Salisbury FES Newsletter
Summer 2005

Editorial

The FES (Functional Electrical Stimulation) Newsletter is a biannual (approximately) publication with the purpose of promoting the clinical use of FES. It is distributed chiefly to clinicians who have attended the Salisbury introductory FES course but also those who have an interest in the field or those we hope may be interested. FES is a means of producing functional movement in paralysed muscles by the application of electrical impulses to the nerves of those muscles. FES is increasingly used in neurological rehabilitation to improve mobility and upper limb function. The most common use is for the correction of dropped foot in hemiplegic gait, an intervention now recommended by the Royal College of Physicians in their publication "National clinical guidelines on stroke".

The 2nd edition of the Royal College of Physicians "National clinical guidelines on stroke" has now been published and it has updated its entry on FES. The remit of FES now includes "improving arm movements, dorsiflexion and gait". This is the first time they have recommended the use of FES upper limb and reflects the increasing published evidence for the technique. You can access the guidelines on line at: www.rcplondon.ac.uk/pubs/books/ stroke/. We are pleased to announce the publication of the results of our CSP Research Foundation funded study into the effects of FES in the upper limb following stroke. The reference is: Mann GE, Burridge JH, Malone LJ, Strike PW. A Pilot Study to Investigate the Effects of Electrical Stimulation on Recovery of Hand Function and Sensation in Subacute Stroke Patients. Neuromodulation, Volume 8 Issue 3 Page 193 - July 2005

On 18th November 2005 we will be holding our annual FES user day. This year the event is being hosted by Northwick Park Hospital, London and is open to anyone who has an interest in clinical FES. As usual there will be reports on the latest developments in clinical FES, case studies and a problem solving workshop. These meetings are a good opportunity to swap experience and meet up with others working in the field. We welcome presentations on any aspect of clinical FES. While you do not have to offer a presentation to come we particularly welcome case studies and reports of clinical experience with FES from all practitioners in the field. Please return the form at the end of this newsletter.

In October, the FES group at Queen Mary's Hospital Roehampton are hosting a second meeting on the application of FES in Paediatrics. This follows up the meeting held 3 years ago and aims to promote discussion between health care professionals working with children. Please see the meeting announcement and application form towards the back of the Newsletter.

Increasingly we are contacted by people seeking FES treatment and asking if they can obtain it in their area. The Data Protection Act does not allow us to give out details of the clinicians on our database who have done the FES course and in any case many clinicians may not be in a position to offer treatment. While we have attempted to keep a list of all clinicians active in FES, our list has become out of date and inaccurate. For this reason we are asking that anyone active in clinical FES (either NHS or private) complete and return the form at the end of this newsletter. Please do this even if you have sent in the old form before as we need to know our information is up to date. Thanks for you time.

Those who read the last newsletter may remember that the CE mark for the Stim-u-Step, an implanted dropped foot stimulator, was announced. We are currently

putting things on place to offer the device as part of our clinical service and hope to begin this autumn. We also plan to offer training to other centres in the use of the device. If you would be interested in using the Stim-u-Step, please contact me to register your interest.

Thanks to all who have contributed to this newsletter and apologies for its late arrival. As always we welcome your feedback and we are pleased to hand on any "good ideas", reports, meeting reviews or adverts that you have through this newsletter. Next edition will be put together in the New Year (ish) so please send copy by then. This and all back issues of the Salisbury FES Newsletter are on our web page www.salisburyfes.com

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FES Web User Group;
"A way to share ideas and experiences"

The FES User Group "**Odstock_stim"** is a web-based discussion forum available to all potential or current FES users. It was established following several requests from Salisbury patients for a means of communicating with each other.

Steve Crook and Catherine Jolley as technical and clinical representatives were required to present the idea to the South Wiltshire PCT Patient and Public Involvement Committee (PPI). They agreed the forum in December 2004. The group therefore "went live" in January 2005.

Potential members must join "Yahoo" and then either apply via email or be invited to join the group. Steve and Catherine are "administrators" and have control over membership. They regularly "police" the site to ensure there are no contentious emails. They intervene only if there is a specific request to us for information about FES or to correct any inaccurate information being circulated. Essentially the group is "patient owned" and input from Salisbury staff should be minimal.

Currently there are nearly 40 members including 4 –5 staff at Salisbury. Discussion points have included methods of carrying stimulators, fatigue, and MS medication. Topics will be monitored to gather feedback on specific issues.

Please encourage your patients join if they would like to do so. Clinicians are also welcome to join the group to share ideas and experiences or simply to view discussions taking place. The easiest way to access the group is to click the link on our web site www.salisburyfes.com. Any contributions will be much appreciated!

Catherine Jolley
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FES with Familial Spastic Paraparesis (FSP)

Hi
My name is Carol McFadden and I am a physiotherapist working in the Medical Physics Department.

Your help would be very much appreciated if you treat anyone with FES who has been diagnosed with Familial Spastic Paraparesis. (FSP) Over the last few years we have been receiving an increasing number of referrals to assess and treat people with this condition. In the majority of cases FES has produced very good effects. Recently I have been gathering information regarding this group. The aim is to collate information to investigate clinical effectiveness and possibly form the basis for a small trial.

I am hoping to gather information on a national level for two reasons: firstly to gather information on the number of patients seen nationally. Secondly as a therapy network for the sharing of ideas regarding FES effectiveness in this cohort. If you feel that you would benefit from such a group then do contact me. I work 3 days a week Mondays, Tuesdays and Thursday, emailing is the easiest route cmf@salisburyfes.com or phone 01722 429119.

Many Thanks

Carol Mcfadden

MS Trial Feedback

In April this year we held a feedback day for the research volunteers who took part in our recent trial of the ODFS with people with Secondary Progressive MS. Below is a summary of the presentation given by the research team.

An Investigation into the Effect of Functional Electrical Stimulation on Mobility and Quality of Life in Patients with Multiple Sclerosis

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Funded by the MS Trust

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INTRODUCTION

About 85,000 people in the UK have Multiple Sclerosis (MS) a condition which is the greatest cause of disability in young adults.
The effects of MS frequently lead to difficulty in controlling mobility as a result of muscle stiffness, weakness and poor co-ordination and balance. These problems often result in dropped foot and instability and weakness at the hip and knee. There has been little previous research into the effects of FES on gait in Multiple Sclerosis. This study proposed that the use of stimulation to correct dropped foot in people with MS could provide an effective orthosis to improve mobility and quality of life.

METHOD

People with secondary progressive MS were recruited to the study. Following assessment and recruitment they were randomly assigned to stimulation and exercise groups. All had a dropped foot impairing mobility, had not used FES before and had an effective response to stimulation. The FES group received stimulation to the common peroneal nerve to correct dropped foot, using the Odstock Dropped Foot Stimulator. The exercise group was given exercises to improve gait, appropriate to the individual subject. Both groups continued treatment for 18 weeks. Assessments were carried out at the beginning of treatment week 0, week 6, week 12 and at the end of treatment week 18.The primary outcome measure was walking speed over 10 metres. Other outcome measures included physiological cost index (PCI) over 10 metres, and walking distance, speed PCI and Total Heart Beat Index (THBI) over 3 minutes. PCI is a measure of the effort required to walk. Each person kept a falls diary throughout the study. Quality of life assessments included The Hospital Anxiety and Depression Scale (HAD), the Multiple Sclerosis Impact Scale (MSIS-29) and the Multiple Sclerosis Walking Scale (MSWS-12).

RESULTS

64 subjects (aged 18 years and above) with secondary progressive MS were recruited to the study. Of these 10 dropped out. The 6 minute walking test proved too demanding for the first 11 subjects and was changed to a 3 minute test for the remaining 43 subjects. Results are therefore presented for 43 subjects for walking tests and for 54 subjects for falls. In the walking test group 20 subjects received FES – 13 female and 7 male, mean age 51.7 years range 31-63 years, mean time since diagnosis 13.6 years range 5-32 years. 23 subjects received exercises - 16 females and 7 males, mean age 56.9 years range 39-71 years, mean time since diagnosis 17.8 years, range 6 to 29 years. In the falls group 26 subjects received FES - 16 female and 10 male, mean age 52.4 years range 31-71 years, mean time since diagnosis 12.5 years range 3-32 years. 28 subjects received exercises - 20 females and 8 males, mean age 57.5 years range 39-71 years, mean time since diagnosis of 18.0 years, range 6 to 28 years.

SPEED AND DISTANCE

The 10 metre walking speed test showed a small orthotic benefit of FES at each assessment but no carry over effect into improved walking speed without stimulation.

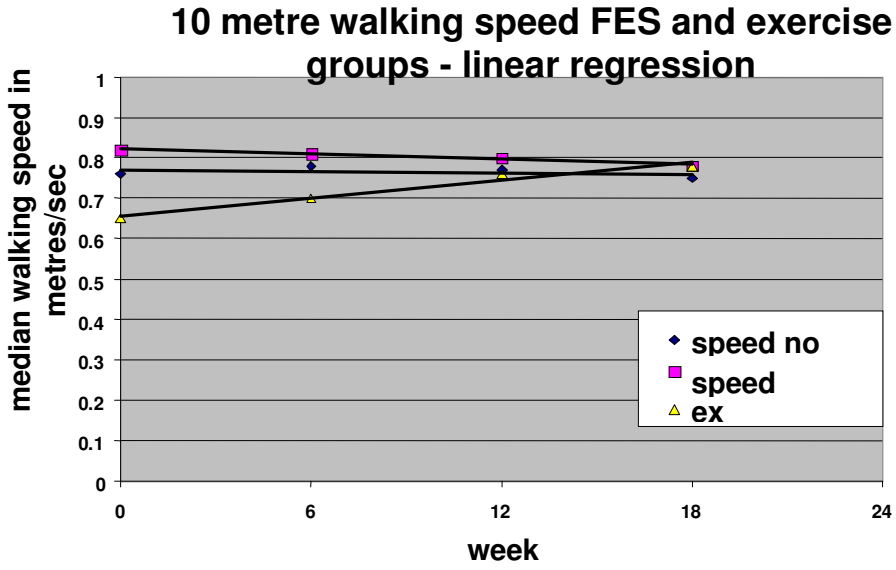

Fig.1 Median 10 metre walking speed

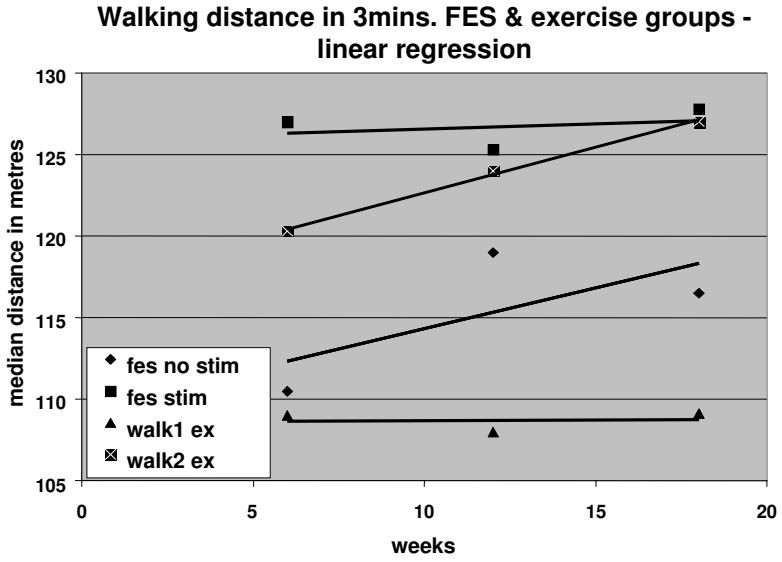

Fig.2 Median distances walked in 3 mins.

The exercise group however did show a carry over effect between the beginning and the end of the study. (Fig.1)

Walking distance in 3 minutes showed a greater degree of orthotic benefit in the FES group than for speed over 10 metres and also a carry over effect at the end of the study in the exercise group (Fig.2).

EFFORT

The effort of walking (PCI) in the 10 metre walking test showed a slight reduction in both groups, but there was no statistical significance in either group. In this study the stimulation did not appear to have a significantly beneficial effect on effort.

The total heart beat index (THBI) measured during the 3 minute walk is a measure of effort related to the distance walked. Results were inconclusive, as there appeared to be a slight increase in the stimulation group and a small reduction in the exercise group. None of the changes were significant.

FALLS

Both groups reduced the total number of falls experienced between each 6 week assessment period, which was significant at the end of the study. The total number of falls over the study period was significantly less in the FES than the exercise group. (Fig.3)

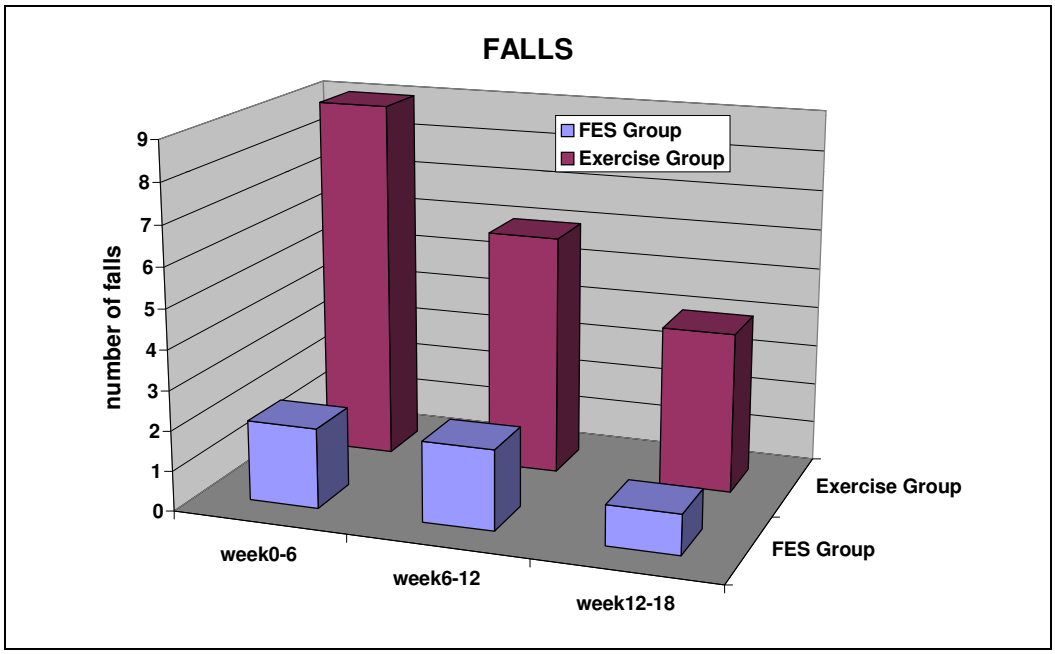

Fig.3: Total number of falls between 6 week assessments for FES and exercise groups

QUALITY OF LIFE ASSESSMENTS

The Hospital Anxiety and Depression (HAD) scale showed a reduction in scores in both groups in the depression section which were significant in the exercise group but not the FES group. In the anxiety section scores were reduced in the FES group and remained unchanged in the exercise group. (Fig.4)

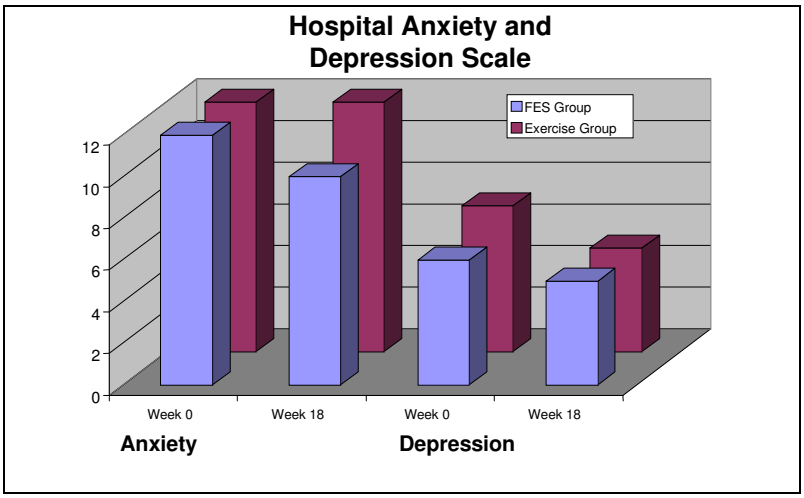

Fig.4 Hospital Anxiety and Depression Scale

MSIS 29

A reduction in scores indicates improvement in this test that has a physical and a psychological section. Improvement was seen in both groups at each stage of the study but was only significant in the FES group in the psychological section of the

test. However, the exercise group showed a strong trend towards significance. (Fig. 5)

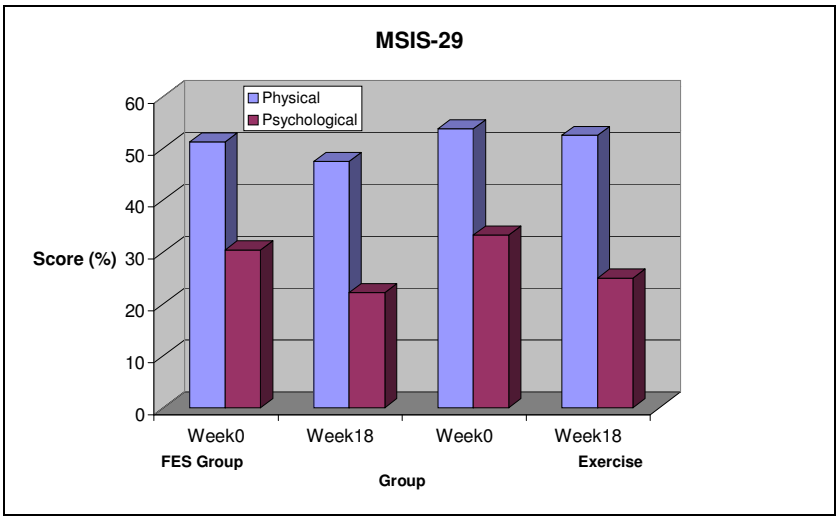

Fig. 7 MSIS 29

MSW 12

This is a test of walking ability and a reduction in scores indicates improvement. In both groups there was a slight increase in scores.

DISCUSSION AND CONCLUSIONS

The greatest orthotic benefit of FES was demonstrated in walking distance over 3 minutes. This is probably more clinically relevant for people with MS than walking speed over 10 metres which showed a smaller beneficial effect. This may indicate that the 10 metre test was not the most appropriate measure to use when testing the effect of FES on walking in people with MS. In this study there was no significant training effect of FES on unstimulated walking but exercise was shown to have a significant training effect on both walking speed and distance and therefore should be considered as an essential part of any treatment programme with emphasis on the appropriate targeting of that exercise as was done in this study. The role of FES in significantly reducing falls in this subject group is particularly important in view of the economic implications of falls in healthcare.

The questionnaires showed a definite trend to improvement in scores except for the MSW12 where scores increased slightly. This test does not appear to be sensitive enough to reflect changes in walking ability and does not allow for any changes to be recorded when the stimulator is being used.

This study shows that FES provides an effective means of correcting dropped foot in people with MS and has a significant role in preventing falls. The role of exercise has also been shown to be beneficial particularly in the training effect it provides. Importantly subjects gain autonomy and control in improving their mobility. The results of this study indicate that further work should investigate the combination of FES as an orthosis combined with exercise in order to achieve an optimum effect of therapy.

COPM (Canadian Occupational Performance Measure)

COPM is a method of assessing changes in the way activities of daily living are performed. At the commencement of each subjects' involvement in the MSODFS trial and before randomisation took place, each research volunteer was interviewed using the COPM questionnaire. The volunteer was asked to identify activities in daily life in which they experienced problems, issues or concerns. Using the COPM scoring card they were asked to rate on a scale of 1-10, the importance of each chosen activity (1 not important at all, 10 extremely important). The top five highest scored, self-perceived problems were confirmed with the volunteer and were then individually scored for performance (how well the task was performed) and satisfaction (what the research volunteer thought about it). These were also rated on a scale of 1-10. The total performance scores were added together and divided by 5 (the number of problems). The COPM re-assessment was undertaken 18 weeks later at the end of the trial, the client scores each problem again for performance and satisfaction. The reassessment score was taken away from the pre trial score to give the change in score. A change of 2 or more is considered clinically significant.

Results

	ODFS	**Exercise**
Average COPM change in performance	1.4**	0.5
Average COPM change in satisfaction	2**	0.5
Average number of activities that improved by scoring 2 or more on the COPM scale; Performance for each individual: Satisfaction for each individual:	 2.1* 2.6*	 0.9 1
Average number of activities that were reported to be worse by scoring 2 or more on the COPM scale, Performance for each individual: Satisfaction for each individual:	 0.44 0.31	 0.33 0.33

Significant difference using Mann Whitney U Test

****Significant score using Wilcoxon Test***

Conclusion

The ODFS group improved their performance of ADL tasks and were more satisfied with their performance after 18 weeks. This improvement was not seen in the exercise group. This indicates that the ODFS has a positive impact on activities of daily living.

Acknowledgements: The authors gratefully acknowledge a grant from the Multiple Sclerosis Trust, which funded this study.

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Can we help your local FES service 'get off the ground'?

Various resources are available and they may save you time and effort!

- Sample cost calculation year on year and associated sample business plan (Newsletter Spring 04) (see web site www.salsiburyfes.com)

- Salisbury staff may be able to help you with queries some of us have tried writing business plans ourselves, reviewed other plans or have direct experience dealing with funding bodies.
- We have contact with local FES services NHS and private.
- User Day is a good opportunity to share ideas with other therapists (Northwick park 18th Nov)
- Salisbury website…. We will put details and links on our web site to local clinics

Get in touch if you think we can help! See page at back of newsletter to register details.

The National FES Centre (Salisbury) offers free outreach service.

Currently after completing one of our courses, clinicians are able to access our help by email, post or telephone. Attendees at our User Day and those that come to sit in at our clinics also have opportunities to share experiences and 'pick our brains'. Occasionally this is not enough and so for a trial we are offering an additional outreach service involving an experienced clinician from Salisbury visiting other clinics.

The service could be useful in the following circumstances
- telephone advice has not been sufficient to answer a query
- a clinician wants one of us to attend an appointment with their patient(s) to help problem solve or assist in a novel application of electrical stimulation
- a clinician would appreciate our assistance to help build their confidence

We expect the service to consist of largely of a 'one off' visit and anyone requesting these would need to meet the costs of travel.

Please contact Ingrid Wilkinson for further information

Just a note… previously a FES 'Refresher' course was offered to clinicians who had completed a standard course and wished to update their skills. There was not enough demand then but please contact us if you would be interested.

FES educational material becomes available

Some clinicians find themselves needing to give presentations introducing FES to other therapists, as part of in service education or to managers to try and secure funding. We know that this can be daunting and so have some resources that may help

We have produced a CD which will run (we hope!) on any PC containing the following:
- Power point presentation giving a basic intro to FES for dropped foot with video examples. This is auto run and would be suitable for a lay audience
- A second power point presentation containing more detailed information suitable for an "in Service" training session
- Various clinic forms and other information.

The CD costs £5 and is available form the department.

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Research

The following paper updates the previous questionnaire published in 1999 and was presented at the International Functional Electrical Stimulation Society's (IFESS) Conference held in Bournemouth September 2004

Patterns of use and user perceptions of the Odstock Dropped Foot Stimulator following stroke and multiple sclerosis

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Abstract

A purpose designed questionnaire was sent to 285 users of FES to assist walking who started their treatment between July 2000 and July 2002. 211 replies were received of which 145 were dropped foot stimulator users. Overall satisfaction with the device and the clinical service was high. The most commonly sited reason for using the device was that it reduced the effort of gait. The device also reduced tripping and increased the confidence while walking. Half of the users who had had a stroke reported a significant carryover effect. Some problems were reported with locating electrode positions and equipment reliability although these were less than previously reported. Skin irritation is a problem for some users.

1 Introduction

The Odstock Dropped Foot Stimulator (ODFS) is a single channel foot switch controlled external FES device used for correction of dropped foot following upper motor neurone lesions. Stimulation of the common peroneal nerve elicits dorsiflexion and eversion, which prevents the toe catching the ground in the swing phase and enables safer weight bearing due to improved loading response at heel strike. The ODFS has been used at the Salisbury FES clinic since 1995 and its use is a recognised treatment in the UK health service[1].

Following medical referral, patients are assessed to see if the device assists their gait. If gait can be improved (between 80% and 90% of those referred) the patient is asked to return for two clinic sessions on consecutive days. On the first day they are taught how to use the ODFS and on the second, their ability to do so is checked and walking speed and PCI recorded. Follow up is made at 6 weeks, after a further 3 months, then after a further 6 months and then either 6 monthly or yearly depending on the individual for as long as the device is used. Patients are encouraged to contact the clinic if they experience a problem so that continuity of treatment can be maintained[2].

The purpose of this study was to analyse the success of the FES service and find out what the service users thought of their treatment and equipment[3]. This is a follow up to a questionnaire survey carried out in 1997[4]. The new survey has an extended scope to give a more detailed picture of how the device is used and has been targeted at a more homogeneous group from a defined time span.

2 Method

A purpose designed questionnaire was sent by post in July 2003 to all patients who used FES to assist walking and started their treatment at the Salisbury FES clinic between July 2000 and July 2002. Replies were anonymous but coded reply envelopes were used to identify non-respondents enabling a second questionnaire 6 weeks after the first.

3 Results

286 questionnaires were sent out and replies received from 211 (74%) of which 66 used a two channel FES device. The results presented here are restricted to the 112 ODFS users who had a dropped foot due to stroke (cerebral vascular accident - CVA) 69 or multiple sclerosis (MS) 43. The other ODFS users were people who had a spinal cord injury (7), a traumatic brain injury (4), cerebral palsy (2), Parkinson's disease (1) or unspecified course (19). The mean age of those with CVA was 59.0 years (SD 14.7 years) and MS was 53.6 years (SD 8.5 years). Of those who had used the ODFS, 9 CVA and 3 MS had stopped using the device.

How is the ODFS used?

48% of CVA and 40% of MS use the ODFS every day while 15% of CVA and 28% of MS use it 4 to 6 days a week and 23% of CVA and 15% of MS use it 2 to 3 days a week. While 8% of CVA and 5% of MS regularly walk in excess of a mile (1.6km) with the ODFS the majority walk more restricted distances, 33% CVA and 38% MS walking between 100 and 500m and 38% CVA and 40% MS between 10 and 100m. 60% of CVA and 63% of MS use the device in their home while 72% of CVA and 88% of MS use it outside. Popular uses include shopping, 63% CVA and 60% of MS; day trips out; CVA 50% and MS 65% and socialising; 45% CVA and 43% of MS. 17% of CVA and 8% of MS used the ODFS while working.

The ODFS was found beneficial in situations such as climbing stairs, 40% CVA and 48%MS, and also descending stairs, 35% CVA and 52% MS. It was also useful when walking up an incline, 72% CVA and 73% MS. The device was also considered useful where the floor surface increased the resistance to moving the foot. 56% of CVA and 81% of MS found it beneficial when walking on carpet and 70% of both CVA and MS found its use beneficial when walking on rough ground.

Why do ODFS users choose to continue its use?

A list of 14 possible reasons for using the device was derived from discussions with ODFS users and also the clinical team. Questionnaire recipients were asked to identify all the reasons that applied to them and ring the single most important reason. Additionally, there was an option to offer alternative reasons. The most important reason to use the ODFS in both groups was that it reduced the amount of effort while walking, 27% CVA and 33% MS. The other most important reasons for the CVA group was that their walking was better without the ODFS after they had used the device (short term carryover effect) 22% and the hope that their walking would be improved in the long term 20%. The other most important reasons for the MS group were that they were less likely to trip when using the ODFS 28% and could walk further 10%.

When the contributing reasons given for using the ODFS are analysed, again less effort was the answer most often identified, 83% CVA and 88% MS. Second in the CVA group was the hope that their walking would improve in the long term, 73%, while this was identified by only 55% of MS. Equally important to the MS group to the reduction in effort was that they were less likely to trip while using the ODFS, 88% while both groups were more confident while walking 70% CVA and 78% MS.

Being able to walk further was identified by 58% of CVA and 75% of MS while walking faster was identified by 60% of both groups. Short term carry over was identified by 50% of CVA and 23% of MS.

Problems

While 50% of CVA and 38% of MS found the electrode positions easily, 18% of CVA and 33% of MS found that it was difficult to locate the correct positions. 48% of CVA and 20% of MS found wearing the device made dressing more difficult and 27% of CVA and 20% of MS had problems when undressing and dressing for the toilet. 27% of CVA and 20% of MS experienced difficulties with the equipment when transferring to and from the car. The sensation of the stimulation was considered mild by 37% of CVA and 30% of MS or moderate by 47% of CVA and 55% of MS and uncomfortable by only 5% of each group. 25% of CVA and 10% of MS always required help to put the equipment on while 48% of CVA and 58% of MS were fully independent. The perceived time to put on the equipment was a mean of 7.4 minutes for the CVA group and 7.9 minutes for the MS. Of those CVA ODFS users who had stopped using the device, their perceived time to put the device on was a mean 13.3 minutes.

10% of CVA and 18% of MS had experienced some difficulty in using the equipment while 44% of the CVA who had stopped using the device experience problems. 22% of both groups had had reliability problems with the stimulator and 33% had experienced problems with the foot switch. 25% of both groups had experienced problems with either the electrode or footswitch cable. 33% of both groups had experienced some skin irritation at the electrode site at some time.

Opinion

The questionnaire gave a series of statements and the respondent was asked if they agreed or disagreed with the statement. 92% of CVA and 98% of MS were glad that they had the ODFS and 91% of CVA and 90% of MS would recommend it to another person. 70% of CVA and 73% of MS agreed that its use increased their independence and 85% of CVA and 83% of MS agreed that they were more confident when using the ODFS. 69% of CVA and 71% of MS agreed that it improved their quality of life. Only 22% of CVA and 20% of MS agreed that the equipment was of good cosmetic appearance while 17% of CVA and 35% of MS disagreed with this statement.

Why had those that had discontinued using the equipment stopped?

A list of reasons for stopping use of the ODFS was drawn up from clinical experience. The questionnaire asked that all the reasons that were relevant were identified and the most important reason selected. Additional reasons could be given if required. Of the 9 CVA users who had stopped the most important reason for 4 people was that they received too little benefit from its use. Other reasons were that it was too difficult to use 1, skin allergy 1 and oedema 1. Two MS users stopped because their mobility deteriorated, 1 because the stimulation was painful and 1 because the benefit was too small. Adding the all other contributing reasons together for both groups, 6 people received to little benefit from the device, 4 thought it was to much bother to use, 4 found the electrode positions to difficult to find and 3 found the device to difficult to use. Of the 9 CVA users who stopped 7 used the device on their left side while 2 used it on their right side.

Clinical Service

Overall satisfaction with the clinical service was very high. Clinical treatment, the clinician' s explanation of the device, the instruction manual and technical and administrative service were all judged to be good or very good. The one area of

complaint was the parking facilities, judged by 32% of CVA and 18% of MS to be inadequate or poor.

4 Discussion and Conclusions

While the questionnaire was answered anonymously, respondents would have been aware that it was sent from Salisbury and may therefore have been influenced in their replies. Overall compliance with treatment was high with only 12 discontinuing out of 145 ODFS users. However it is likely that there was a greater number of discontinuing ODFS users amongst the 74 people who did not return the questionnaire. The compliance rate may also be biased by the number of people who had progressed to using a 2 channel FES device for gait. This device is generally used where there are more severe gait problems such as bilateral dropped foot, insufficient knee flexion or hip extension.

Like the earlier survey, the reduction in effort was seen as the most important reason for using the device[4]. However, a change from the previous survey is the much greater proportion of CVA ODFS users reporting the short term carryover effect as a reason for using the device, 50% compared to 15%. Another difference was the number of people reporting problems with finding the electrode position, 18% CVA and 33% MS compared to an overall level of 44%. This change may be due to improved clinical methods derived from the FES team's experience.

A number of problems were experienced with equipment but less than were reported previously. Foot switches in particular have a finite life, lasting on average about 6 months and therefore must be considered as a consumable item. Recent changes to some components have addressed the main areas of unreliability. More concerning are the reports of skin irritation at the electrode site although this was only a contributing reason to discontinuing in one case. It is important to maintain skin and electrode hygiene and replace the electrodes regularly. Once the skin has healed, in most cases use of the device can continue with an alternative electrode type.

Overall it is clear that the device provides useful function, is well accepted and is viable in clinical service.

References

1. Taylor PN, Burridge JH, Wood DE, Norton J, Dunkerly A, Singleton, C, Swain ID. (1999) Clinical use of the Odstock Drop Foot Stimulator - its effect on the speed and effort of walking. Arch Phys Med Rehabil 80: 1577-1583,.
2. Taylor PN. The use of electrical stimulation for correction of dropped foot in subjects with upper motor neuron lesions. *Advances in Clinical Neuroscience and Rehabilitation,* 2(1): 16-18, 2002.
3. Karsznia A, Dillner S, Ebefors I, Lundmark P. Why patients use or reject a peroneal muscle stimulator?. In: Popovic D ed. Advances in external control of human extremities X. Belgrade: Nauka. 1990: 251-60.
4. Taylor PN, Burridge JH, Dunkerley AL, Lamb A, Wood DE, Norton JA, Swain ID. (1999) Patient' s Perceptions of the Odstock Dropped Foot Stimulator (ODFS). Clin. Rehabil 13: 333-340

Acknowledgements
We would like to thank J. Hand for assistance with data entry.

CPD – quiz on ODFS

By working through the following questions you can test your knowledge of the ODFS and its applications. Remember to copy the quiz for your CPD file. If it raises any issues you would like further information on please email me. All feed back appreciated.

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1. **From the following list, please circle the conditions you do NOT think FES would be useful for.**
   a) sensory and motor neuropathy
   b) progressive multiple sclerosis
   c) familial or hereditary spastic paraparesis
   d) foot drop following lumbar discectomy

2. **While teaching a new patient how to use an ODFS you realise they have poor skin condition, in the area you wish to place the electrodes… what will you do? Circle the answer(s) you think are appropriate to try.**
   a) nothing different, put the electrodes on and try stimulation
   b) try the electrodes in an alternative position away from the flare up
   c) suggest the patient seek medical advice to try and improve skin condition and postpone treatment with stimulation
   d) Use thicker gelled hypoallergenic electrodes

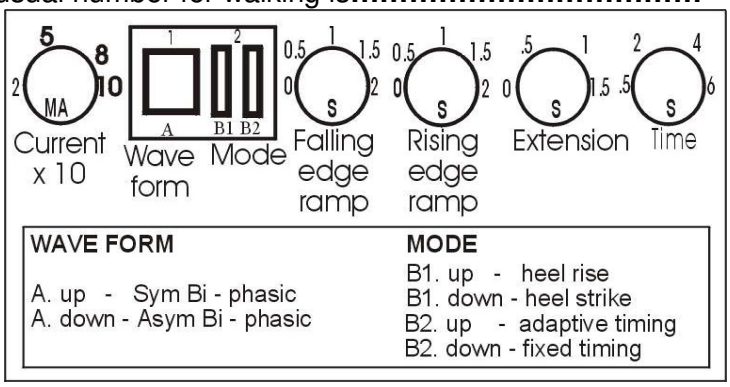
3. **The patient in front of you has severe clonus. With this problem in mind, circle the parameter(s) you will take most care over when setting up the ODFS**
   a) time
   b) pulse width
   c) down ramp
   d) up ramp
   e) current

4. **Your patient who has used an ODFS for some time comes to see you saying it is not coming on and off AT ALL during walking but that it worked when testing in sitting with the red button. What do you think the possible causes might be, list four.**
   1.
   2.
   3.
   4.

5. **Some patients complain their toes claw during stance phase and cause discomfort. The way the stimulator is set up may help or worsen this problem. Circle the parameter(s) you would check.**
   a. output level via pulse width knob
   b. current output
   c. ramps and timing
   d. adjust electrode positions slightly

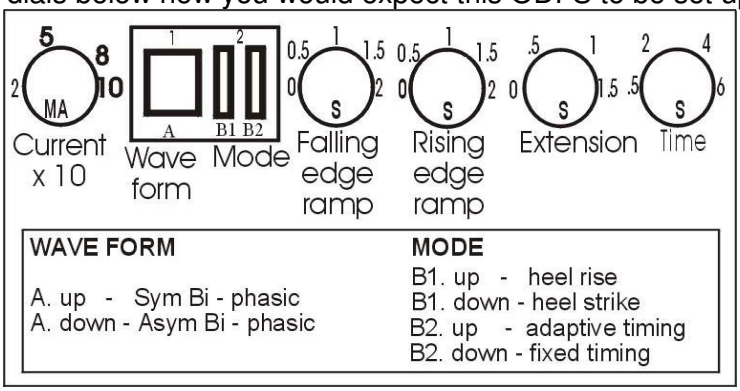
6. **You are reviewing an ODFS patient for a colleague and take a look at the parameters inside the box. The patient has had a stroke and walks with the footswitch under the affected heel. They walk with a stick at a reasonable speed and have no particular clonus problems.**
   Draw on the dials below how you would expect a typical ODFS to be set up.

   Pulse width usual number for walking is**.....**



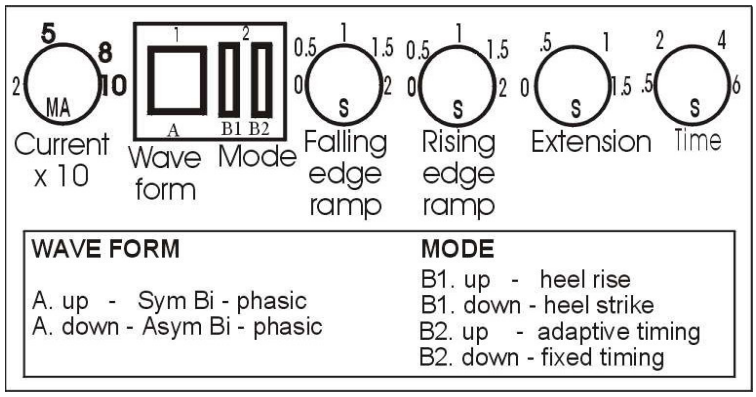
7. **Your next patient is a very slow walker with high tone but no problems triggering the stimulator from the affected side**

   Draw on the dials below how you would expect this ODFS to be set up.



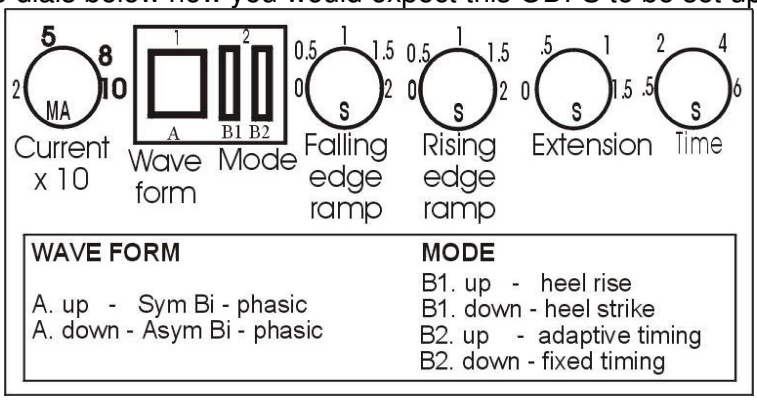
8. **The next patient has irregular heel contact on the affected side which causes lots of triggering problems and they have had longstanding skin sensitivity**

   Draw on the dials below how you would expect this ODFS to be set up.



9. The next patient has problems with foot flap i.e. they have uncontrolled lowering of the affected forefoot after heel strike which parameter do you think will control this the most?……

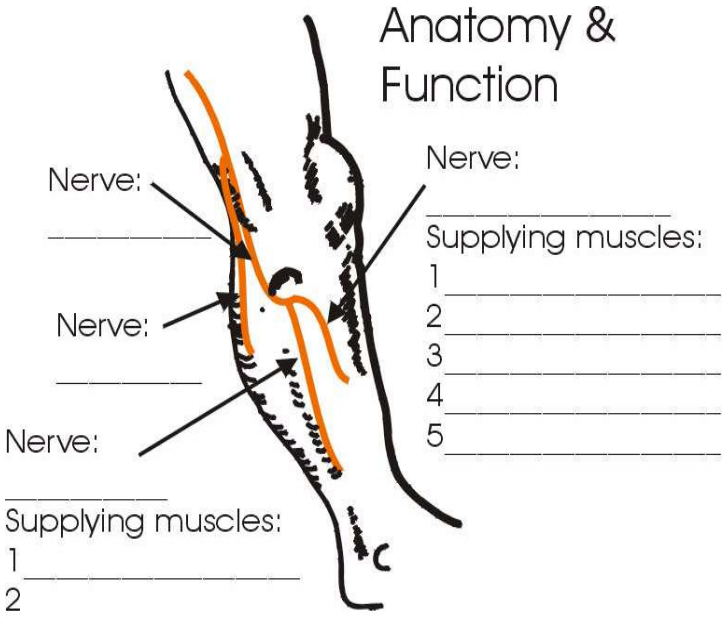
Draw on the dials below how you would expect this ODFS to be set up.



10. An electrode lead can become worn and cause an intermittent fault.

True or false?

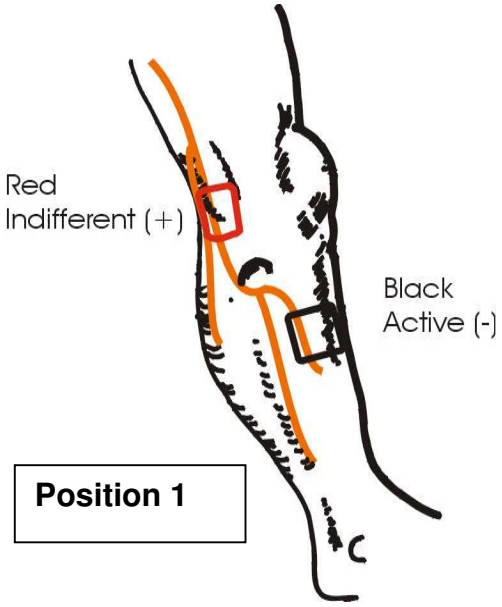
11. Please label the diagram below

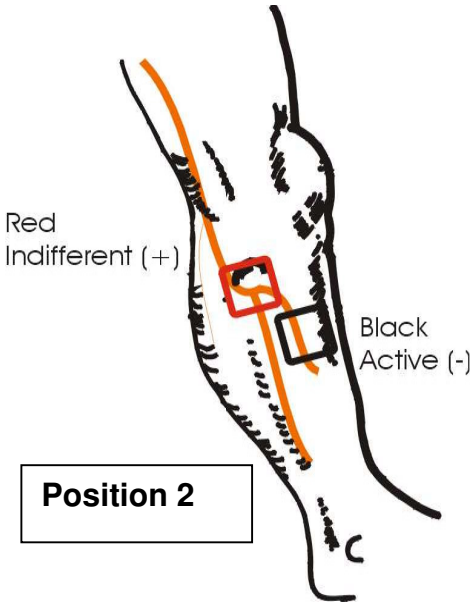


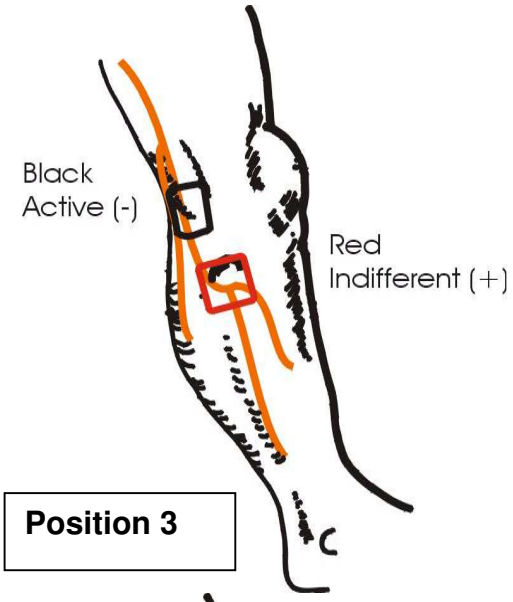
12. Positioning electrodes can be very tricky and there are always patients who are exceptions but the following refers to typical electrode positioning.

Below are pictures of typical electrode positions for helping drop foot problems, assuming the ODFS is on an asymmetrical biphasic setting.

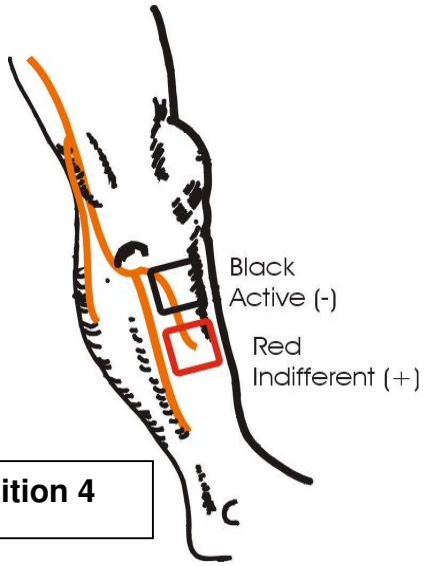
a. Which is the most usual or 'standard' position for the electrodes
   Answer……
Which option(s) might you choose if the patient had
b. Slightly too much eversion in response to standard positioning
   Answer(s)……
c. Strong eversion in response to the above modified standard electrode position
   Answer(s)……
d. Decreased knee flexion as well as drop foot
   Answer(s)……
e. Tendency for too much eversion with standard popliteal fossa position
   Answer(s)……



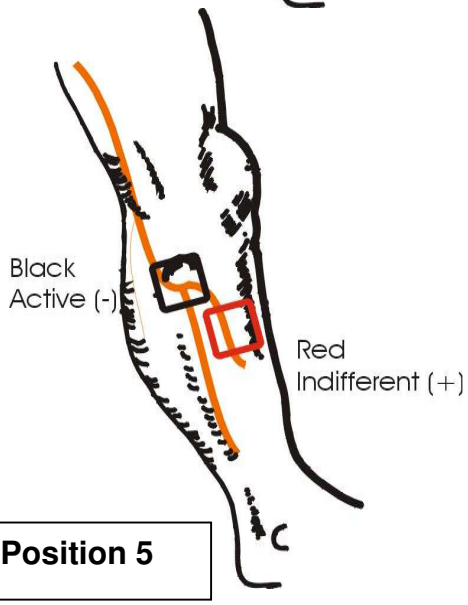




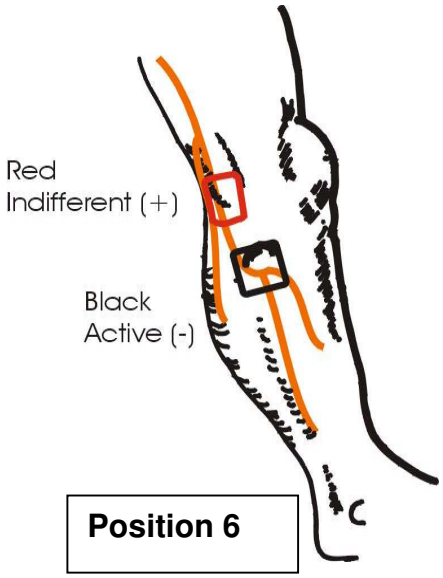
Position 3



Position 4



Position 5



Position 6

Answers to CPD quiz

1. FES is only suitable for upper motor neurone lesions and so you should have ringed a and d as these are peripheral problems.

2. Answers b, c and d would all be worth trying depending on the way the patient presents and how much they understand warnings regarding skin condition. Sometimes stopping altogether for a while is the only way to stop a patient stimulating a damaged area. Generally use of hypoallergenic thicker gelled electrodes is a good idea if you are at all worried about skin condition. We are currently reviewing the advice we give patients regarding skin care and will soon be discussing it with our local dermatologist so watch this space!

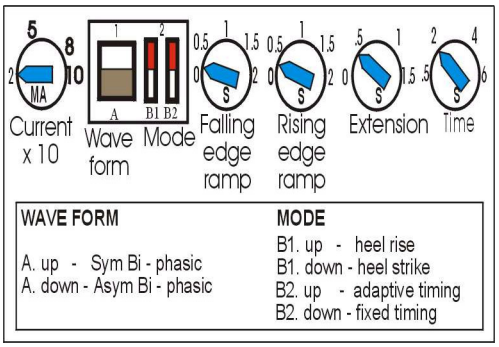
3. The most relevant parameter is d. A slower contraction of the dorsiflexors and evertors is likely to affect the stretch reflexes in the calf the least and so have the most reduction in clonus reaction. Intensity of the stimulation may increase clonus if it is set to high. You may like to try a period of exercise stimulation if extensor spasms are a problem. This can be done with a Microstim set with a long ramp and used daily for sessions of up to half an hour.

4. There are quite a few possibilities!

   - broken footswitch
   - disconnected footswitch lead either at the box itself or the connection to the switch
   - the switch could have moved in the shoe so that weight is no longer landing on it. We usually use an insole with the switch stuck underneath in the best position so patients can move it from shoe to shoe but it has less chance of becoming dislodged.
   - The patients walking pattern has changed so that they no longer weight bear sufficiently on the switch. This could be because of pain or tight calf muscles and can be improved by moving the switch a little or changing the switch to the opposite shoe so that the 'good' foot triggers it.
   - A fault in the ODFS.
   - A damaged footswitch or electrode lead.

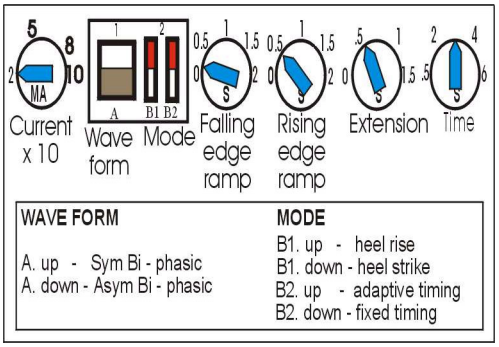
5. **a**, **b** and **c** would be the first things to check and **d** might be a possibility especially if the electrode near the fibula head was placed posteriorly enough to illicit plantarflexion. The problem can be associated with extensor spasm and a lack of stability around the joints. A dynamic insole sometimes called a total contact insole may help. Liaison with orthotics or the rest of the MDT regarding tone reducing medication or injections such as botox may help.

6. Normally pulse width is used between 4 and 6 on the dial for comfort and effective drop foot correction. This needs to be balanced with suitable current output on the control panel inside. As current settings are so patient specific they will appear in the following diagrams set on minimum.

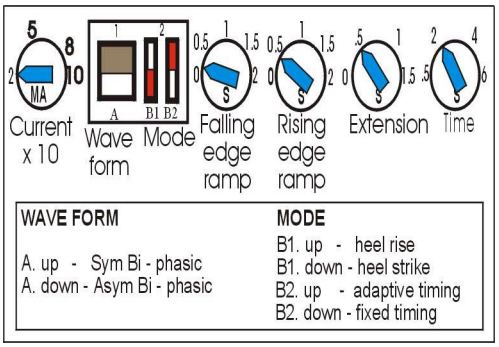


7. Note that time has now increased as they walk slowly. It should be set a little longer than the time taken for an average swing phase for that patient.

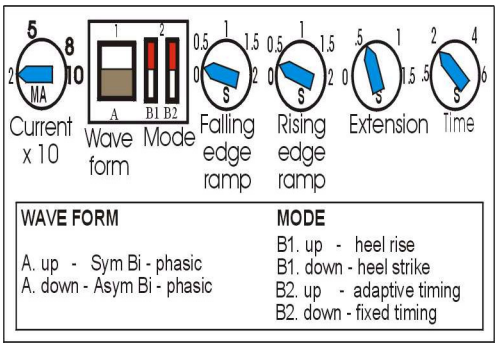
   Also the rising edge ramp has to be increased to avoid calf over activity via the stretch reflex



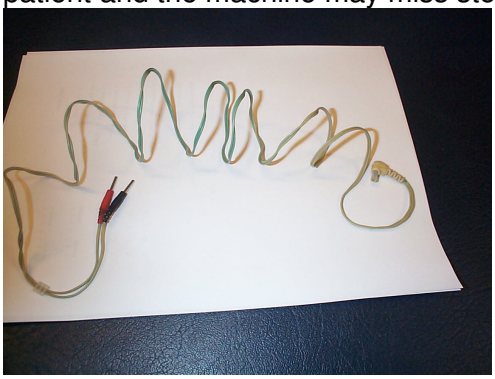
8. To address irregular heel contact the footswitch could be worn on the non affected side i.e. Slide B1 down.
   To help minimise chances of skin irritation the waveform has been changed to symmetrical biphasic i.e. Slide A is up.



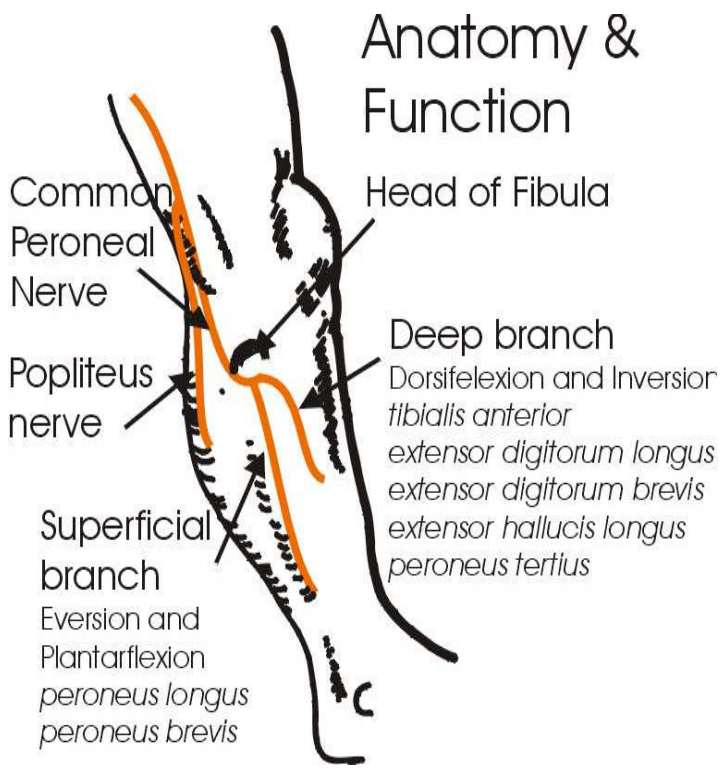
9. Increasing the extension time usually helps this problem as the machine remains ON at peak output for a short time after heel strike. Increased falling edge ramp may help but not so effectively as output is just trailing off slower. Sounder will be useful for this.



10. If you look at this on the internet site you could enlarge the image below and you will see that wire has gone green as the copper wire inside reacts with body heat and sweat and leaches into the plastic insulation. This can make the lead go very stiff. Leads tend to take a year or more of daily use before they go like this. This can produce fluctuations in the power delivered to the patient and the machine may miss steps.



11.



12.a. standard position is position five (labelled v.).
12.b position two (ii.) reversing the red and black is a common way to reduce excessive eversion. If too much inversion is produced the ODFS could be set to symmetrical biphasic which might balance the movement.
12.c. position four (iv.) stimulates the motor points of tibialis anterior.
12.d. position six (vi.) will produce some knee flexion via the flexor withdrawal response because of the electrode (red) placed on the lateral border of the popliteal fossa, just above the knee crease. It is possible to put the stronger black electrode near the popliteal fossa i.e. position three (iii.), but this may be too uncomfortable to tolerate!!!
12.e. position one (i.) combines strong output to tibialis anterior for dorsiflexion while keeping knee flexion due to flexor withdrawal.

FES COURSES

Before clinicians can prescribe the ODFS or 02CHS for their patients, they must attend a course. This is mandatory. Three courses are offered. The introductory course gives an introduction to FES and its application in neuro-rehabilitation. The course, which has a large practical content, is intended to enable clinicians to select candidates for the ODFS and use the device. The second course, intended for clinicians who have some experience of the ODFS, introduces the O2CHS, used for more complicated gait applications. The upper limb course expands on the introduction to exercises used in upper limb hemiplegia, given in the introductory course. For further information, course programmes and booking form can be found on the web (www.salsiburyfes.com). Please contact course secretary Claire Hall for all bookings and course enquiries Tel: 01722 429065.

INTRODUCTORY SINGLE CHANNEL FES COURSE

2005

September 23/24th	Ireland
October 10th/11th	Queen Mary' s Hospital Roehampton London (followed by paediatric FES workshop - see below)
November 11/12th	Newcastle
December 3/4th	Norwich

2006

January	Cornwall or Plymouth (venue and date to be confirmed)
January 21st/22nd	Salisbury
February	Homerton Hospital, East London (single channel and upper limb)
March	Walton Hospital, Chesterfield
April	St Mary' s Hospital, London

April	Salisbury
May	Dartford PCT, Kent
September 21st - 23rd	Adenbrooks, Cambridge. (single channel and upper limb)
October	Salisbury

UPPER LIMB One Day FES COURSE

Open to participants who have not completed the single channel course or wish to cover more in depth the upper limb stimulation, principally in hemiplegia. Some participants may find some of the physiology hard going and it is preferred that they have attended the single channel course first.

2006

February	Homerton Hospital, (in conjunction with single channel course)
July	Salisbury

TWO CHANNEL COURSES

Participants must have completed the single channel course.

2005

October	Salisbury

2006

May	Salisbury

ODFS Refresher course

It is suggested that we run a one day refresher course for people who have been trained in the use of the ODFS but not had the opportunity to consolidate their skills with experience. The course will cover the practical issues of using and setting up the device and provide practice with patients. We have not set a date for this course but if anyone would be interested or would like us to come and do a course at your hospital, please contact us.

ONE DAY WORKSHOP

Upper and Lower Limb Electrical Stimulation in Paediatrics

To be held at Queen Mary's Hospital, Roehampton, London
Wednesday 12th October 2005, 10:30am to 5pm
Sponsored by FESnet

The aim of the workshop is to promote discussion and the exchange of ideas in an informal setting. The workshop will review the evidence to support the use of electrical stimulation in paediatrics, report on current research and clinical techniques, and present case studies.

We would be very pleased to receive presentations from attendees. Presentations should be of 20 minutes duration and may be on any aspect of the clinical application of electrical stimulation. This includes original research, clinical experience or case studies.

Please provide a 300-500 word abstract (on disc or through email).
PowerPoint, slides, OHP and video will be available for your use.

The cost of the meeting will be £60. Please make cheques payable to: *Wandsworth PCT*

Please complete the slip below and return it, together with payment, to:

Mrs Sally Durham or Dr David Ewins
Gait Laboratory, Roehampton Rehabilitation Centre, Queen Mary's Hospital, Roehampton, London SW15 5PN, Telephone: 020 8355 2175, Fax: 020 8355 2952, email: gaitlab@swlondon.nhs.uk

Upper and Lower Limb Electrical Stimulation in Paediatrics, 12th October 2005

Name _____

Address _____

_____

_____

Phone Number _____

email _____

I wish to give a presentation Yes / No

Title of presentation _____

_____

FES Equipment Order Form

Please use this form to order FES equipment from the department of Medical Physics & Biomedical Engineering - Salisbury District Hospital. All orders must have the name of the FES trained clinician. Please read the conditions of sale overleaf.

Name of supervising clinician or therapist
that has attended the Salisbury FES course:_____

Name & address to send the equipment to (stimulators
will only be sent to the trained therapist or clinician): _____

_____

_____

Name & address to send the invoice to: _____

_____

_____

Contact phone number for queries with this order: _____

Code	Items	Number required
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

Stimulators can be supplied with electrodes, electrode and foot switch lead lengths and shoe inner sole size of your choice. Please specify your requirements.

Cheques should be made payable to *Salisbury Health Care NHS Trust*.

Please send order to:
Mr Stacey Finn, Department of Medical Physics and Biomedical Engineering, Salisbury District Hospital, Salisbury, Wiltshire, SP2 8BJ. UK

Fax: 0044 (0)1722 425 263, Tel: 0044 (0)1722 429 118, E-mail: s.finn@salisburyfes.com

Condition of sale

The Odstock® range of neuromuscular stimulators are supplied under the following conditions of sale:

> The supplied device will only be fitted by; a person who has been trained to the standards set by the Department of Medical Physics and Biomedical Engineering (MPBE) in the use of a given FES device, or a person approved as being competent in the use of FES techniques by MPBE. The said person must be registered in the list of accredited users held by MPBE.
>
> The registered person and their employer are considered responsible for the continuing support of the use of the device by the end user.

Warranty

The Odstock® range of stimulators and accessories are warranted for a period of twenty four months from date of initial fitting by a FES trained and registered clinician. This is with the exception of the footswitch, which is warranted for a period of one month only. Also excluded are electrodes, and batteries, which are considered to be consumable items. Should the unlikely event of any failure of the device occur during the warranty period, the device should be returned to the address shown below for inspection. Should the failure be due to a manufacturing or material defect the device will be repaired or a replacement supplied free of charge. This warranty is valid providing that:

1. the failure cannot be attributed to misuse or improper fitting
2. the warranty registration form has been completed and returned to the address shown below within 14 days of initial fitting
3. it can be certified by demonstrable evidence that the fitting of the Odstock® was done by a registered accredited user.

This warranty is in addition to any statutory rights available to the purchaser

Repairs outside the warranty period

Repairs occurring outside the warranty period will be charged at a flat rate of £35 +VAT. Alternatively an extended 5 year (from first use of the device) warranty can be purchased at a cost of £100* + VAT. The extended warranty must be purchased at the same time as the device. The device accessories (leads, sounders etc.) are excluded from the extended warranty and are subject to a one year warranty only.

The Department of Medical Physics and Biomedical Engineering, Salisbury District Hospital, Salisbury, Wiltshire, SP2 8BJ, UK.

FES User Day 2005
Northwick Park, London
Friday 18th November 2005
10am - 5pm

Please fill in the form below to reserve your place. We also invite 15 minute presentations on any aspect of the clinical application of electrical stimulation. Presentations may be of original research, clinical experience or of case studies. The aim of the meeting is to promote discussion and the exchange of ideas in an informal setting.

It is hoped to have sessions on the following areas:

- Use of FES to improve mobility in stroke, MS, PD and spinal cord injury
- FES in Cerebral palsy
- FES in stroke upper limb
- Electrical stimulation in conjunction with Botulinum toxin.
- Facial palsy
- Stimulator technology update

Please provide a 300-500 approx. abstract, which we will be made available on the day and will also be included in the winter addition of the FES Newsletter. Power point, slides, OHP and video will be available for your use. If using power point, please bring your talk on disk, CDROM or Zip disk so a single computer can be used. This saves time between presentations.

The cost of the meeting is £40. Please make cheques payable to the Medical Physics Trust Fund.

++

Name _____

Address _____

_____

_____

Phone number_____

I will attend the FES User Day Meeting Y / N

I wish to present a presentation Y / N

Tittle _____

_____

Please return this form to Sue Borrett, Department of Medical Physics and Biomedical Engineering, Salisbury District Hospital, Salisbury, Wiltshire, SP2 8BJ

Abstracts may be e-mailed (p.taylor@salisburyfes.com) or sent on a disk to Paul Taylor at the above address.

Service provision

The Clinic in Salisbury receives enquiries every day from people who want to receive FES treatment in their home area. We therefore wish to produce a directory of clinicians who are using FES so we can pass on their details. The information will be used for the sole purpose of connecting potential clients with FES trained clinicians. We can also add the information to our web page (http://www.salisburyfes.com/clinics.htm). Please fill out and return the form below.

If you have previously sent us information, please still fill in and return this form so we can ensure our information is up to date.

Name: _____

Work Address:

_____

_____

_____Post code_____

Tel: _____Fax: _____

E-mail: _____

Web page: _____

I / We provide a clinical FES service Y / N

Type of conditions treated: (Please ring) All CVA MS SCI CP TBI F/HSP

Other_____

Treatment is provided for: (Please ring) Upper limb exercise Lower limb exercise

Dropped foot More complex gait problems

Other_____

Treatment: (Please ring) We use FES for treatment as part of physiotherapy

We provide FES equipment for short term use at home

How long_____

We provide FES equipment for long term use at home

Referrals: (Please ring) We take referrals from within our hospital

We take referrals from GP' s in our own PCT

We take referrals from any GP or Medical Consultant

We take self referred patients

PTO

To whom should referrals be made?_____

Address_____

_____

Any restrictions from where / how referrals can be made? _____

_____

_____

Funding: (Please ring) Internal hospital funding Contract with PCT Cost per case

Charity Private Research grant Other_____

Funding covers: (Please ring) Therapy staff time Equipment Consumables

How many FES patients do you see each year? New_____ Follow up_____

How many Patients use FES at home? New_____ Follow up_____

Do you have a waiting list? Y / N How long?_____

Please add my details to the directory Y / N

Please add my details to the web page Y / N

Please add any additional details about your service / funding / referral procedure etc.

Signed _____

Date _____

Thanks for completing this form.

Please send to: Phil Carley, Department of Medical Physics and Biomedical Engineering, Salisbury District Hospital, Salisbury, Wiltshire, SP2 8BJ, UK