

The **brachialis muscle** is the principal flexor of the **elbow joint**, because its attachment sites provide the best mechanical advantage in responding to loads on the joint—certainly better than the **biceps brachii**, as you can see. Yet it's the bulge of a contracted biceps that gets all the visual attention! The key to understanding this lies in the insertion of the tendon of the biceps brachii on the tuberosity of the radius. Try flexing the elbow joint with the palm and curled fingers down (pronated forearm). Lift a load with the hand in that position. The biceps muscle has a poor mechanical advantage; the brachialis has a better one, so the brachialis does the work. Now slowly supinate the forearm with that same load, feeling the strength coming into the biceps muscle as it supinates the forearm. Clearly, the biceps brachii is the prime mover in forearm supination, adding to the power of the brachialis. The combined load brings on a bulging biceps brachii. Note the additional attachment of the biceps aponeurosis into the deep fascia of the common flexor group (not shown) in the forearm.

The **brachioradialis** is active in flexion of the elbow and rapid resistance to the powerful elbow extensors of the **triceps brachii**. This three-headed muscle, with its massive tendon of insertion, is the principal extensor of the elbow joint. Of the three heads, the medial head may be the primary antagonist to the brachialis. In fact, it may be not a medial head at all, but a *deep* head of the muscle. Many an olecranon fracture has been prevented by the interface of the thick tendon of the three heads of triceps between the proximal ulna and a potentially injurious force striking the olecranon. The smaller *anconeus*, considered an extension of the medial head of the triceps, assists in the function of elbow extension. The **anconeus** is a very thin muscle almost lost in the fascia on the posterior aspect of the olecranon and upper posterior ulna.

The **pronator teres**, crossing the proximal forearm on its *anterior* aspect, assists in elbow flexion as well as pronation of the forearm. The **supinator** crosses the proximal forearm on its *posterior* aspect; it is an important supinator of the forearm though secondary to the biceps brachii in that function. The tendon of the biceps inserting on the radial tuberosity (see lowest illustration, anterior view) is what gives advantage to the power of supination over pronation when the radioulnar joint is supinated. You might review page 43 ("Integration of Muscle Action") on this topic.

The **pronator quadratus** is the principal pronator of the elbow joint, superior in its mechanical advantage over the **pronator teres**. Pronating the forearm (palm down) involves medial rotation of the radius. Because only the radius can rotate in the forearm, the pronators clearly cross the radius on the anterior side of the forearm, and their origin is ulnar.