FUNCTIONAL ELECTRICAL STIMULATION
FOR THE HEMIPLEGIC SHOULDER
Information for Patients and Families
Author: Marc-André Roy, MSc.

What is Functional Electrical Stimulation (FES)?

The term FES is used to describe a technique whereby an electrical current makes a muscle move. This may seem unusual or unnatural to some, however did you know that the body naturally uses electrical currents to make muscles move? The brain sends currents through our nerves. The nerves relay the message to the muscle and then the muscle shortens.

FES works in a very similar way. An electrical current is applied to either the skin over a nerve or over a muscle, making the muscle contract (i.e. shorten). With FES, people who have been paralyzed by injuries to their neck or back may be able to move their muscles and perhaps even do things such as walk.

However, this module will look at FES used for a different purpose – the use of FES for reducing or reversing the effects of stroke in the shoulder. Strokes often result in shoulder pain, spasticity (stiffness), subluxation (joint out of socket) and loss of function.

There are also types of electrical stimulation that do not cause muscle contraction (e.g. TENS).
Are there different kinds of FES?

Despite the use of different terms (functional electrical stimulation, functional neuromuscular stimulation and electrical stimulation), these all have the same goal: to make the shoulder muscles contract in order to increase function and decrease pain, spasticity (stiffness) and subluxation (joint out of socket). Different terms are often used to describe the same technique.

Why use FES to the shoulder after stroke?

Shoulder pain, spasticity, subluxation and loss of function after stroke are common and can profoundly affect quality of life. FES is used for increasing shoulder function and for preventing pain and dysfunction in hemiplegic stroke patients.

Does it work for stroke?

Research has studied how FES can help stroke patients with a hemiplegic shoulder to address the following problems:

Muscle function
There is moderate evidence that FES treatment does not prevent the loss of shoulder function after a stroke. There is limited evidence that FES in combination with regular physical therapy can improve muscle function.

Shoulder subluxation
There is limited evidence that FES improves and prevents shoulder subluxation after stroke. There is conflicting evidence as to whether there is a lasting effect after the treatment is stopped.

Shoulder pain
There is moderate evidence that FES does reduce shoulder pain post-stroke when there is shoulder subluxation.

Shoulder muscle tone
There is limited evidence that FES treatment, in combination with conventional physical therapy, can improve tone in the shoulder of patients after a stroke.
Shoulder EMG activity
There is limited evidence that FES treatment, in combination with conventional physical therapy, can improve EMG activity in the shoulder of patients after a stroke.

What can I expect?

Small square stickers (electrodes) are placed on the skin over the centre of a muscle. Wires connect the electrodes to a stimulator, a small machine that produces the current. The stimulation is usually started at a very low level and causes a tingling “pins and needles” feeling on the skin. The current is then slowly increased after each stimulation until it is strong enough to make the muscle contract. This level will be used for the treatment – that is, the smallest current necessary to make the muscle contract. Although some people find it uncomfortable, it is usually well tolerated.

Treatment times may vary. However, FES is usually done over 3 to 5 sessions per day, ranging in duration from 45 minutes to 2 hours. It is done 5 to 7 days per week.

Are there any risks or side effects?

After the treatment, there may be pink marks on the skin under the electrodes. Usually the pink marks fade out within an hour. The electrodes can irritate the skin, but this is not common. This problem can often be solved by using hypoallergenic electrodes or changing the type of stimulation.

Although it is very rare, this type of therapy may increase spasticity (muscle tightness).

Some people should not use FES. This includes people with epilepsy, cancer, cardiac pacemakers, poor skin condition and hypersensitivity to the electrical stimulation.
Who provides the treatment?

Physical therapists will usually provide the FES treatment. However, due to the long duration of the stimulation it is possible for the treatment to be done at home after discharge from the hospital. This will require you to have a stimulator at home.

How many treatments will I need?

Some patients continue to use FES for many years. To maximize the benefits after stroke, it should be used for at least 6 weeks.

How much does it cost? Does my insurance pay for it?

Although the cost of a FES machine varies, some systems are relatively inexpensive. Rental or lease options bring the cost down to the equivalent of 1 or 2 clinical visits per month.

Is FES for me?

While there haven't been many high quality studies done regarding the use of FES for treating the hemiplegic shoulder, most of the studies have reported good results from its use. More specifically, FES has been reported to improve function and muscle tone, increase EMG activity and reduce subluxation and pain in the shoulder.

Information on this web site is provided for informational purposes only and is not a substitute for professional medical advice. If you have or suspect you have a medical problem, promptly contact your professional healthcare provider.