Anatomy: The glenohumeral joint of the shoulder complex is a synovial joint composed of three bones: humerus, scapula, and clavicle. Overall, stability is achieved through the static and dynamic structures of the associated muscles, tendons and ligaments. Normally the head of the humerus remains centered in the glenoid fossa, which allows for the joint surfaces to align congruently with one another and move through a full range of motion. The most common structures often involved in shoulder impingement include the tendons of the rotator cuff muscles, particularly the suprasinatus and infraspinatus as well as the tendon of the long head of the biceps and the subacromial bursa. Shoulder impingement occurs when the glenohumeral joint moves out of neutral alignment and the humeral head no longer rests in the center of the glenoid fossa.

Causes/Mechanism of Injury: The rotator cuff tendons pass through a narrow space between the acromion process of the scapula and the head of the humerus. Anything which causes narrowing of this space can result in impingement syndrome by compressing the subacromial structures. In order for the shoulder joint to function properly the thoracic spine, ribs and four shoulder joints (glenohumeral, sternoclavicular, acromioclavicular and scapulothoracic) must work in harmony. When these components are not working together properly the subacromial space is diminished and a shoulder is at risk of impingement. Repetitive movements into this impingement can result in serious damage to these structures. This compression can be caused by boney structures such as subacromial bone spurs and variations in the shape of the acromion. Poor posture and biomechanics can further narrow the subacromial space and predispose an individual to shoulder impingement as the mechanics of the shoulder are changed. With the normal mechanics of the shoulder, this space is the narrowest between 60° to 120° of elevation or at the end of the available ROM. Loss of function of the rotator cuff muscles, due to injury or loss of strength, may cause the humerus to...
move superiorly, further narrowing this space and results in impingement. Inflammation of the subacromial bursa or rotator cuff tendons further worsens shoulder impingement. Impingement can also be worsened if an individual continues to sleep on the involved shoulder.

**Symptoms:** Common symptoms of shoulder impingement are pain which increases with certain activities and decreases with rest, a dull and localized aching that is felt deep within the shoulder, and a painful arc of motion from 60-120 degrees as the arm is lifted sideways. This painful arc is often accompanied by crepitation or a catching sensation during motion. Muscle substitution patterns are often present as the arm is raised overhead and pain can be felt at the end range of motion for raising the arm above the head. Poor postures, loss of motion, muscle weakness or imbalance, and pain with certain shoulder motions are also symptoms of this condition. Specifically, weakness and fatigue in the rotator cuff muscles is evident with this condition and moving the shoulder overhead or across the front of the body may increase pain. Other diagnoses which may cause some of the symptoms of shoulder impingement include rotator cuff tendinitis, biceps tendonitis or rupture, C5-C6 nerve root irritation, irritation of the brachial plexus, acromial bone spurs, adhesive capsulitis or shoulder instability.

**Treatment/Management:** Physical therapy treatment will focus on correcting biomechanical abnormalities and maintaining shoulder ROM. Scapular strengthening will be key in order to increase shoulder retraction and facilitate correct posture leading to an opening of the subacromial space. Patients should avoid overhead activity with the involved shoulder as rest will help the healing process. Over the counter anti-inflammatory medication and ice can help alleviate inflammation as the impingement subsides. Patients should avoid sleeping on the involved side until the injury is resolved as sleeping on the affected shoulder may exacerbate symptoms. Taping techniques can be used in order to help achieve proper glenohumeral positioning. In severe cases cortisone injections may be used and surgical removal of a portion of the acromion may be needed. Patients will benefit from soft tissue mobilization and joint mobilization of the surrounding joints including the thoracic spine, AC/SC joints and posterior capsule. It is important to correct address excessive kyphosis in the spine while treating impingement. A comprehensive strengthening program should emphasize exercising in neutral alignment with proper mechanics. Individuals will have a favorable outcome if they are treated before the onset of degenerative changes.