


Hot Topics in Clinical Practice

Surface EMG



Hot Topics in Clinical Practice

Surface EMG

- Disclaimer
 - What is it?
 - How does it work?
 - What is it used for?
 - How much does it cost?
 - Is it a useful clinical tool?
 - Summary
- 
- Decorative graphic consisting of several concentric circles of varying sizes and opacities, located in the bottom right corner of the slide.

Disclaimer

- This lecture is merely a description of my clinical thought process as an evidence based practitioner exploring the possibility of adding a new technology to my practice. I am not a neurologist nor an expert in electromyography. I am not endorsing or recommending any product(s). I am also a big fan of REO Speedwagon (the band, not the car).

Surface EMG

What is it?

- EMG (electromyography) is a technique used to record and quantify electrical potential of muscles cells during contraction and at rest.
 - Traditionally performed using needle electrodes for intramuscular activity.
 - Often used in conjunction with NCV (nerve conduction velocity)
 - This combination of tests are the Gold Standard when neuropathy or myopathy is suspected
 - More recently surface electrodes have been used to record broader muscle function or dysfunction.

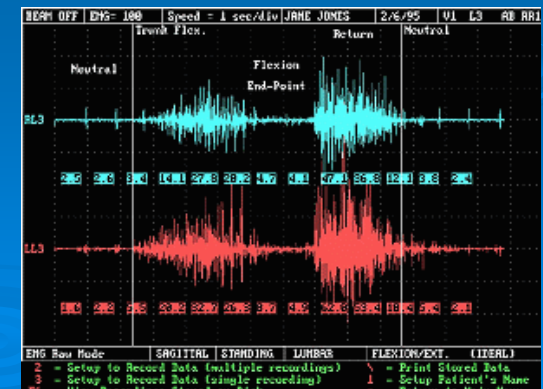
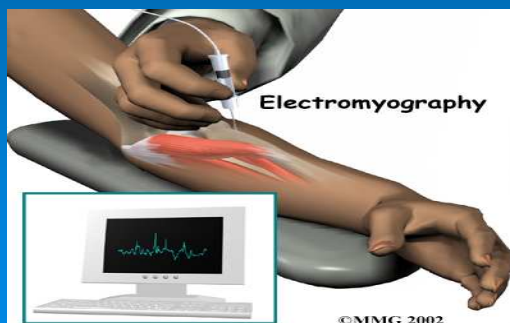


EMG

How does it work?



- Electrodes detect intrinsic skeletal muscle fiber electrical activity and the resulting signal is displayed on an oscilloscope or decomposed by a computer and displayed on a monitor. (unlike NCV where an electrical impulse is applied to a peripheral nerve, and a separate electrode detects the signal, the time the impulse took to travel is measured, and velocity is calculated)
 - Additionally the signal can be visualized and audioized (why is visualized a word and audioized is not?) and used as biofeedback for neuromuscular reeducation.



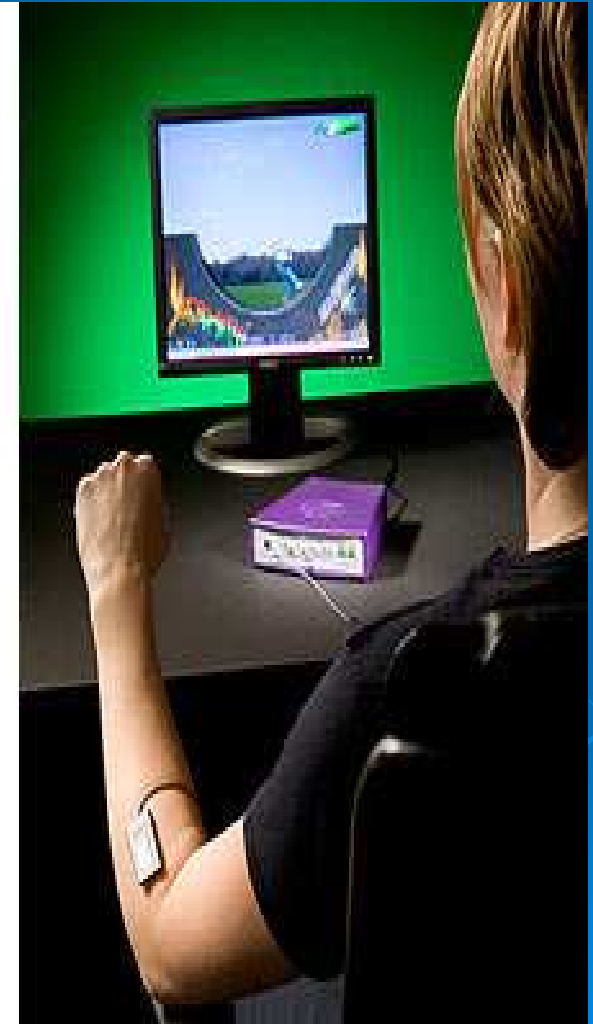
Needle EMG and NCV are Typically Used to Diagnose:

- Alcoholic neuropathy
- Axillary nerve dysfunction
- Becker's muscular dystrophy
- Brachial plexopathy
- Carpal tunnel syndrome
- Centronuclear myopathy
- Cervical spondylosis
- Charcot-Marie-Tooth disease
- Common peroneal nerve dysfunction
- Denervation (reduced nervous stimulation)
- Dermatomyositis
- Distal median nerve dysfunction
- Duchenne muscular dystrophy
- Facioscapulohumeral muscular dystrophy (Landouzy-Dejerine)
- Familial periodic paralysis
- Femoral nerve dysfunction
- Fields condition [1]
- Friedreich's ataxia
- Guillain-Barre
- Lambert-Eaton Syndrome
- Mononeuritis multiplex
- Mononeuropathy
- Motor neurone disease
- Myasthenia gravis
- Myopathy (muscle degeneration, which may be caused by a number of disorders, including muscular dystrophy)
- Myotubular myopathy
- Neuromyotonia
- Peripheral neuropathy
- Poliomyelitis
- Polymyositis
- Radial nerve dysfunction
- Sciatic nerve dysfunction
- Sensorimotor polyneuropathy
- Shy-Drager syndrome
- Sleep bruxism
- Spinal stenosis
- Thyrotoxic periodic paralysis
- Tibial nerve dysfunction
- Ulnar nerve dysfunction

Surface EMG

What is it used for?

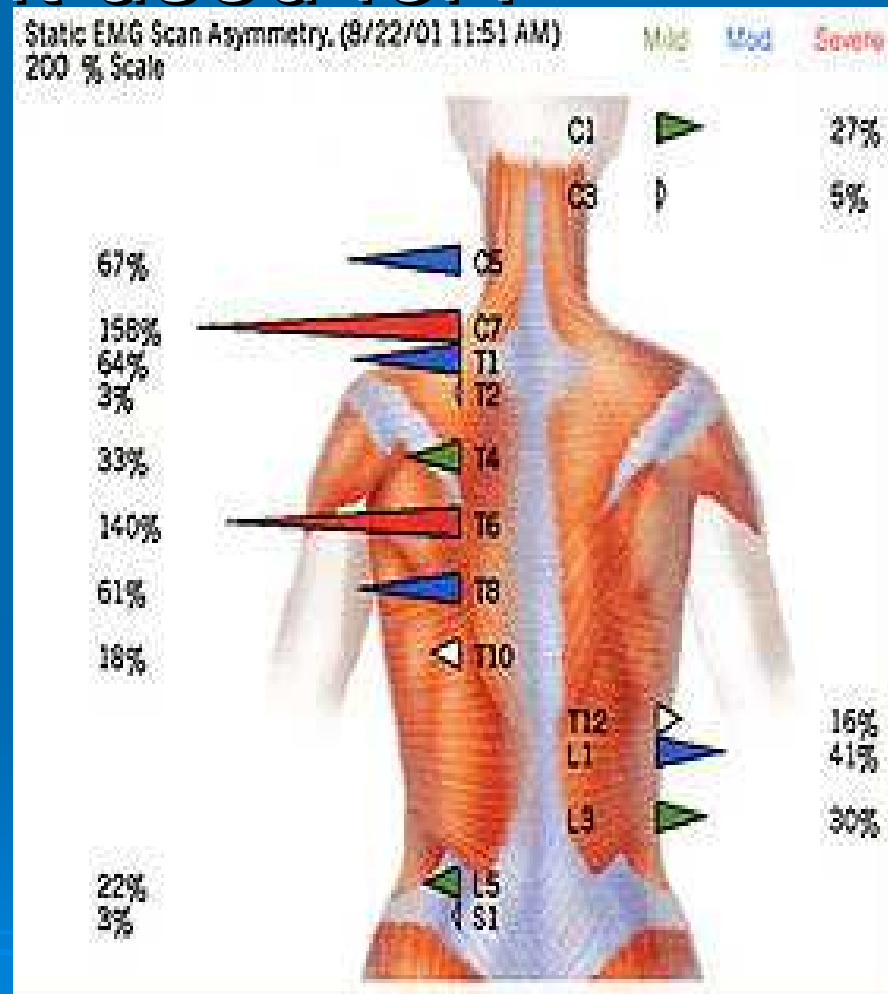
- Both surface and needle EMG measure muscle activity at rest (Static) and during active (Dynamic) contraction
- Chiropractors, Physical Therapists, and Occupational Therapists use dynamic surface EMG as a source of biofeedback for neuromuscular training



Surface EMG

What is it used for?

- Chiropractors use static and dynamic EMG to perform spinal screenings
- Results are computerized into a very nice display of muscle activity at each spinal level



Surface EMG

What is it used for?



- Static EMG of the spine is typically performed with hand held electrodes that take measurements at each spinal level (or every 2-3 depending on electrode size)



- Dynamic EMG of the spine uses surface electrodes that are affixed to the skin

Surface EMG

How Much Does it Cost?

- There is a rather dramatic range of cost depending on what you want, needle or surface, static or dynamic, and the cost escalates with each bell and whistle added

For Example:

- A “gently used” Neurometrix NCV and EMG full setup can be purchased on eBay for the ‘buy it now’ price of \$1,250 with free shipping
- While Myovision’s “Stealth Bomber” with fully Digital and Wireless: Surface Static EMG, Dynamic EMG, and Range of Motion comes in with a much heftier price tag of \$14,980



Surface EMG

How Much Does it Cost?

- The “competitively priced” CLA (Chiropractic Leadership Alliance) Subluxation Station has static and dynamic sEMG, as well as digital range of motion, digital algometry, and digital thermal scanning (available with Myovision).

FEATURES

Click on the name of the technology to learn more.

Rolling/Segmental Thermal

Inclinometer

Algometer

Computer

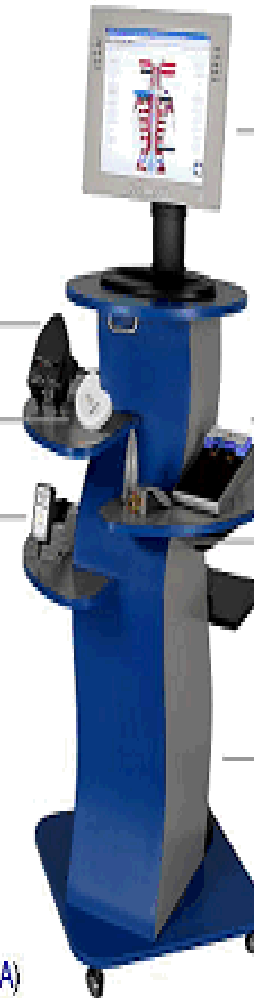
Pulse Wave Profiler

Surface EMG

The Stand



The only technology of its kind
Certified by the Space Foundation.
(Space Foundation is co-founded by NASA)



Surface EMG

Is it a Useful Clinical Tool?

- Here is where the disclaimer applies. As the presenter I owe it to you, the audience, who has been lulled to a state of drowsy purgatory, a conclusion. Unfortunately, I have yet to arrive at that destination myself.
- So with my apologies I will provide what I have so far:

Surface EMG

Is it a Useful Clinical Tool?

First: The Research

- As evidence-based practitioners, this is a clinical question that we might want to and should investigate before we make a purchase and start using the technology.
- In short, what I have found:
 - There is decent evidence to support the use of dynamic surface EMG as biofeedback
 - There is insufficient but growing evidence supporting the use of dynamic surface EMG to assist in the objective diagnosis of spinal conditions and for monitoring progress of spinal conditions
 - There is insufficient evidence to support the use of static surface EMG to assist in objective evaluation or monitoring of progress...HOWEVER→

Surface EMG

Is it a Useful Clinical Tool?

Intuition

- The technology and concept of spinal surface EMG does make sense (to me). Why?
 - We are taught and accept the idea that spinal restriction, or fixation, or subluxation, or intersegmental dysfunction, or the chiropractic lesion, will produce hypertonicity due to irritation of local efferents.
 - It is generally accepted that healthy skeletal muscle, at rest, is electrically silent on EMG
 - Therefore, if a surface EMG scan demonstrates paraspinal muscle activity at rest, then something must be activating the muscles

Surface EMG

Is it a Useful Clinical Tool?

Proponents

- Claim that interexaminer reliability is better with sEMG than palpation and the results are quantified
- Claim that while the correlation of findings and pain is supported in a few studies, the correlation is not necessary for what we treat as chiropractors
- Both CLA and Myovision are endorsed by Guy Riekemen, current president of Life University. Past president of Palmer
- Colleges that endorse or use sEMG include Palmer, Parker, Life East and West, New Zealand, Bridgeport, Northwestern, and Cleveland
- Speakers and instructors: Bill Esteb (Patient Media), Bob Hoffman (Masters Circle) Mark Charrette, Ted Morter (BEST), Fortune Management, The Colts, The Lions, Dan O'Brien, Terry McCosky (NUCCA), ICA, John Gerhardt, and many more. www.myovision.com and www.subluxation.com

Surface EMG

Is it a Useful Clinical Tool?

Experts

- I spoke with a neurologist familiar with the technology and a physical medicine clinician at Mayo Clinic familiar with the technology and they both had similar sentiments
 - Surface EMG is too “noisy” and “quirky” to have practical clinical application as a diagnostic tool. Currently some application is acceptable in rehab (biofeedback)
 - However, with advances in technology, increased specificity is possible with better electrodes and computer filtering, decoding, and analysis of signals

Surface EMG

Is it a Useful Clinical Tool?

Field Docs

- I spoke with four practicing chiropractors who use/used the technology:
 - From a Chicago chiropractor: “The test has some validity. I can correlate test results with subjective and objective findings. It’s great for marketing” She said that an average street fair will produce 15-20 new patients over a weekend.
 - From a Chicago Western Suburb chiropractor who sees over 400 patient per week “not sure you want my opinions, I have not used it in 4 years”
 - From a Chicago chiropractor “it is our primary marketing tool, patients love having something to look at” He said his best week was a patient appreciation week where he screened new patients all week long for free. He converted “over 50” new patients.
 - From a chiropractor in Virginia who owns and manages 9 clinics. “we used to use it, but the results were not reproducible. At the time it seemed too gimmicky. I have considered looking into the newer technology, but everything I buy I need 9 of and that will get pricy” He does x-ray nearly every patient.

Surface EMG

Closing Thoughts-Discussion

- The companies that sell these products draw (in my opinion) false conclusions from the available literature to validate the technology.
 - They also make no claims as to using the equipment for diagnosis, rather as a practice building and marketing tool with some reference to outcome assessment (like with the digital ROM and algometry)
 - Are street fair spinal screenings good for our collective reputation?
 - Can the ethical use of a questionably valid diagnostic tool be the 'greater good' (no, I am not talking about scare tactics, 100 visit or \$3000 dollar prepaid treatment plans)?
 - The technology is very cool and visually appealing to patients. Patients do need visuals and visuals make a report of findings much easier to conduct, more understandable to patients, and produces better compliance.
 - The digital range of motion and algometry are very handy validated outcome assessments (but come with a hefty price tag). Thermography and sEMG look promising and it appears that a lot of money is being invested to research and develop these technologies. Myovision's virtual consultation software looks amazing.
 - A distinct advantage of sEMG is that chiropractors can perform surface EMG and NCV as they are non-invasive (less than routine x-ray). Chiropractors can also perform and bill for needle EMG in some states. If the state allows acupuncture or venipuncture then needle EMG is likely allowable.
- COMMENTS?

THANK YOU

*I know it hurts to say goodbye, But it's time for me
to fly. –Terry Lettrell*

