EMG Hand Muscle Firing Patterns In Climbing

***Metolius Climbing* – Bend, Oregon, USA**

May 30, 2006 Dr. Terry Zachary

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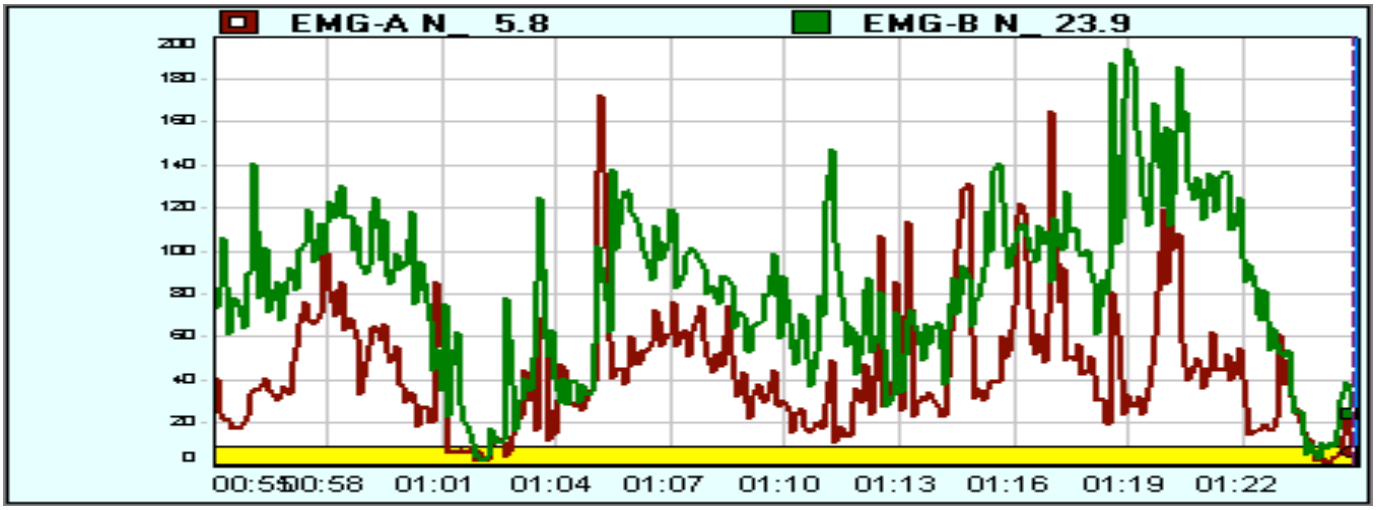
EMG Muscle Patterns - Metolius Climbing

- **Finger Flexor Muscle Activity (red)**
- **Finger Extensor Muscle Activity (green)**

CLIMBER 1 - Jamie Kruk
(Finger Extensor Muscle vs. Finger Flexor Muscle Activity In Climbing)

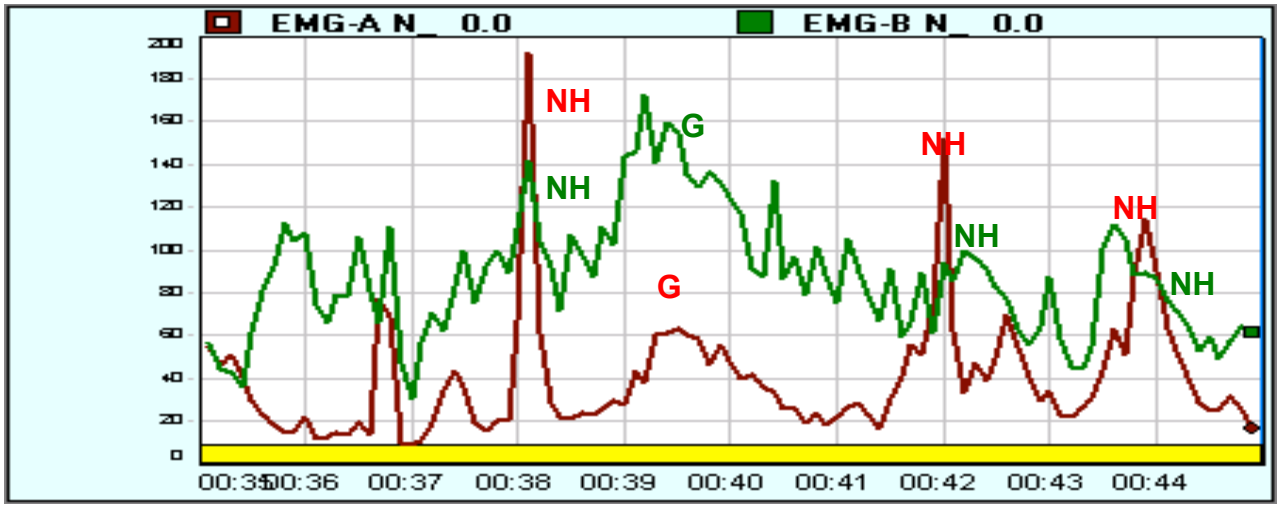


CLIMBER 2 - Jason Chong
(Finger Extensor Muscle vs. Finger Flexor Muscle Activity In Climbing)

Discussion:

sEMG (surface electromyography) allows a wonderful opportunity to view the cooperative nature of the hand muscles during climbing. Notice in **CLIMBER 1** and **CLIMBER 2** how both sets of finger muscle groups (finger flexor muscles and finger extensor muscles) are almost always very active during the climb. Red peaks are indicative of the climber grasping a new hold (**NH**) or simply re-adjusting or anchoring within in a hold position. Notice how the finger extensor muscles (**NH**) support the finger flexors (**NH**) even in beginning the new hold.

FIGURE 3 (Close-Up of Classic Finger Muscle Activity During Climbing)



Notice just how active the finger extensor muscles are throughout the climb. This is because finger extensor muscles (**G**) support and stabilize the action of gripping (**G**) (flexion) by the finger flexor muscles, especially when the grip hand is more spread or more extended, as in an overhang. Old thinking said that the finger extensor muscles were not very active. Our research proves otherwise.

Conclusions

The sEMG muscle patterns clearly illustrate the fundamental presence of both finger extensor muscle and finger flexor muscle activity throughout a climb. In identifying and proving this fundamental physical law, the need to maintain strong healthy balanced finger flexor and finger extensor muscles becomes very clear.

The **Metolius Gripsaver Plus** offers a one-step portable solution for all of the training needs of the serious climber, ensuring balanced finger exercise through full natural 3-dimensional planes of motion. The result is strength, balance, speed and maximum blood flow / lymphatic drainage of the hand, wrist, forearm and elbow. To the climber, this means *maximum performance* and *injury prevention*.

Further study and experimentation is necessary in order to more completely analyze the use of sEMG finger muscle patterns in climbing. Further opportunities may exist in using sEMG patterns in relation to 1) teaching, 2) training and 3) injury prevention in climbing.

Metolius Climbing continues to lead the field in hand muscle education and training for all climbers. Check www.metoliusclimbing.com for more information.