FUNCTIONAL ELECTRICAL STIMULATION (FES)
FACT SHEET

Functional Electrical Stimulation (FES) can help people who have had damage to their brain or spinal cord to move more easily. This fact sheet explains what is meant by FES, who may benefit and how. It gives information on FES treatment and patient suitability.

What is FES?
FES has been used widely in rehabilitation for therapy, function restoration and maintenance of vital function in muscle weakness and/or paralysis. FES uses small electrical impulses to activate muscles by exciting the nerves leading to the muscles. Two self adhesive patches (electrodes) are usually placed on the skin close to the nerve supplying the muscle and over the centre of the muscle. Leads connect the electrodes to a stimulator that produces the impulses.

Who may benefit from using FES?
People who have difficulty moving due to damage to their brain or spinal cord can benefit from FES. The majority of people who use FES have had a stroke, suffer from Multiple Sclerosis (MS) or have had an incomplete spinal cord injury (T12 or above). It can sometimes be used with children who have cerebral palsy and people who have had a head injury. To be effective it is important that the nerve fibres between the spinal cord and the muscles are not damaged. The impulses need to travel along the nerves to reach the muscles.

How FES can help walking
The most common problem treated by FES is called dropped foot. This is an inability to lift the foot and toes when swinging the leg during walking, causing the toes to catch or the foot to drag on the ground. Dropped foot is caused by weakness of the muscles that lift the foot and excessive tightness (spasticity) in the muscles of the calf which are caused by alteration of messages passing to or from the brain from the spinal cord. FES compensates for the interrupted messages by applying an external stimulus to the muscles. Stimulation is given to the muscles at the front of the leg. The simplest stimulator is the Odstock Dropped Foot Stimulator (ODFS). It activates the muscles that lift the foot during walking. A switch worn in the shoe triggers the stimulation and the electrical signals reach the muscles through electrodes stuck to the skin on the side of the leg, just below the knee. The stimulator is about the size of a pack of cards and can be worn at the waist on a belt or in a pocket. Leads connect the stimulator to the switch in the shoe and to the electrodes on the leg. A small battery operates the stimulator.

Electrical stimulation can help people to walk faster, with less effort and with more confidence. Stimulators are being continually developed with computer technology allowing them to be more finely controlled and more muscle groups can be stimulated to produce a more natural walking pattern.
How stimulation can be used to improve arm and hand function
This is much more varied and complicated. Stimulation may be given as an exercise to strengthen weak muscles or relax tight ones. This sort of stimulation is often used as part of physiotherapy. People who benefit from this usually have some movement of the arm and hand. FES is used to improve on this in order to make the hand and arm more useful.

How do patients receive FES treatment?
Patients should contact their GP or hospital Consultant who will refer them to an appropriate service for an assessment to see if there is a possibility that FES may help. FES is obtained on the NHS in specialist centres. Private FES services are also available in various locations.

What does treatment involve?
Different services will offer assessments and follow-up in different ways however in general an assessment takes about an hour. If patients do not respond to FES then they will be discharged from the FES clinic. If FES can help this is reported to the referring Doctor. Appointments are then made for the patient to attend the clinic to be supplied with their FES device and given advice on its use. Further review appointments are made so that progress can be measured and adjustments made to the stimulator or exercise programme. Some patients use stimulation independently everyday – others use it as part of their physiotherapy treatment. Some patients continue to use FES for many years, others only for a period of a few months.

Are there any tests involved?
Tests are usually performed to measure walking speed and effort, or quality of movement. Patients who are using stimulation to improve arm and hand function may be asked to perform a simple functional test. Tests rarely take longer than an hour and are repeated at regular intervals to measure progress and to find out whether treatment needs to be changed.

Are there any risks or side effects from the treatment?
Stimulation causes a tingling “pins and needles” sensation on the skin, although most people do not find it uncomfortable, a few do and for this reason do not use it. Sometimes, even though patients are carefully assessed, the treatment has not helped them or patients are not able to use the stimulator effectively. In these cases stimulation will be stopped. Very occasionally patients find that the electrodes irritate their skin. Using hypo-allergenic electrodes or changing the type of stimulation used can often solve this problem. Very rarely stimulation increases muscle tightness (spasticity) and in these cases treatment will be stopped. A few patients have found FES ineffective because they have difficulty positioning the electrodes in the right place.

What are the benefits of treatment?
Clinical trials and measurements taken with patients who have used FES to help their walking have shown beneficial results. These include an ability to walk faster, with less effort and with more confidence when they use the stimulator. Sometimes muscle tightness (spasticity) is reduced. Some patients find that after using the stimulator for a few months their walking is sufficiently improved that they no longer need to use it. This however doesn’t generally apply to patients who have Multiple Sclerosis.
Further information on FES can be found at [www.salisburyfes.com](http://www.salisburyfes.com)

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Alternatively, log on to:  
[www.thebraincharity.org.uk](http://www.thebraincharity.org.uk)  
or call 0151 298 2999 for advice and information for people with neurological conditions and their carers.