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ORTHOPAEDIC  
SURGERY AND  
TRAUMATOLOGY

# De plaats van ESWT in de sporterspopulatie

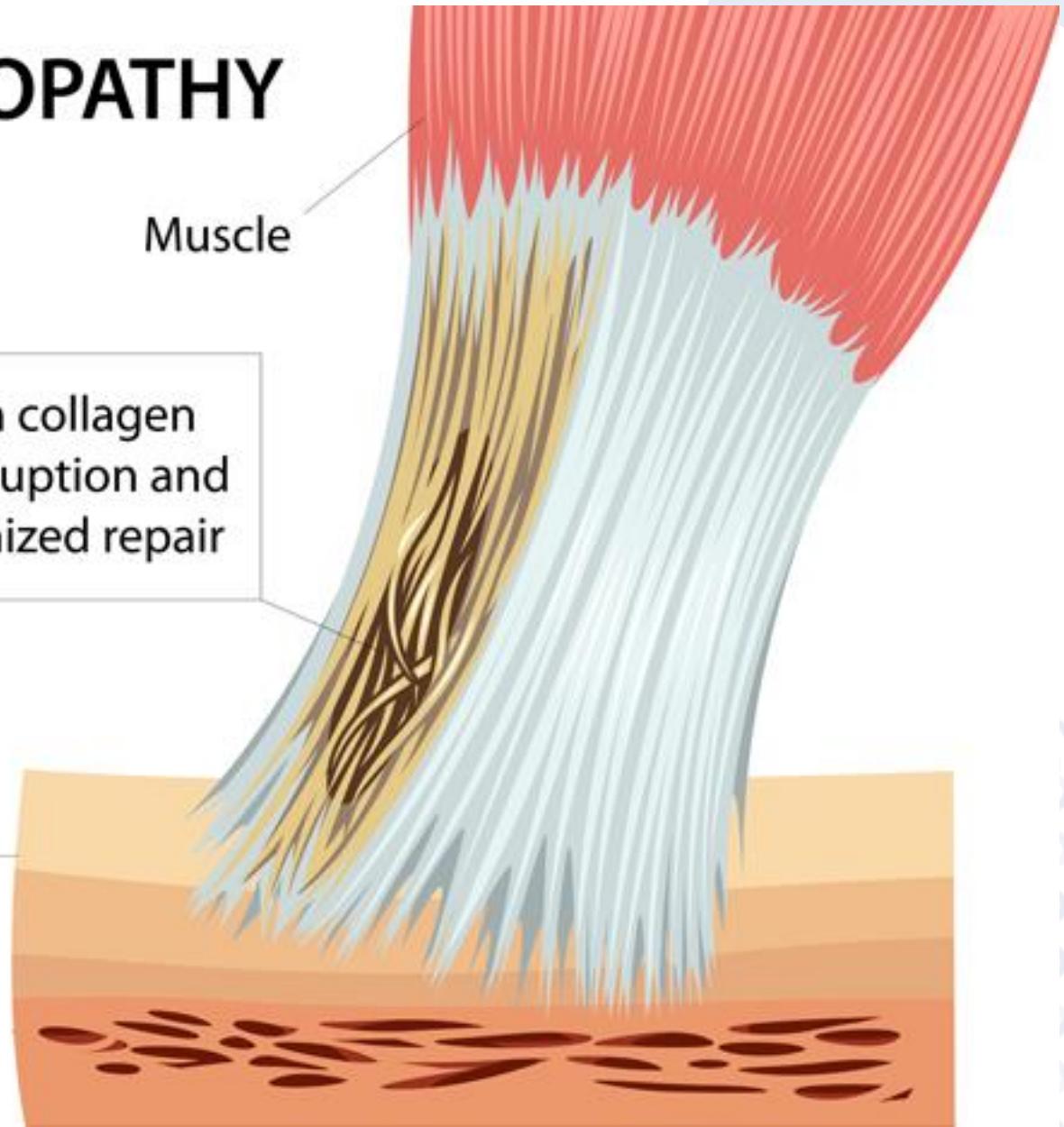
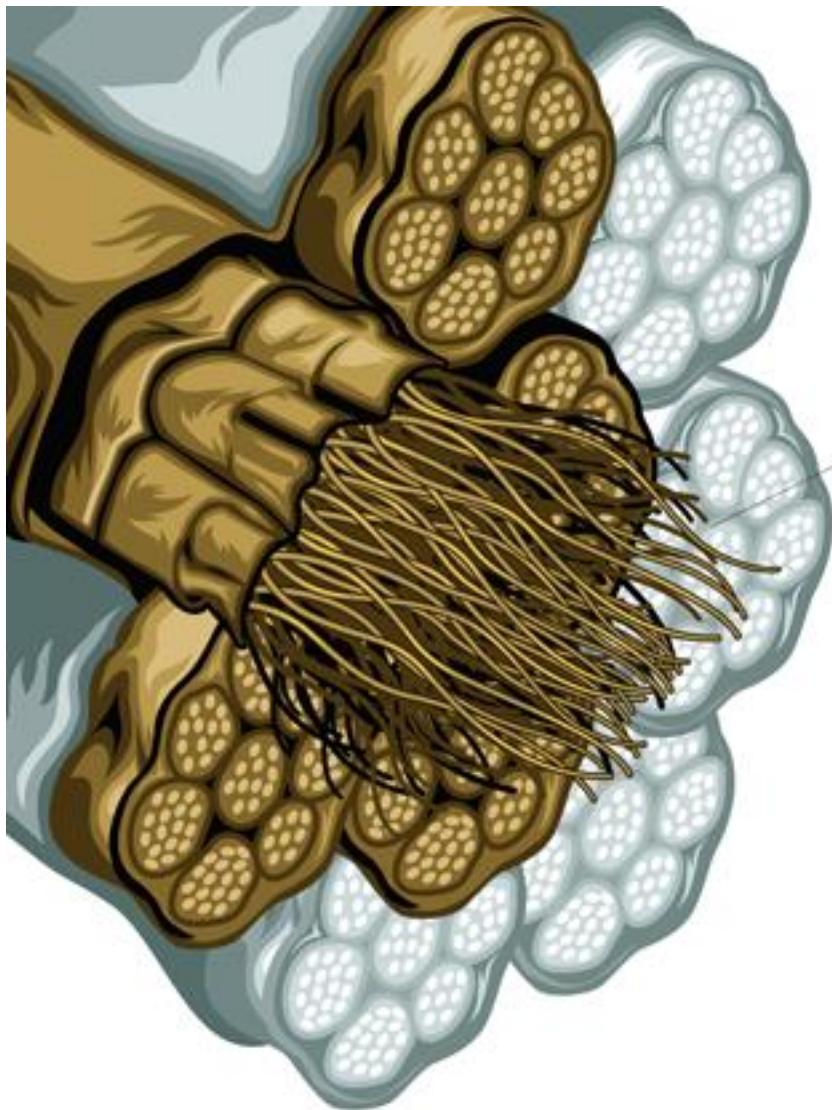
Dr. L. Geukens

# TENDINOPATHY

Muscle

Tendon collagen  
fiber disruption and  
disorganized repair

Bone





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- Achillespees tendinopathie
  - Prevalentie 11% (lopers), 9% (dansers), 2% (tennissers) ...
- Patellapees tendinopathie
  - Volleybal, basketbal, voetbal, tennis, lopers, ...
- Epicondylopathie
  - Lateraal (tennis); mediaal (golf, pitchers)
- Rotator cuff tendinopathie
  - Tennis, volleybal, speerwerpers
- Hamstrings insertietendinopathie
  - Sprinters, hordelopers, voetbal





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## Return to sports

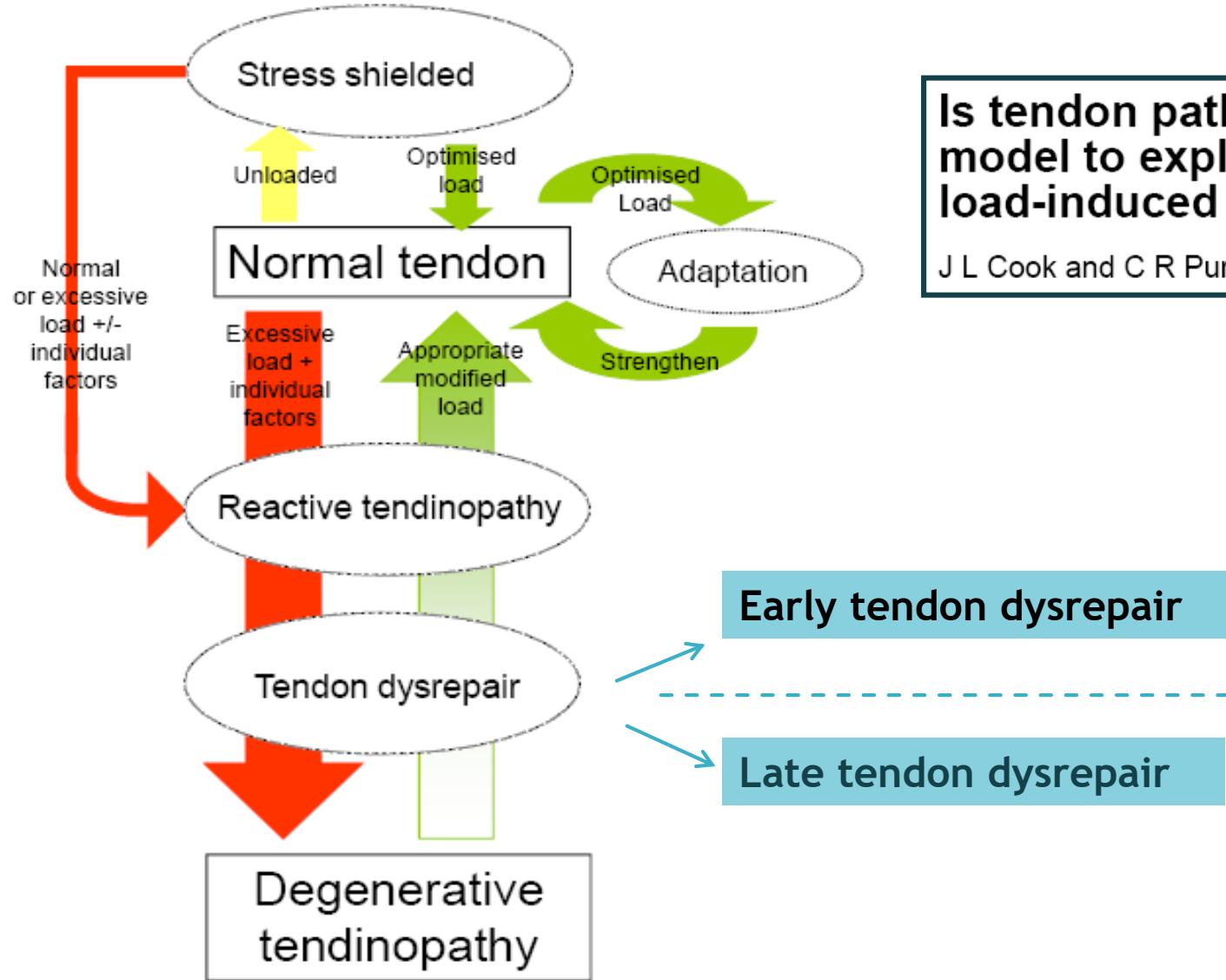
- *original level* 15.8
  - competitive athletes
- *less intensive* 52.6
  - competitive 26.3
  - intensive training 15.8
  - recreational 10.5
- *no return to sports* 10.5
  - intensive training 5.3
  - recreational 5.2
- *other less demanding sport act.* 21

## Residual complaints

- completely pain-free 15.4
- discomfort only with rigorous exercise 34.6
- pain with mild effort 26.9
- unchanged complaints 3.8
- worse 19.3

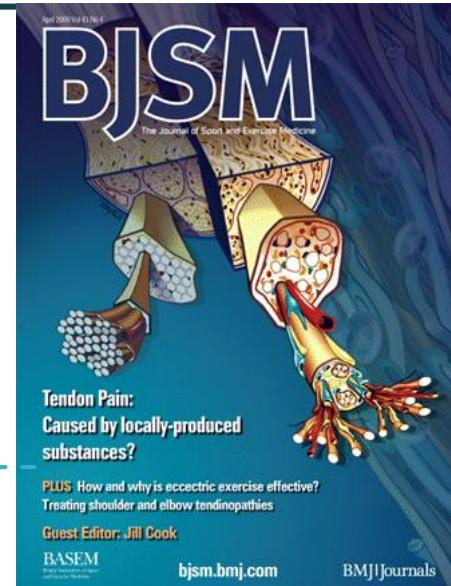


# Tendinosis en tendinopathie (geen tendinitis)



Is tendon pathology a continuum? A pathology model to explain the clinical presentation of load-induced tendinopathy

J L Cook and C R Purdam



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# Eerste behandelingsstappen



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## Symptomatische behandeling

- Relatieve rust, kinesitherapie, cryotherapie, medicatie: anti-inflammatoir/injectie (?)

## Correctie van risicofactoren

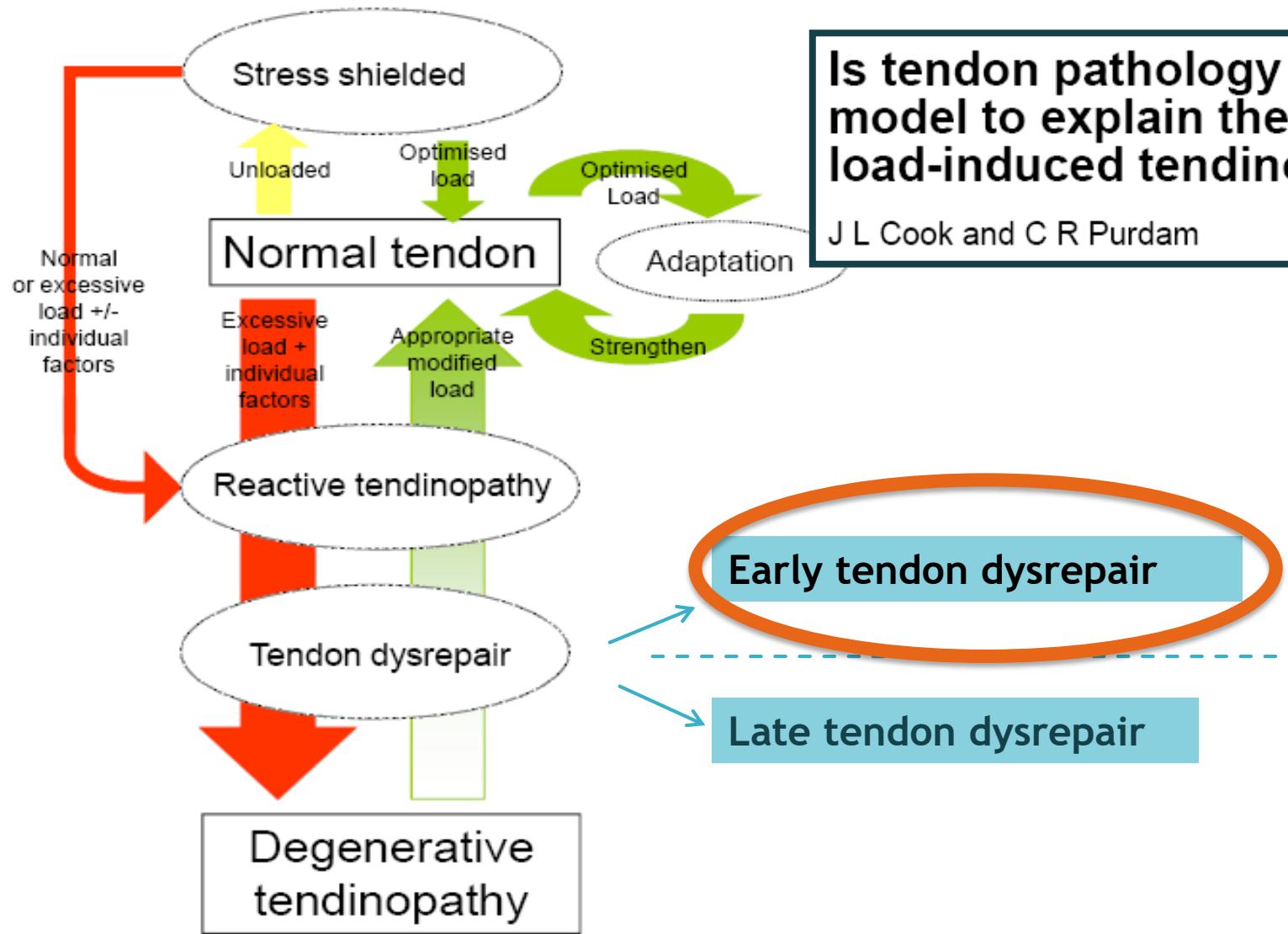
- Intrinsieke risico factoren
- Extrinsieke risico factoren

## Causale therapie

- Eccentrische peestraining



# ESWT



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# Geschiedenis

Corporeal shock wave therapie:

Ontwikkeld eind jaren 70

Toepassing in de urologie begin jaren 80 (nier- en ureterstenen)



Goede resultaten -> gebruik in andere domeinen: (biliaire en pancreasstenen, speekselkliersteentjes, ziekte van La Peyronie

Musculoskeletale toepassingen

1986 eerste musculoskeletaal toestel in Duitsland

Literatuurevidentie sinds begin jaren 90

1999: zachte weefsels





# F-ESWT / R-ESWT



## FOCUSED

100 - 1000 bar

pressure

$\approx 0,2 \mu\text{s}$

pulse duration

focused

pressure field

large

penetration depth

cells

effect

## RADIAL

1 - 10 bar

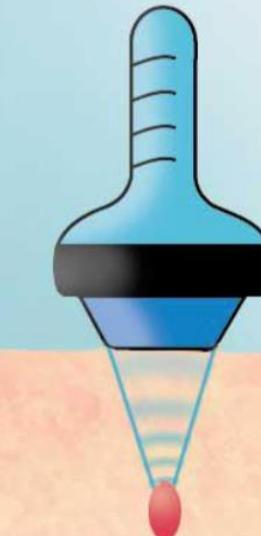
0,2 - 0,5 ms

radial, divergent

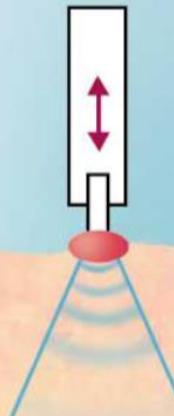
small, superficial

tissue

## F-ESWT



## R-ESWT

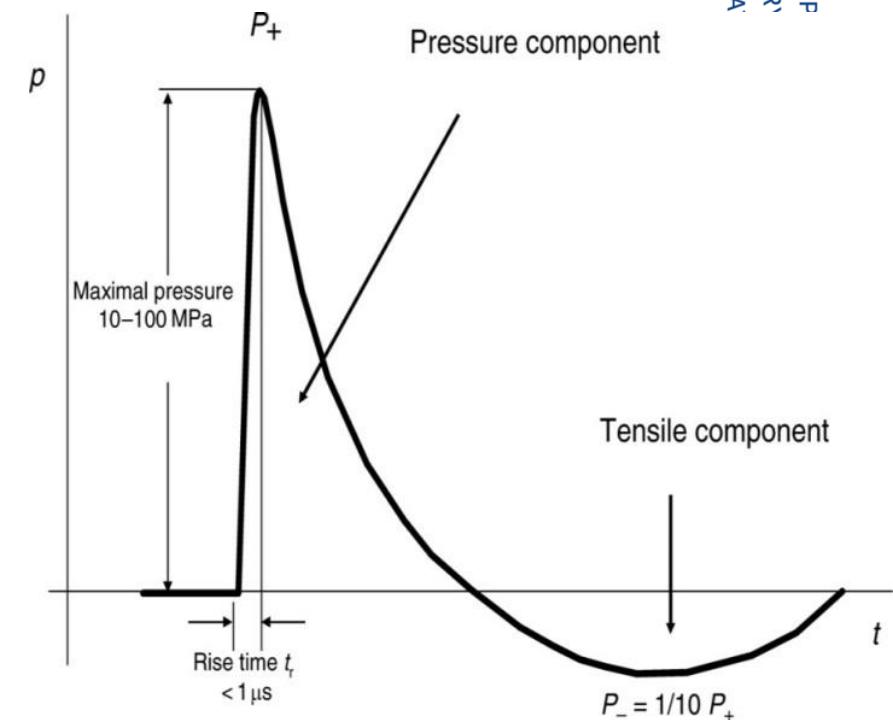
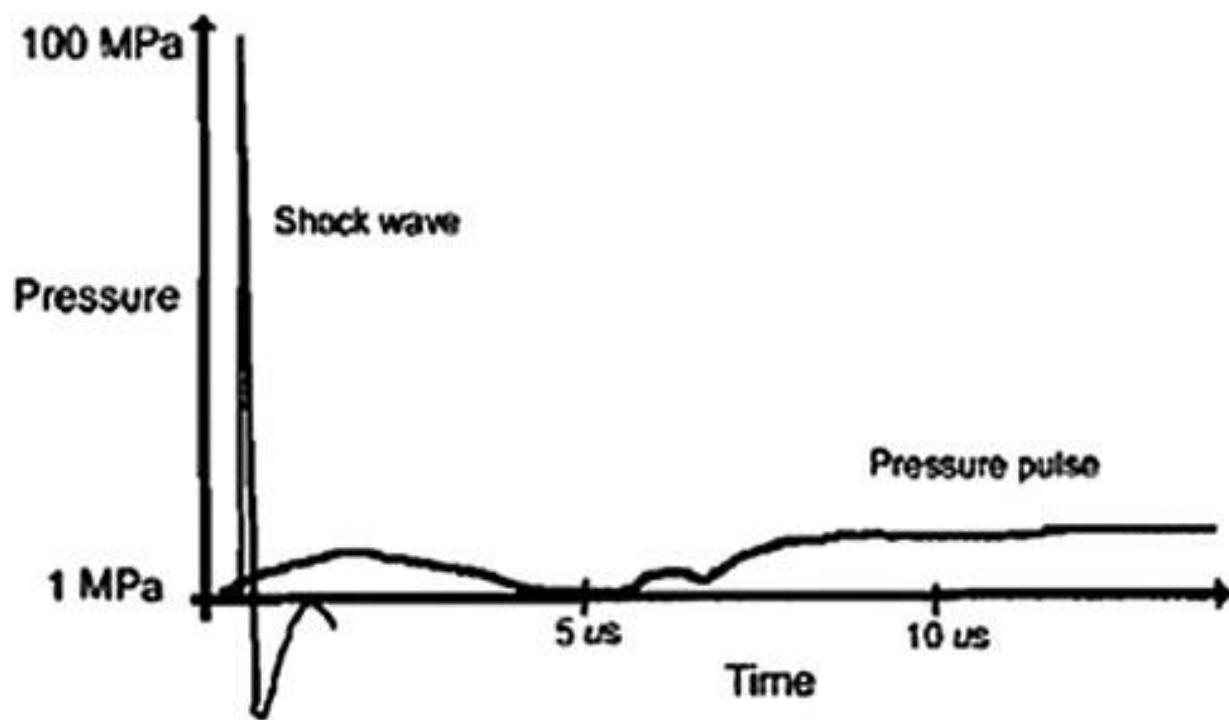


ORT  
SUR  
TRA

# ESWT: Wat

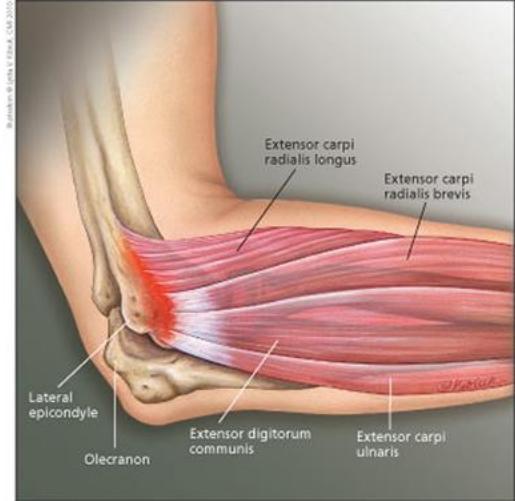


- ▶ Shock wave = sonische / accoustische golf
- ▶ Transfer van energie van punt a naar punt b
- ▶ Geen permanente verplaatsing van partikels, geen massa transport



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# Voornaamste indicaties - musculoskeletaal



- Fasciosis plantaris
- Laterale/Mediale epicondyl tendinopathie
- Achilles/Patella tendinopathieën
- Gluteus medius/minimus tendinopathie
- Calcifiërende cuff tendinopathie



Trigger punt behandelingen

Pseudartrosis



# F-ESWT: Evidentie



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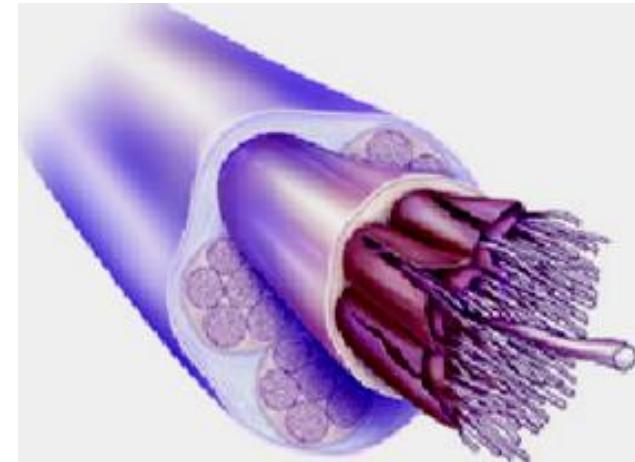
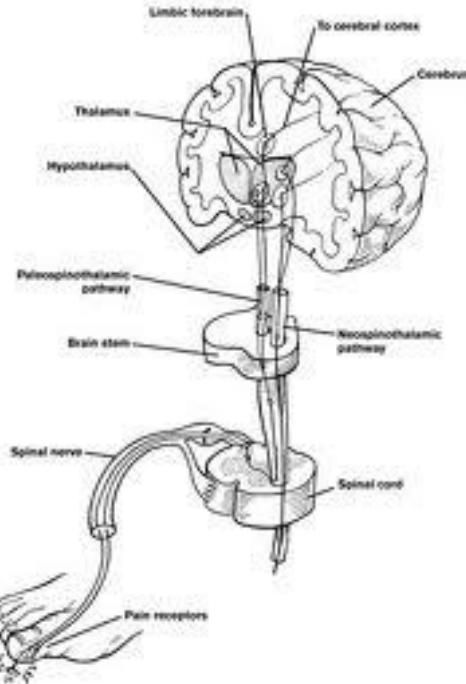
Summary of Efficacy Findings in Published Reports of  
Clinical Studies Related to the Use of ESWT in Orthopaedic Treatment

Author	Treatment (Device)	Dose	Orthopedic Indication	Follow-Up Time	Efficacy Variable
Souza (2002-2009)	ESWT w/Reflectron™ 1 Treatment	3000-4000 (0.15 mJ/mm <sup>2</sup> )	8 Nonunion Fractures	NR	<b>Complete boney union</b> 7/8 (88%) Incomplete union 1/8 (12%)
Schaden (1998-2004)	ESWT w/OssaTron® 80% - 1 Treatment 15% - 2 Treatments 5% - 3 Treatments 1 patient – 4 Treatments	4000-12000 (0.38-0.40 mJ/mm <sup>2</sup> )	172 Nonunion Fractures	4.8 +/- 4.0 months	<b>Complete boney union</b> 138/172 (80.2%) Incomplete union 34/172 (19.8%)
Wang (2001)	ESWT w/OssaTron® 1 Treatment	1000-6000 depending on bone type, (20kV-28kV)	72 Nonunion Fractures	12 months	<b>Excellent/Good</b> 58/72 (80%)
Santos (2001-2007)	ESWT w/Reflectron™ 1 Treatment	1200-1500, 20mm depth (0.14 mJ/mm <sup>2</sup> )	297 Chronic Plantar fascitis (heel pain)	180 days	<b>Excellent/Good</b> 228/297 (76.8%) <b>Acceptable</b> 24/297 (8.1%) No change 45/297 (15.1%) Worsening 0/297 (0%)
Lui (2009)	ESWT w/Reflectron™ 1 Treatment	1000, 5mm depth (0.13 mJ/mm <sup>2</sup> )	16 Chronic Patellar Tendinopathy	180 days	<b>Excellent/Good</b> 12/16 (75%) Poor 4/16 (25%)
Rocket (2002-2007)	ESWT w/Reflectron™ 79% - 1 Treatment 15% - 2 Treatments 6% - 3 Treatments	1000, 5mm depth (0.13 mJ/mm <sup>2</sup> )	156 Chronic Achilles Tendinopathy	180 days	<b>Excellent/Good</b> 108/156 (69.2%) <b>Acceptable</b> 24/156 (15.4%) Poor 24/156 (15.4%)
Cross (1998-2002)	ESWT w/OssaTron®	1500 (18kV)	165 Chronic Lateral Epicondylitis (tennis elbow)	56 days	<b>Excellent/Good/Fair</b> 149/165 90% Poor 16/165 (10%)
Santos (2002-2004)	ESWT w/Reflectron™ 94% - 1 Treatment 6% - 2 Treatments	1200, 35mm depth (0.14 mJ/mm <sup>2</sup> )	32 Hip Bursitis	180	<b>Excellent/Good</b> 28/32 (87.5%) <b>Acceptable</b> 4/32 (12.5%) Poor 4/32 (12.5%)
Wang (2008)	ESWT w/OssaTron® 1 Treatment	6000 (0.62 mJ/mm <sup>2</sup> )	30 Avascular Necrosis (Hip)		<b>Improved</b> <b>Unchanged</b> Worsened/hip replacement 25/30 (83%) 2/30 (7%) 3/30 (10%)

# ESWT: Effecten

*Korte termijn: pijnstillend*

1. Vrijzetting van verschillende endorfines
2. Toename membraanpermeabiliteit neuronen
3. Inhibitie pijnimpulsen (gate controle theory) door hoogfrequente pulsen op de pijnreceptoren

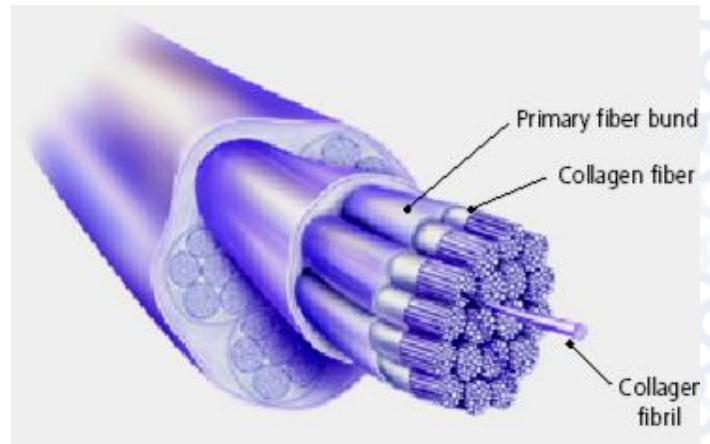
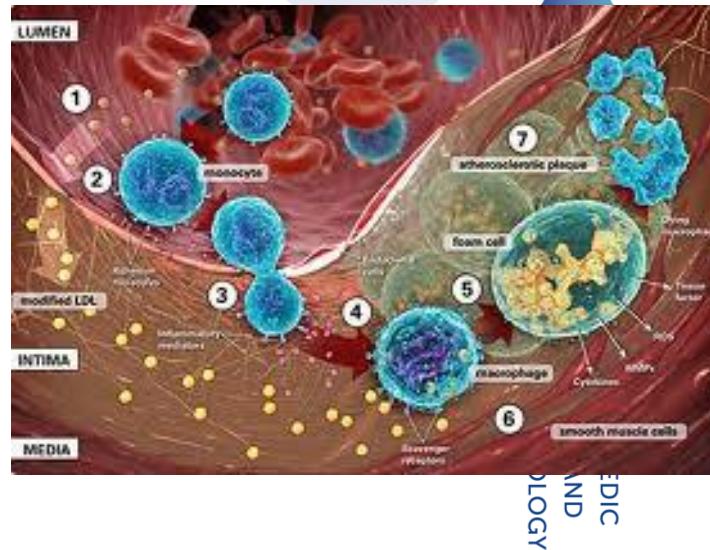


# ESWT: Effecten

*Lange termijn: regeneratief*

1. Toename inflammatoir geregelde processen  
(hyperaemia - VEGF)
2. Inductie van specifieke groeifactoren  
(eNOS)

*Associatie van kinesitherapie voor synergisch effect  
Cumulatief bij repetitieve R/*



# Advers effects

Tissue damage

Damage of the vessel wall (capillaries and veins)

Haemorrhages and haematomas (often!)

Cutaneous erosions, reddening of the skin

Nerve lesions

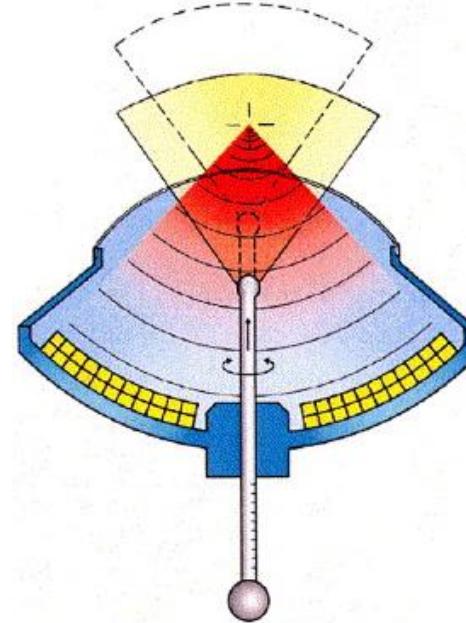
Bone oedema

Osteonecrosis of humeral head

Alveolar injuries, hepatic necrosis

Unpleasant feeling, pain

...?



# ESWT in het ZOL

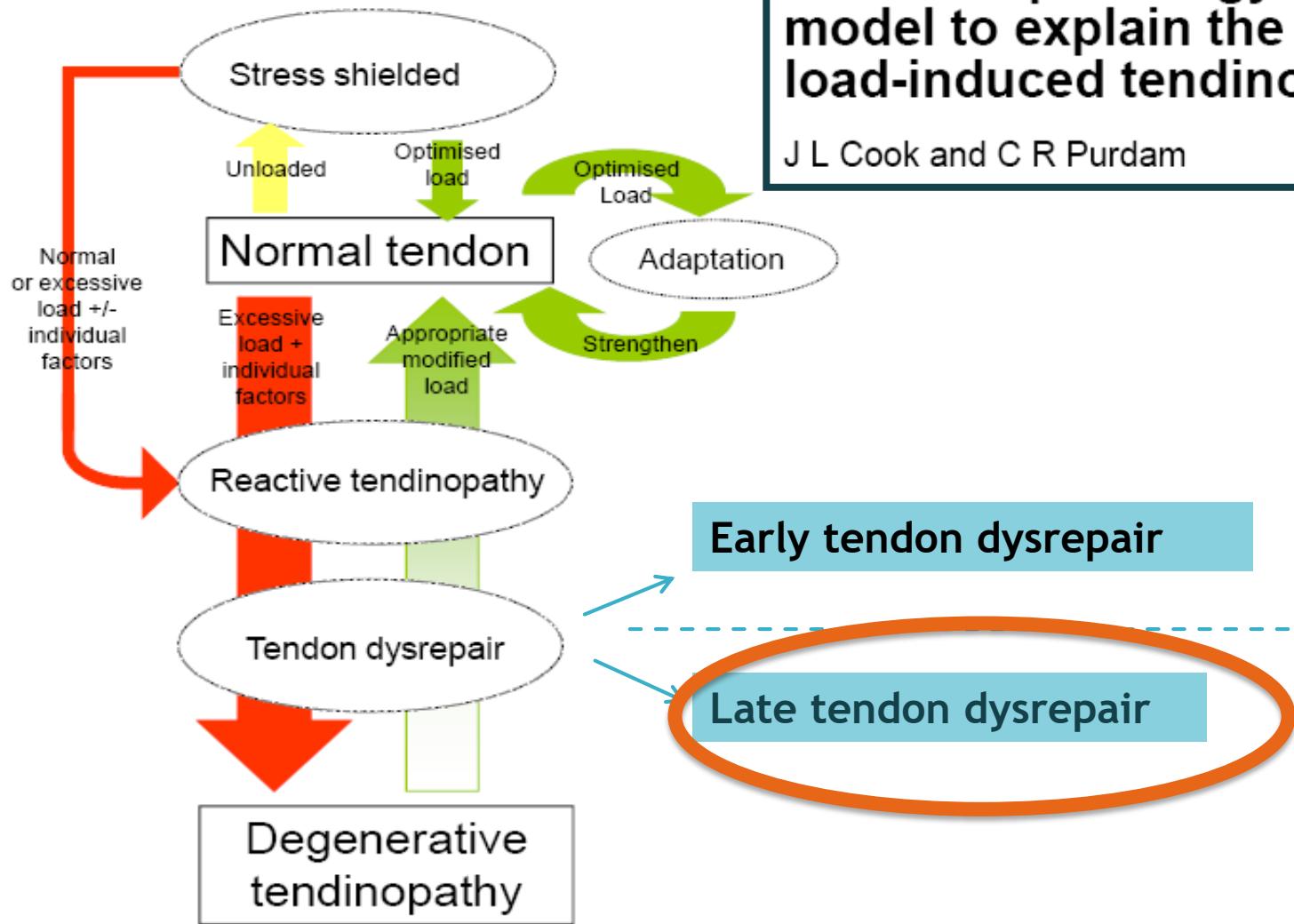
Steeds in combinatie met oefentherapie!

- b. Echogeleide positionering
- c. 1 sessie = 2000 schokjes (10min)
- d. 3 sessies, 1-2 week interval
- e. Geen nazorg
- f. Controleraadpleging 6 weken na laatste sessie
- g. Succesratio: 60-75%
- h. Tweede reeks nuttig indien gedeeltelijk effect van eerste reeks

*Richtlijnen van de European Society for Musculoskeletal Shockwave Therapy*

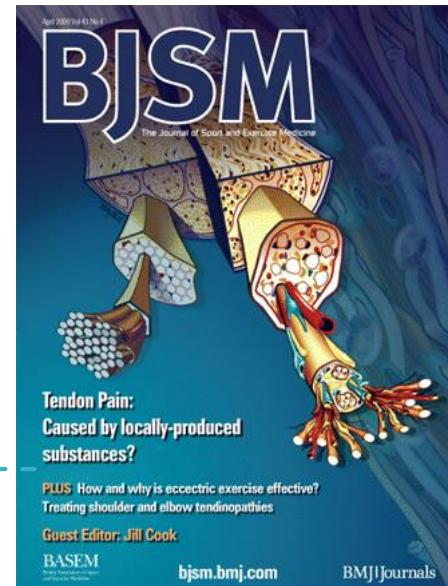
*Belangrijk om te weten dat geen enkel EBM protocol bestaat!*

# PRP



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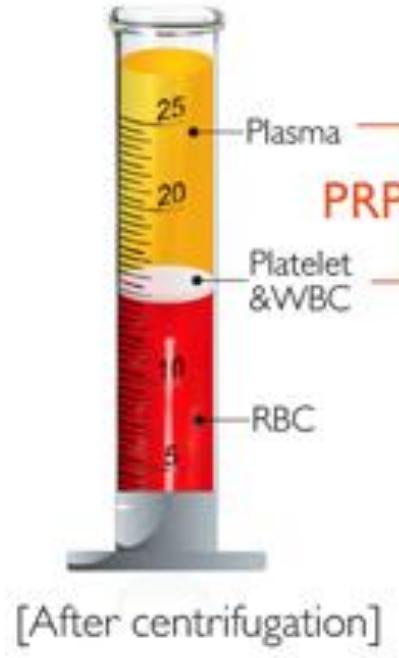


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# ACP (Autologous Conditioned Plasma) - PRP

- Groeifactor injecties - platelet rich plasma injecties
  - Injectie van bloed/plasma
    - Toevoer van groeifactoren voor peesherstel
      - PDGF, TGF $\beta$ , EDGF, ...
    - Gemakkelijk en veilig in gebruik
    - Toenemend gebruik in de sportgeneeskunde (tendinopathieën en kraakbeenlijden)
    - Evidentie?



# ACP (Autologous Conditioned Plasma) - PRP

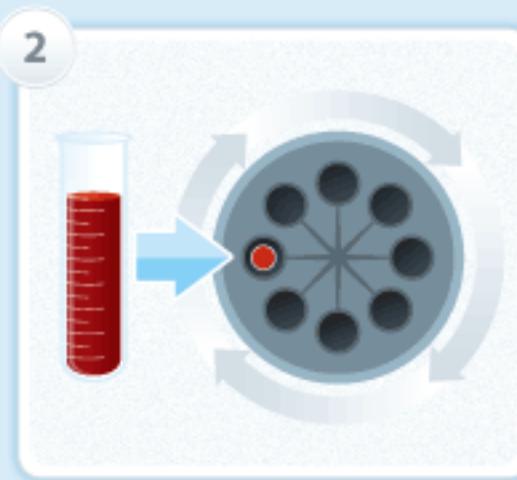


## PROCESS OF PRP THERAPY



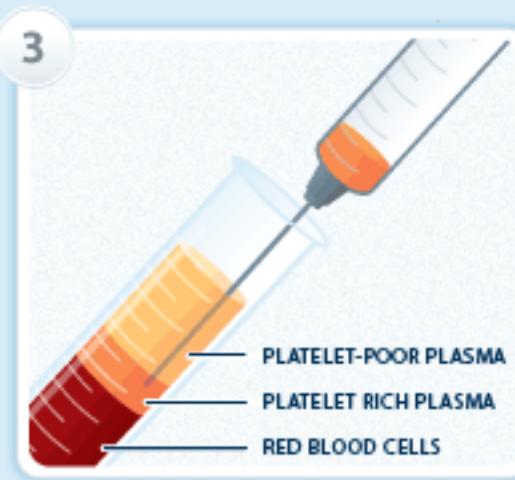
### Collect blood

30-60ml of blood is drawn from the patient's arm.



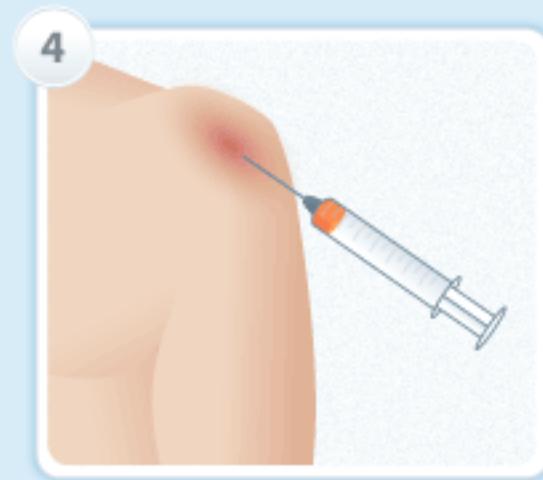
### Separate the platelets

The blood is then placed in a centrifuge. The centrifuge spins and separates the platelets from the rest of the blood components.



### Extract platelet-rich plasma

Extract 3-6ml of platelet-rich plasma.



### Inject injured area with PRP

Using the concentrated platelets, we increase the growth factors up to eight times, which promotes temporary relief and stops inflammation.

# Bedankt voor jullie aandacht

