Quiz Policies

Eligibility
The NCSF online quizzes are open to any currently certified fitness professional, 18 years or older.

Deadlines
Course completion deadlines correspond with the NCSF Certified Professionals certification expiration date. Students can obtain their expiration dates by reviewing either their certification diploma or certification ID card.

Cancellation/Refund
All NCSF continued education course studies are non-refundable.

General Quiz Rules

- You may not have your quiz back after sending it in.
- Individuals can only take a specific quiz once for continued education units.
- Impersonation of another candidate will result in disqualification from the program without refund.

Disqualification
If disqualified for any of the above-mentioned reasons you may appeal the decision in writing within two weeks of the disqualification date.

Reporting Policy
You will receive your scores within 4 weeks following the quiz. If you do not receive the results after 4 weeks please contact the NCSF Certifying Agency.

Re-testing Procedure
Students who do not successfully pass an online quiz have the option of re-taking. The fees associated with this procedure total $15 (U.S) per request. There are no limits as to the number of times a student may re-test.

Special Needs
If special needs are required to take the quiz please contact the NCSF so that appropriate measures can be taken for your consideration.

Quiz Rules

What Do I Mail Back to the NCSF?
Students are required to submit the quiz answer form.

What do I Need to Score on the Quiz?
In order to gain the .5 NCSF continued education units students need to score 80% (8 out of 10) or greater on the CEU quiz.

Where Do I Mail My Quiz Answer Form?
You will mail your completed answer form to:

NCSF
Attn: Dept. of Continuing Education
5915 Ponce de Leon Blvd., Suite 60
Coral Gables, FL 33146

How Many CEUs Will I Gain?
Professionals who successfully complete the any continuing education quiz will gain .5 NCSF CEUs per quiz.

How Much does each quiz cost?
Each quiz costs the student $15.00.

What Will I Receive When The Course Is Completed?
Students who successfully pass any of the NCSF online quizzes will receive their exam scores, and a confirmation letter.

How Many Times Can I Take The Quizzes For CEUs?
Individuals can take each NCSF quiz once for continuing education credits.

CEUQuiz

A CLOSER LOOK AT

Shoulder Complex Dysfunction

Certainly the more physically active a person is the greater their risk for injury. It may seem counterintuitive but the facts are a healthy body requires movement, and movement by its nature places greater stress on the body presenting in both positive and (sometimes) negative outcomes. The glenohumeral (or shoulder) joint and the shoulder girdle represent a common area of dysfunction and consequent risk of injury among athletes and fitness enthusiasts alike. One of the most common forms of injury resulting from shoulder capsule and/or scapular dysfunction is shoulder impingement syndrome. This syndrome most commonly occurs during sports or activities requiring repetitive overhead movements, or with repeated action upon a biomechanically-compromised joint. Symptoms often include pain and loss of functional range of motion (ROM) during the performance of overhead movements and various shoulder actions. Chronic impingement can lead to significant muscle damage and further scapular/shoulder dysfunction. Essentially, repeatedly performing overhead activities in an improper manner, albeit due to dysfunction or poor movement technique, drives the rotator cuff in position to rub against the acromion process of the scapula. When this occurs the constant friction causes the rotator cuff itself to become inflamed and swollen (tendonitis). Consequently, the rotator cuff becomes trapped or pinched under the acromion. This issue also promotes inflammation within bursa (fluid-filled sacs designed to reduce frictional forces within a joint) found in the glenohumeral joint capsule. In severe cases, bone spurs or changes in the normal contour of bone can develop and connective tissues may fray.

Glenohumeral and scapular dysfunction present a significant risk for connective tissue damage and various issues that limit function within the kinetic chain. This article will serve to investigate the causes and effects of the two main issues, scapular dyskinesis (or altered scapular positioning and motion) and posterior shoulder capsule tightness on shoulder function, risk for injury, and common limitations in physical activity or sport.

The scapula serves many functions to facilitate a healthy and efficient shoulder joint. In fact, the scapula plays a key role in almost all aspects of normal arm/shoulder function, including, but not limited to: performing synchronized rotational actions during humeral motion; serving as a stable foundation for rotator cuff activation; and functioning as an integral link in the kinetic chain during activities involving the upper extremities. These functions, and many others, can only be fulfilled when the anatomical structures surrounding and interacting with the shoulder function properly. The presence of bony or soft tissue injury, as well as any muscle weakness or imbalance can alter the postural position and movement patterns of the scapula. An altered position, and the consequent kinematics often due to multi-directional instability, has been termed scapular dyskinesis. Scapular dyskinesis is associated with most shoulder injuries (e.g., shoulder impingement, rotator cuff disease, labrum injury, clavicle fracture, and acromioclavicular joint injury), but it usually appears as a non-specific response to a painful condition in the shoulder complex more so than an explicit response to a specific glenohumeral pathology. In other words, scapular dyskinesis is usually caused by unnatural pain circuits with consequent muscle or connective tissue dysfunction. Blatant issues such as scapular winging and audible snapping can be easily identified, but additional steps should be taken to understand how all issues within the shoulder complex are integrated before a comprehensive rehabilitation plan can be developed.

Certainly skeletal deviations are apparent to competent practitioners, but only a medical doctor can diagnose scapular dyskinesis during a medical examination. This process should consist of a visual inspection of the scapular position both at rest and during various humeral movements, as well as the employment of postural measurements. If these processes are correctly implemented, one can recognize the scope of scapular involvement in (or the potential for) a given shoulder complex injury. Research has identified normal, three-dimensional scapular kinematics and proper scapulohumeral rhythm, as well as common abnormal kinematics during various shoulder injuries/pathologies.

Scapulohumeral rhythm describes the movement of the scapula across the thoracic ribcage in relation to the humerus. This rhythm is compromised by any issue that alters the positioning of the scapula. Common causes of faulty rhythm include an imbalance in the trapezius, (usually being strong upper fibers and weak middle/lower fibers) or a forward head posture (i.e., kyphotic upper back). Among other functions, scapulohumeral rhythm serves two major purposes: (a) it preserves the length-tension relationships of glenohumeral musculature to allow for sustained force through a greater ROM (e.g., during an overhead press, the anterior and medial heads of the deltoid do not shorten as quickly as they would without the simultaneous upward rotational movement in the scapula), and (b) it helps prevent impingement between the humerus and the acromion.

As it relates to normal or abnormal scapular kinematics, the literature does not seem completely consistent with regard to the scapula's resting position, but the scapula is usually positioned approximately horizontal, internally rotated by 35°, and with a 10° anterior tilt. This explains why the scapular plane is not a true frontal plane motion (30° anterior). During normal

shoulder elevation, most researchers concur that the scapula tilts posteriorly and rotates both upward and externally. Patients with shoulder impingement syndrome generally demonstrate decreased upward scapular rotation, a decreased posterior tilt, and a decrease in external rotation during the same movement. Those with impingement also demonstrate greater scapular upward rotation and clavicular elevation during flexion of the shoulder. This may help to explain some of the cause for limited ROM or faulty movements which commonly occur during overhead pressing or other actions involving shoulder flexion within this population. In all actuality, those with shoulder impingement demonstrate limited ROM and force capacity in all directions when compared with their healthy counterparts. An easy assessment of function is the Apley Back Scratch Test. Internal rotation of the humerus at the high side with poor internal rotation at the low side is commonplace among those at risk.


Apley Back Scratch Test

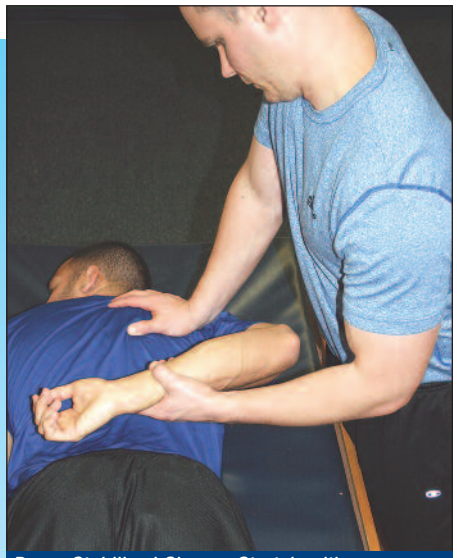
Scapular dyskensis is also a consequence to posterior glenohumeral joint capsule tightness. Among other actions, this severely limits functional ROM through shoulder internal rotation. Glenohumeral internal rotation deficit (GIRD) can have significant negative effects on overhead movements or sport activities due to its effects on scapular positioning. Research published in the *Journal of Orthopaedic & Sports Physical Therapy* examined 23 subjects who had participated in competitive sports involving overhead activity for five years; they were categorized into two groups based on the presentation of GIRD (defined by a 20% deficit). The scapular positioning of subjects performing shoulder internal rotation from a position of 90° of shoulder flexion and abduction was evaluated using 3-dimensional electromagnetic surface tracking. Additional sensors monitored trunk and humeral motion. Scapular position data at the terminal end position of shoulder internal rotation, along with total shoulder internal rotation ROM measurements were used to analyze the relationship between GIRD and scapular position. The GIRD group had significantly greater anterior tilting of the scapula (approximate 9.2° difference) across positions compared to the control group. Specifically, a significant association between GIRD and (a) scapular anterior tilting during flexed internal rotation, and (b) scapular anterior tilting and upward rotation during abducted internal rotation was seen. These findings clearly demonstrate the significant relationship between GIRD and abnormal scapular positioning, which increases the risk for injury. This potential for injury (with the presence of GIRD) during the movement patterns examined was reinforced in another study published in the *Journal of Orthopaedic & Sports Physical Therapy*, which quantified the relative strain of numerous movements on tissues of the shoulder. In summary, the researchers found tissue strain to be greatest with one of the same movement combinations – glenohumeral internal rotation combined with humeral flexion. Secondly, internal rotation combined with abduction produced greater strain than the other rotational combinations examined, as well as cross-body adduction. A practical application here would be to consider that the potential for abnormal scapular positioning and tissue strain are greatest during exercises that biomechanically mimic an upright row, especially if the pull migrates into the sagittal plane and forces additional flexion.

Now, the act of overhead throwing in itself places high stress on the joints/tissues of the shoulder and arm, as demonstrated by the commonality among throwing athletes to exhibit altered shoulder internal and external ROM in the dominant arm when compared with the non-dominant arm. Therefore, one can easily infer that throwing actions may promote scapular dyskinesis over time, when muscular imbalances are not addressed in a training program. Dyskinesis can exist as a result of alterations to bony structures, the shoulder capsule (e.g., posterior thickening/tightness), or muscles in response to high-volume throwing over a number of years; either way, when GIRD reaches ≥20°, alterations in scapular biomechanics during the "wind-up" or "follow-through" actions frequently lead to impingement and/or labral pathology.

Due to this known correlation, research has examined the effects of specific stretching protocol on passive GIRD in overhead throwing collegiate athletes, as well as other populations. A study published in the *International Journal of Sports Physical Therapy* investigated the effects of stretching on NCAA Division I baseball players using goniometric measurement and assessment. Craig Morgan, MD explained that "the stretching protocol used in the study may indeed limit the progressive decline of shoulder functionality associated with GIRD", otherwise known as the "pathological cascade of the throwing shoulder." He specifically claims that the tearing of the posterior-superior labral rim can be avoided by initiating posterior capsule stretches early in the cascade, potentially eliminating connective tissue restriction. He states that the first sign of this cascade is a painless loss of velocity and command caused by an early loss of glenohumeral internal rotation, secondary to posterior capsule restriction. This restriction is caused by changes in connective structures in the area that make them less elastic. Once this cascade has begun, GIRD will cause the posterior-inferior capsule to become progressively less mobile. This increased tightness leads to greater total posterior shoulder stiffness and reduced ROM, minimizing the thrower's ability to properly prepare for, or engage in competition. In later stages, posterior shoulder pain may present (without mechanical symptoms) during the late cocking and early acceleration phases of the throwing cycle due to posterior-superior glenohumeral instability. Posterior-inferior capsular restriction shifts the humerus into a posterior-superior position, adding undue strain on the labral-glenoid complex. This repositioning also allows for increased ROM through external rotation; placing the rotator cuff in position to contact the glenoid margin and resulting in symptoms of internal impingement. In the final stage of the cascade, restriction and the resultant posterior-superior shift leads to the development of mechanical symptoms due to subsequent failure of posterior-superior labrum anchors (including the biceps tendon). This loss in anchoring tension from the glenoid attachments allows anterior-superior translation of the humeral head during forced humeral elevation with internal rotation, as

Prone Sleeper Stretch

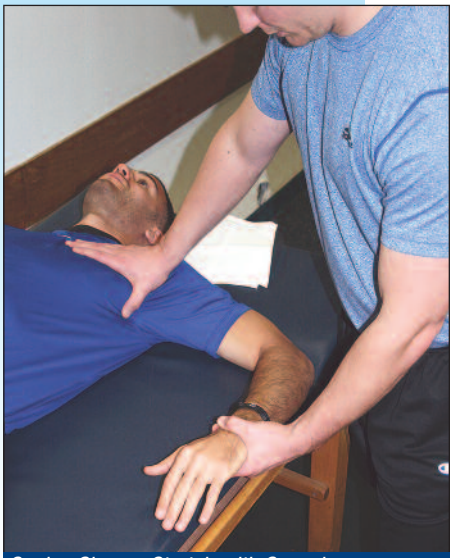
Prone Stabilized Sleeper Stretch with Assisted Rotation



Prone Stabilized Sleeper Stretch with Extension and Internal Rotation

Sidelying Sleeper Stretch

Supine Sleeper Stretch with Scapular Stabilization at 45



Supine Sleeper Stretch with Scapular Stabilization at 90

seen with overhead throwing. In time, this leads to the tearing of the posterior-superior labral rim due to damaging superior labral anterior-posterior movement, known as the "SLAP event." Once the SLAP event has occurred, mechanical symptoms usually require surgical intervention.

In an investigative effort to develop stretching protocols that lower the risk for tearing the labral rim, the research team first determined the degree of GIRD in the throwing shoulder of each study participant. They then administered a daily (five days/week) posterior capsule stretching program for a total of 12 weeks. The program involved the implementation of six specific stretches, referred to as sleeper stretches, for three to five 30-second holds. Post-stretching internal and external rotation measures were obtained. The coaches and athletic trainers involved in the study also monitored the players for shoulder injuries and innings of competition lost due to shoulder injuries during the intervention period. Following the 12-week program, a significant increase in dominant arm internal rotation ROM was observed, as well as total rotator cuff mobility. Clearly, the posterior capsule stretching program involving the sleeper stretches was helpful for facilitating increased passive internal rotation ROM at the glenohumeral joint, which is crucial with the presentation of GIRD in throwing athletes.

In any case, treatment of scapular dyskinesis and capsule tightness must ultimately strive to restore dynamic scapular stability by strengthening scapular stabilizers utilizing appropriate kinetic chain-based rehabilitation protocols and applying applicable stretching techniques. The following flexibility activities can be used to help regain scapular balance and stability in throwing athletes and recreational lifters alike. Due to the fact that they emphasize capsule stretching over muscle stretching they can be used prior to loading without reactive relaxation to improve performance and reduce the risk for injury.

CEU Quiz

Shoulder Complex Dysfunction

1. _____ is directly associated with the performance of repetitive overhead movements and/or biomechanically compromised lifting techniques.
   a. Scapular dyskinesis
   b. The SLAP event
   c. Shoulder impingement syndrome
   d. Abnormal scapulohumeral rhythm

2. _____ is a term used to describe altered scapular positioning and motion.
   a. Scapular incongruence
   b. Scapular dyskinesis
   c. Scapular impingement
   d. Scapular disruption

3. True or False? The scapula performs synchronized rotational actions during most humeral motions.
   a. True b. False

4. Which of the following is considered a normal (or healthy) scapular tilt when it is in a resting position?
   a. A 15° anterior tilt
   b. A 15° posterior tilt
   c. A 10° anterior tilt
   d. A 10° posterior tilt

5. Posterior glenohumeral joint capsule tightness commonly limits functional range of motion through shoulder _____.
   a. adduction
   b. external rotation
   c. abduction
   d. internal rotation

6. With glenohumeral internal rotation deficit (GIRD), scapular positioning is usually altered in which of the following ways during overhead throwing?
   a. The scapula undergoes increased posterior titling and retraction
   b. The scapula undergoes decreased protraction
   c. The scapula undergoes increased anterior tilting and upward rotation
   d. The scapula undergoes increased retraction and downward rotation

7. According to research, when glenohumeral internal rotation experiences a functional deficit of _____, scapular biomechanics during overhead throwing are commonly altered.
   a. <5° b. >10° c. ≥15° d. ≥20°

8. True or False? The progressive decline in shoulder functionality associated with GIRD often results in tearing of the posterior-superior labral rim.
   a. True b. False

9. _____ translation of the humeral head during explosive overhead throwing is a result of GIRD and scapular dyskinesis.
   a. Anterior-posterior
   b. Posterior-inferior
   c. Anterior-superior
   d. Posterior-medial

10. True or False? Research has demonstrated that an appropriate anterior capsule stretching program can be effective in reducing the presentation of GIRD among throwing athletes.
    a. True b. False

CEU Quiz Answer Sheet — Shoulder Complex Dysfunction

Directions: Fill in each blank with the correct choice on the answer sheet. To receive 0.5 CEUs, you must answer 8 of the 10 questions correctly. Mail a copy of the completed quiz with a check or money order for $15 to NCSF, Attn: CEU department, P.O. Box 163908, Miami, FL 33116.

1. ____	**4.** ____	**7.** ____	**10.** ____
2. ____	**5.** ____	**8.** ____	
3. ____	**6.** ____	**9.** ____	

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Quiz Answer Form

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Quiz Answers

1. _____ 6. _____
2. _____ 7. _____
3. _____ 8. _____
4. _____ 9. _____
5. _____ 10. _____

Fill in each blank with the correct choice on the answer sheet. To receive 0.5 CEUs, you must answer 8 of the 10 questions correctly.

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