Identification of shoulder complaints in clinical practice

Michael J. Davidson

Who am I?

Michael Davidson

OMT, PT and Acupuncturist

“Restoring function is my profession!”

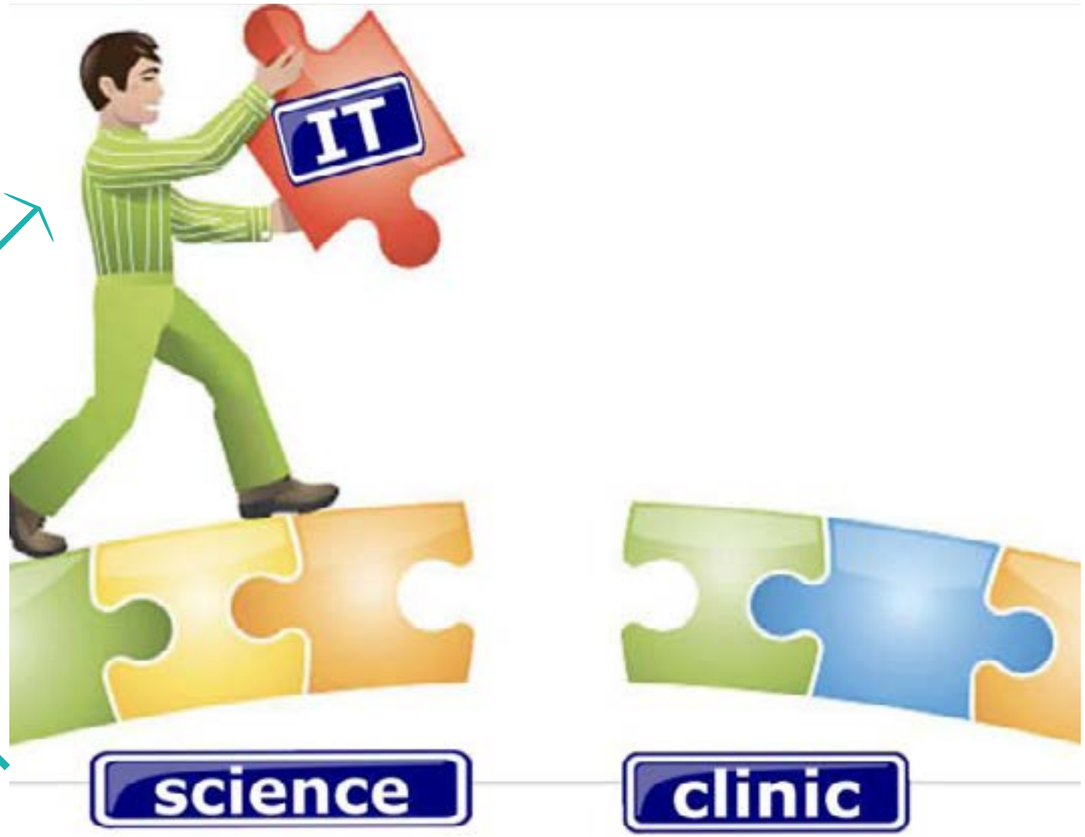
MiLé Fysiotherapie

“To prevent surgery in case of a functional problem.”

“What and why is the link between symptom provoking and symptom reducing tests/complaints - in other words - between structure and function testing.”

Bridging the gap?

Dogmas?



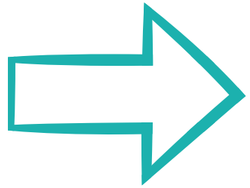
Quack?

History of scientific tests

Inter-rater reliability (1990): Can I repeat a test in time?

Diagnostic accuracy (2000): What is the diagnostic value?

Clustered tests (2010 - 2021): What are the best test combinations?



“Put into each other’s perspective” - Ann Cools.

“An academic is a person who knows
a thousand ways of making love...
but never had a girlfriend.”

- Patient of Michael Davidson, 2018.

Shoulder examination in physical therapy

James Cyriax
1980

Philip Greenman
1990

Needs for OMT
2000

Ann Cools
2010

PHYSIODOC

Physiodoc
2017 - till now

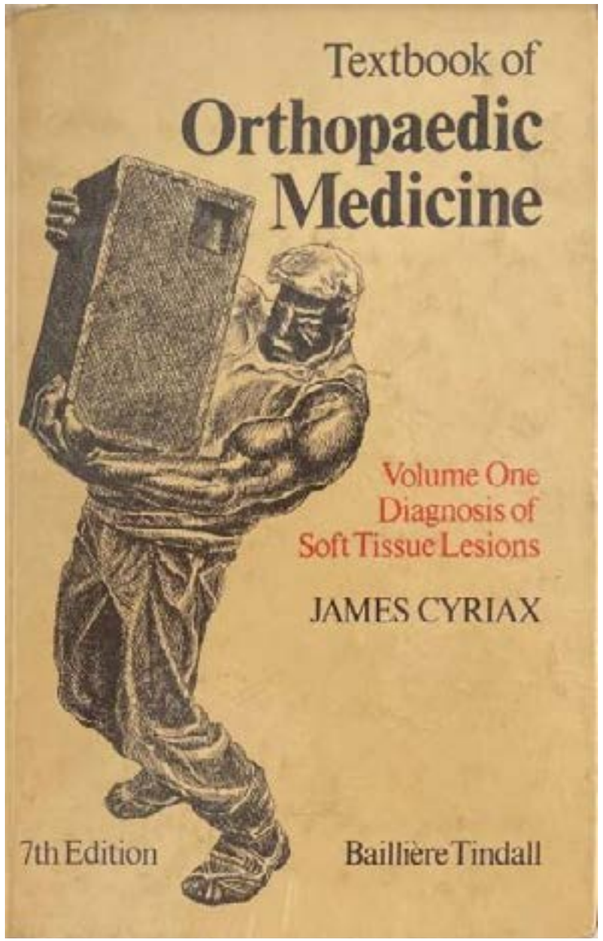
Classification of shouldertests

- Testing joint **mobility**
- Symptom **provocative** testing
- Symptom **reducing** tests
- Tissue **flexibility** testing
- Tissue **failure** test
- **Pain** cluster
- **Weakness** cluster
- Cluster **instability**

“It’s old wine in new bottles.”

Cyriax 13 testen

Cyriax (1978)

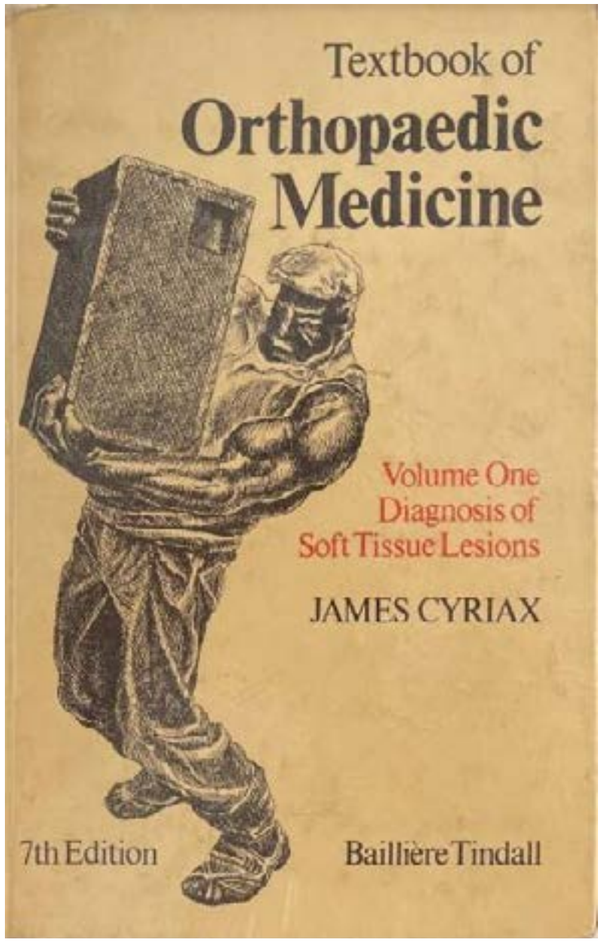


The two pillars of his system are:

A good understanding of the phenomenon “referred pain”

Examination by selective tissue tension

Cyriax (1978)



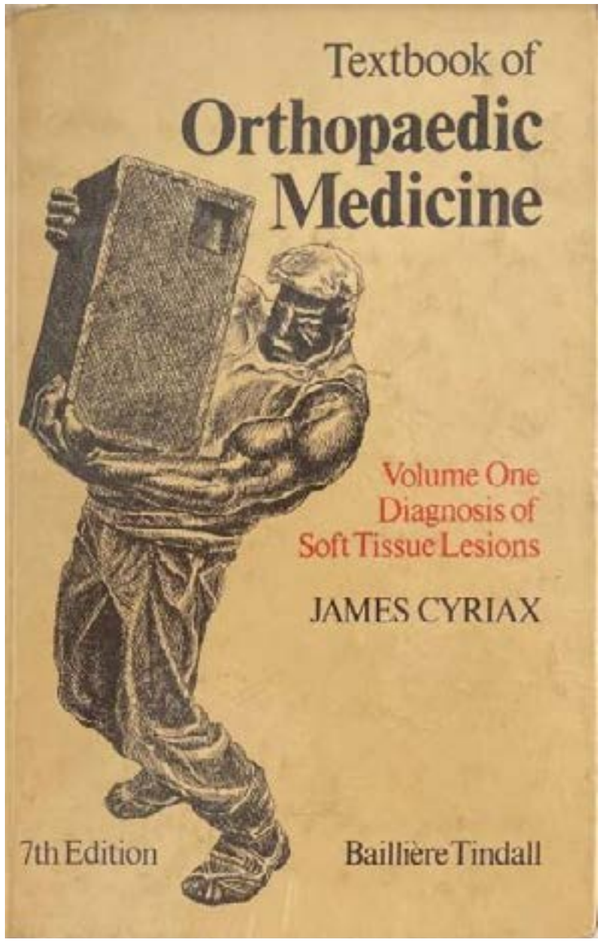
Three principles for examination:

Isometric contradictions test the function of the contractile tissues.

Passive movements test the function of the inert structures

Capsular patterns differentiate between joint conditions and other inert structure lesions

Cyriax (1978)

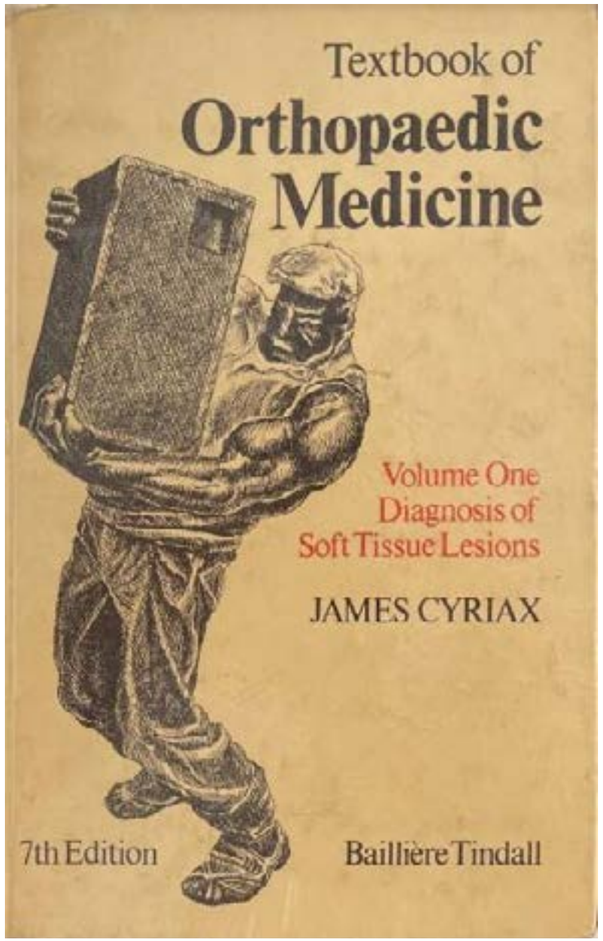


End feel: Stiff elastic vs goniometry

Normal...
Hard bony (ligamentous inhibition)
Elastic
Soft

Pathologic...
Empty
Boggy

Cyriax (1978)



In my opinion...

The best!

Arthron distinguished from soft tissue

Algorithm of soft tissue tests with symptom reduction tests.

1990 - 2022

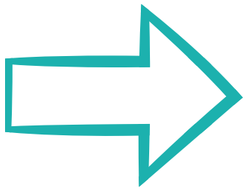
OMT

Biomechanical chain
Local
Segmental

ART

Asymmetry
Range of motion
TTA

1990 - 2022



*"**Treat the joint first** and examine the proximal bone -scapula- first! Including the entire shoulder girdle and adjacent joints."*

physioplux

1990 - 2022

OMT

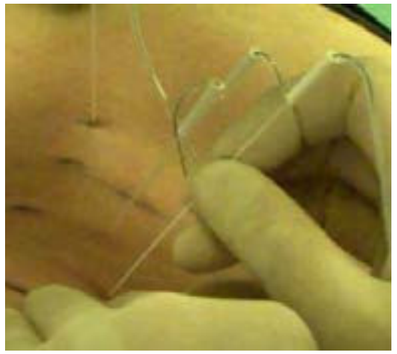
Biomechanical

Local

Segmental

Treatable quantities

“Green flags”



Scott Prins

1990 - 2022

Questionnaires
for patients

VS

Local segmental examination
provoking or sedating pain

Treat the joint first!

36.153 Physical therapists whose **9%** with specialization manual therapist.

A step to the future: Ann Cools

Ann Cools
Prof. dr.

Translates **science to clinic** while retaining her scientific background.

Low diagnostic value of orthopedic tests? **Prioritize function over structure.**

Symptom reduction testing vs provocation testing.

“Old tests” with **modern interpretation.**

Hypotheticodeductive approach

Pain can be of **biochemical** or **psychological** origin

Casuality and/or correlation?

Casuality and/or correlation?

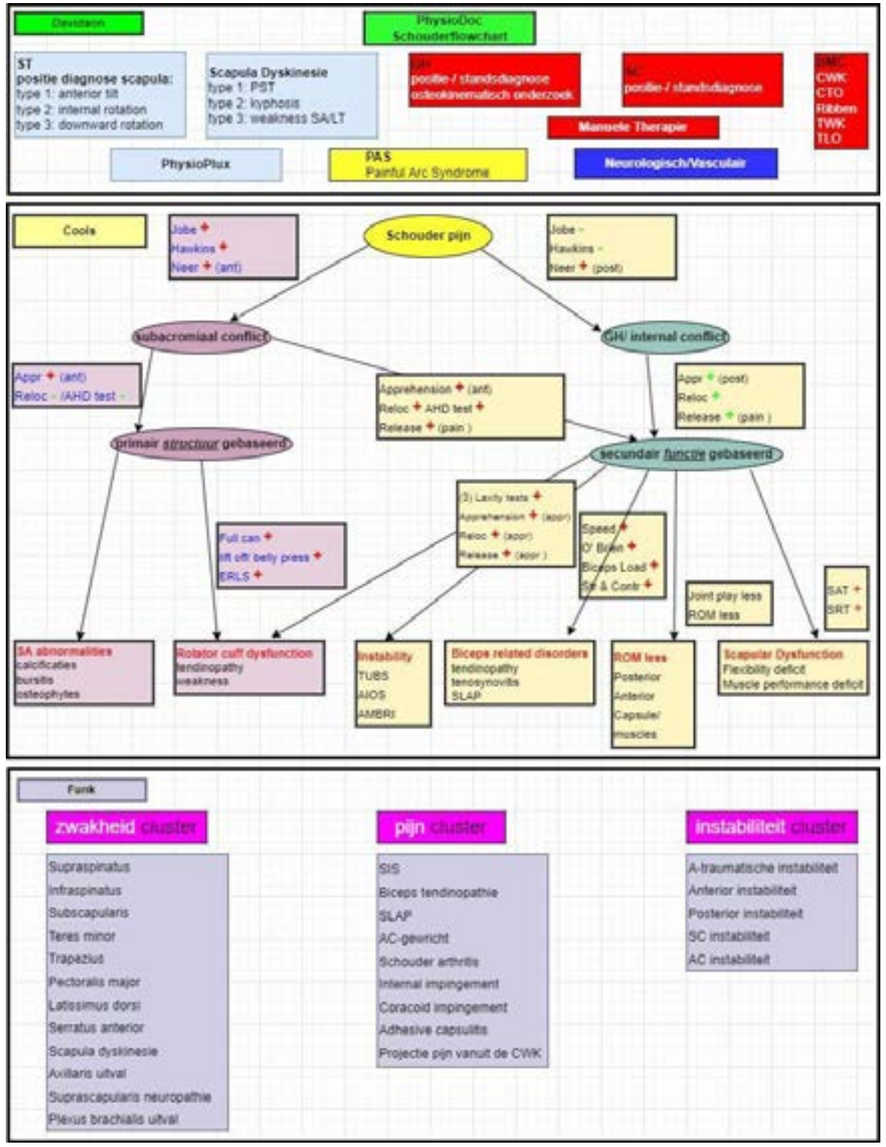
What is the primary source and **why**?

Is the anatomy **damaged** and/or **degenerated?**

Diagnosing and **restoring** function is my **profession**

Casuality and/or correlation?

Hypotheticodeductive approach



Uniformity execution and interpretation in shoulder examination and anamnesis

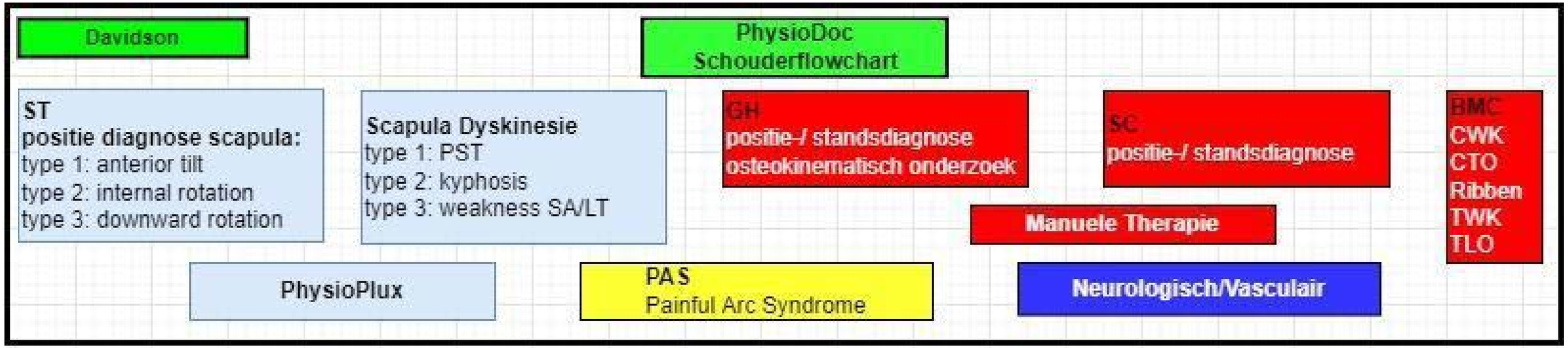
National and international cohort that will provide **prospective values**

Before administering the shoulder tests, a science based **digital history** must be performed.

And now **my clinical approach** to the shoulder examination

Flowchart Physiodoc

Flowchart Physiodoc



Voorvragen

	vraag	type vraag
	zoals de patient hem krijgt	
1	Wat is uw leeftijd?	numeriek
2	Kunt u aangeven waar uw klacht zich bevindt?	Multiselect
3	Hoe zou u de klacht omschijven?	Multiselect
4	Wanneer heeft u last van uw klacht?	Multiselect
5	Bent u beperkt in uw beweging?	Multiple choice
6	Hoe is uw klacht ontstaan?	Multiple choice
7	Wanneer is uw klacht onstaan?	Multiple choice

Antwoorden voorvragen

antwoorden zoals patient ze ziet							
I	II	III	IV	V	VI	VII	VIII
Voorzijde (+plaatje)	Achterzijde (+plaatje)	Buitenzijde (+plaatje)	Bovenzijde (+plaatje)	Nek (+plaatje)	Uitstraling naar arm (+plaatje)		
Ik heb pijn	Het voelt stijf	Ik heb een doof gevoel	Ik voel tintelingen	Ik heb minder of geen gevoel	Mijn schouder is/was uit de kom	Er is iets niet goed in mijn schouder/ mijn schouders zijn asymmetrisch	Ik kan niet of moeilijk bewegen
Continue	Alleen als ik een specifieke beweging maak	Ik hoor een klikkend of poppend geluid	Ik hoor/voel een schurend of schavend geluid/gevoel	Ik heb nu geen klachten ik kom voor iets wat eerder is gebeurt			
Ja, ik kan geen volledige bewegingen maken	Ja, het doet pijn maar ik kan wel bewegen	Ja, een zwelling in mijn arm beperkt mij	Ja, alleen/met name in de ochtend	Nee			
Ik ben gevallen	Door een ongeluk op snelheid (bv. botsing met fiets of auto)	Een verdraaiing of verzwikking	Tijdens het sporten (overig)	Het is al lang geleden ontstaan	Op een andere manier	Ik weet het niet	
Het is een nieuw klacht die onlangs is ontstaan	Ik heb opnieuw last van deze klacht en ik heb dit ook eerder gehad	Ik heb al langer last van deze klacht					

Diagnosevragen

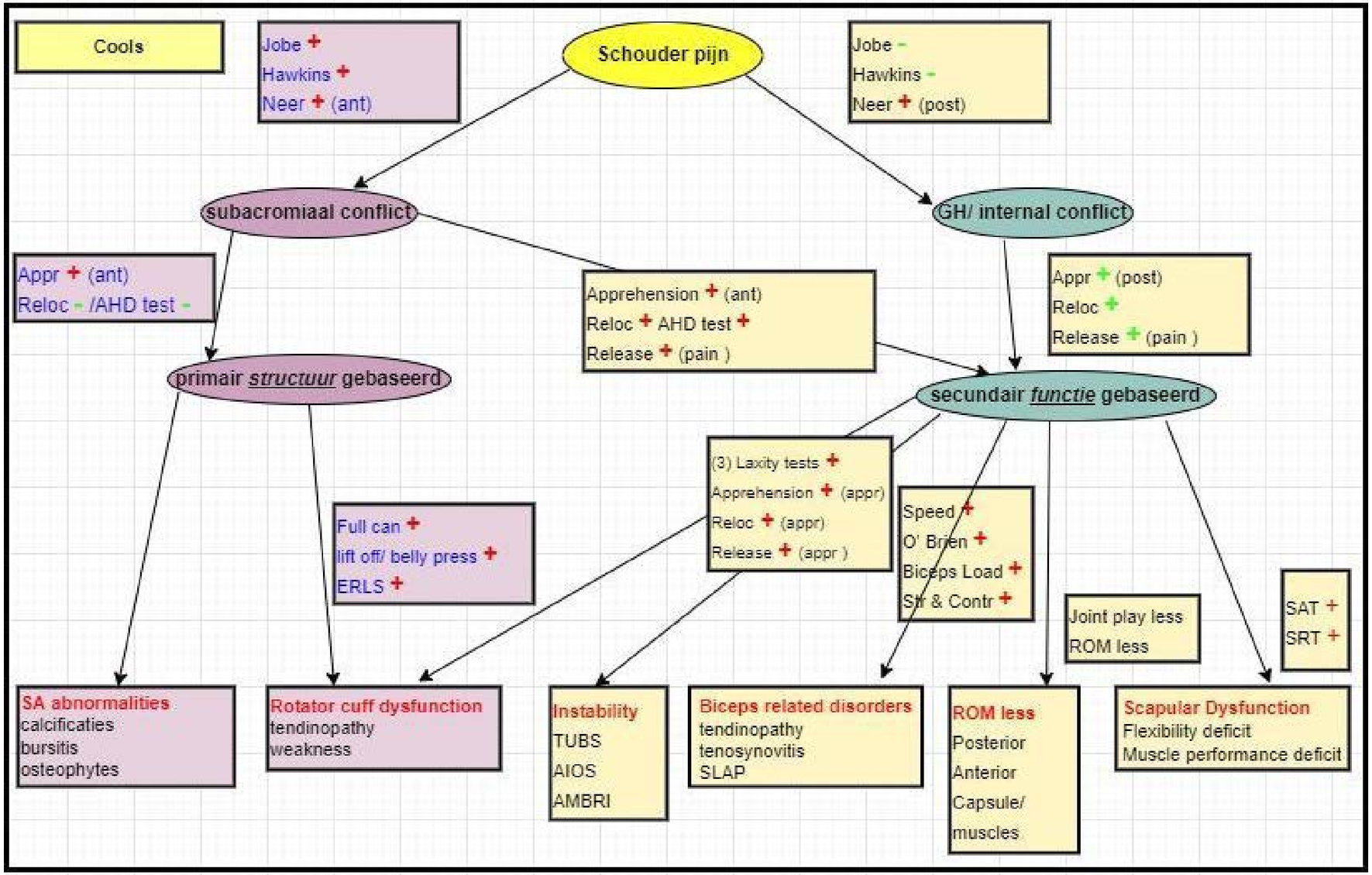
Titel	Koppelvraag	Vraag
Nachtpijn		Wordt u wakker van de pijn?
Nachtpijn		Beïvloed de pijn uw nachtrust nadelig?
Gewrichtsstijfheid in de ochten		Heeft u alst van stijfheid van de schouder in de ochtend?
Gewrichtsstijfheid in de ochten	Indien 12 Ja	Verbeterd dit in de loop van de ochtend?
Gewrichts klachten bij inspanning		Neem de pijn toe bij bewegen?
Gewrichts klachten in rust		Heeft u klachten in rust?
Koorts		Heeft u koorts?
Koorts	Indien 16 Ja	Hoe hoog is uw koorts gemeten?
Warm gewricht		Zijn er tekenen van ontsteking?
Warm gewricht	Indien 18 Ja	Zijn er tekenen van ernstige ontsteking?
Uitstralende pijn in dermatomeer patroon		Is er uitstralende pijn in het dermatomeer patroon?
Uitstralende pijn in dermatomeer patroon		Welke dermatoom?
Parasthesieën		Is er een tintelend of prikkend gevoel (zoals een slapend been)?
Verergering klachten bij drukverhoging plexus		Leidt een specifieke beweging tot verhoging van de pijn?
Passieve bewegingsbeperking		Kunt u de schouder nog volledig bewegen? (al dan niet passief)
Spierzwakte		Heeft u duidelijk minder kracht in de arm?

Flowchart Ann Cools

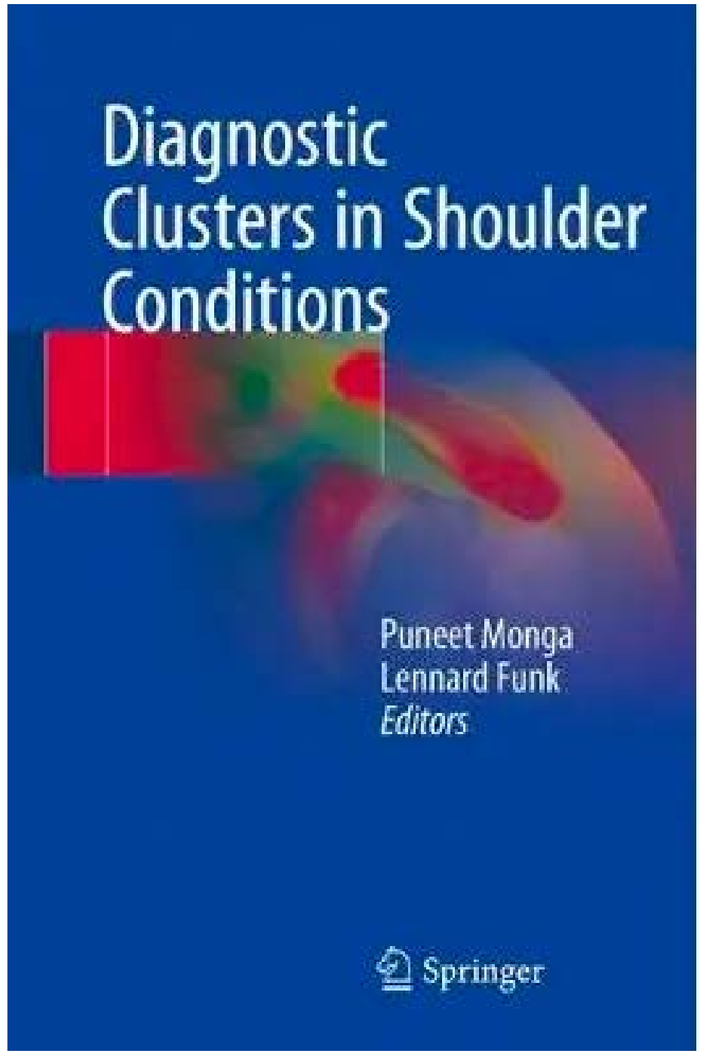
Ann Cools

Prof. dr.

Flowchart Ann Cools



Diagnostic clusters



Diagnostic clusters

Funk

zwakheid cluster

- Supraspinatus
- Infraspinatus
- Subscapularis
- Teres minor
- Trapezius
- Pectoralis major
- Latissimus dorsi
- Serratus anterior
- Scapula dyskinesie
- Axillaris uitval
- Suprascapularis neuropathie
- Plexus brachialis uitval

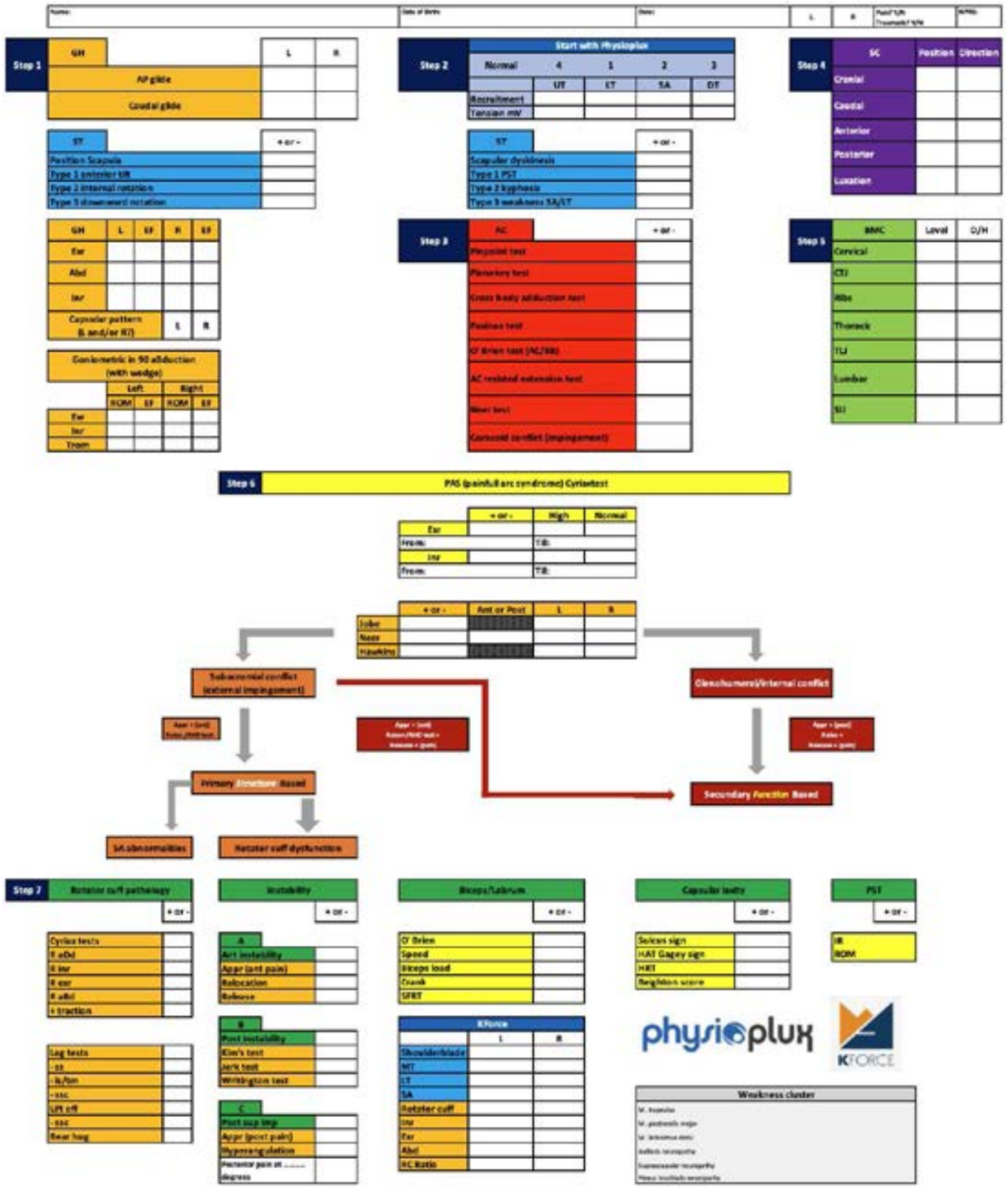
pijn cluster

- SIS
- Biceps tendinopathie
- SLAP
- AC-gewricht
- Schouder arthritis
- Internal impingement
- Coracoid impingement
- Adhesive capsulitis
- Projectie pijn vanuit de CWK

instabiliteit cluster

- A-traumatische instabiliteit
- Anterior instabiliteit
- Posterior instabiliteit
- SC instabiliteit
- AC instabiliteit

Shoulder flowchart



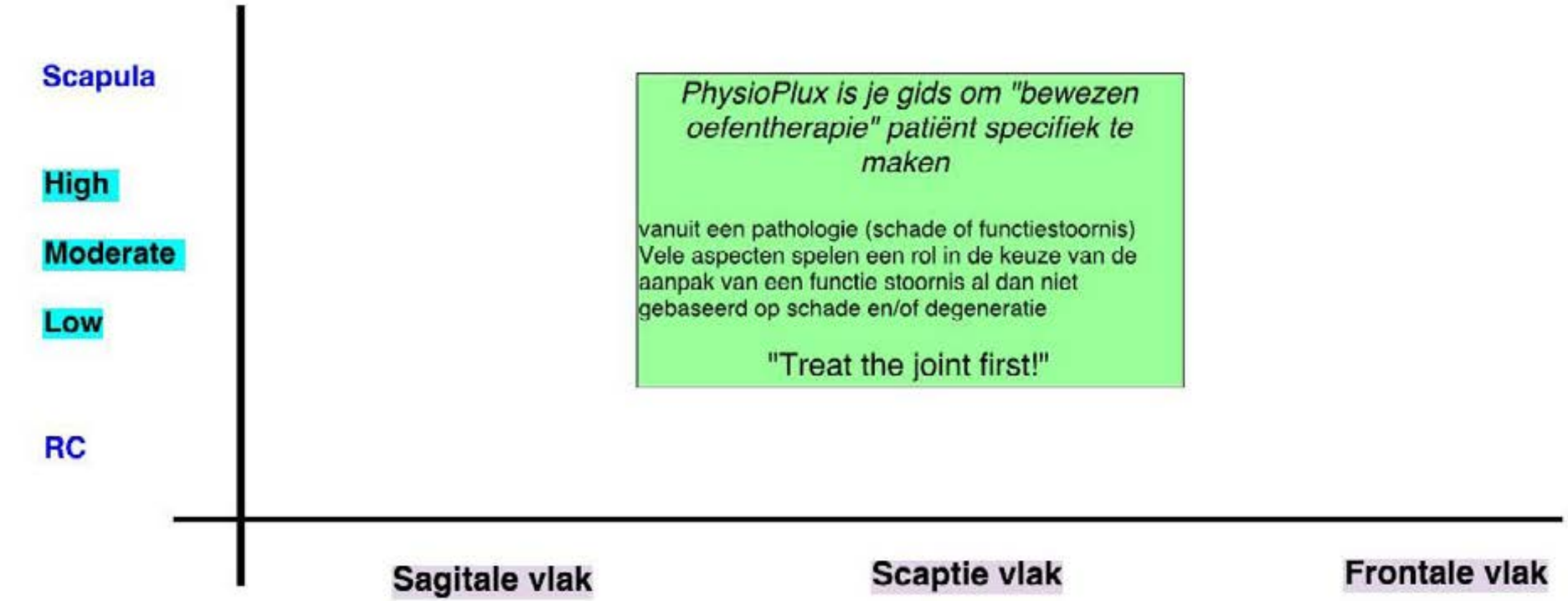
My eclectic **shoulder flowchart** in development

Evidence based exercise therapy

Bewezen O.T?

...maar nog niet patient specific!

RC-Ruptuur	RC-tendinopathie	Instabiliteit	Capsulaire laxiteit	Gird/PST	Scapula Dyskinesie Type 1	Scapula Dyskinesie Type 2	Scapula Dyskinesie Type 3	Biceps Brachii
In funcle (Ann Cools)	Isometrich (J.Cook)	Closed Chain (Ann Cools)	Closed Chain (Ann Cools)	stretching dorsal structures	Strengthening LT and MT	Strengthening LT and SA	Promoting upwards rotation + Strengthening Trapezius	Dorien Borms/ Cools

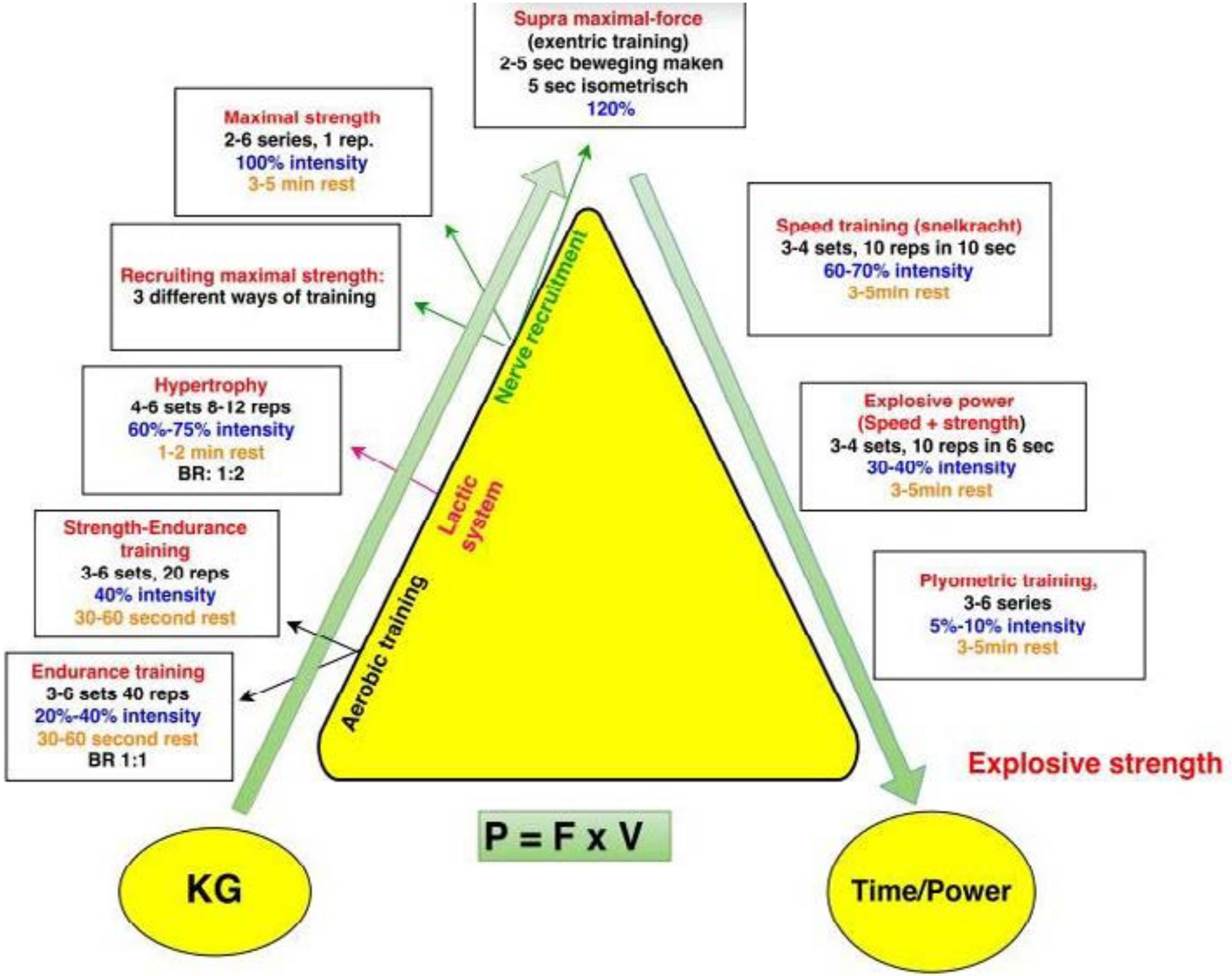


PhysioPlux is je gids om "bewezen oefentherapie" patiënt specifiek te maken

vanuit een pathologie (schade of functiestoornis)
Vele aspecten spelen een rol in de keuze van de aanpak van een functie stoornis al dan niet gebaseerd op schade en/of degeneratie

"Treat the joint first!"

Methodology of training exercices



Glenohumeral

Step 1	GH	L	R
	AP glide		
	Caudal glide		

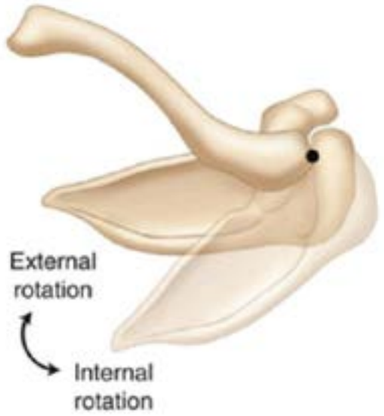
AP glide

AP glide

AP glide

Scapulathoracic

ST	+ or -
Position Scapula	
Type 1 anterior tilt	
Type 2 internal rotation	
Type 3 downward rotation	



Passive osteokinematic examination GH

GH	L	EF	R	EF
Exr				
Abd				
Inr				
Capsular pattern (L and/or R?)			L	R

Passive external rotation

Passive aBduction

Passive internal rotation

Goniometric examination GH

Goniometric in 90 aBduction (with wedge)				
	Left		Right	
	ROM	EF	ROM	EF
Exr				
Inr				
Trom				

2017

2013

Scapulathoracic

Step 2	Start with Physioplux				
	Normal	4	1	2	3
		UT	LT	SA	DT
	Recruitment				
	Tension mV				

Physioplux

physioplux

Scapulathoracic

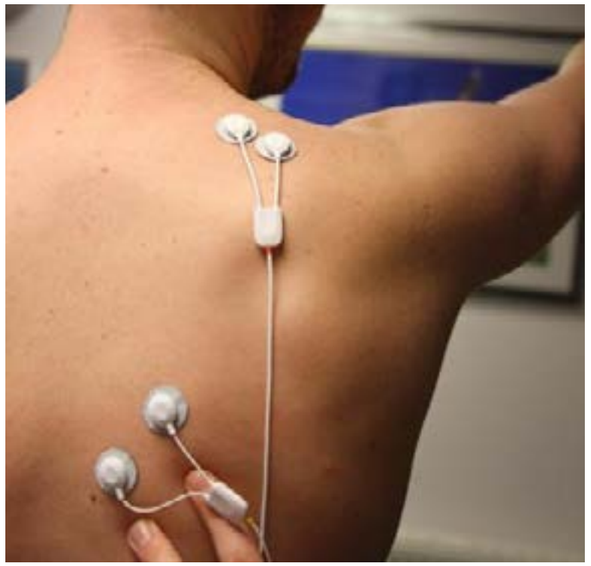
Step 2	Start with Physioplux				
	Normal	4	1	2	3
		UT	LT	SA	DT
	Recruitment				
	Tension mV				

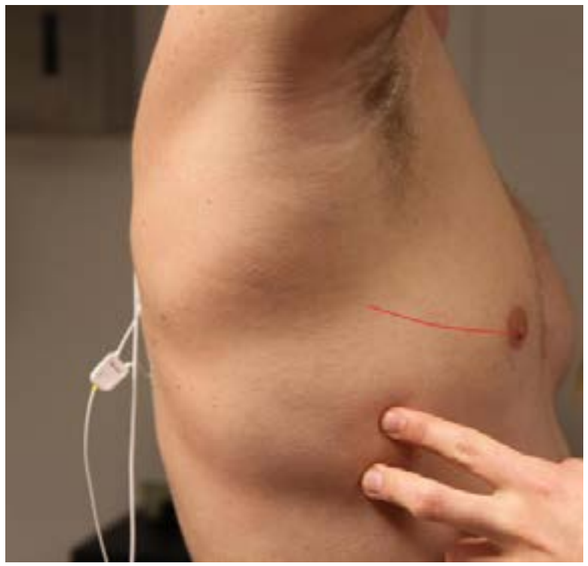
Diagnostic: “Proximal stability, for distal mobility.”

Treatment: “Beyond scientific research?!”

Scapulathoracic

Start with Physioplux				
Normal	4	1	2	3
	UT	LT	SA	DT
Recruitment				
Tension mV				





Scapulathoracic

Shoulder Dysfunctions – EMGBF - PhysioPlux on the assessment and treatment of a patient with SD

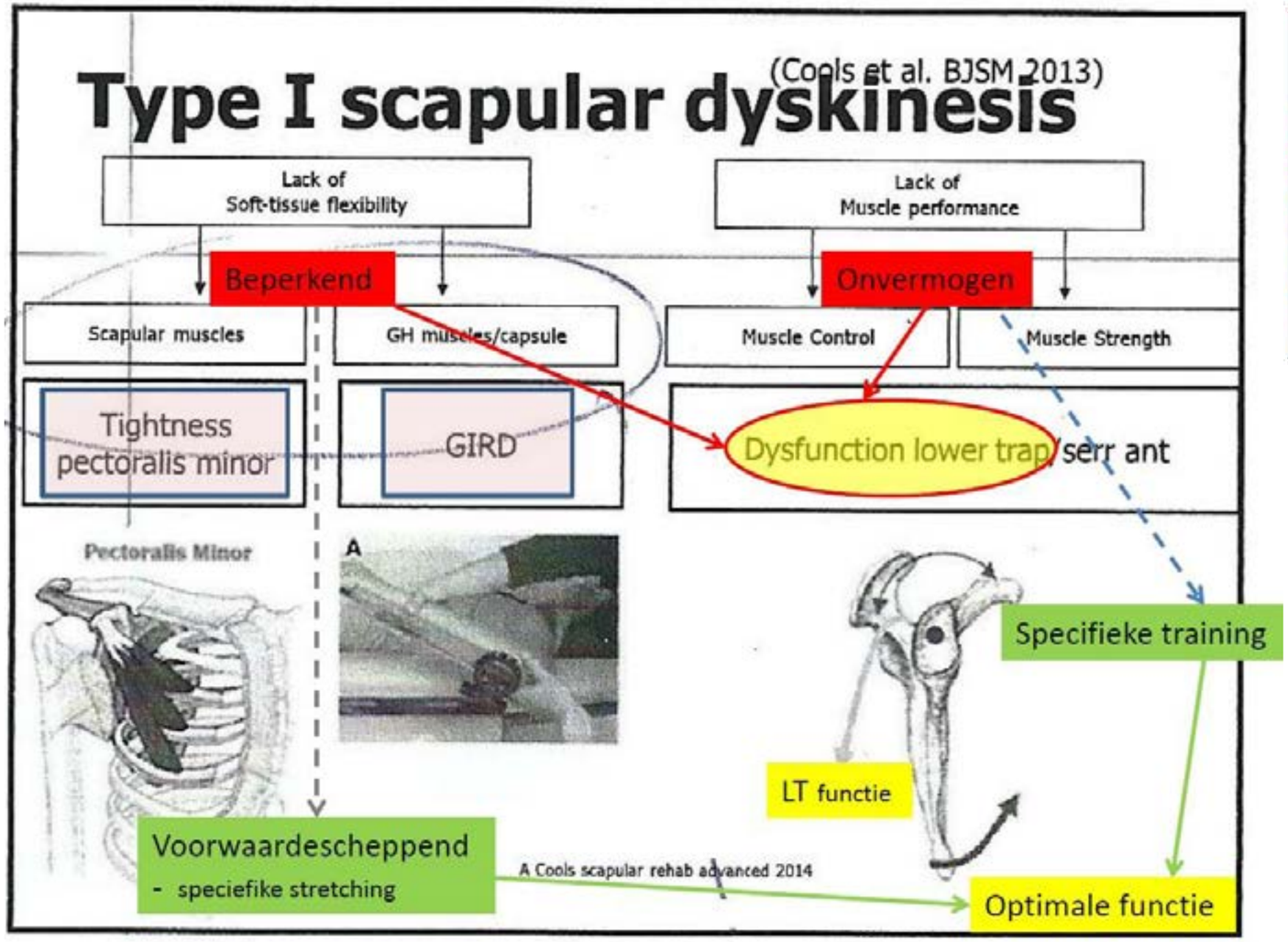
Cristina Santos

Placement of the electrods

Muscle	Placement of the electrodes	Initial position for MVIC	Muscular action to measure MVIC
Upper trapezius (UT)	between the C7 spinous process and the lateral tip of the acromion.	Sitting position shoulder positioned at 90° ABD or Shoulder at 0°	Pressure applied to the head, who is in Flexion + Lateral Rotation + Extension or Resisted shoulder elevation
Lower trapezius (LT)	¼ of the distance between the spine and the inferior angle of the scapula	Sitting position shoulder positioned in at 90° FLEX	Pressure applied against the arm elevation, with the arm diagonally overhead in the direction of imuscle fibers
Serratus Anterior (SA)	placed vertically along the mid-axillary line at the 6th rib levels through the 8th	Sitting position Shoulder at 90° ABD	Pressure applied above the elbow and on the inferior border of the scapula. The patient have to resist against pressure, trying to flex the arm and rotate the scapula
Anterior Deltoid (AD)	at a finger, distal and anterior to the acromion, with a line direction between the thumb and the acromion	Sitting position Shoulder at Abd + Flex + Ext Rot	Pressure applied on distal portion of the arm, against Abd + Flex + ,

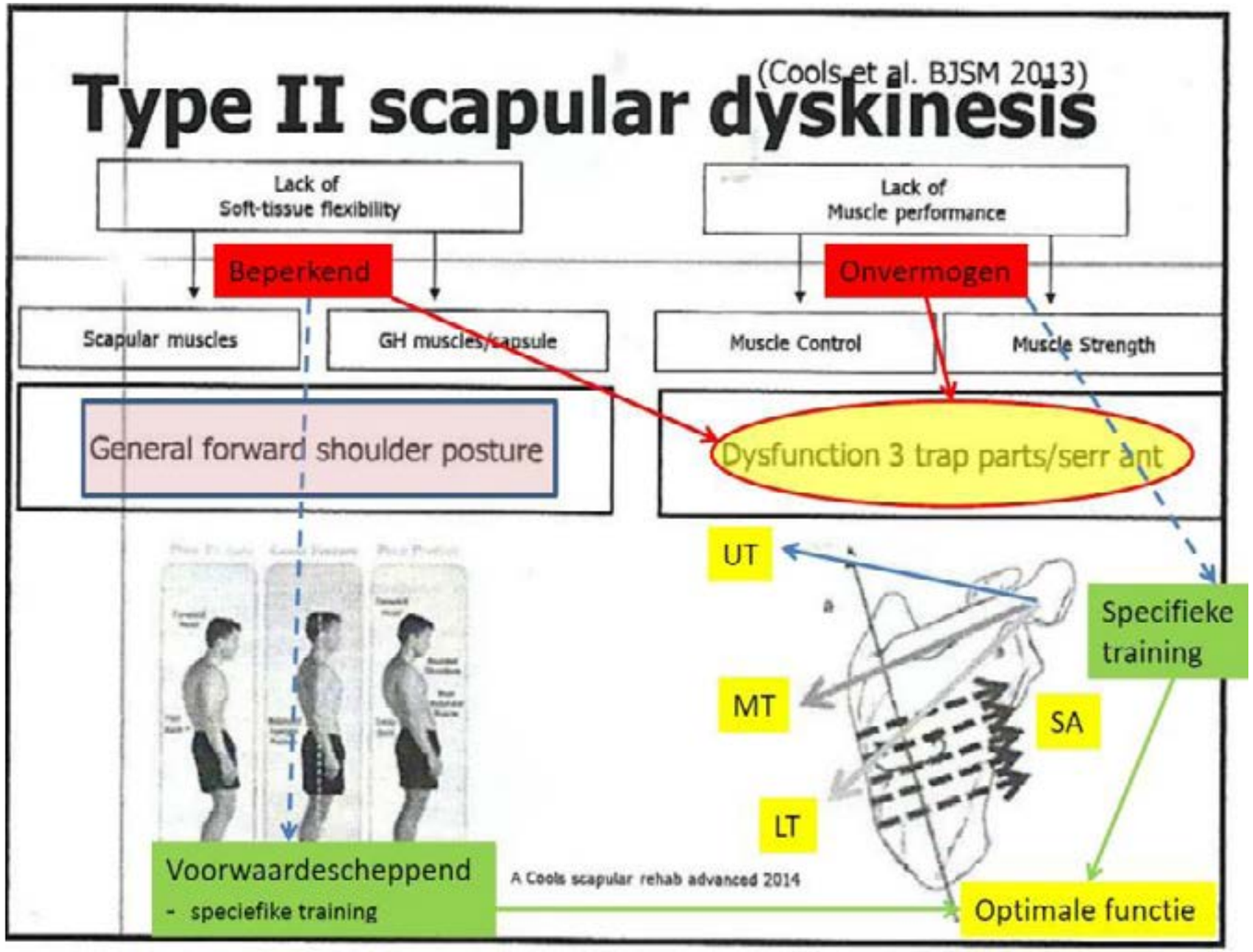
(Ekstrom et al 2005, Hermens et al 1999, Santos & Matias, 2007)

Scapulathoracic (type I)



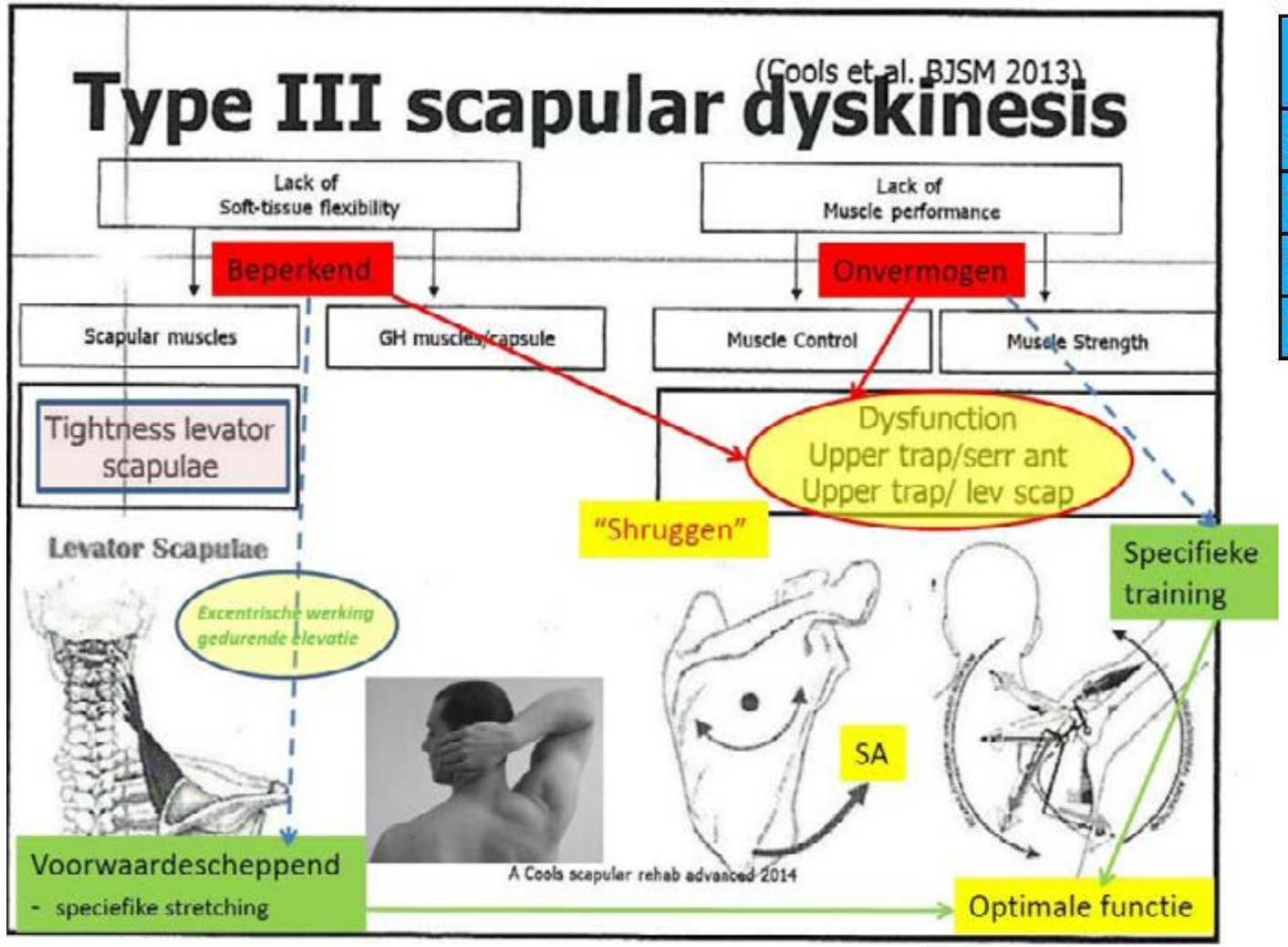
ST	+ or -
Scapular dyskinesis	
Type 1 PST	
Type 2 kyphosis	
Type 3 weakness SA/LT	

Scapulathoracic (type II)



ST	+ or -
Scapular dyskinesis	
Type 1 PST	
Type 2 kyphosis	
Type 3 weakness SA/LT	

Scapulathoracic (type III)



ST	+ or -
Scapular dyskinesis	
Type 1 PST	
Type 2 kyphosis	
Type 3 weakness SA/LT	

AC joint

Symptom provocation/pain/instability

Neer test

Crossbody aDduction

Step 3	AC	+ or -
	Pinpoint test	
	Pianokey test	
	Cross body adduction test	
	Paxinos test	
	O' Brien test (AC/BB)	
	AC resisted extension test	
	Neer test	
	Coracoid conflict (impingement)	

AC resisted extension

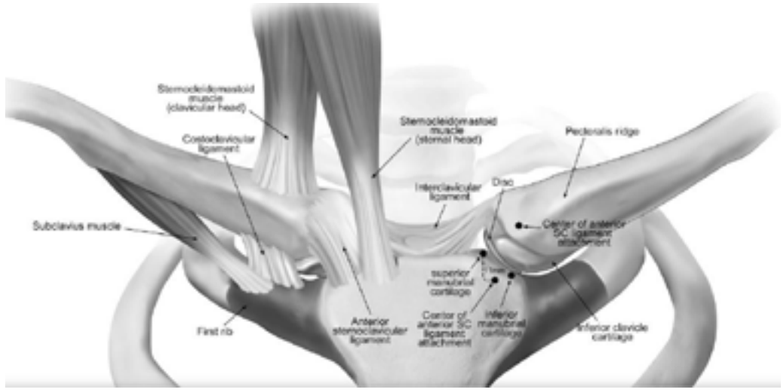
Paxinos test

SC joint

Symptom provocation/pain/instability

Step 4	SC	Position	Direction
	Cranial		
	Caudal		
	Anterior		
	Posterior		
	Luxation		

Distraction manipulation



Surgical anatomy

Examination

BMChain

Symptom provocation/pain/instability

Thoracic manipulation

Step 5	BMC	Level	D/H
	Cervical		
	CTJ		
	Ribs		
	Thoracic		
	TLJ		
	Lumbar		
	SIJ		

PITCHPERFECT

Separation measurement

Painful Arc Syndrome

Impingement (conflict)

Step 6 — PAS (painfull arc syndrome) Cyriaxtest

	+ or -	High	Normal
Exr			
From:		Till:	
Inr			
From:		Till:	

	+ or -	Ant or Post
Jobe	+	
Neer	+	A
Hawkins	+	

	+ or -	Ant or Post	L	R
Jobe				
Neer				
Hawkins				

	+ or -	Ant or Post
Jobe	-	
Neer	+	P
Hawkins	-	

- Subacromial conflict (external impingement)
  - Appr + (ant) Reloc-/AHD test -
  - Primary *Structure* Based
    - SA abnormalities
    - Rotator cuff dysfunction
  - Appr + (ant) Reloc+/AHD test + Release + (pain)
- Glenohumeral/internal conflict
  - Appr + (post) Reloc + Release + (pain)
  - Secundary *Function* Based

Painful Arc Syndrome

Impingement (conflict)

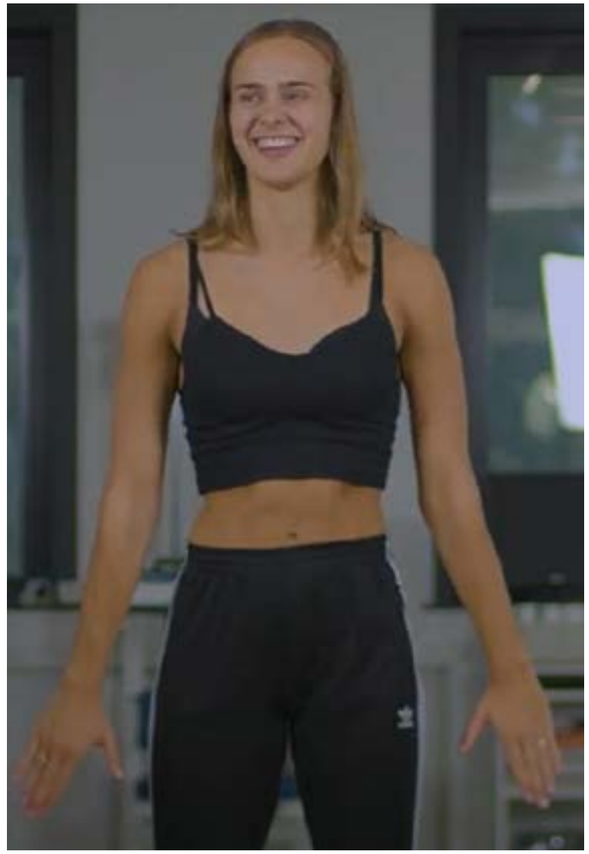
Step 6	PAS (painfull arc syndrome) Cyriaxtest

	+ or -	High	Normal
Exr			
From:		Till:	
Inr			
From:		Till:	

Subacromial Pain Syndrome

or

Subacromial Conflict?



Painful Arc Syndrome

Impingement (conflict)

	+ or -	Ant or Post	L	R
Jobe				
Neer				
Hawkins				

Jobe

AHD, scapulaire functie and SA pressure

AP glide

Hawkins

Neer

Painful Arc Syndrome

Impingement (conflict)

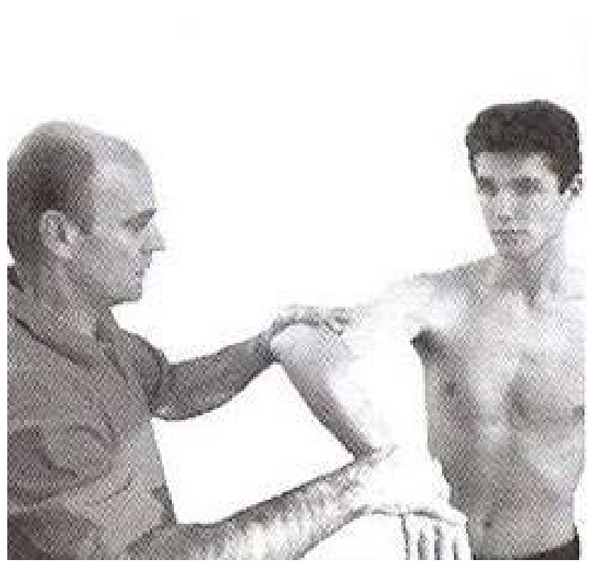
	+ or -	Ant or Post	L	R
Jobe				
Neer				
Hawkins				

Table 4: Diagnostic Accuracy for Any Test Combination From the ROC Curve Analysis

	Sensitivity (95% CI)	Specificity (95% CI)	+LR (95% CI)	−LR (95% CI)	AUC (95% CI)
Any test combination Cut point: 3+ of 5 tests	.75 (.54–.96)	.74 (.61–.88)	2.93 (1.60–5.36)	.34 (.14–.80)	.79 (.66–.92) *P*=.001

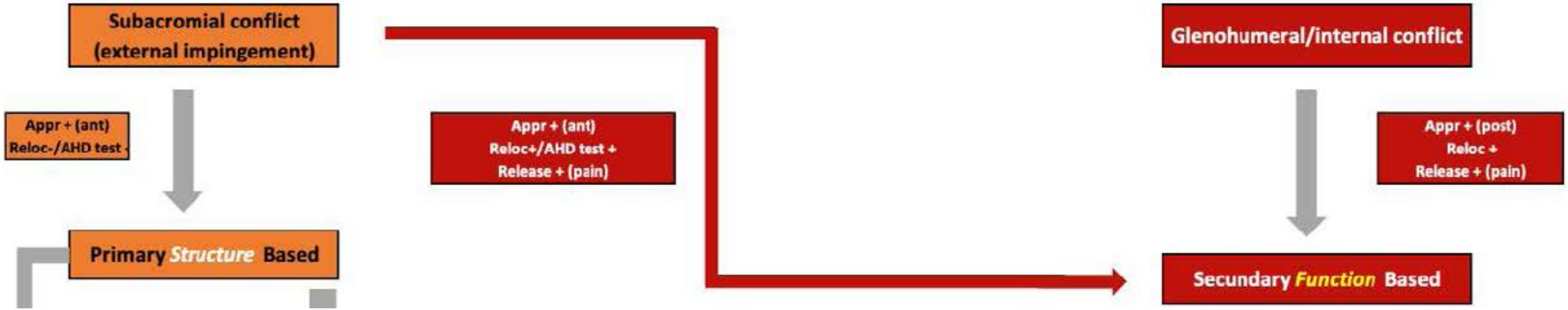
Cluster:

1. PAS test
2. Exorotation
3. Neer
4. Hawkins
5. Jobe



Painful Arc Syndrome

Impingement (conflict)



Subacromial conflict/external conflict

Symptom provocation

Apprehension (ant) +

Subacromial conflict (external impingement)

Appr + (ant)
Reloc-/AHD test -

Primary *Structure* Based

SA abnormalities

Rotator cuff dysfunction

Relocation AHD test — —

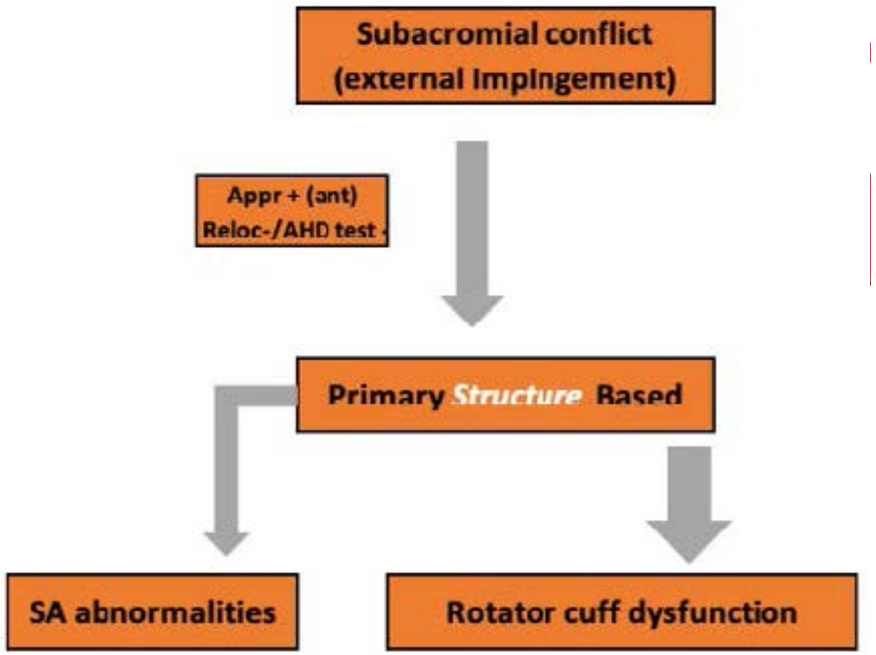
Release — +

Subacromial conflict/external conflict

Symptom provocation

Subscapularis

Belly press test



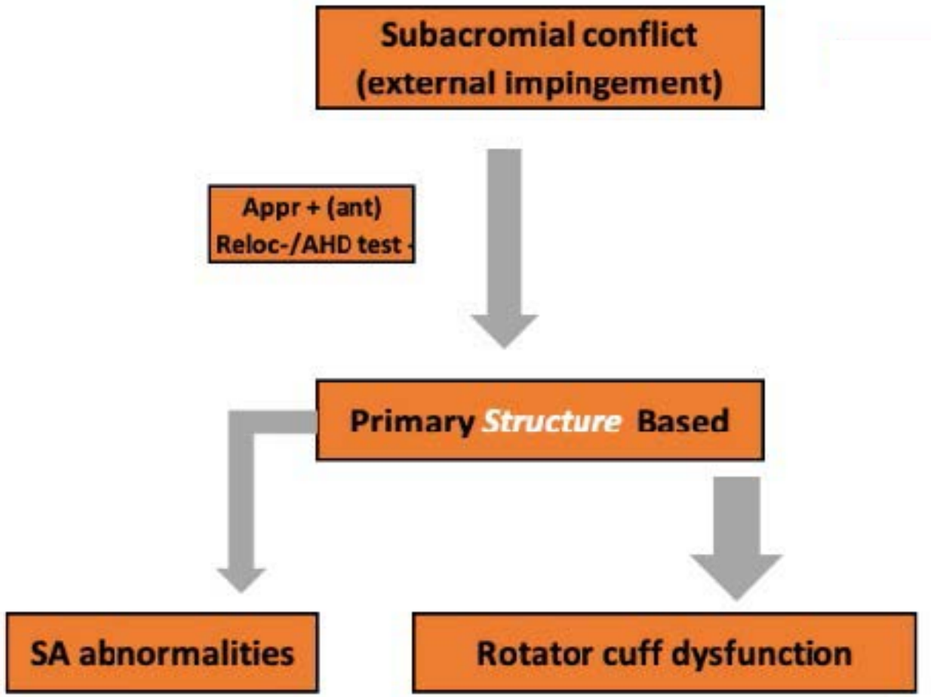
Supraspinatus: full can test

Bear hug test

Teres minor

Subacromial conflict/external conflict

Symptom provocation



Damage? Muscular/neurologic? Anatomy?

Lag tests	
- ss	
- is/tm	
- ssc	
Lift off	
- ssc	
Bear hug	

Subacromial conflict/internal conflict

Symptom provocation

Glenohumeral/internal conflict

Appr + (post)
Reloc +
Release + (pain)

Secundary *Function* Based

Apprehension (post) +

Relocation +

Release (pain) +

Subacromiaal conflict/external/internal conflict

Symptom provocation

Step 7	Rotator cuff pathology	
Damage? Muscular? Anatomy? Neurologic?		+ or -
Cyriax tests		
R aDd		
R inr		
R exr		
R aBd		
+ traction		

Secondary **function** based

Modifications!!!

Instability

Flexibility

\+ Apprehension (ant)

Relocation NEG

\+ Release (pain)

Instability

A	
Ant instability	
Appr (ant pain)	
Relocation	
Release	

B	
Post instability	
Kim's test	
Jerk test	
Writington test	

C	
Post sup imp	
Appr (post pain)	
Hyperangulation	
Posterior pain at ..... degrees	

Jerk test

Wrightington test

Kim test

Alternative Kim?

Capsular Laxity

Flexibility/Laxity

Capsular laxity	
	+ or -
Sulcus sign	
HAT Gagey sign	
HRT	
Beighton score	

Biceps/Labrum tests

Symptom provocation

Biceps/Labrum	+ or -
O' Brien	
Speed	
Biceps load	
Crank	
SFRT	

Speed test

Bicep Load test

The crank test was performed with the patient in the upright or supine position. The shoulder was elevated 160° in the scapular plane, an axial load was applied by the examiner, and the humerus was internally and externally rotated. Pain elicited during this test, typically with external rotation, was a positive indication for a pathologic condition of the labrum and was found in 29 patients. Also, a click may or may not be felt that reproduces the patient's symptoms of pain or catching.[7]

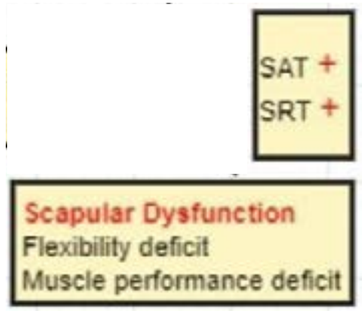
Crank test

SFRT

O'Brien test

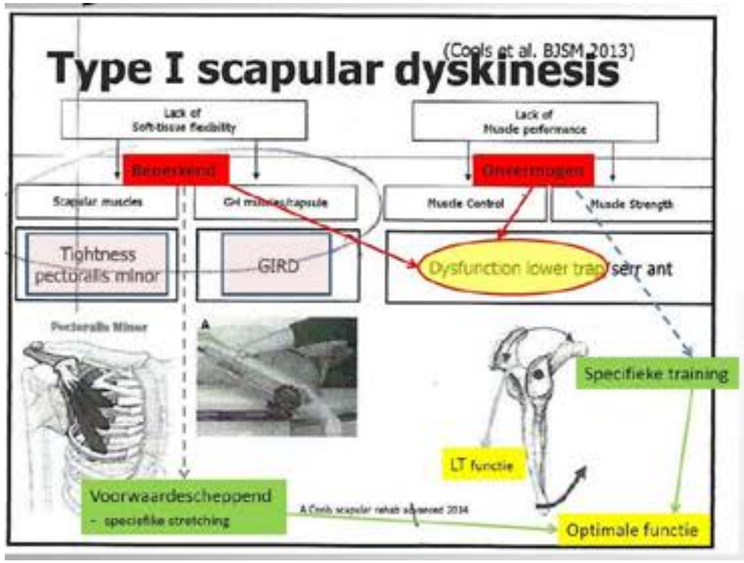
GH/internal conflict

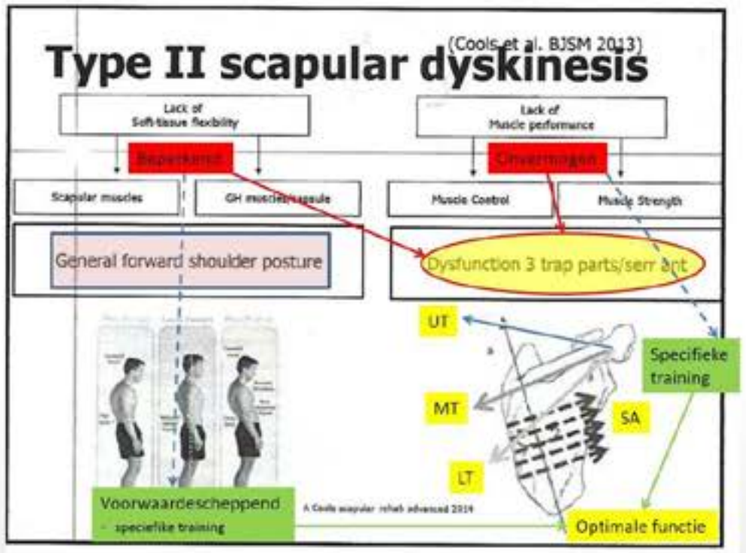
Symptom provocation

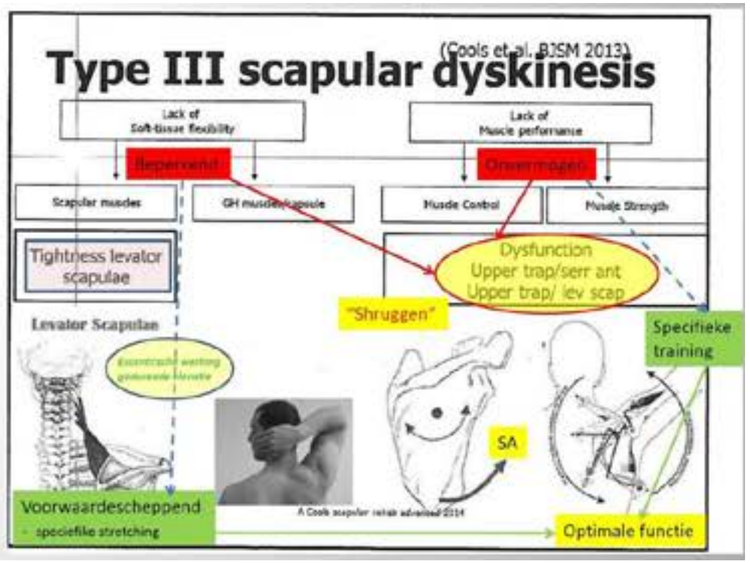


Reject

Are subtly incorporated in - not yet proven - modified clinical tests

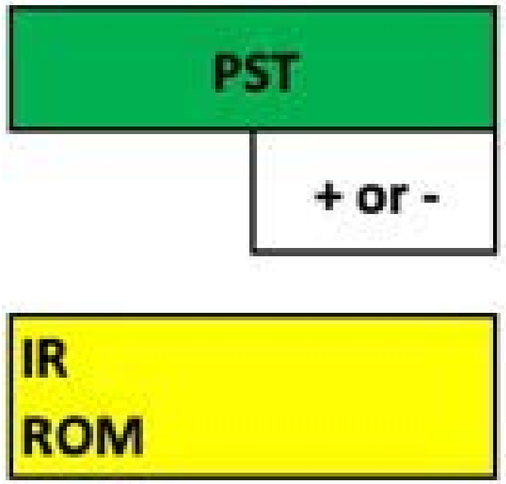




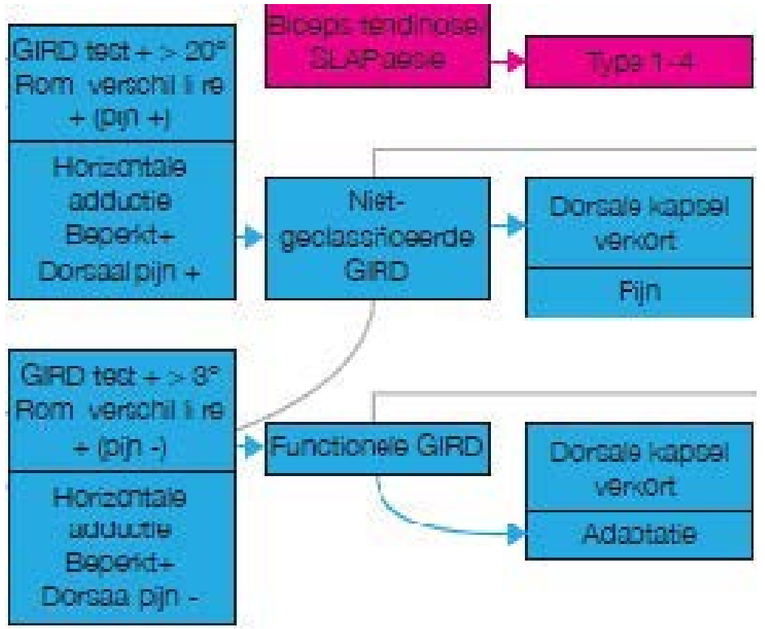


GIRD/PST

Flexibility



Team



Weakness clusters

Trapezius

Accessory nerve

Weakness cluster
M. trapezius
M. pectroralis major
M. latissimus dorsi
Axillaris neuropathy
Suprascapular neuropathy
Plexus brachialis neuropathy

KForce		
	L	R
Shoulderblade		
MT		
LT		
SA		
Rotator cuff		
Inr		
Exr		
Abd		
RC Ratio		

Specific strength test for **musculus trapezius**

Triangle test

LT strength test

Example

Weakness clusters

Pectoralis major

Weakness cluster
M. trapezius
M. pectroralis major
M. latissimus dorsi
Axillaris neuropathy
Suprascapular neuropathy
Plexus brachialis neuropathy

Pectoral nerve

Resisted aDduction

Signs and symptoms:

- Ecchymosis chest and upper extremity
- Dropped nipple sign
- Loss of axillary fold
- Passive aBduction test
- Resisted aDduction test

Passive aBduction

Weakness clusters

Latissimus Dorsi

Thoraco dorsal nerve

Weakness cluster
M. trapezius
M. pectroralis major
M. latissimus dorsi
Axillaris neuropathy
Suprascapular neuropathy
Plexus brachialis neuropathy

Ladder test

Prone strength test

Functional test

Weakness clusters

Serratus anterior

Long thoracic nerve

Wall test: face a wall, standing about two feet from the wall and then push against the wall with flat palms at waist level

Weakness cluster
M. trapezius
M. pectroralis major
M. latissimus dorsi
Axillaris neuropathy
Suprascapular neuropathy
Plexus brachialis neuropathy

Uspeert et al. BMC Musculoskeletal Disorders (2019) 20:360
https://doi.org/10.1186/s12891-019-2741-7

BMC Musculoskeletal Disorders

RESEARCH ARTICLE Open Access

Validity and reliability of serratus anterior hand held dynamometry

Jos Uspeert[1*], Hans C. J. W. Kerstens[2,4], Renske M. J. Janssen[1], Alexander C. H. Geurts[1], Nens van Alfen[3] and Jan T. Groothuis[1]

Conclusion: The results indicate that validity for strength testing of the serratus anterior muscle is optimal with subjects in a seated position and the shoulder flexed at 90° in the scapular plane. Intrarater reliability is moderate and interrater reliability of this procedure is poor. However the high SDC values make it difficult to use the measurement in repeated measurements.

Winging of the scapula on aBduction and forward flexion > 90

Weakness clusters

Axillaris neuropathy

Weakness cluster
M. trapezius
M. pectroralis major
M. latissimus dorsi
Axillaris neuropathy
Suprascapular neuropathy
Plexus brachialis neuropathy

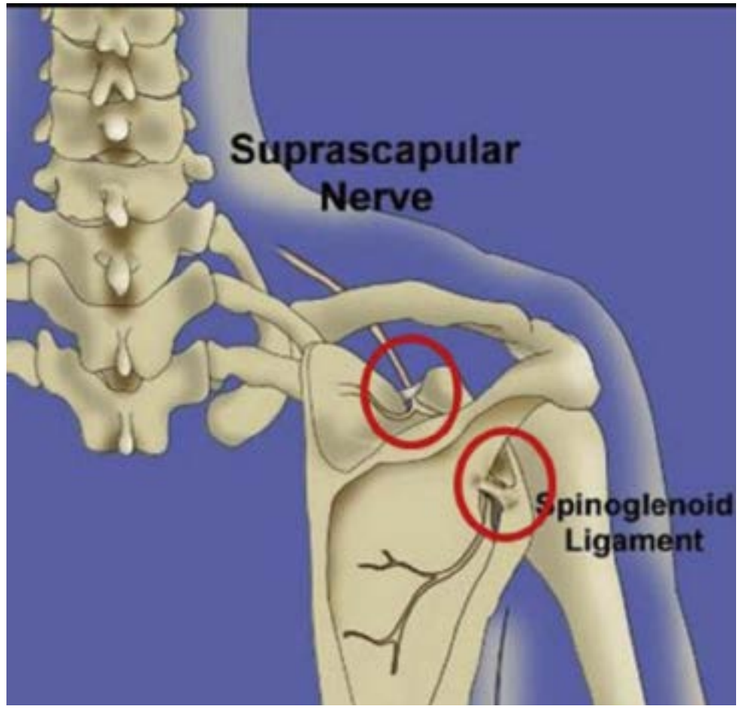
ABduction in int. rot. sign

Swallowtail sign

Weakness clusters

Suprascapularis neuropathy

Suprascapulair noth lesion:
Muscle wasting and weakness of supraspinatus and infra-spinatus



ABduction in int. rot. sign

Weakness cluster
M. trapezius
M. pectroralis major
M. latissimus dorsi
Axillaris neuropathy
Suprascapular neuropathy
Plexus brachialis neuropathy

Technique

Endoscopic/arthroscopic decompression of the suprascapular nerve at the spinoglenoid notch: indications and surgical technique

Kevin D. Plancher MD, MPH [a, b, c, d], Thomas B. Evely DO [c, d], Jasmine E. Brite BS [c], Karen K. Briggs MPH [d], Stephanie C. Petterson MPT, PhD [d]

Suprascapulair noth lesion:
Muscle wasting and weakness of infraspinatus only

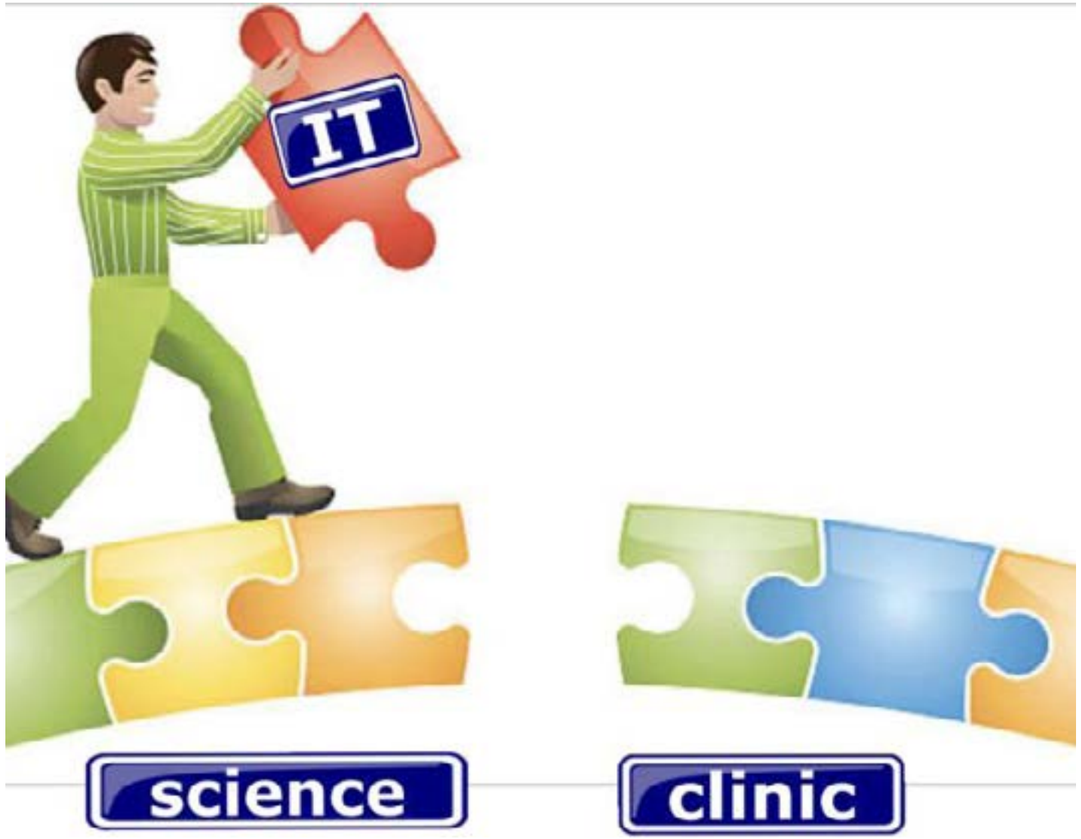
Weakness clusters

Plexus brachialis neuropathy / Neuralgic amyothrophy

Weakness cluster
M. trapezius
M. pectroralis major
M. latissimus dorsi
Axillaris neuropathy
Suprascapular neuropathy
Plexus brachialis neuropathy

Examination of the clinical signs and symptoms

Cyborg era will bridge the gap?



Prospective values

Scientific research

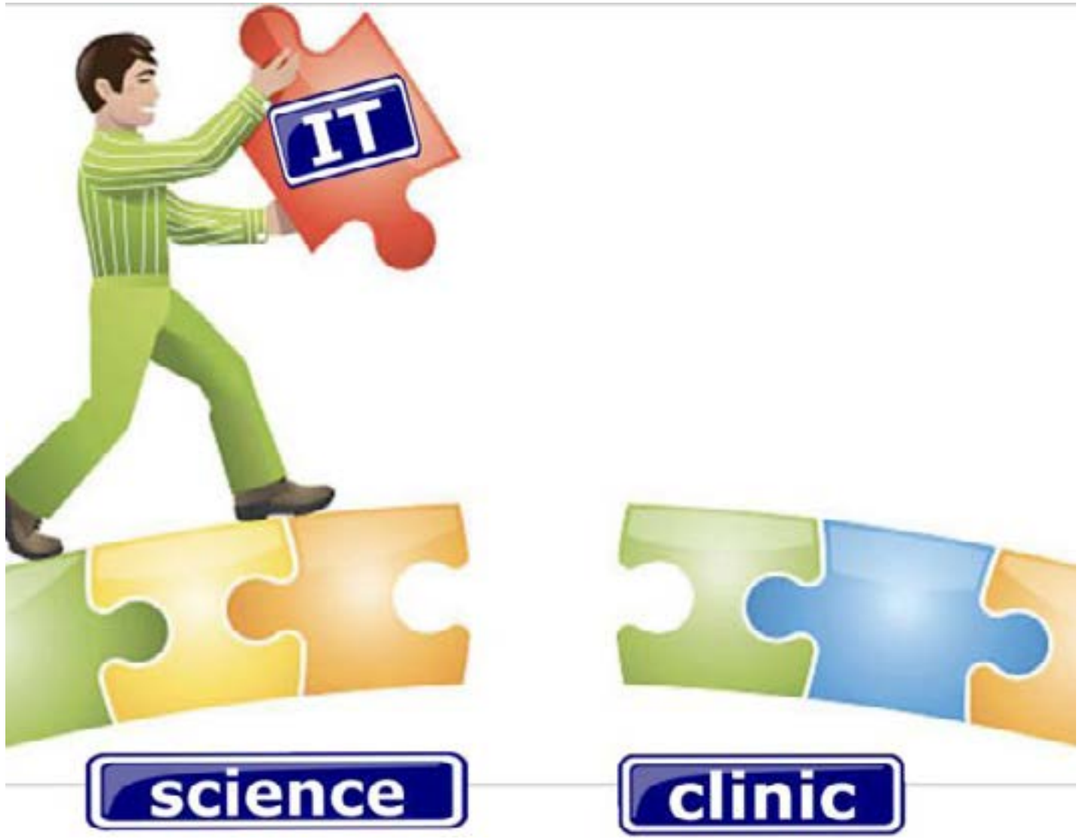
Education

Uniformity

Patientspecificity

Digitized

Cyborg era will bridge the gap?



I hope that in the near future science will support the clinic in a different way, in digitized processing and assessing the patient specific data and scientifically “adjusting” the results. So that the clinic is scientificized
A condition is, however, that the participating parties have the competences to carry out a good shoulder examination with uniformity in tests and outcomes.

Physiodoc

Michael Davidson
Physiotherapist

Justin de Boer
Medical researcher

Reems van der Linden
Industrial designer

Nazca IT solutions

Erwin Moll

–

Nus Jurgens

–

Erik van der Graaff

–

Modellen

Michael Post
Model

Donja Vos
Model

Liv Beezemer
Model

Thank you!

Liked the presentation? Mail us!

michael@milefysiotherapie.nl