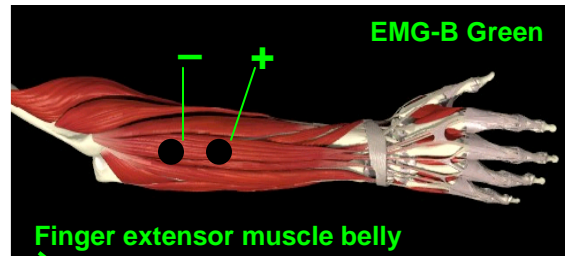
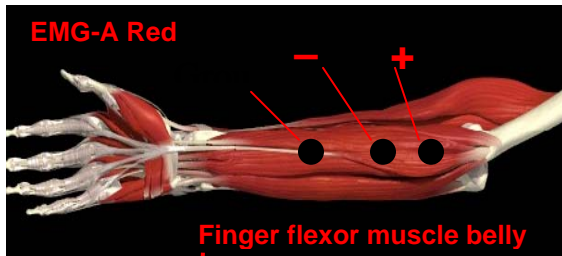


## sEMG Patterns for Musicians

GHS Strings

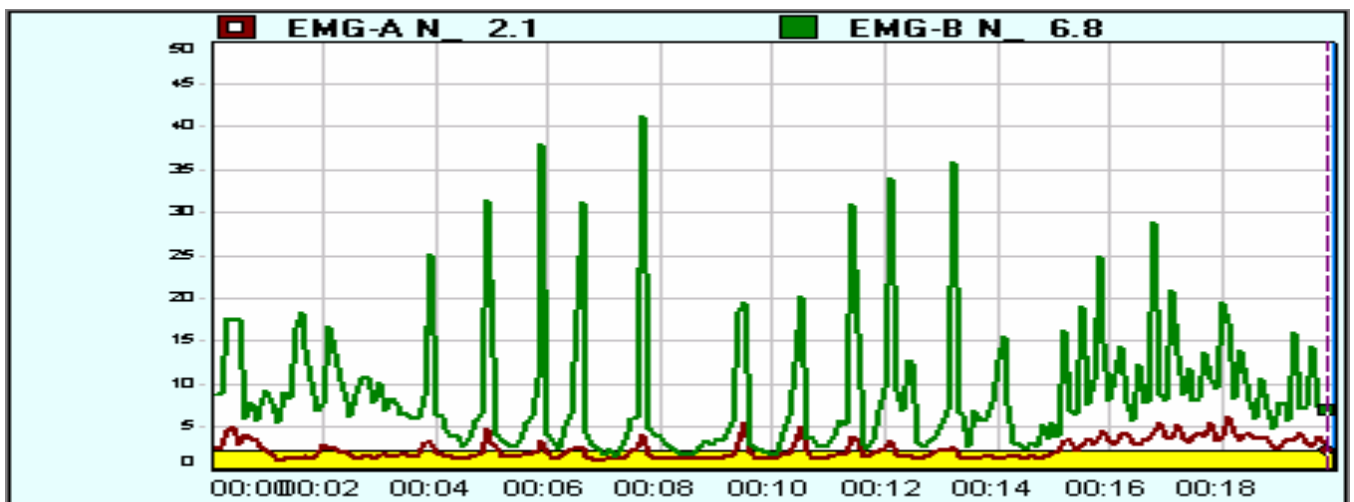
The J&J Engineering I-330 C2 Mini-sEMG (surface electromyography) unit was used to study the hand muscle activity of various musicians. sEMG leads were placed on the finger flexor belly (**EMG-A Red**) and the finger extensor belly (**EMG-B Green**) of the appropriate forearm. Electrode placements were determined through palpation during isolated finger flexion and extension, respectively. Lead placement patterns are illustrated below and sEMG result charts follow:



Guitar (Cording Hand)



Guitar (Strum Hand – With Pick)

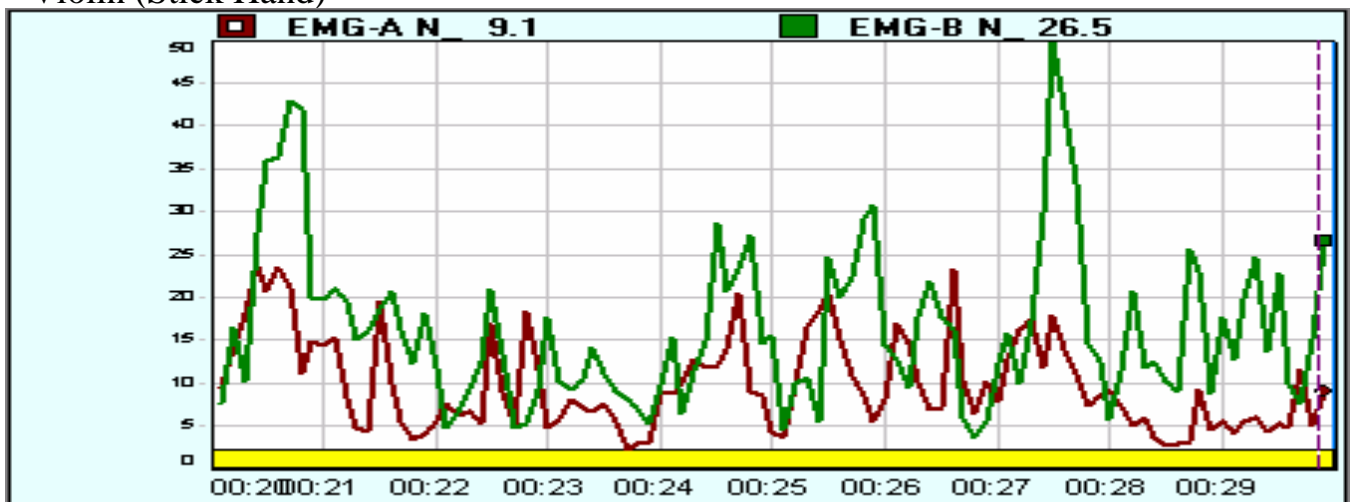


Notice how the **finger extensor (opening) muscles** (located in the guitarist's forearm) are extremely active, a commonality when all musical instruments are played. The reason for this phenomenon is that **finger extensor muscles** are always active in support of the action of finger flexion. The **finger flexor (closing) muscles** located in the forearm are also active, of course. Notice how each works in combination with the other at all times. These studies clearly indicate the need for musicians to properly prepare all hand muscles (through full opening and closing), not just flexors.

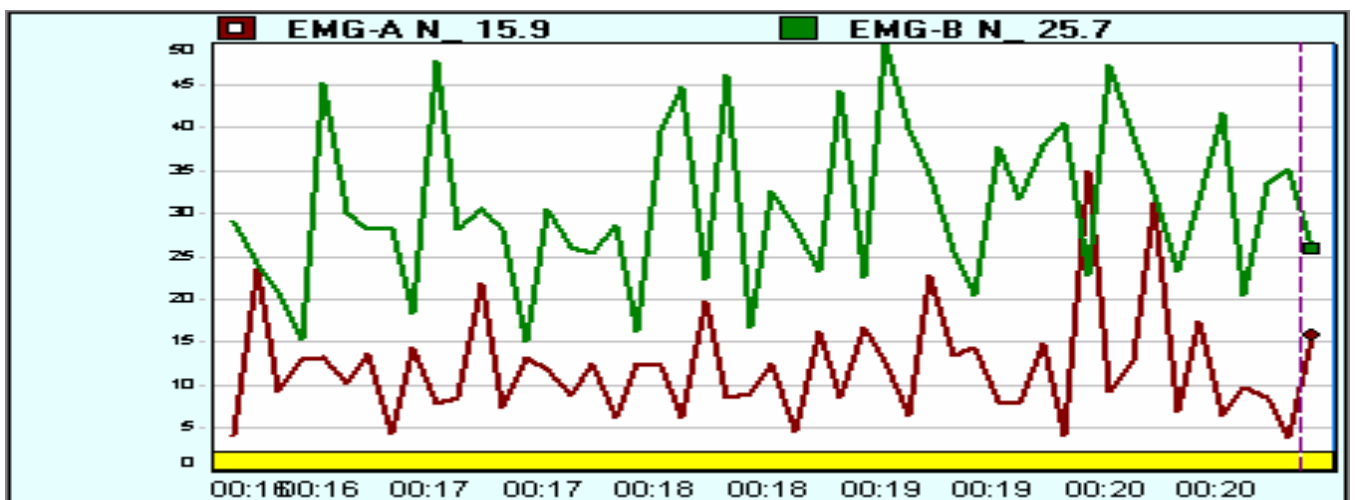
Poor **finger extensor muscle** training results in **overuse and tendonitis of the back of the wrist, forearm and elbow.** Musicians use these muscles repetitively and therefore run the high risk of developing debilitating **RSI's (repetitive stress injuries).**

Intrinsic hand muscles (muscles within the hand) are not illustrated, as they may require needle-insertion EMG for proper study. They are the muscles (mostly flexors) that become shortened and dominant in musicians, leading to **RSI's (especially repetitive flexion), carpal tunnel syndrome and DeQuervain's tenosynovitis.** Opposing muscles (extensors) must be trained to offset repetitive flexion imbalances.

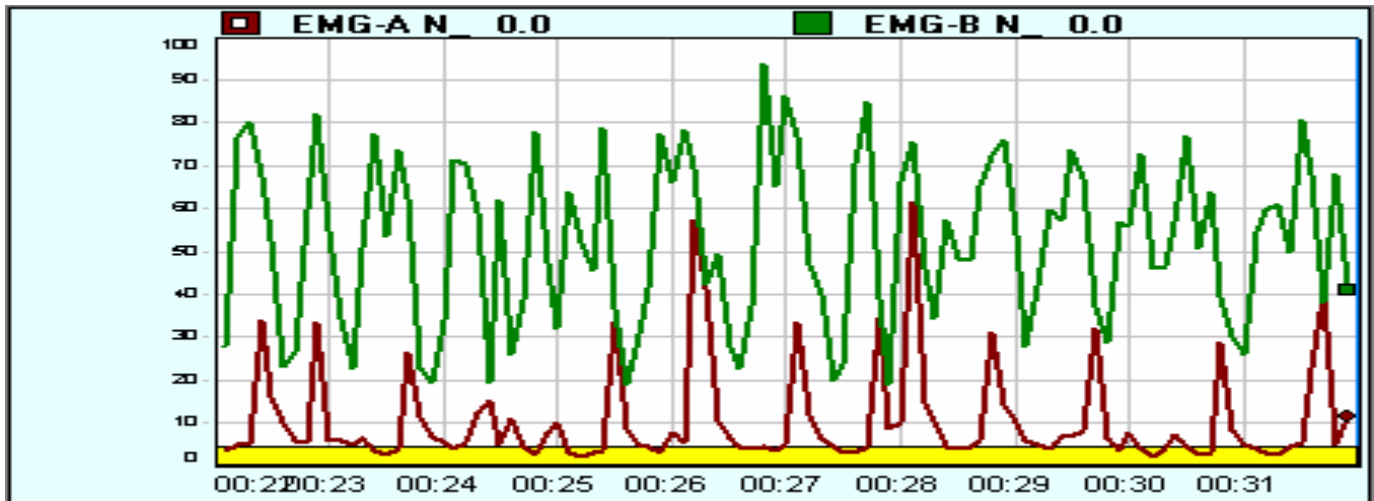
### Violin (Stick Hand)



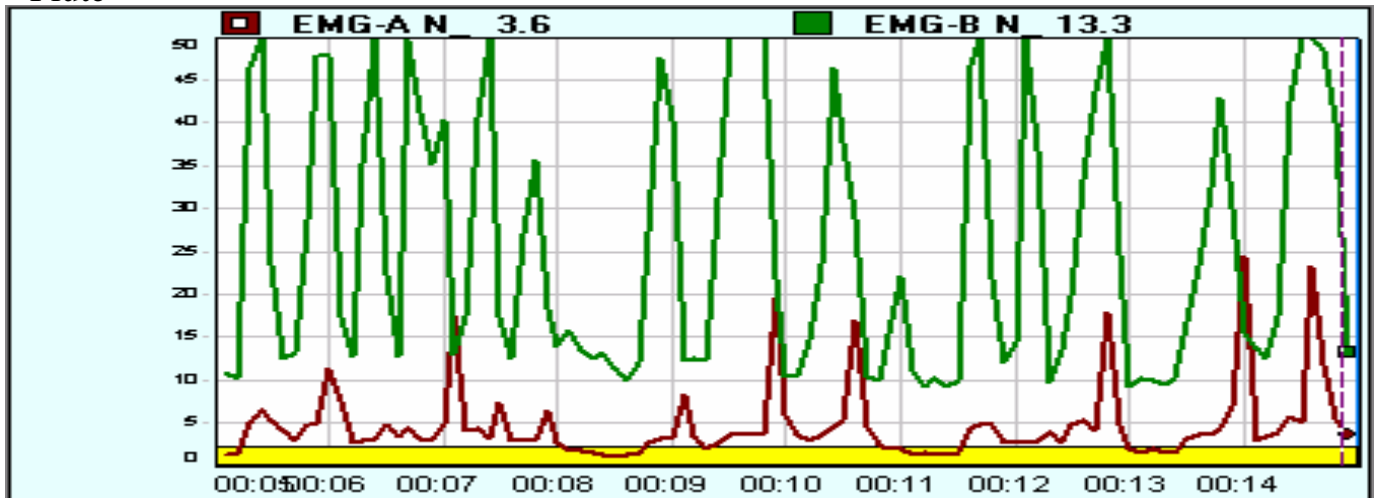
### Drums



## Piano



## Flute



Musicians are as prone to repetitive hand, wrist and elbow injury as any profession or hobby in any market. These injuries can be debilitating, yet are very preventable through proper training.

Unfortunately, it is commonplace historically for musicians to: 1) do no exercise at all, or to 2) use flexion-only devices (spring-loaded or molded). These approaches do not address the inherent eventual problem of *repetitive flexion imbalance* (due to repetitive gripping and flexion). 9 muscles close the hand and 9 muscles open the hand. Musicians must change their fitness approach by preparing all 18 of the hand muscles in balance to prevent injury and improve performance.

**GHS Handmaster Plus** offers the complete and cutting-edge one-step solution for proper hand muscle fitness and blood flow. Designed by a health care, **GHS Handmaster Plus** specifically prevents the music injuries that result from musical overuse and imbalance. Please visit [www.ghstrings.com](http://www.ghstrings.com) for more information.