1a. Muscle force depends on muscle length according to the force-length relationship. The extrinsic finger flexors shorten as the wrist flexes and lengthen as the wrist extends. Hence the force in the extrinsic finger flexors depends on wrist joint position.

1b. The strongest grip occurs when the wrist is slightly hyperextended. This is to keep the extrinsic finger flexor muscles from getting too short.

1c. The extrinsic finger flexors tend to force the fingers into flexion (in order to grip something). The ‘wrist-only’extensors neutralize the tendency for the extrinsic finger flexors to also flex the wrist (which would be bad given the discussion in 1a and 1b above).

1d. No, we would not expect the extrinsic finger extensor muscles (antagonists) to be active since they would reduce the strength of the grip.

2a. The sudden burst of triceps activity helps stop the elbow from flexing rapidly once the resistance is removed.

2b. The triceps are acting eccentrically while the elbow is flexing since they are active while they are lengthening.

3a. The biceps are active to assist in producing force (or torque) in supination.

3b. The triceps are active to neutralize the tendency of the biceps to flex the elbow during this maneuver.

4a. The biceps muscle belly reduces in size and gets softer (less tight) in when the forearm is pronated.

4b. The biceps tendon wraps around the radius as the radial tuberosity moves to face dorsally with pronation. This could potentially make it more difficult for the biceps to flex the elbow since it no longer has a direct line pull from insertion to origin.

4c. This lengthens the biceps (which also affects the force it can develop).

4d. The EMG activity in the biceps reduces in pronation compared to supination. This is due to neural inhibition of the biceps when the forearm is pronated. This also explains the softness of the biceps.

4e. It is more difficult to perform elbow flexion tasks when pronated than when supinated because we lose the full contribution of the biceps. However, it allows selective strengthening of the other elbow flexors (e.g., brachialis, brachioradialis, and pronator teres) during exercises such as reverse curls and pronated pull-ups.

5. Using EMG we showed how the clavicular pectoralis major became active during isometric shoulder joint flexion and the sternal pectoralis major became active during isometric shoulder joint extension. Both parts became active during isometric shoulder joint horizontal adduction.