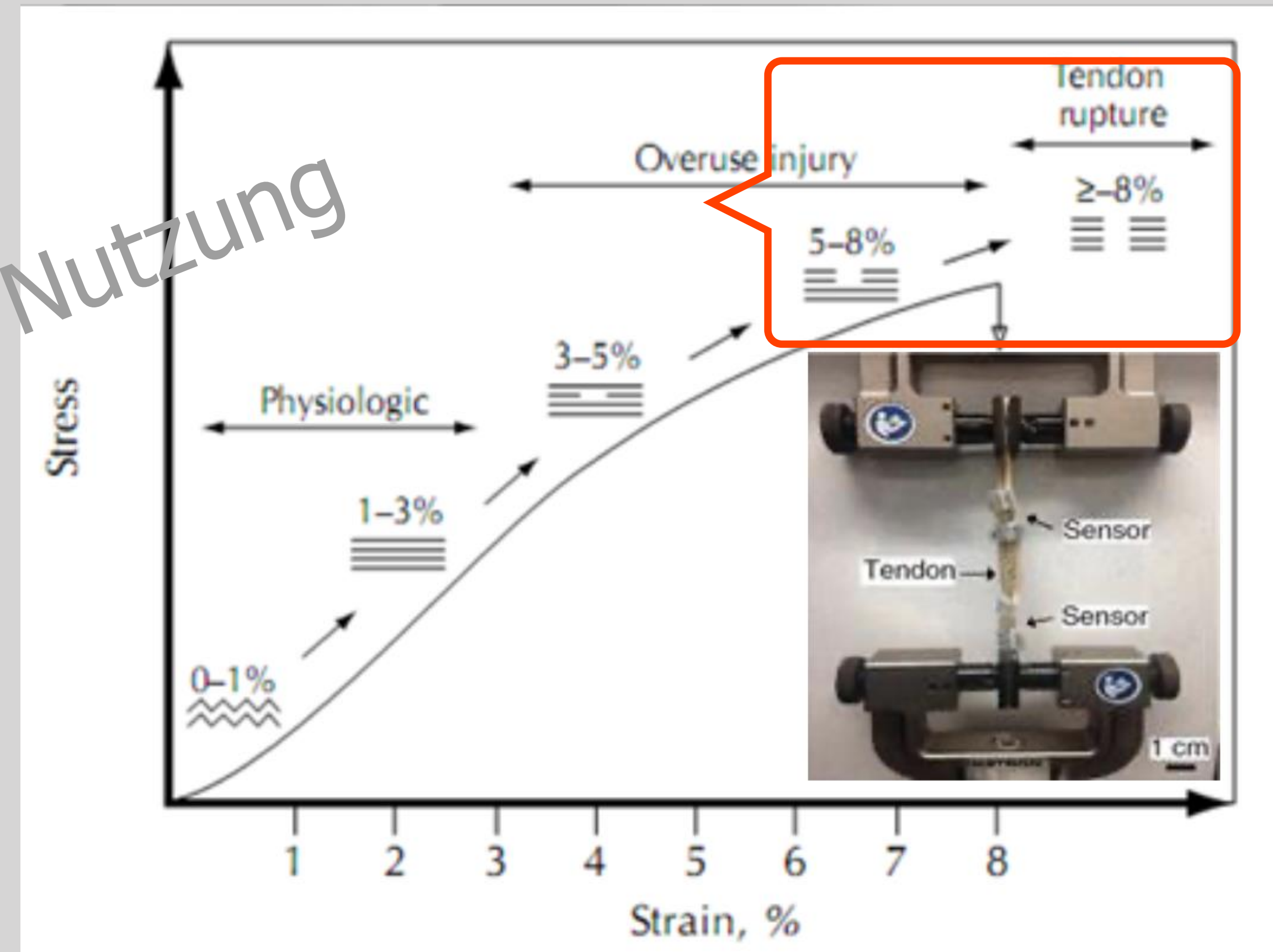
>> überträgt die im Muskel generierten Kräfte auf den Knochen (Force transmission)

>> Fähigkeit zur Speicherung elastischer Energie
Mechanische Eigenschaft: >>**Steifigkeit**<<



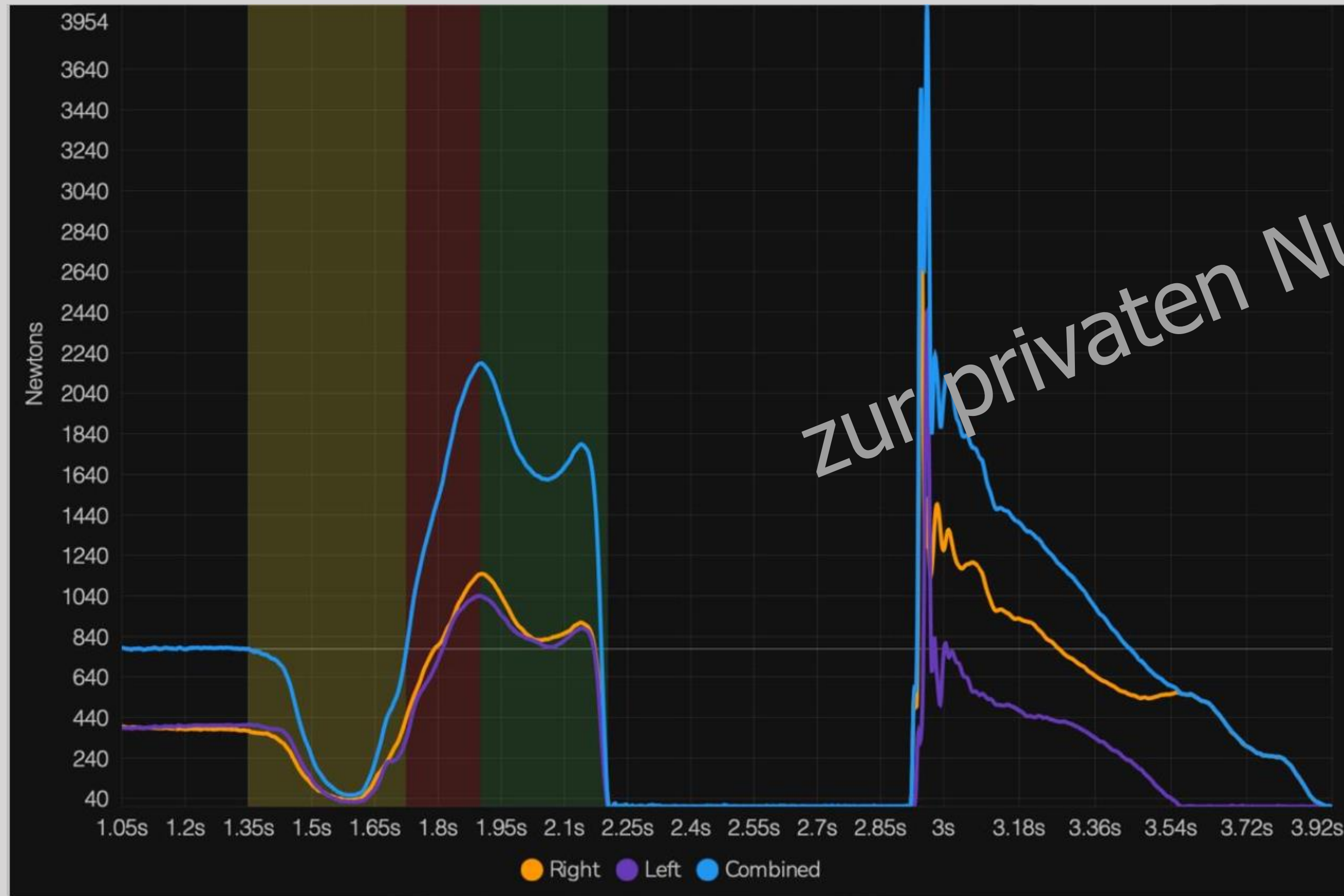
Steifigkeit / Young Moduls:

>> Widerstandsfähigkeit gegen Verformung aufgrund einer von außeneinwirkenden Kraft



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Belastung:



Malliaras P, Cook J, Purdam C, Rio E. Patellar Tendinopathy: Clinical Diagnosis, Load Management, and Advice for Challenging Case Presentations. J Orthop Sports Phys Ther. 2015

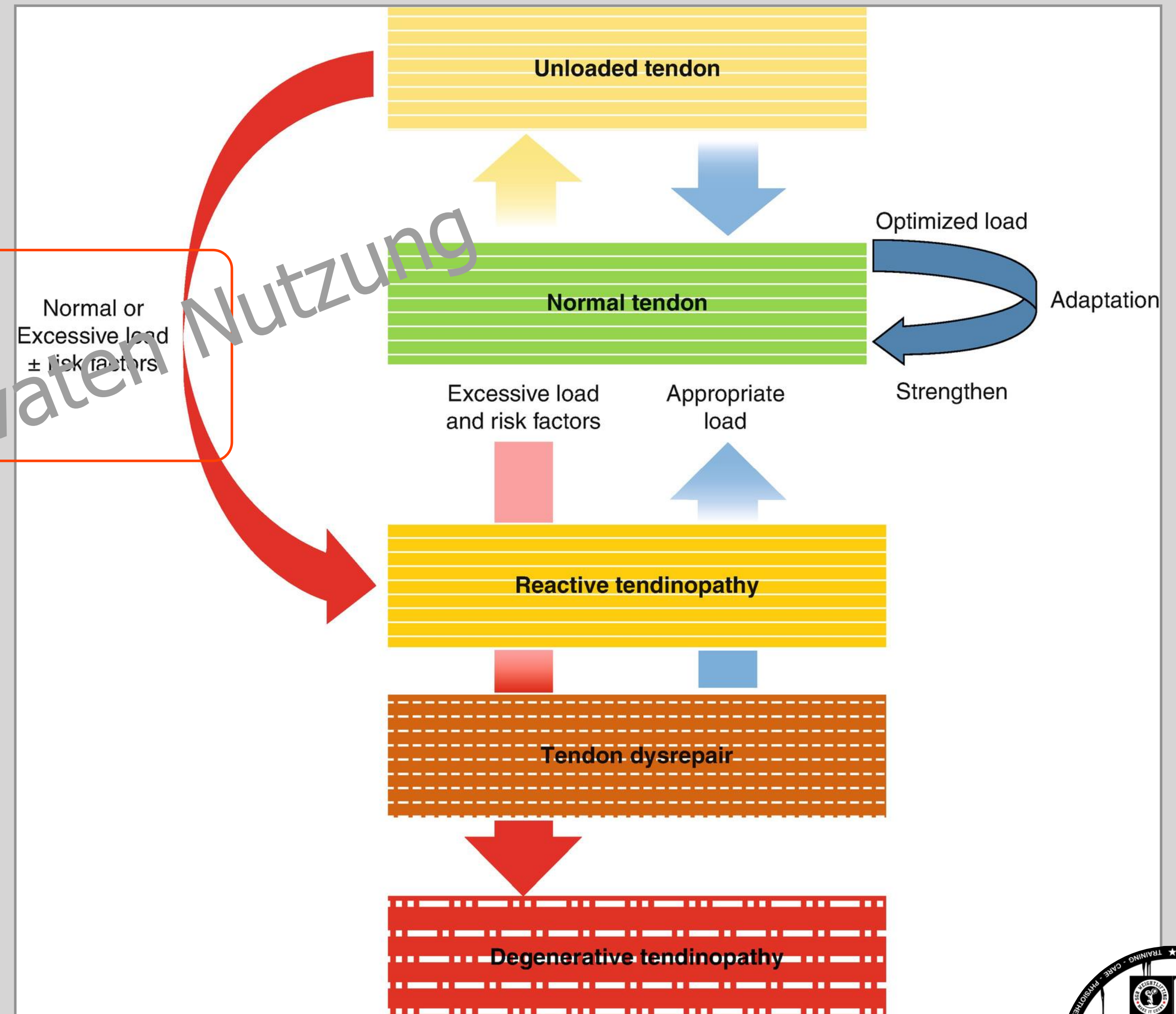
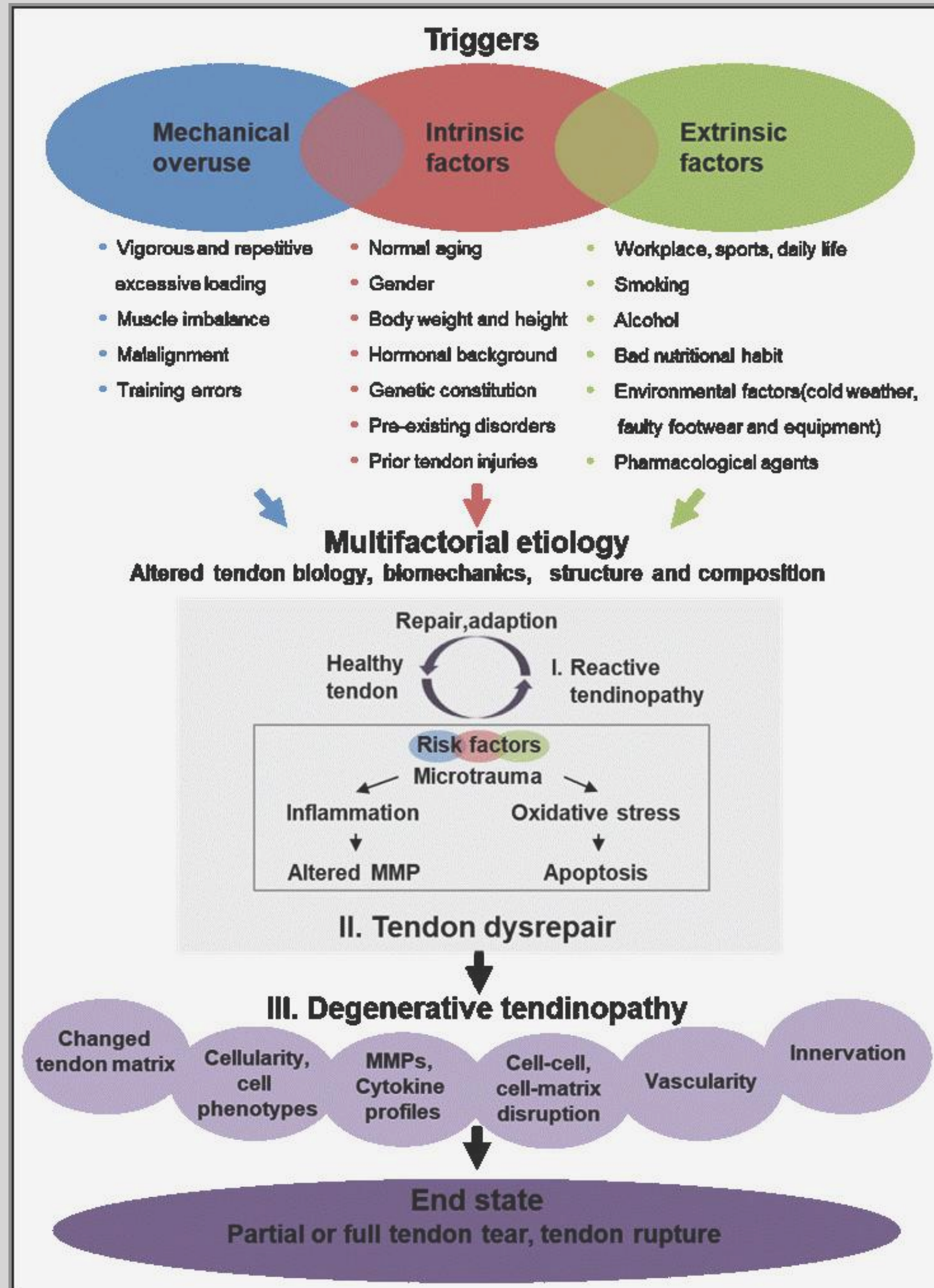


>> 6,5faches BW
>> ABER: Loading Rate:
93faches BW/Sek!!!



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Tendon Research Group, QMU London



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> J Physiol. 2007 Sep 15;583(Pt 3):1079–91. doi: 10.1113/jphysiol.2007.135392. Epub 2007 Jul 26.

Time course of muscular, neural and tendinous adaptations to 23 day unilateral lower-limb suspension in young men

Maarten D de Boer¹, Constantinos N Maganaris, Olivier R Seynnes, Michael J Rennie, Marco V Narici

Affiliations + expand

PMID: 17656438 PMCID: [PMC2277190](#) DOI: [10.1113/jphysiol.2007.135392](#)

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Are Sport-Specific Profiles of Tendon Stiffness and Cross-Sectional Area Determined by Structural or Functional Integrity?

Article in PLoS ONE · June 2016
DOI: 10.1371/journal.pone.0158441

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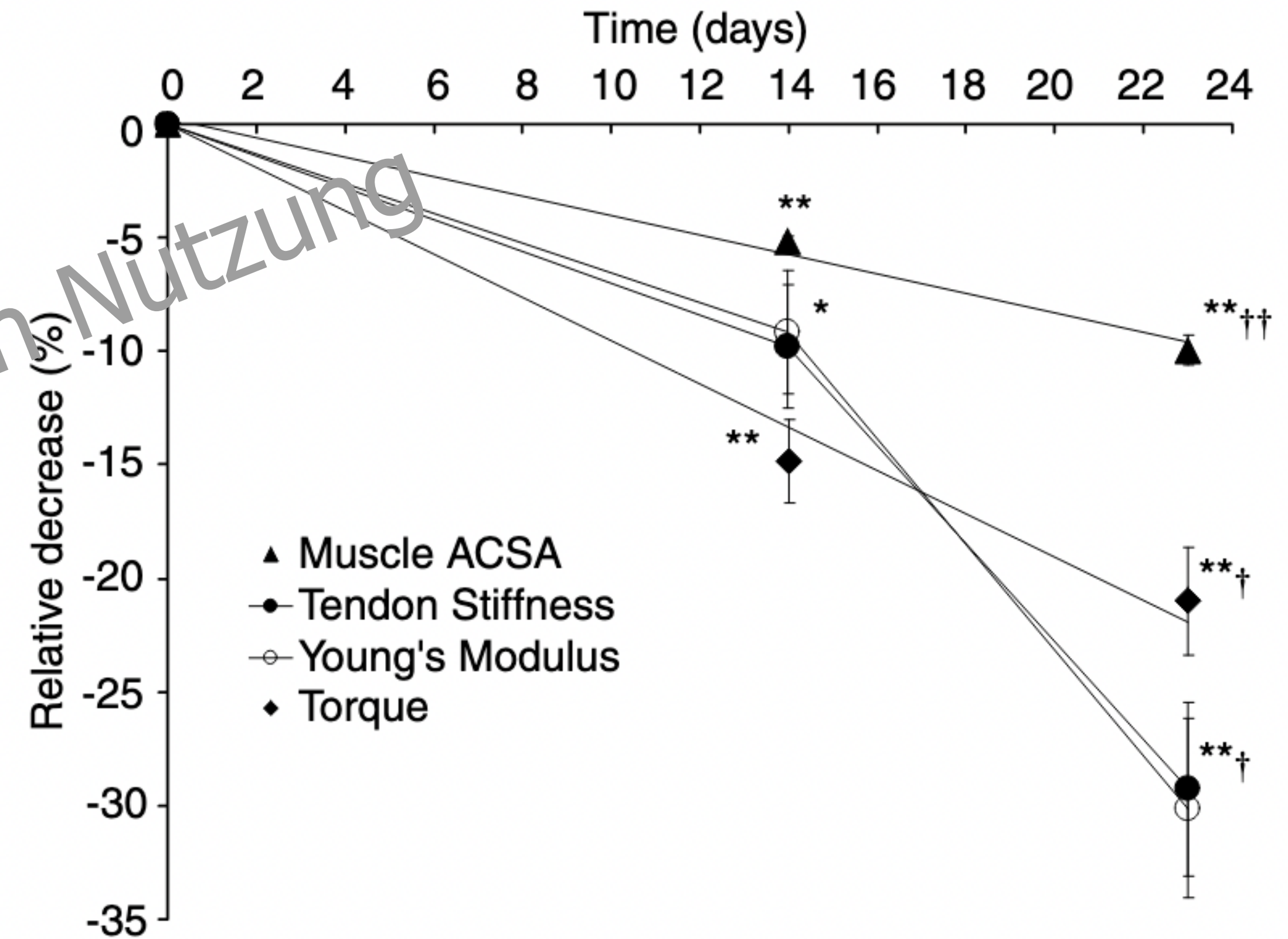
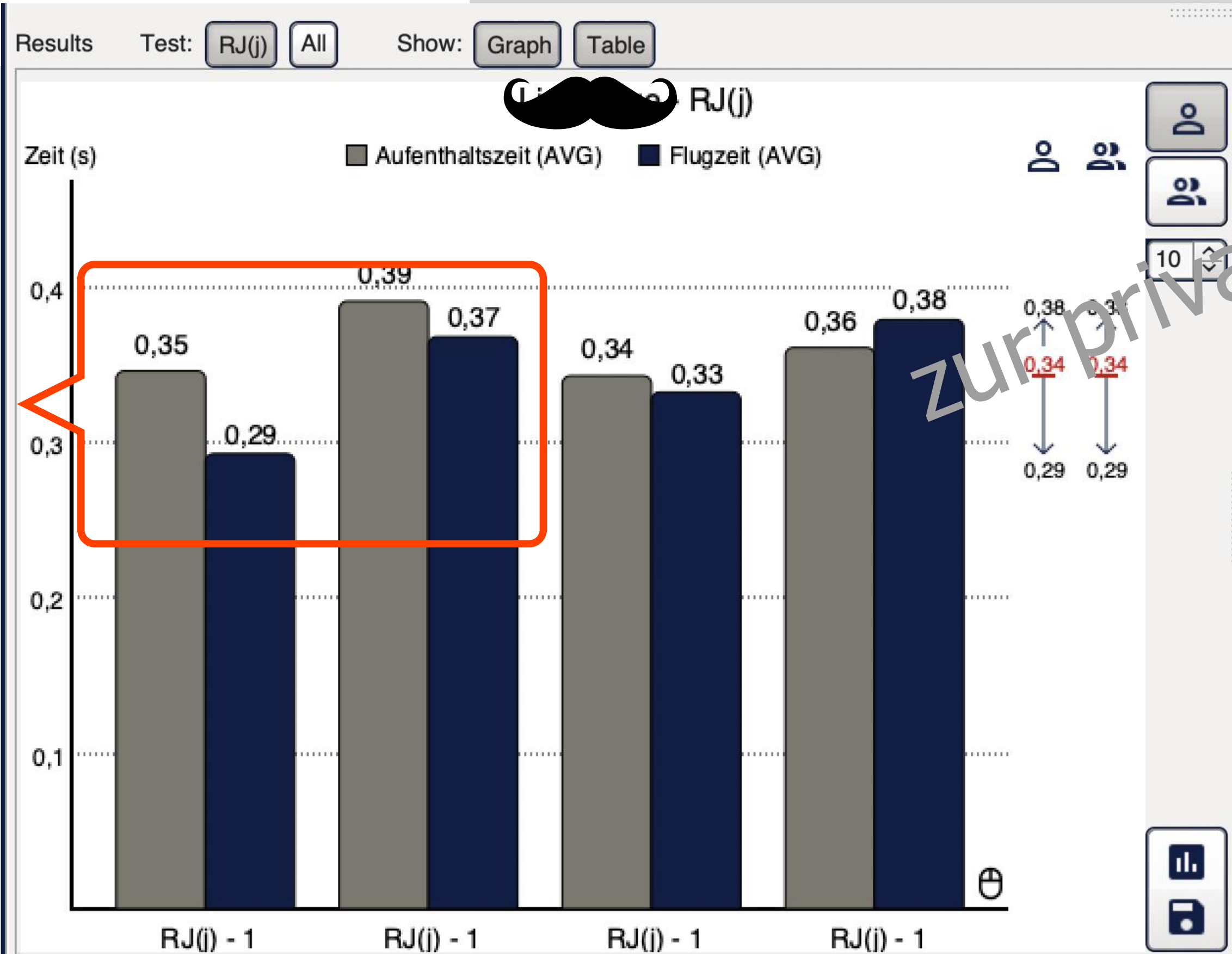
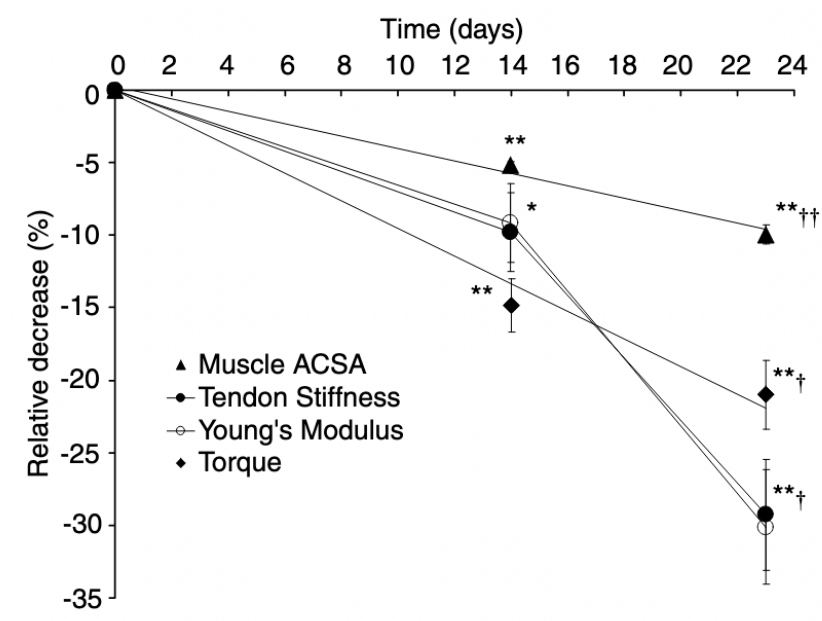


Figure 2. Relative decrease (%) at 14 and 23 days of suspension for m. quadriceps femoris ACSA (s), patellar tendon stiffness (●), patellar tendon Young's modulus (○) and torque (◆)



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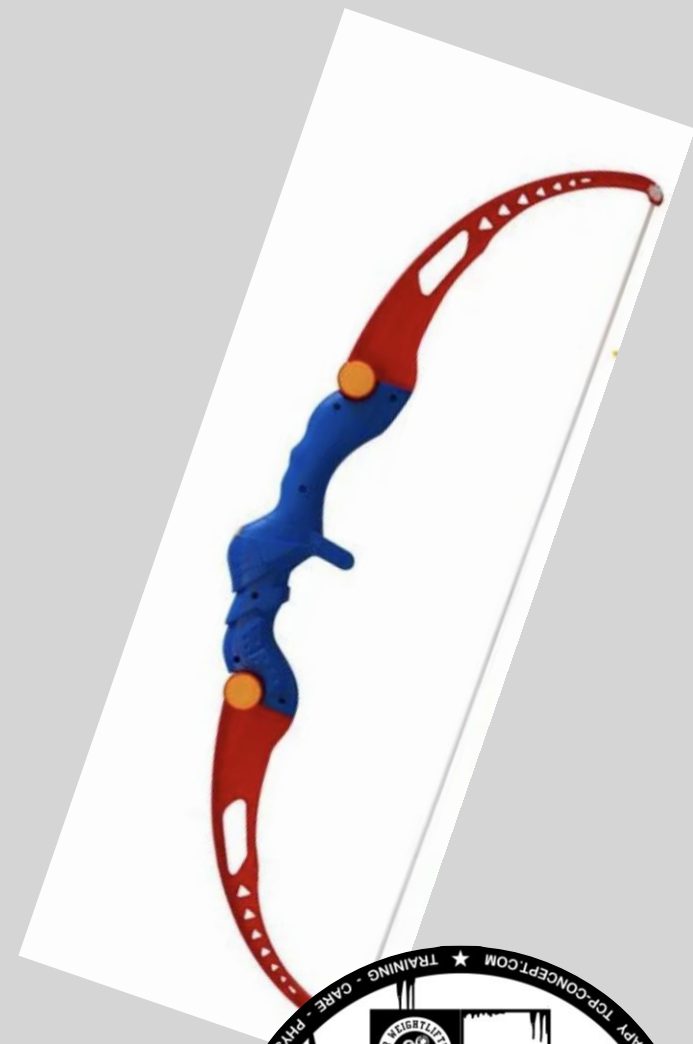


Reactive Strength Index RSI

$RSI = \text{Sprunghöhe (m)} / \text{Bodenkontaktzeit (s)}$

Einstufung nach Flanagan:

- < 1.5: geringe Reaktivkraftfähigkeit
- 1.5 – 2.0: moderate Reaktivkraftfähigkeit
- 2.0 – 2.5: gut ausgeprägte Reaktivkraftfähigkeit
- 2.5 – 3.0: hochausgeprägte Reaktivkraftfähigkeit
- > 3.0: exzellente Reaktivkraftwerte

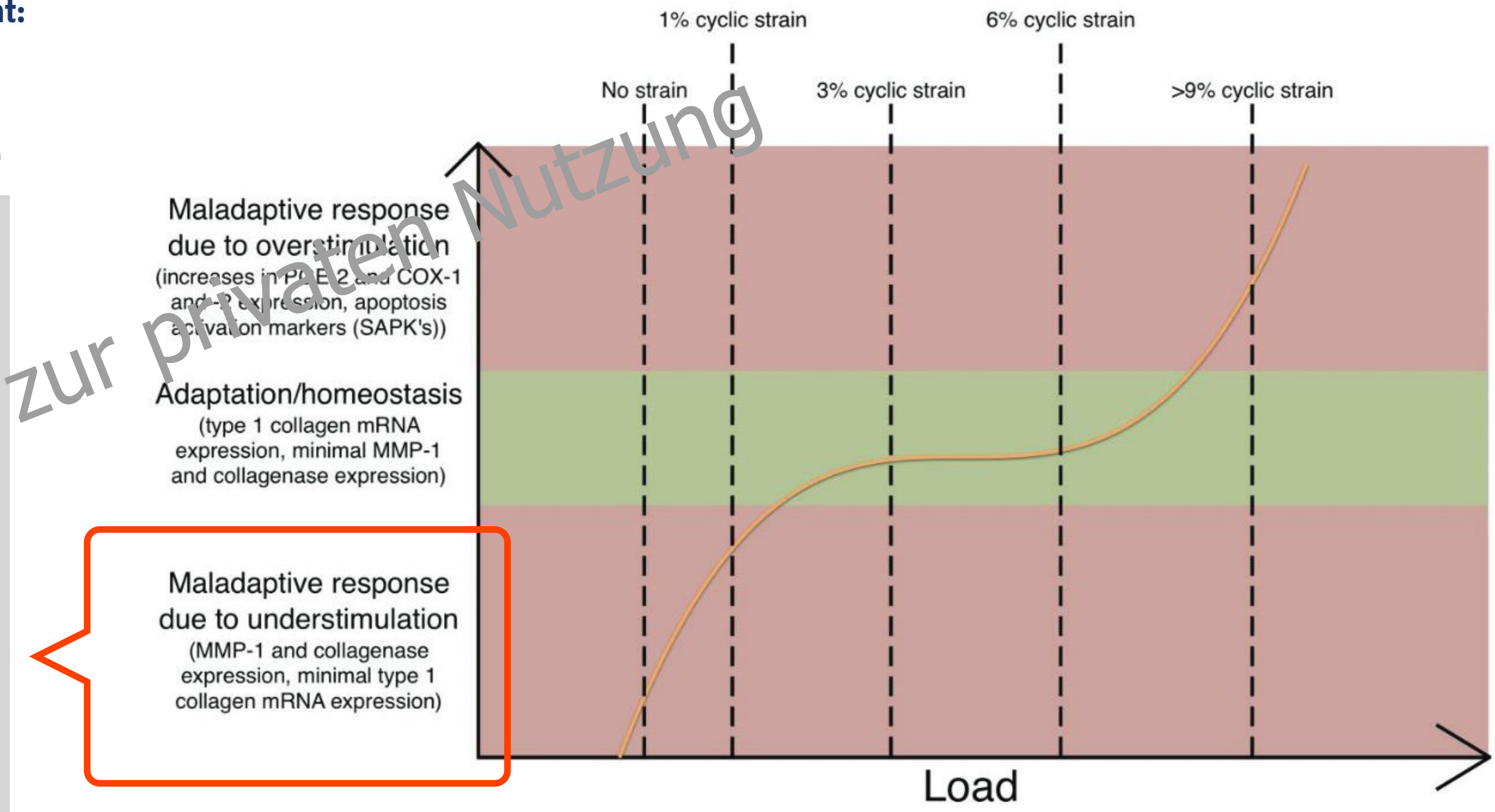


Review Article

**How do tendons adapt? Going beyond tissue responses to understand positive adaptation and pathology development:
A narrative review**

Sean I. Docking, Jill Cook

¹La Trobe Sport and Exercise Medicine Research Centre, College of Science, Health and Engineering, La Trobe University, Australia



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Wie viel Alkohol enthalten Bier, Wein, Sekt und Schnaps?*



Quelle: Lange et al. (2016) (eigene Umrechnung)

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Open Access | Journal Article | DOI

The effects of alcoholic compounds on the stability of type I collagen studied by differential scanning calorimetry.

Kyosuke Fukuda, Takashi Nezu, Yoshihiro Terada

Kyushu University

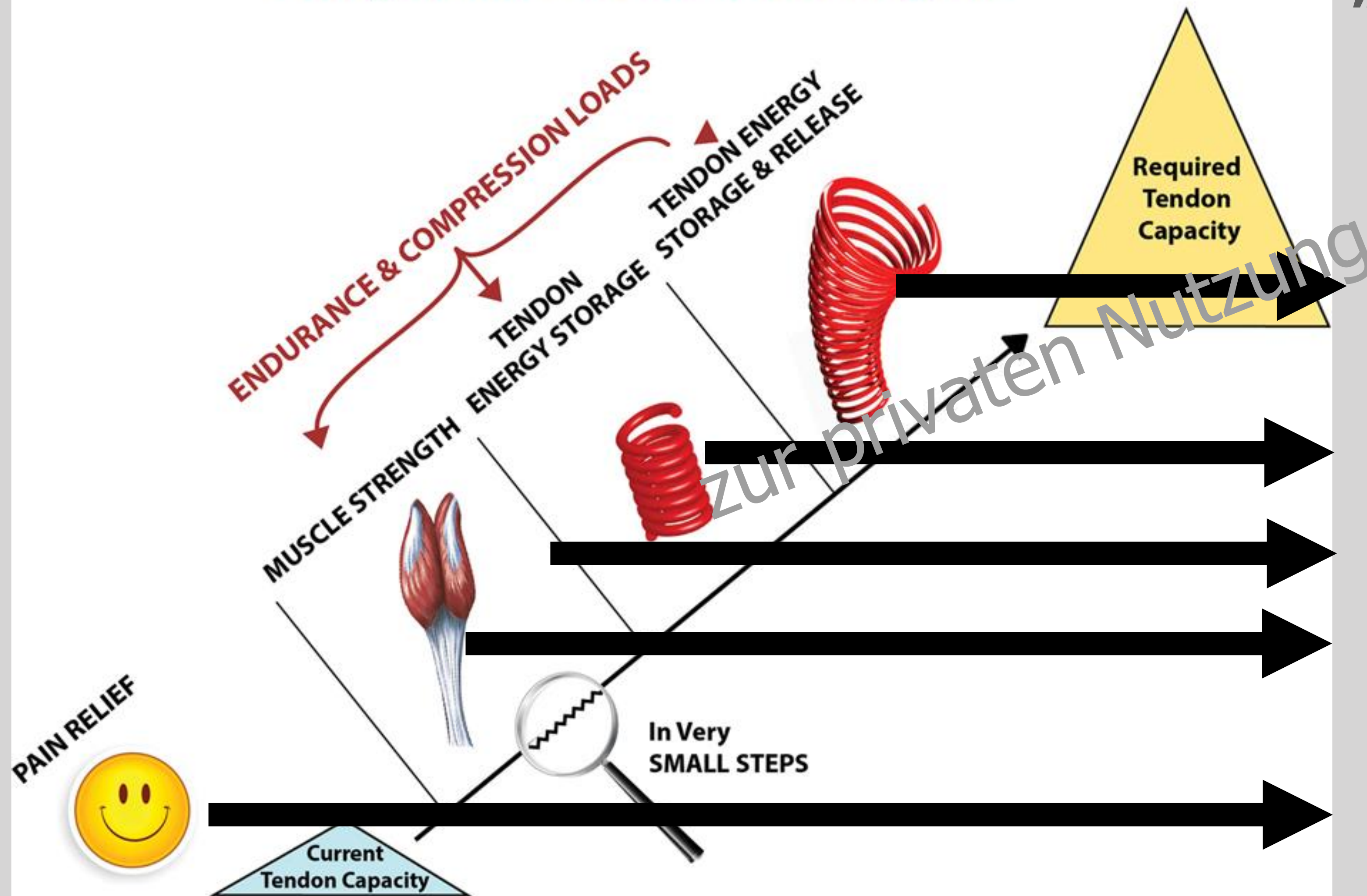
01 Sep 2000 - Dental Materials Journal

(The Japanese Society for Dental Materials and Devices) - Vol. 19, Iss: 3, pp 221-228

- Alkoholkonsum ab 2,4%vol fördert die Expression des MMP1 Enzyms (Matrix Metalloproteinase-1)
- 10g Alkohol reduzieren die kollagene Resynthese der Sehne um 10 Tage!



4-Stage Achilles Rehabilitation Program



Source: Peter Brukner: *Brukner & Khan's Clinical Sports Medicine: Injuries, Volume 1, 5e*: www.csm.mhmedical.com
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4.) DVZ / Plyometrie

3.) Energiespeicherung

2.) Kraftaufbau SupraEXZ

1.1) Kraftaufbau via HSRT

1.) Isometrie



Schmerzfrei und isometrisch

37

Training bei Patellarsehnen-Tendinopathie Frustrierend, langwierig und anfangs schmerzhaft – das sind wohl die häufigsten Assoziationen zum Jumpers Knee. Bei der Reha von Patienten mit Patellar-Tendinopathie ist Geduld gefragt – und ein schmerzfreies, isometrisches Training mit hohen Belastungen wie dem tendoneuroplastischen Training.

ch geschützt



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Rio et al:

- Athleten mit Tendinopathie haben größere kortikale Hemmung der Quadrizepsaktivität.

Tube et al:

- erhöhte kortikale Hemmung kann zu phasischen (intermittierend auftretenden) nozizeptiven Reizen führen, die sich ähnlich dem belastungsabhängigen Schmerz bei PT äußern.

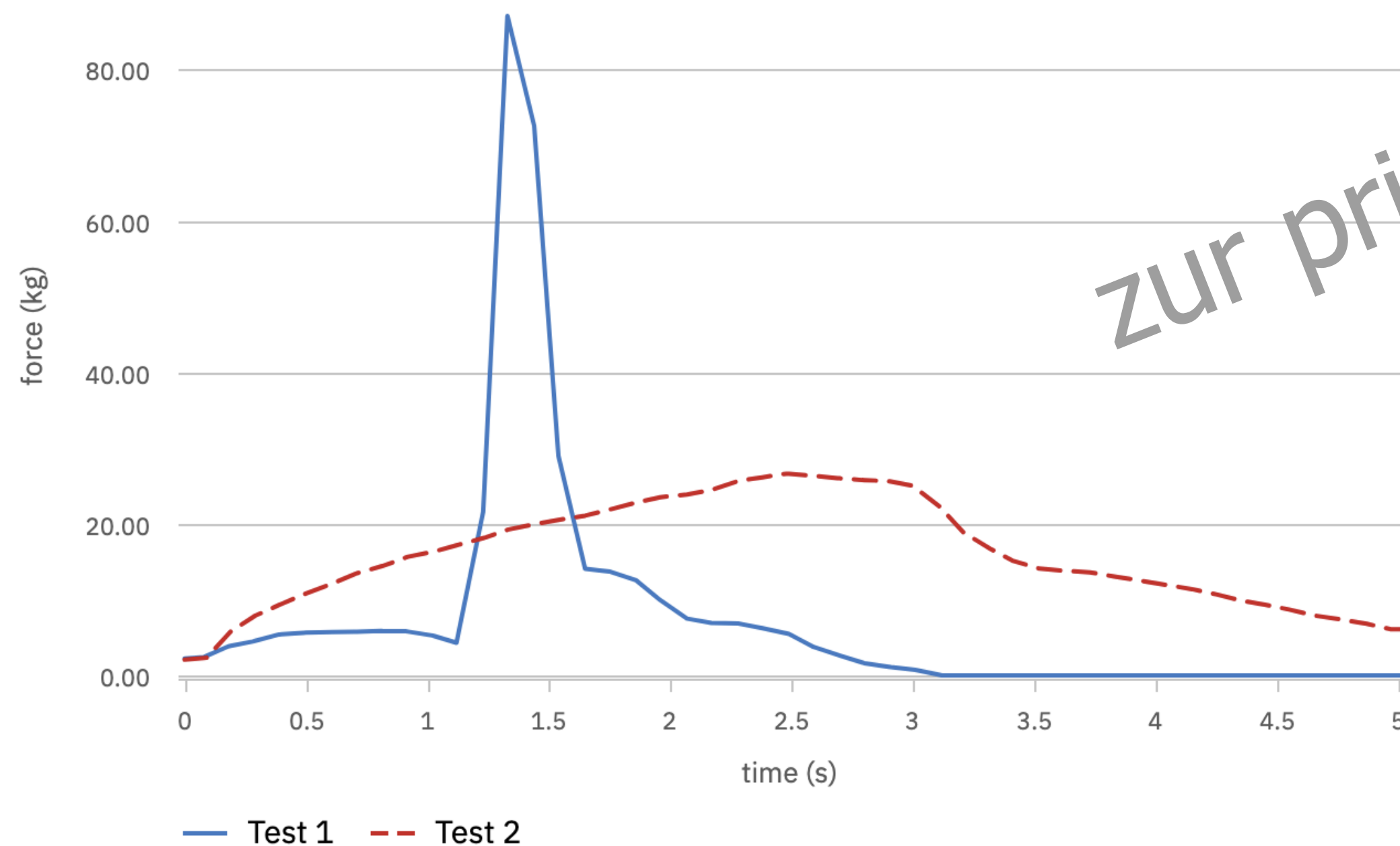
Rio et al:

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HSRT:

Heavy Slow Resistent Training

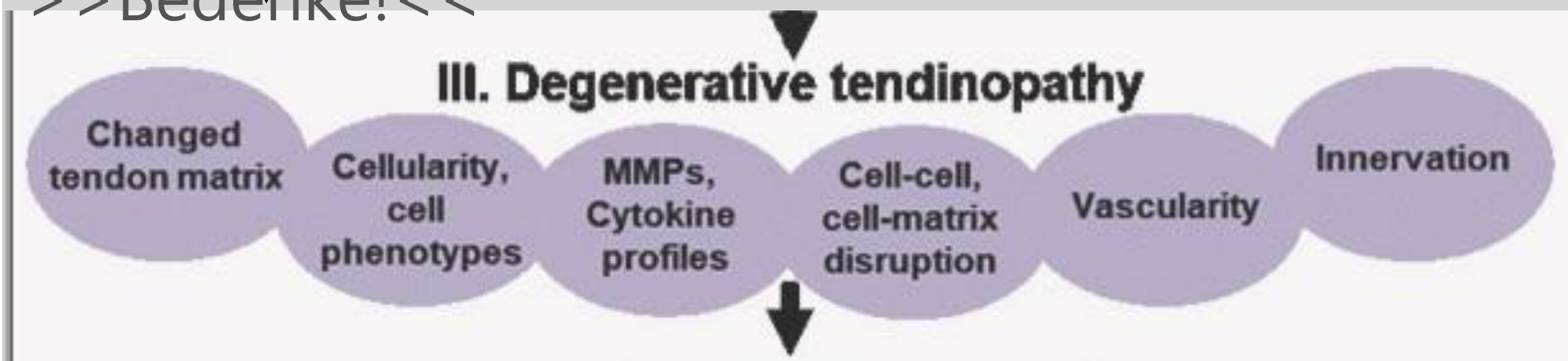
K/A



HSRT:

- lange Time under Tension
- Fokus auf flache, aber lange Kraftkurve
- hohe Kadenz: 4-2-4-2

>> Bedenke! <<



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Contents lists available at [ScienceDirect](#)

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Journal of Science and Medicine in Sport

Journal homepage: www.elsevier.com/locate/jsams

 **JSAMS**
Journal of Science and Medicine in Sport

Original research

Do physical or imaging changes explain the effectiveness of progressive tendon loading exercises? A causal mediation analysis of athletes with patellar tendinopathy

Jie Deng ^{a,b,*}, Jos Runhaar ^c, Stephan J. Breda ^b, Edwin H.G. Oei ^b, Denise Eygendaal ^a, Robert-Jan de Vos ^a

^a Department of Orthopedics and Sports Medicine, Erasmus MC University Medical Center, the Netherlands
^b Department of Radiology and Nuclear Medicine, Erasmus MC University Medical Center, the Netherlands
^c Department of General Practice, Erasmus MC University Medical Center, the Netherlands

> > The beneficial effect of progressive tendon loading on patellar tendinopathy was **NOT** mediated by changes in physical properties, tendon thickness or degree of neovascularisation < <



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EXPERIMENTAL IMMUNOLOGY

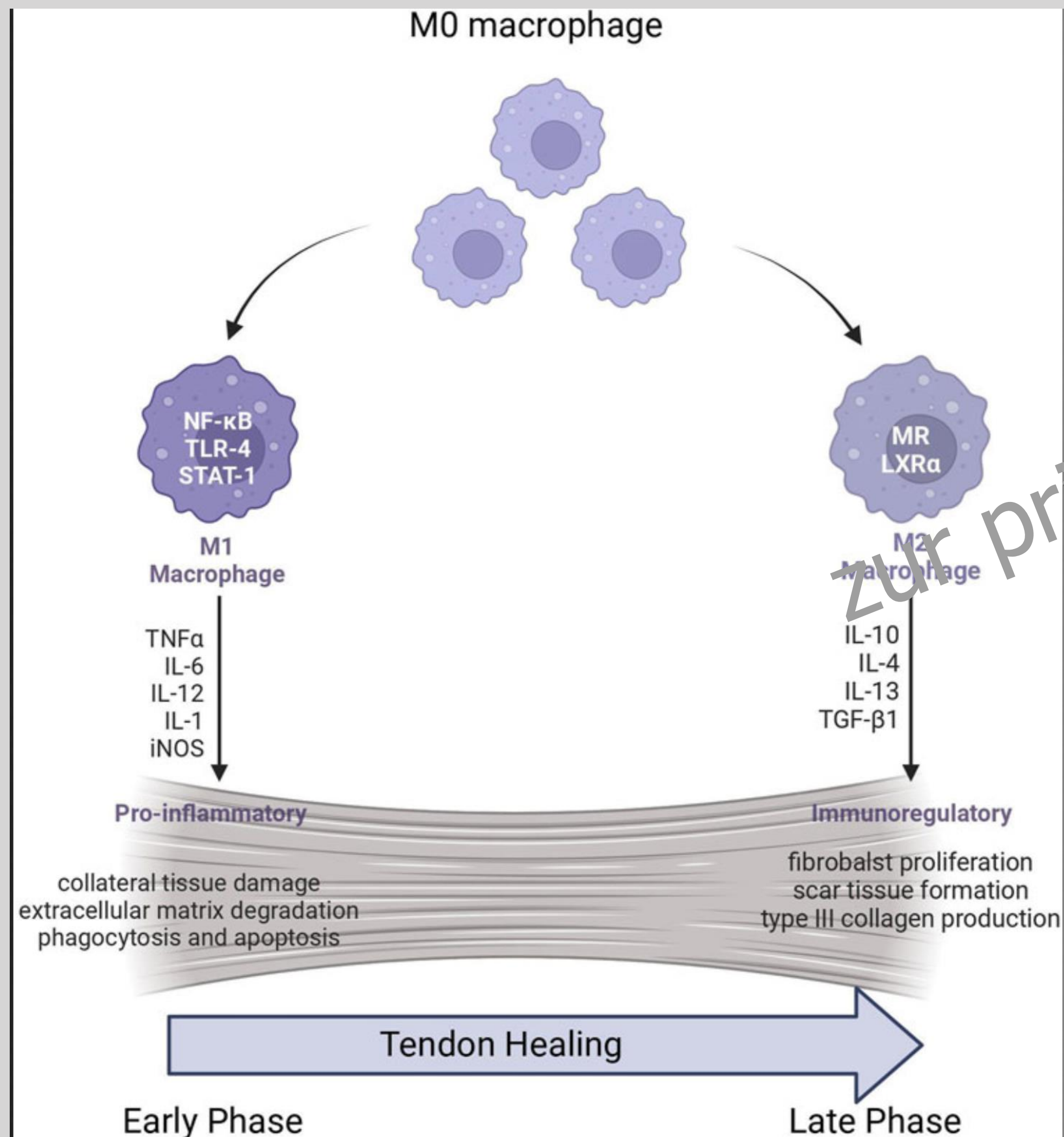
doi: 10.1111/sji.12162

An optimized Protocol for Human M2 Macrophages using M-CSF and IL-4/IL-10/TGF- β Yields a Dominant Immunosuppressive Phenotype

S. Mla*, J. Warnecke*, X.-M. Zhang*, V. Malmström† & R. A. Harris*

>> ABER warum hilft Training trotzdem?!

- Repolarisation durch GA1 Training
- Repolarisation durch Intervalltraining bei Laktatkonzentration > 12mmol



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