CAPULAR STABILITY allows proper positioning of the scapula on the thorax during upper extremity movements and directly influences rotator-cuff-muscle performance and glenohumeral arthrokinematics. There is also evidence suggesting that rotator-cuff fatigue indirectly alters scapular arthrokinematics.1 This possibly occurs from scapula-muscle fatigue associated with providing a stable platform for the rotator-cuff muscles.1 Thus, a comprehensive therapeutic exercise program that addresses strength and endurance is important to safeguard against upper extremity muscle weakness and fatigue.

Proprioceptive neuromuscular facilitation (PNF) is one of many therapeutic exercise interventions used to restore range of motion and motor control.2-4 Advantages of PNF include the incorporation of functional movement and its association with enhanced motor recruitment via irradiation, stretch reflexes, and proprioception.2,3,5 This column presents the first diagonal (D1) of PNF techniques for scapular-muscle rehabilitation.

### Positioning the Athlete

Placing the athlete in side-lying is perhaps the easiest way for the clinician to control the involved scapula. The athlete should lie on the unaffected side with a pillow between the knees and underneath the head. Ensure that body segments are in a neutral position—the head properly aligned with the trunk (watch for excessive cervical flexion) and the trunk not rotated or laterally flexed. Observe the scapula and pelvis for neutrality, paying particular attention to excessive protraction and retraction of either.

### Important Application Parameters

There are several general guidelines to follow when applying scapular PNF. First, the clinician should guide the athlete through the movement patterns a few times for familiarization. Second, scapular movement will occur in an arc as it articulates with the thorax, so the clinician’s hands and body should move with the athlete in order to provide the appropriate direction to the resistance force. Third, the clinician should position him- or herself so that scapula movement occurs directly toward or away from him or her such that their body is “within” the athlete’s movement diagonal. It is very difficult to control the athlete’s movement or apply appropriate force from “outside” the diagonal. Finally, the clinician should use a lumbrical grip to distribute force evenly over the desired muscles (see Figure 1).2

### Movement Patterns

The scapular patterns move in two different diagonals: D1 and Diagonal 2 (D2). These diagonals intersect...
to form an “X” when viewed from the superior position. Unlike the extremity PNF patterns that contain complex component movements involving multiple joints, the scapular patterns essentially consist of four total-component movements: elevation, depression, protraction, and retraction. The scapula moves from posterior (retracted) depression to anterior (protracted) elevation in D1, whereas it moves from posterior elevation to anterior depression in D2.

Diagonal 1

Once the athlete is in the appropriate position with proper alignment, the clinician stands or kneels behind him or her, depending on whether the athlete is side-lying on a high table or low plinth. Movement can begin at either end of the pattern, that is, in either posterior depression or anterior elevation. The following movement descriptions refer to the right scapula.

Concentric Movement From Anterior Elevation to Posterior Depression

When the athlete moves the right scapula from anterior elevation to posterior depression, the clinician places his or her left hand on the spine of the scapula while the left hand “frames” the inferior border of the scapula using the thumb and index fingers in an “L” shape (Figure 2A). Only the palm of the right hand should contact the spine of the scapula. The athlete’s scapula begins in a position of protraction and elevation without any associated trunk rotation, and the clinician instructs the athlete to move the scapula “downward and back” into his or her hands. There should not be any associated trunk rotation during the movement—the clinician should ensure that the diagonal remains close to the body, which allows better isolation of the scapula muscles. The scapular depressors and retractors act concentrically to produce the movement in this pattern.

Eccentric Movement From Posterior Depression to Anterior Elevation

Once the athlete is in the position of scapular retraction and depression, the clinician might choose to move the scapula back into the protracted position with elevation as the athlete resists the movement, which now causes the scapular depressors and retractors to act eccentrically. Note that the clinician’s hand placement does not change during the eccentric phase of this movement (Figure 2B).

Concentric Movement From Posterior Depression to Anterior Elevation

Body positions for both athlete and clinician remain the same for concentric movement from posterior depression to anterior elevation. The clinician places the athlete’s scapula in retraction and depression and then instructs the athlete to move the shoulder into elevation and protraction. Again, it is helpful to allow several practice movements, which can be passive or active. Clinician hand placement changes to allow proprioceptive input and resistance to the scapular elevators and protractors (Figure 3A). Both hands essentially overlap, with a lumbrical grip over the anterior acromion process; it is helpful, however, to place the hand that was formerly framing the inferior border of the scapula on top of the other hand (the one

Figure 2. The beginning scapular position and respective hand placements for (A) concentric movement from anterior elevation to posterior depression and (B) eccentric movement from posterior depression to anterior elevation.