

# Shoulder injury and prevention in swimmers



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# Acknowledgements

**Peter Blanch** – “The Swimming Machine”

**Andrea Mosler** – AIS physio and shoulder  
guru

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Group

**Mark Gillham and Meg Cooley** – professional  
colleagues

**Swimmers** – coached, treated and rehabilitated.



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# Presentation Plan

- ❑ **Shoulder anatomy**
- ❑ **“Swimmer’s shoulder” causes – intrinsic and extrinsic**
- ❑ **Screening for compromised anatomy**
- ❑ **Addressing intrinsic causes of shoulder pain via preventative strengthening, stretching and stability programs.**



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# Shoulder Pain



# Shoulder pain is the most common musculoskeletal injury of competitive swimmers

# Incidence is highly variable in research .  
Prevalence: 40-90%

# Commonly termed “Swimmer’s Shoulder”

# Research has not uncovered any predisposition due to gender; male vs female.

# Average adolescent performs approx. 1 million strokes/year



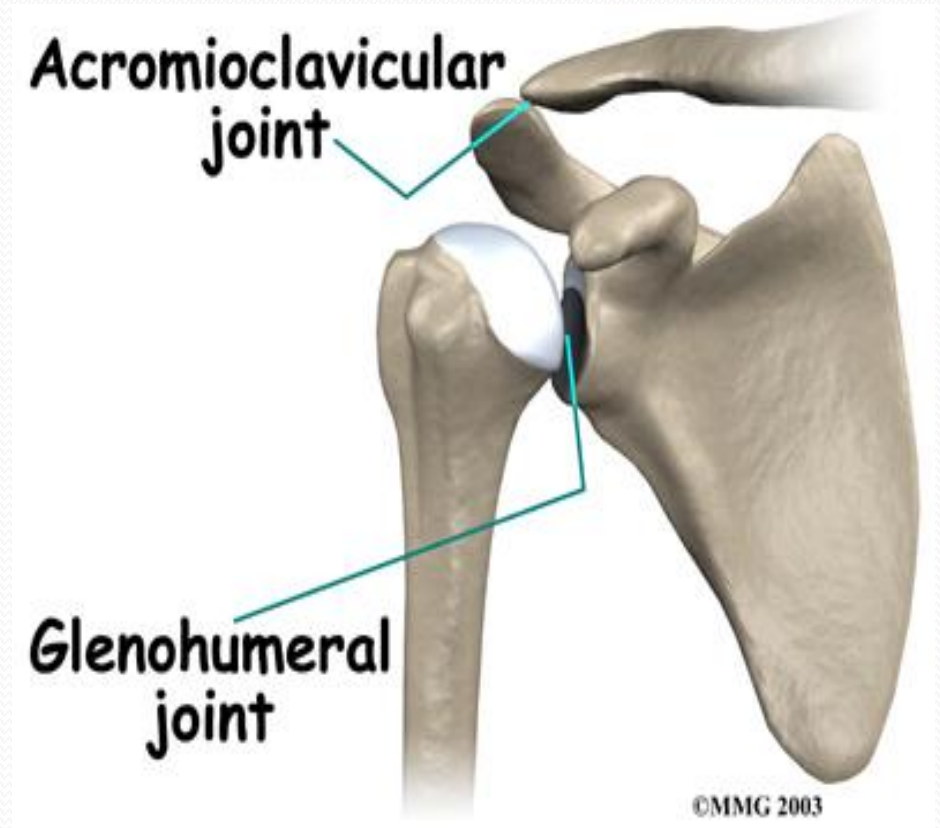
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# A “delicate” or “unstable” joint ?



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*The “ball” is too big to sit snugly in the socket.....unless....*

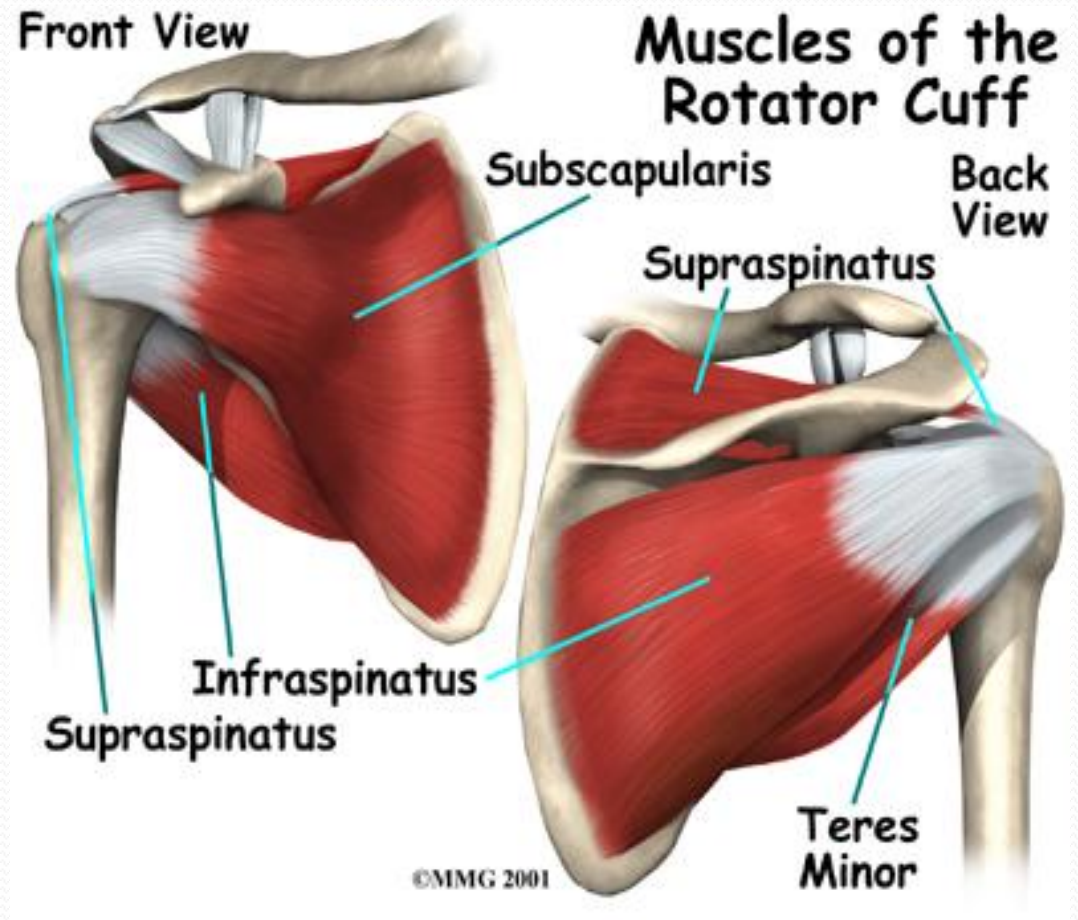


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*A specifically designed muscular system provides the stability to keep the head of the humerus “ball” in the glenoid labrum of the scapular – the “socket”.*

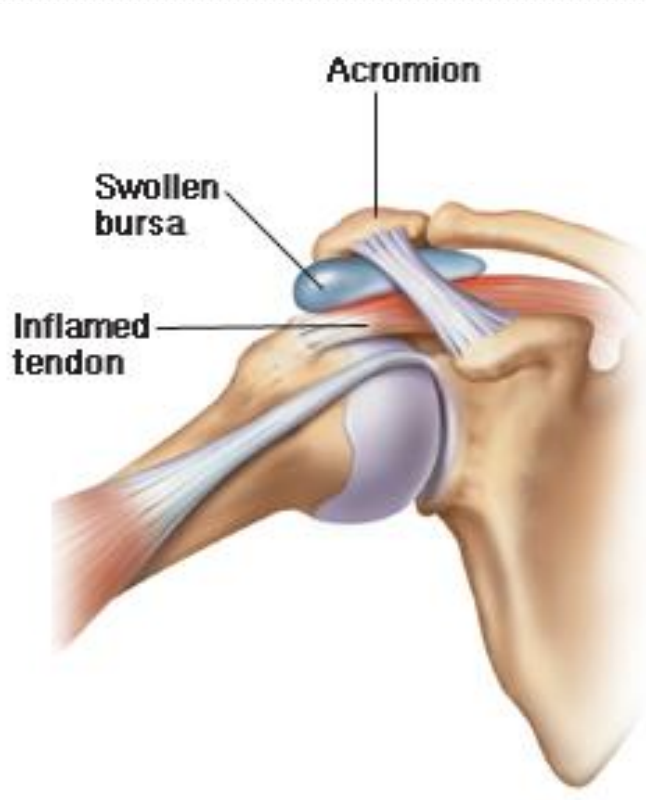
*ie. **The Rotator Cuff***



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# “Swimmers Shoulder”

In a “nutshell” – when the subacromial space is narrowed for extended/repeated periods of time an inflammatory change occurs in the bursa between the rotator cuff tendons and the acromion. With greater fluid in this bursa, the space is narrowed further and the tendon materials undergo chronic change – ***tendinosis*** – at the point of greatest pressure.



**THIS EQUALS PAIN!!**



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# Causes;

**Intrinsic** – hooked acromion  
Scapular dyskinesia  
Muscular imbalance  
Excessive joint laxity without control  
Postural thoracic spine issues

*Responsibility of the swimmer to screen and optimise*

**Extrinsic** – load/volume  
technique  
excessive/non-periodized use of hand  
paddles

*Responsibility of the coach to monitor and adjust*

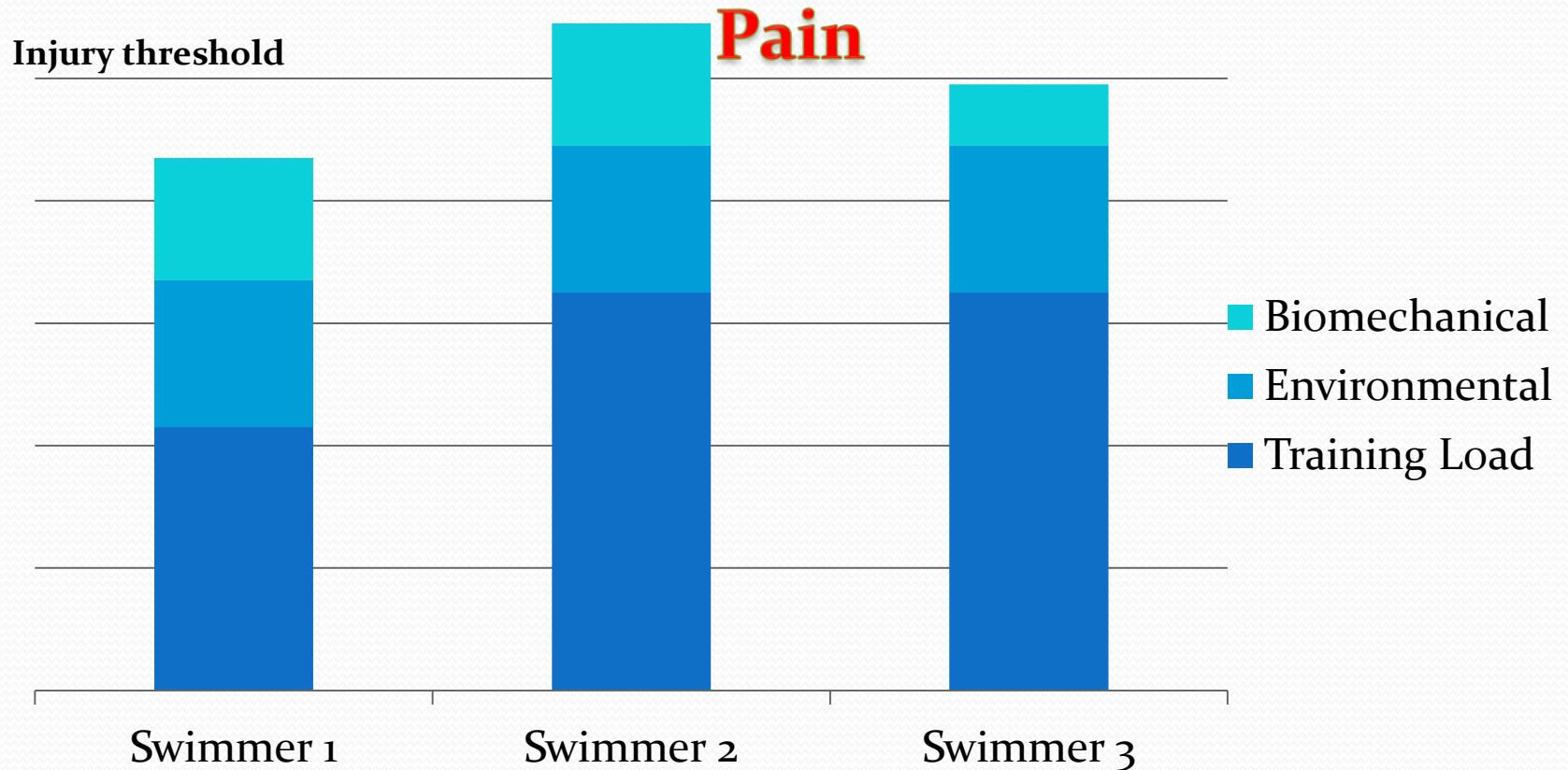


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# Factors causing pain



*Hooper 2011*

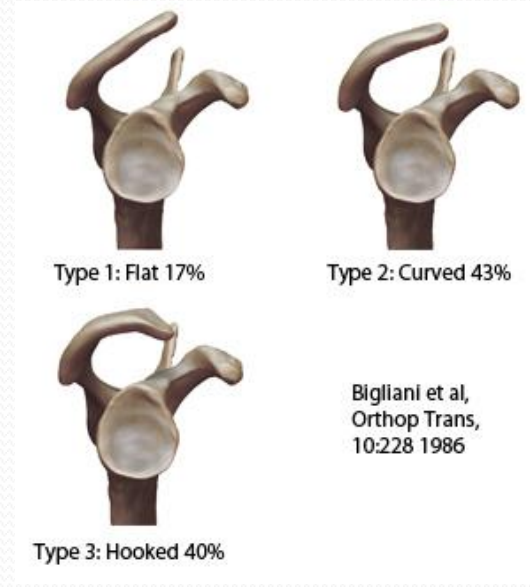


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# Intrinsic Risk Factors for Swimmers Shoulder

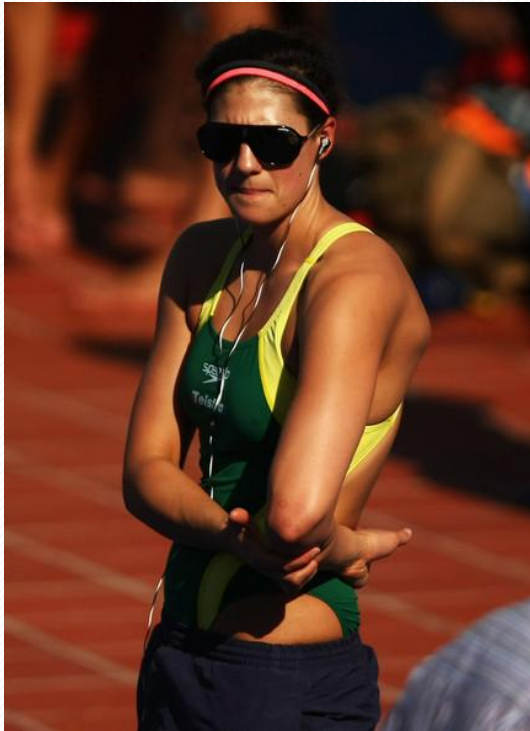
**BASICALLY** ; anything which narrows the subacromial space has the potential to cause pain via the process of tendonosis (especially when subjected to repeated narrowing).

## **1. Hooked acromion**



## 2. Scapula dyskinesia

Also known as “winging” scapula.  
The scapula should follow the contours of the ribcage when elevated above 90 degrees.



## 3. Muscular Imbalance

Typical mental image of a swimmer;  
Strong pectoral muscles and rounded shoulders?

OFTEN find swimmers disproportionately  
“built”/strong in the shoulder internal  
rotators. Strength ratio of internal to external  
rotators should be 3 : 2 !!

*(Implications for dryland and swim program structuring?!)*



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## 4. Excessive joint laxity

Many elite swimmers generally hypermobile

Risk factor for joint injury in age-groupers if not monitored and if training does not reflect progressive increases in intensity



and volume with adequate time for adaptation.

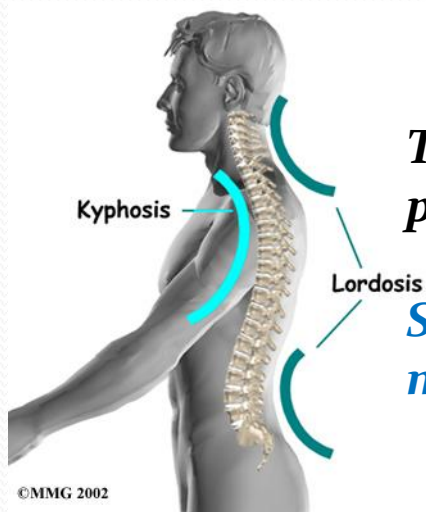
Shoulder subluxation (1/2 way to dislocation) is common in this group with fatigue and loading – careful monitoring is required.

*We will look at a screen for general hypermobility later.*



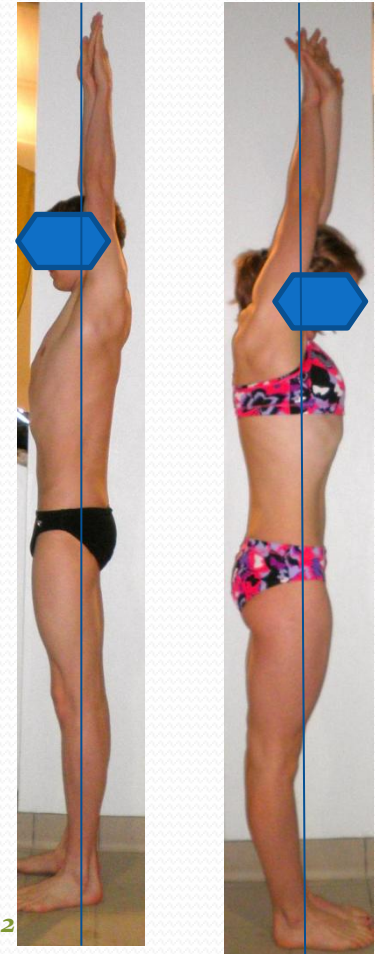
## 5. Postural thoracic spine issues

- Normal posture includes three curves.
- The flattening of these curves OR exaggeration of them indicates muscle “tightness” OR lack of muscular stability.
- Some of these postural changes occur with rapid growth of muscles.



*These changes should influence the priorities of a dryland program ....*

*Static stretching to increase length of muscles vs progressive stability program.*



*Images used by permission Brett Doring – physiotherapist presenter to National ASCTA conference 2012*



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# Extrinsic Risk Factors for Swimmers Shoulder

## Recapping:



load/volume

technique

excessive/non-periodized use of hand  
paddles

**ANY technique that narrows OR unduly loads the subacromial space more than another should be questioned in terms of it's long term effect on the shoulder joint!**



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# COMMON TECHNIQUE ERRORS;

- hand across the midline
- dropping elbow
- straight arm recovery (without roll)
- thumb first catch (free/fly)
- flat catch (back)
- head position too high (hips down)
- incomplete pull phase
- inadequate body roll



Swimming Biomechanics and Injury  
Prevention

New Stroke Techniques and Medical Considerations

James N. Johnson, MD

Jason Gauvin, PT, ATC

Michael Fredericson, MD

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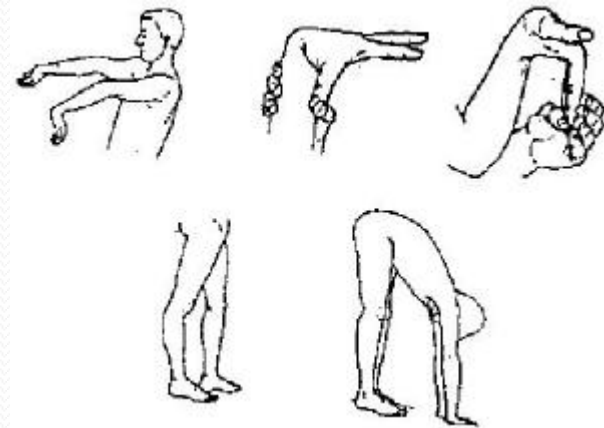
# Screening Tests

GOAL – IDENTIFY hypermobile athlete?

- athlete with decreased range of joint movement?

## Test for general hypermobility

*Implications for coaches/athletes; greater emphasis given to stability and control.*



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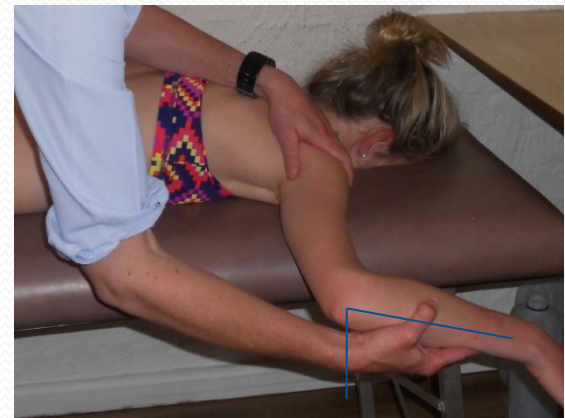
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# Shoulder screening tests

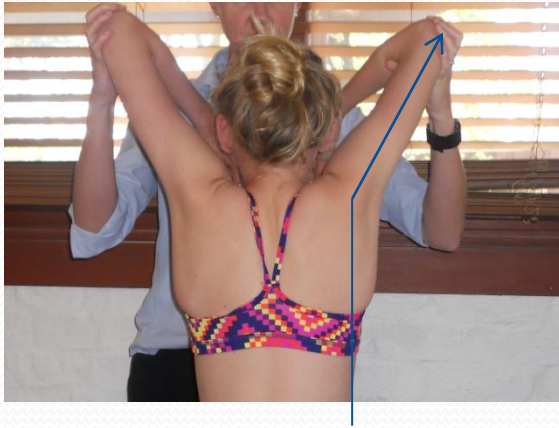


**Internal Rotation** between 40 - 50 degrees is ideal for freestyle, butterfly and backstroke.  
*Without optimal internal rotation a swimmer is unable to achieve early catch or maintain a high elbow.*

**External Rotation** between 80 - 110 degrees is optimal. Required for the recovery part of the Stroke.



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### **Abduction with Internal Rotation**

Another important measure for the swimmer's ability to achieve and maintain a high elbow throughout a stroke cycle. A good range for this is > 150 degrees.

*(Can be improved by stretches into abduction and internal rotation, other stretches and massage).*

### **Scapular Control**

Check if the scapular wings with movement.

- i) Moderately loaded (push up on wall)
- ii) Loaded (push up) +/- to fatigue



# Preventing shoulder injury

## What do we know?

- *External rotators should be 2/3rds as strong as internal rotators (most age-groupers need to strengthen external rotators ?use backstroke recovery, dryland priority)*
- *Scapular needs to be a stable base for ALL shoulder movement (scapular stability exercises in the dryland program)*
- *Internal rotator range needed for efficient technique (stretches to ensure this – unless hypermobile)*
- *Technique should NOT narrow the subacromial space unduly eg. Cross midline, thumb first catch...*



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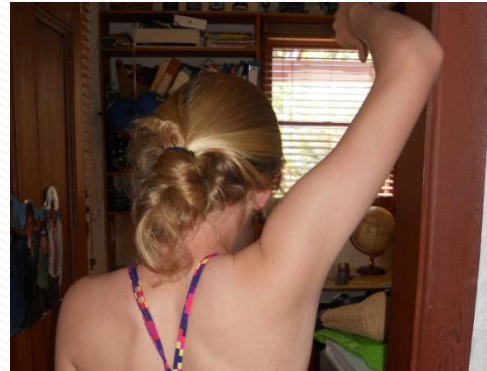


# Essentials for a dryland program

## 1. Stretch AbIR to achieve optimal range

*(Even hypermobile athletes will need to stretch in periods of heavy volume and intensity to MAINTAIN range)*

To achieve lengthening of the muscle; 3 reps x 30 secs



## 2. Strengthen external rotators



Substitute medicine balls, theraband for dumbbells. Backstroke for recovery?  
Use a progressive overload over the season to achieve strengthening.  
Eg. 1 x 10 reps for 2-3 weeks; then 2x10 reps etc.



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### 3. Scapular stability exercises



#### Lower trapezius strengthening

Stand with your arms extended straight overhead and grasp a short **resistance band** with your hands at shoulder width and palms facing forward. By pulling the shoulder blades back and down and flexing the elbows, lower the band to a position behind your neck. The band will stretch as this action is performed. You'll feel the effort in the muscles at the base of your shoulder blades. Do not let your chin protrude forward; keep it tucked. Pause briefly with the band behind your neck and return to the starting position. Repeat 10 times.

#### Scapular push-up

Assume a standard push-up position. Keeping your elbows locked, retract the shoulder blades so your torso sinks a couple of inches toward the floor. Now protract your shoulder blades fully, so your upper back takes on a slightly hunched look. Return to the starting position, and repeat 10 times.

