

# The scapula: its place in clinical reasoning in patients with shoulder pain

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# Scapular assessment and its place in clinical reasoning in patients with shoulder pain

- Why should we address the scapular?
- How can we assess scapular movement?
- When should we assess scapular movement?
- How does this fit within clinical reasoning?

## Elastic energy storage in the shoulder and the evolution of high-speed throwing in *Homo*

Neil T. Roach<sup>1,2</sup>, Madhusudhan Venkadesan<sup>3</sup>, Michael J. Rainbow<sup>4</sup> & Daniel E. Lieberman<sup>1</sup>

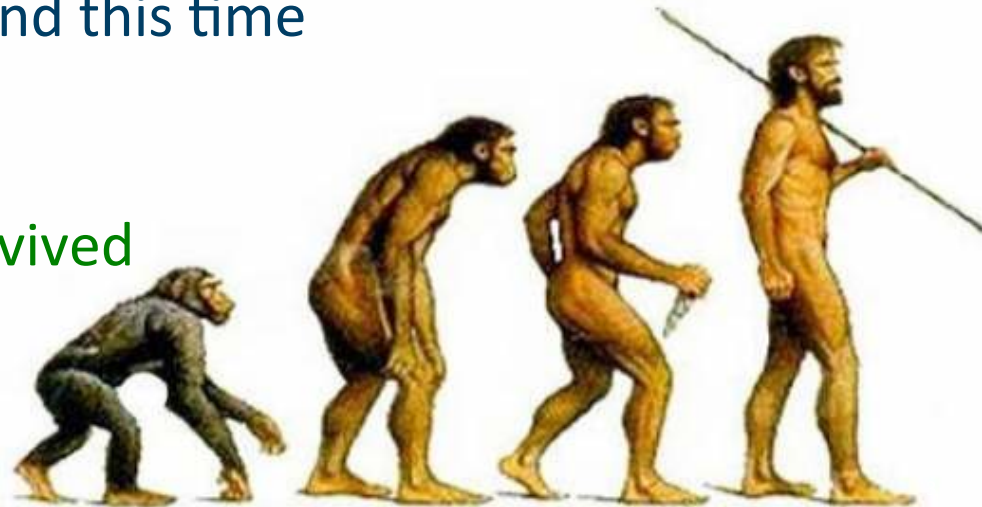
Why did hominins evolve the ability to throw at high speed?

+ / 2 million years ago in *Homo erectus*: adaptations in features that enable energy storage and release at the shoulder ?

Hunting activities intensified around this time

Evolution of the human shoulder is the reason why human kind survived

Or is it the brain?



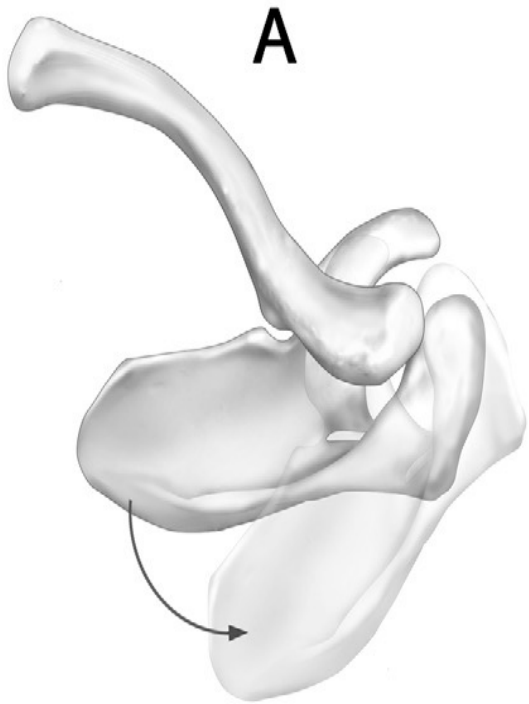
# A brief introduction...

- Properties of an outcome measure
- Consensus on terminology

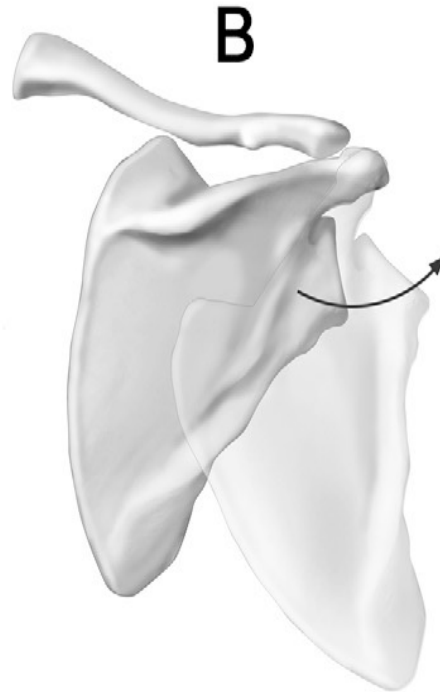
# Properties of a outcome measures

- Reliable, valid & responsive
- Some say...





Internal Rotation



Upward Rotation



Posterior Tilting

(Ludewig et al., 2009)

# What is scapular dyskinesia?

- “The scapula demonstrates premature or excessive elevation or protraction, nonsmooth or stuttering motion during arm elevation or lowering, or rapid downward rotation during arm lowering” (**Dysrhythmia**)
- “The medial border and/or inferior angle of the scapula are posteriorly displaced away from the posterior thorax.” (**Winging**)

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- Why should we address the scapula?
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# Is scapular dyskinesia the cause or effect of shoulder disorders?

**CAUSE ?**

Does scapular positioning predict shoulder pain? (Struyf et al. IJSM 2013)



Obvious scapular dyskinesia => higher probability of shoulder problems in elite handball players (Clarsen et al. BJSM 2014)

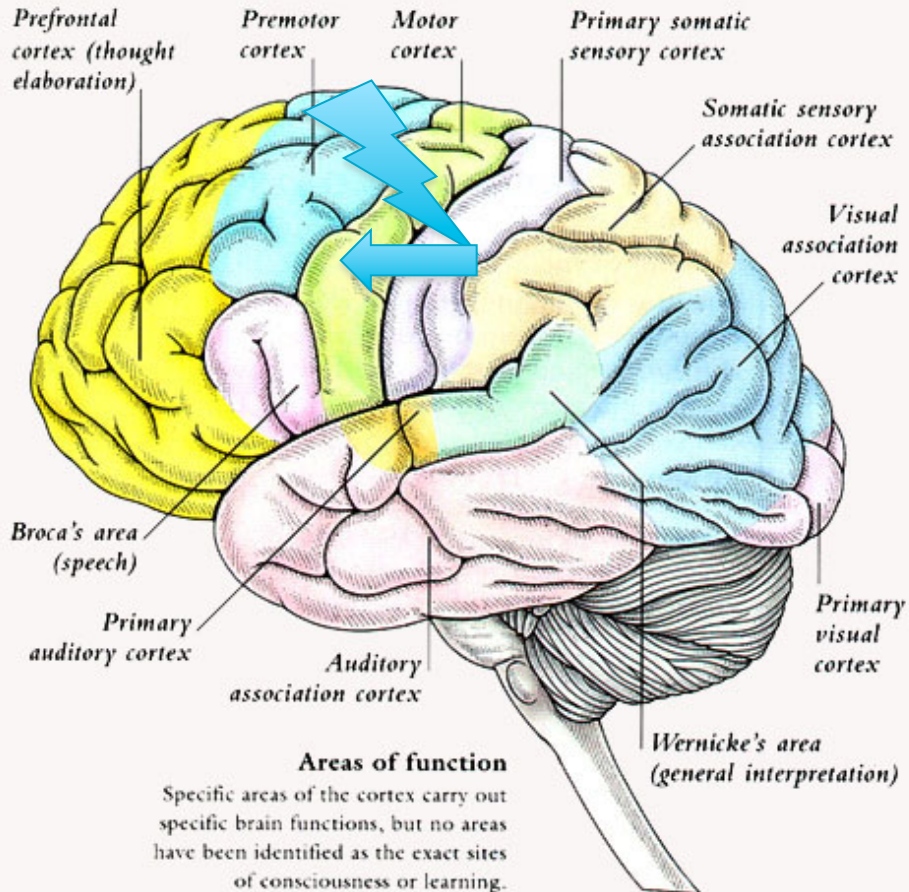


**Yes!**



# Is scapular dyskinesia the cause or effect of shoulder disorders?

**EFFECT ?**

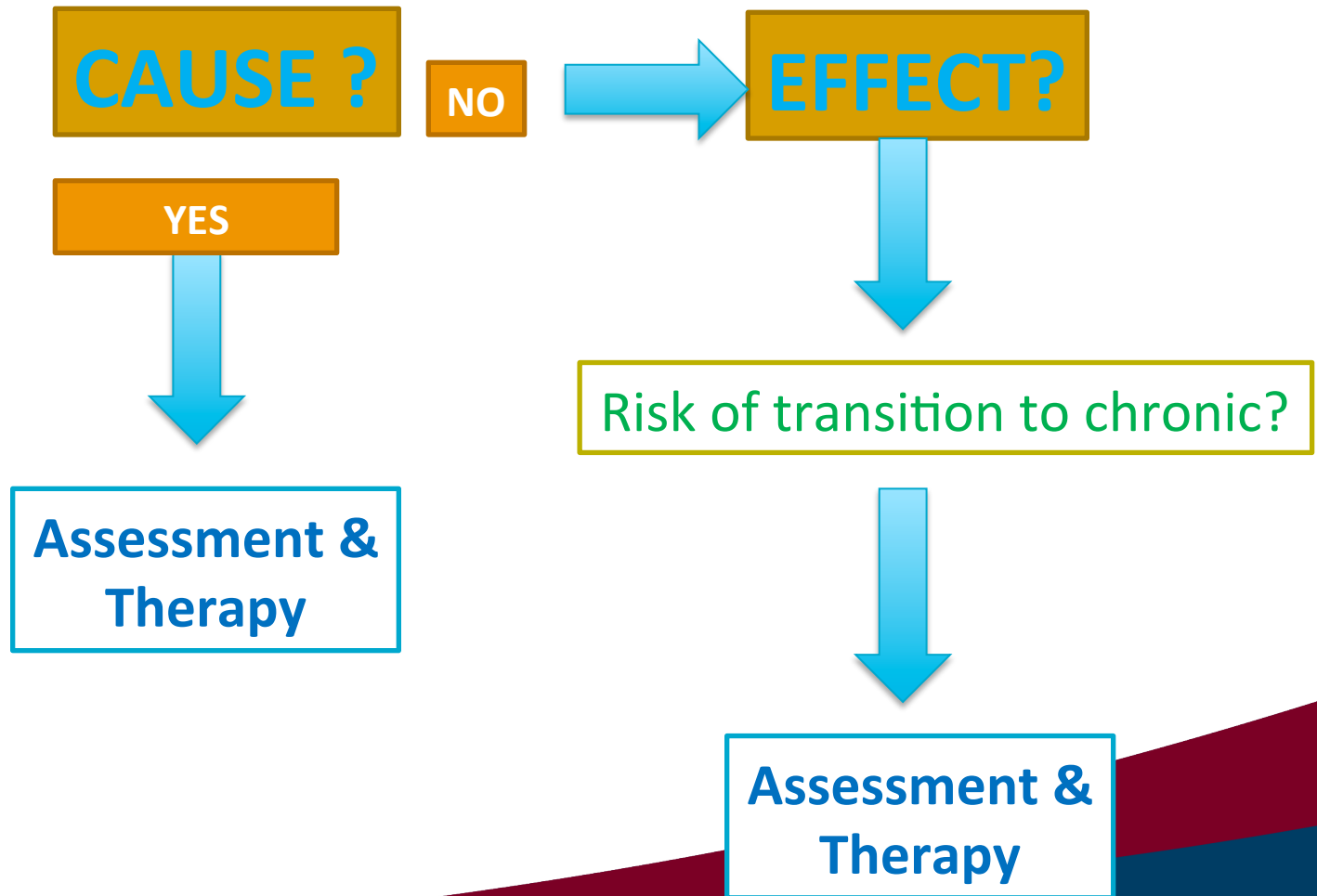


pain-dependent  
inhibitory input

(both ipsilateral and contralateral)

Hodges et al. 2013; Hodges and Tucker 2011a; Nijs et al. 2012b; Farina et al. 2001  
La Pera 2001; Valeriani et al. 1999

# Is scapular dyskinesia the cause or effect of shoulder disorders?



# Studies that differentiate have larger succes rates!

- “scapular muscle rehabilitation improves pain and function (SPADI) in patients with mild impingement symptoms” (6 weeks training)”

De Mey et al. Am J Sports Med 2012

- “A large clinically important treatment effect in favor of scapular motor control training was found in self-reported disability”

Struyf et al. Clin Rheum 2013

Clinical outcomes of a scapular-focused treatment in participants with shoulder injury:  
a systematic review

(BJSM in review)

Elja AE Reijneveld<sup>1</sup>, Suzie Noten<sup>2</sup>, Lori A Michener<sup>3</sup>, Ann Cools<sup>4</sup>, Filip Struyf<sup>2</sup>

- 6 studies included (>6/10 PEDRO score)
  - scapular-focused exercise therapy
  - scapular mobilization
  - scapular taping

# RESULTS?

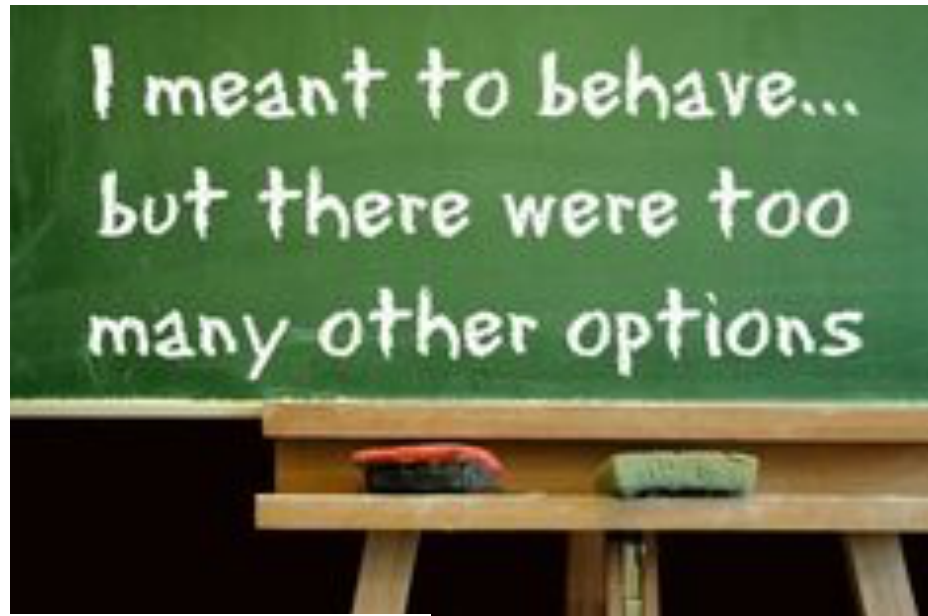
- Moderate evidence = scapular-focused treatment comparable to other treatments in terms of effectiveness, patient participation, and satisfaction in patients with shoulder pain, functional disability, and quality of life.
- Conflicting evidence on the effectiveness of scapular-focused treatment in patients with shoulder pain, functional disability, and quality of life.
- No evidence of a difference in range of motion, rotator cuff muscle strength and quality of life.



# Scapular assessment and its place in clinical reasoning in patients with shoulder pain

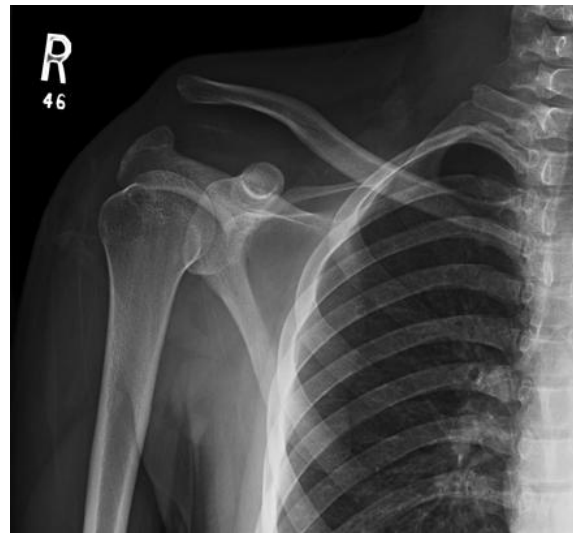
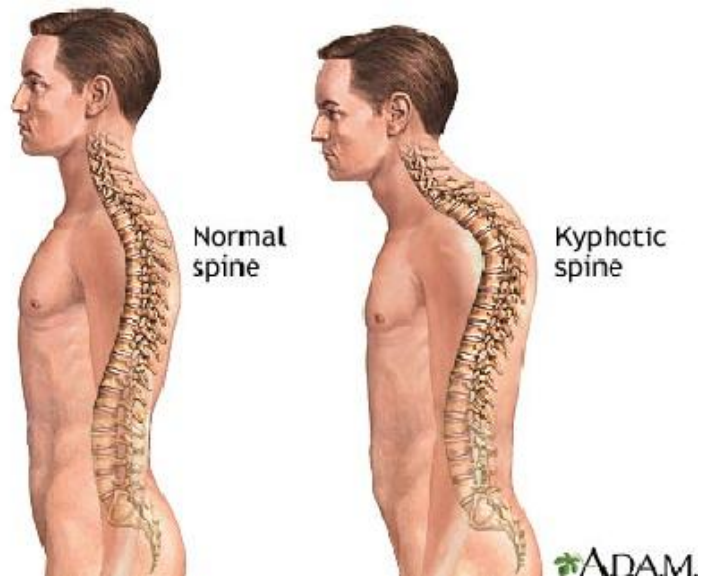
- Why should we assess scapular movement?
- How can we assess scapular movement?
- When should we assess scapular movement?
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# How can we assess scapular movement?





# Factors that influence scapular positioning



# Visual observation of scapular positioning



# Rating scale of Mclure et al. JAT 2009

- a) **Normal motion:** no evidence of abnormality
- b) **Subtle abnormality:** mild or questionable evidence of abnormality, not consistently present
- c) **Obvious abnormality:** striking, clearly apparent abnormality, evident on at least 3/5 trials





Loading depends on bodyweight:

<68 kg => 1.4 kg load

>68 kg => 2.3 kg

# Clinical measurements

- Shoulder protraction (Baylor square/acromion-table distance)
- Pectoralis minor muscle length
- Scapular upward rotation
- Scapular asymmetry



# Acromion – table distance

$(\text{Acromion-table distance (cm)} / \text{BL (cm)}) * 100$

Reliable ! (ICC's > 0.88)

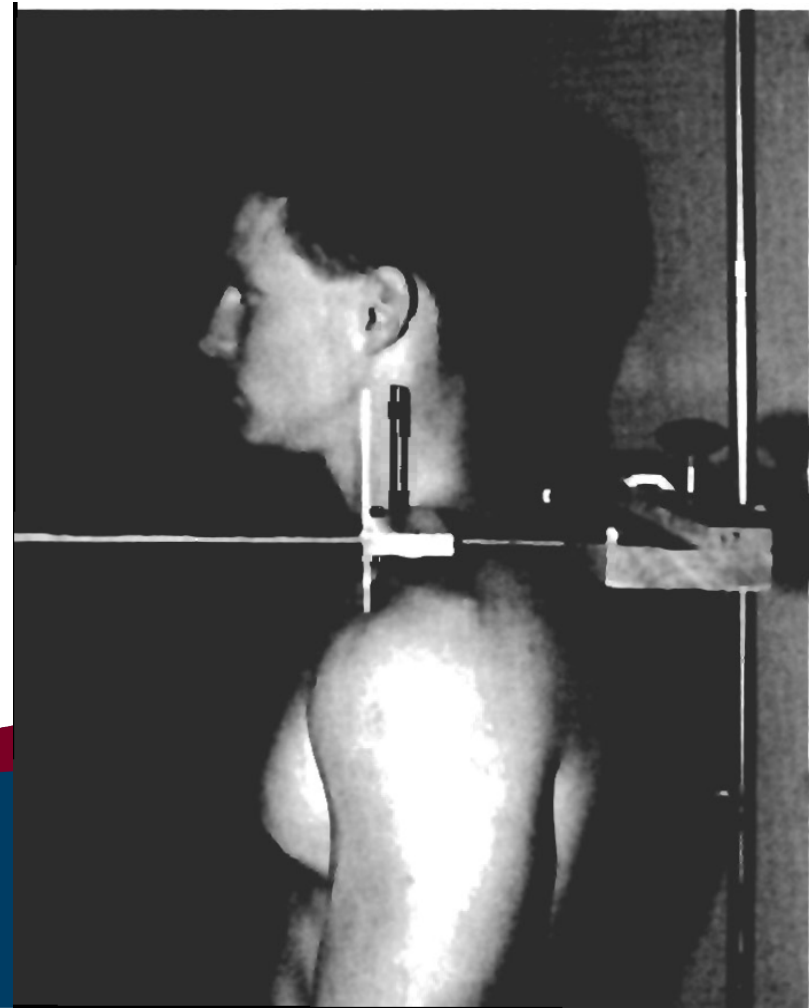


(Nijs et al., 2005; Struyf et al. 2009)

# Alternative method in standing?

- Baylor square method
- Proc. spinosa C7 =>  
Anterior corner acromion
- Reliable & valid

(Peterson et al.,1997)

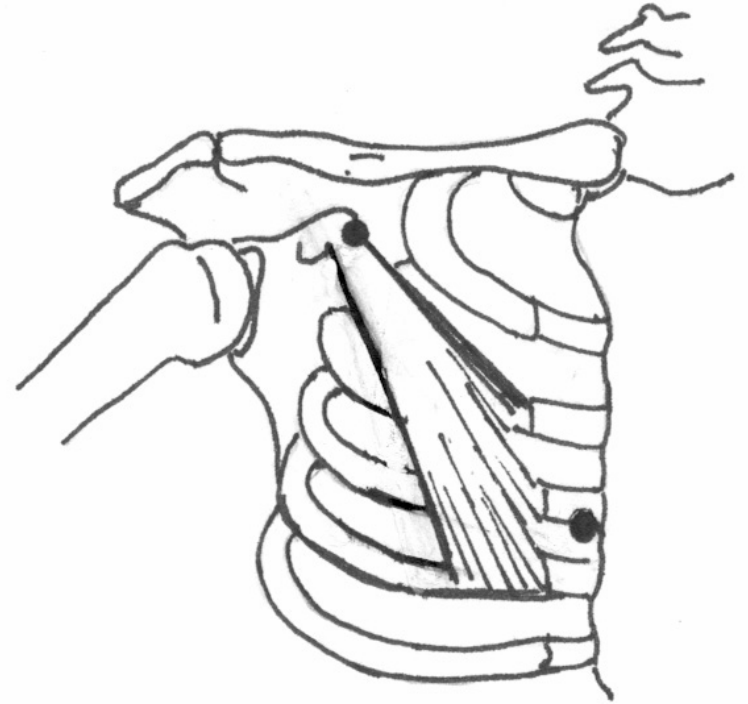




## Pectoralis minor muscle length

Inferomedial aspect of  
proc. corracoid

→ inferolateral aspect of  
costosternal junction of the  
4th rib



# Pectoralis minor

PMI=

Pectoralis Minor length (cm)

Reliable (intrarater)

Valid? (Yes to cadaver)

Caliper!!



Struyf et al., 2014

rsiteit  
erpen

# Scapular upward rotation

Gravity or digital inclinometers  
At rest, 45°, 90°, 135° & endrange

Reliable (intra)

Valid (digital)



(Watson et al., 2005; Johnson et al. 2001)

# Scapular asymmetry

Distance medial border scapula => proc. Spin. Th4  
or Th3

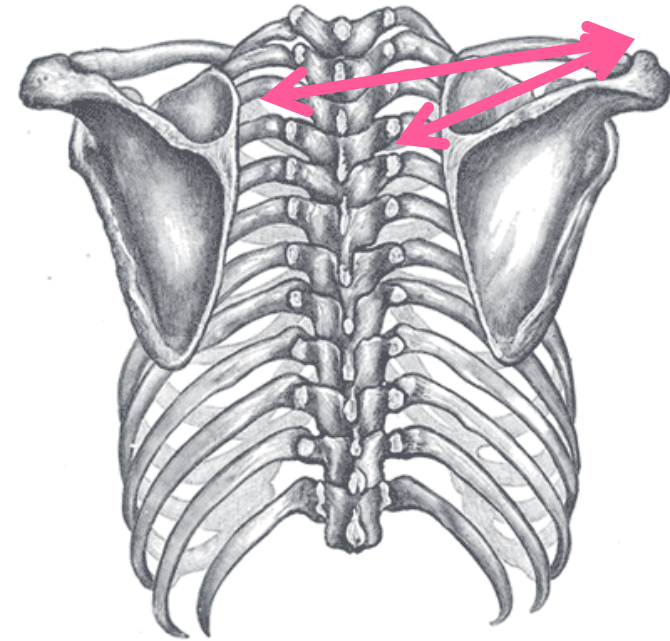
Reliable & Valid



(Peterson et al. 1997, Nijs et al. 2005)

# Scapular asymmetry

- “scapular distance”
- Distance angulus acromialis to Th3
- Divided by the length of the spina scapulae
- Reliable



# Scapular asymmetry

## Lateral scapular slide test



(Koslow et al. 2003; Nijs et al. 2005)

## In summary

Observational evaluation systems and assessment of scapular upward rotation seem suitably evidence-based for clinical use.

Do not use it as a physical examination test for diagnosing pathologies of the shoulder.

Asymmetry is ok!

# When should we assess scapular movement?

- **Is the scapula related to the patients' shoulder pain?**



# Is the scapula related to the patients' shoulder pain?

Scapular Assistance Test (SAT)

Modified Scapular Assistance Test (mSAT)

Scapular Retraction Test (SRT)

Scapular Repositioning Test (SRT)

## Scapular Assistance Test

### Scapular Assistance Test (m)SAT



reliable

(Seitz et al. 2012; Rabin et al., 2006)

# Scapular repositioning test

## ■ repositioning test (SRT)



reliable  
Reduces pain and increase strength

(Tate et al., 2008)

# How does this fit within clinical reasoning?

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THE PAIN STARTS IN MY HUSBAND'S LOWER BACK,  
THEN IT TRAVELS UP HIS SPINE TO HIS NECK,  
THEN IT COMES OUT HIS MOUTH AND INTO MY EARS.  
AND THAT'S WHY I GET THESE HEADACHES.



# At this point...

- Clinicians can use reliable (and valid) clinical tests for the assessment of both static and dynamic scapular positioning in patients with shoulder pain.
- No causal association with shoulder pain proven
- Benefit of symptom alteration tests

# Scapular dyskinesia ≠ diagnosis

- is a clear example of an assessment strategy that emphasizes the search for dysfunctions

# Scapular dyskinesia

- prognoses of shoulder pain is negatively altered by more than movement impairment or pain severity alone.

# Clinical reasoning: factor analysis of...

- Psychosocial
- Neurophysiological
- Lifestyle
- Movement related impairments

DO NOT PATHOLOGIZE YOUR PATIENT

PROFILE YOUR PATIENT



# What about the SICK scapula syndrome?

- Scapular malposition
- Inferior medial border prominence
- Coracoid pain
- Kinesis abnormalities of the scapula

# Should we use an algorithm?

- easy to follow
- and have the intention to eliminate unconscious mistakes
- excellent way to structure and visualize clinical reasoning processes

“yes.... **BUT!**”

# Should we use an algorithm?

- “easy to follow” = relatively simple
- A shoulder pain patients  $\neq$  simple
- it would be easier to use reason to solve the problem.

# Should we use an algorithm?

- What if the patient's shoulder problem falls outside of the reasoning of the algorithm?

= > it will not be fixed



# Should we use an algorithm?



# In summary

- use a patient-centered approach, *profiling* the patients' psychosocial-, neurophysiological-, and lifestyle factors and movement impairments that inform our clinical decision-making.

Stop pathologizing, start profiling!

THANKS !

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