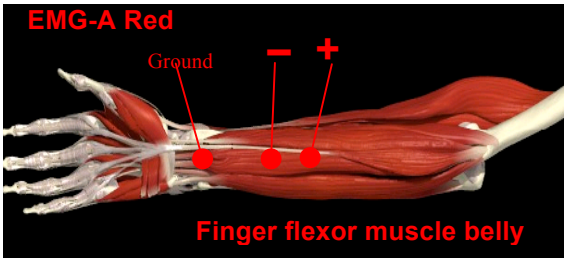
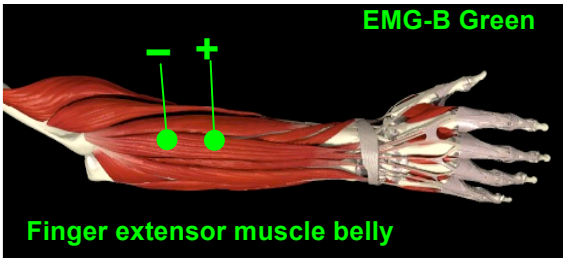
Hand Muscle Study by sEMG

by Dr. Terry Zachary 07/15/06

Participation of Finger Flexor muscles vs. Finger Extensor Muscles In Baseball

The J&J Engineering I-330 C2 Mini-sEMG (surface electromyography) is used in testing hand muscle activity in baseball players. The sEMG leads are placed on the finger flexor belly **(EMG-A Red)** and the finger extensor belly **(EMG-B Green)** of the appropriate forearm of each athlete. Amateur baseball players are tested. Electrode placements are determined using palpation during isolated finger flexion and extension respectively. Lead placements are illustrated below. The study to follow is the first of its kind to test hand muscle participation in baseball.





In the studies to follow, it becomes clear that both **finger extensor muscles** and **finger flexor muscles** are extremely active during all baseball skills. Training all 18 hand muscles (9 muscles close & 9 muscles open the hand) provides an essential competitive edge in baseball, maximizing reaction speed, strength and stamina.

Athletic muscle preparation must ensure that all muscle groups are exercised through a full, natural, 3D range of motion. The ***classic "rice box" exercise*** (immerse hand in box of rice, then squeeze and open against resistance of rice) fulfills this requirement in the area of hand muscle training, yet has regrettably been passed up in favor of convenience-based grip-only exercise tools (mostly spring-loaded, molded or pebble-filled).

Handmaster Plus by *doczac Enterprises* now offers a modern solution—the proper exercise mechanics of a rice box with the convenience of a portable hand exerciser (see www.doczac.com for more information).

General exercise physiology principles tell us that using "flexion-only approaches" to train any area of the body is unwise—so why do we allow it in the hand? Hand muscle imbalance related conditions (carpal tunnel syndrome, tennis/golfer's elbow, DeQuervain's tenosynovitis, tendonitis, RSI, etc.) have never been more prevalent.

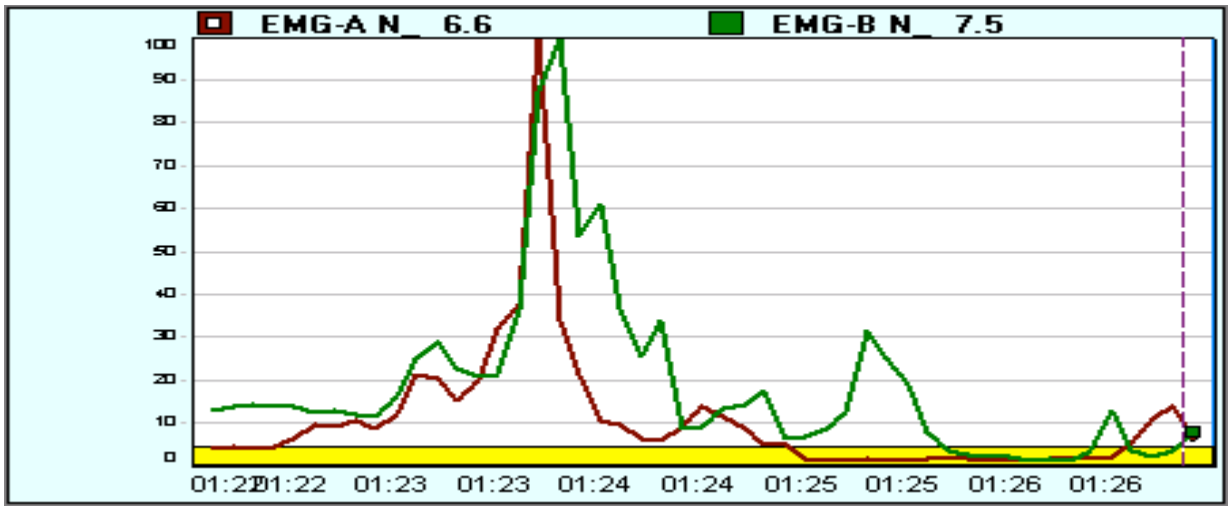
The following studies illustrate the extrinsic finger muscles that are readily accessible by sEMG. To study intrinsic hand muscle activity, needle-insertion EMG is required to compliment the current studies.

In all cases to follow, **red signals** indicate the participation of the finger flexor muscles and **green signals** indicates the finger extensor muscles.

Baseball players require 18 strong, healthy, balanced hand muscles for maximum performance (reaction speed, strength, ROM & stamina) and injury prevention.

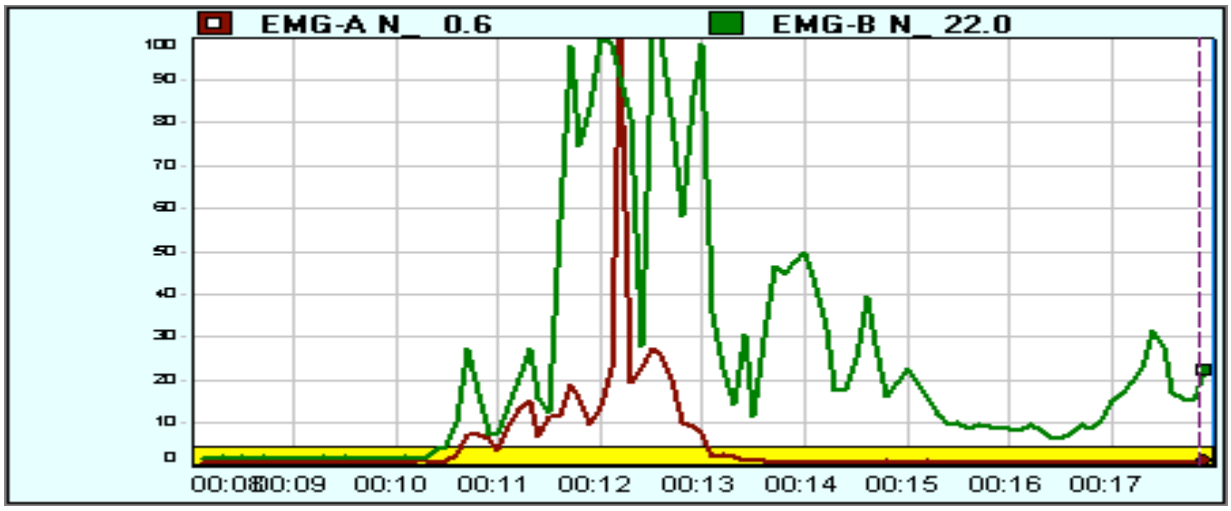
Baseball Swing – Batter

- Finger extensor muscle activity in green
- Finger flexor muscle activity in red



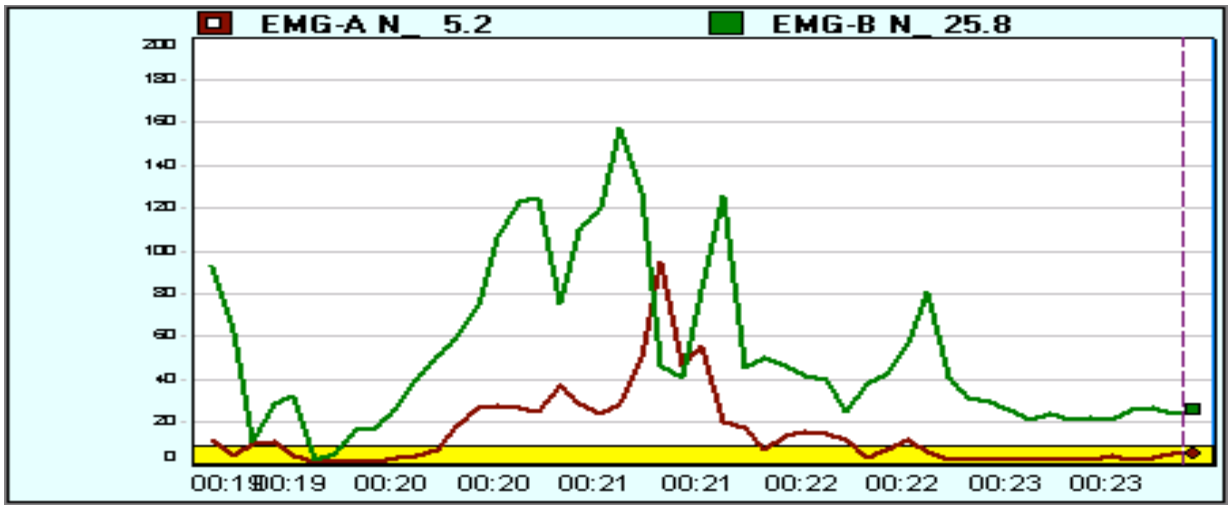
Baseball - Pitcher

- Finger extensor muscle activity in green
- Finger flexor muscle activity in red



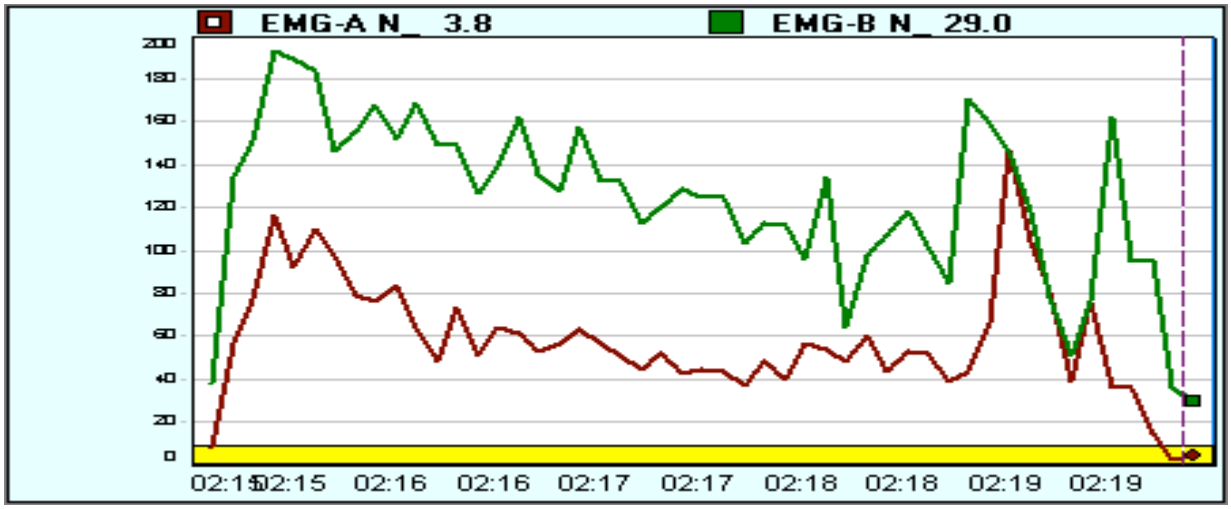
Baseball Infielder

- Finger extensor muscle activity in green
- Finger flexor muscle activity in red



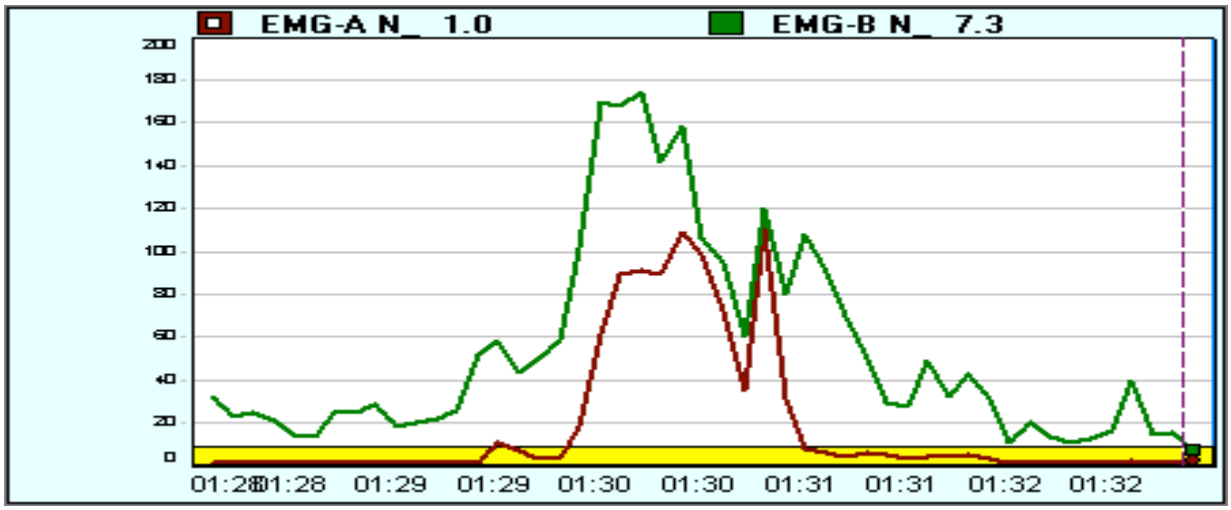
Baseball Catcher (Target Up & Catch)

- **Finger extensor muscle activity in green**
- **Finger flexor muscle activity in red**



Baseball Outfielder Catch

- **Finger extensor muscle activity in green**
- **Finger flexor muscle activity in red**



Baseball Catch (1st Base)

- **Finger extensor muscle activity in green**
- **Finger flexor muscle activity in red**