The following three articles will attempt to achieve three things for the discerning Exercise and Allied health Professionals:

- Clarify some areas of current thinking and research about shoulder muscle imbalance, injury and rehab
- Bring research and practical / clinical knowledge to bear on Subscapularis, Serratus Anterior and Lower Trapezius muscles, that need focus and retraining for Injury Prevention and in the majority of shoulder problems
- Introduce some new rehab drills around 3 distinct Zones of elevation, to aid in the relearning and rehab process of these critical muscles.

Let’s be clear: most shoulders doing exercise in the gym are more imbalanced in their musculature than they may at first seem. Whether they are painful shoulders, or have any degenerative changes that would show up on an MRI scan, or not, is a secondary matter. If a shoulder complex gradually is becoming ‘fixed’ in a dysfunctional movement pattern due to muscle imbalance, it is only a matter of time.

Patho-mechanics (poor movement control around the scapula and gleno-humeral joint) usually precede pathology (breakdown of fragile tendons, bursae and labral structures), which precedes pain (you feel some discomfort or perception of a problem during or after a workout). Mild instability and sub-acromial impingement may be taking place during your workouts, even if there are as yet no obvious signs of it to you. True!
WHAT ARE THE CLASSIC (MOST COMMON) MUSCLE IMBALANCES AROUND THE SHOULDER?

In our last article we explored in some depth the “unrenovated house” that is the imbalanced shoulder: the roof (the scapula and its acromion process) has a tendency to cave in onto the “furniture” (supraspinatus, bursa, labrum), and in around 50-70% of impingement cases (5,6,7) the unstable floor that shifts and shears under load (functionally unstable head of humerus in the glenoid socket).

Remember this picture from a previous article in the Rehab Trainer Library? (if not go to “The Gym Junkie’s Shoulder”)

1 “Roof” – acromion process, coraco-acromial ligament and the coracoid process
2 “Living space” (sub-acromial bursa not shown); “Furniture” includes SSspin/ISspin/Long head biceps
3 “Floor “ – bony head of the humerus

**Roof of the shoulder**: combined anatomy of the acromion process, coraco-acromial ligament and coracoid process

**Floor of the shoulder**: the head of humerus (the “ball” in the socket)

**The living room**: the sub-acromial space

**The furniture**: includes the supraspinatus, infraspinatus and (less so) teres minor tendons, the sub-acromial bursa, the labrum (posterior, superior through to anterior portions). We could loosely include the long head of biceps and subscapularis tendons as furniture that can get inflamed under the coraco-acromial ligament in the anterior shoulder, in a true anterior impingement – though this is relatively rare for the ‘gym junkie’.

The term we loosely use to describe the forces that create these destructive movements is “**muscle imbalance**”. The brain gradually seems to re-wire itself as muscle imbalance sets in – we could perhaps say that the “**volume gradually gets turned down on certain movements and muscles**” as they become less used, and with other movements and muscles the “**volume slowly gets turned up**”.

Thsough, inequalities are created in how easily certain muscles are selected for functional movements, and dominance / inhibition patterns are created. In time these neuro-muscular adaptions become physiological with length-tension changes following (dominant muscles become shortened and more powerful, and inhibited muscles become lengthened and weak).
Here is a list of the most critical imbalances to understand around the shoulder (you or your clients may have any or all of these):

<table>
<thead>
<tr>
<th>Classic muscle imbalance description</th>
<th>Muscles involved in a dominance pattern</th>
<th>Resulting movement patho-mechanics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Global internal rotators (&quot;Chest&quot;) TURNED UP&lt;br&gt;Global external rotators (&quot;Back&quot;) TURNED DOWN</td>
<td>Pec major / lat dorsi /teres major DOMINANT OVER&lt;br&gt;Rhomboïds / trapezius / infraspinatus / teres minor</td>
<td>Poor scapular retraction on push-pull exercises, esp damaging on bench/chest press as the scapula is unable to retract at the bottom of the movement causing rotator cuff damage.&lt;br&gt;Thoracic kyphosis (structural or functional) worsened, limiting overhead flexibility.</td>
</tr>
<tr>
<td>Scapular Elevators TURNED UP&lt;br&gt;Depressors TURNED DOWN</td>
<td>Rhomboïds and levator scapulae (less so Upper traps)&lt;br&gt;Dominant OVER&lt;br&gt;Mid-lower trapezius</td>
<td>Very impure protraction and retraction of scapula on seated row / one arm dumbbell row. Poor flexibility in overhead positions. Tendency to protracting chin and compressing the neck.</td>
</tr>
<tr>
<td>Scapular downward rotators TURNED UP&lt;br&gt;scapular upward rotators TURNED DOWN</td>
<td>Pec minor / rhomboïds / levator scapulae&lt;br&gt;Dominant OVER&lt;br&gt;Lower trapezius / serratus anterior / upper trapezius</td>
<td>Will affect most exercises, but especially any overhead work such as shoulder press, kettle bells or throwing conditioning. Rotator cuff overload and impingement will eventually result.&lt;br&gt;&quot;Deltoid burn&quot; is potentially evidence of external rotator cuff overload, due to insufficient upward rotation and posterior tilt of the scapula.&lt;br&gt;Upper Trapezius becomes less effective for maintaining scapular elevation, causing depressed and downwardly rotated scapular position: neural structures commonly overloaded as brachial plexus tractioned.</td>
</tr>
<tr>
<td>External rotator cuff TURNED UP&lt;br&gt;Internal rotator cuff TURNED DOWN</td>
<td>Teres minor / infraspinatus&lt;br&gt;Dominant OVER&lt;br&gt;Subscapularis&lt;br&gt;Supraspinatus may also be inhibited, allowing the head of humerus to elevate early in abduction&lt;br&gt;(There may also be overall signs of Deltoid being DOMINANT OVER Rotator Cuff)</td>
<td>Forward sitting and externally rotated head of humerus in the glenoid socket; external rotator tightness gradually causes impingement of sub-acromial structures during most movements. Hand behind back limitation of flexibility is an early sign.&lt;br&gt;With excessive &quot;lurching&quot; of the head of humerus during push-pull movements, the rotator cuff does not control gleno-humeral movement early enough, and instead the deltoid learns to respond to ‘stretch facilitation’ and becomes the primary stabilizer of the gleno-humeral joint.</td>
</tr>
</tbody>
</table>