



# InDependent Diabetes Trust

## Diabetic Neuropathy

Updated January 2013



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## Introduction

From early diagnosis of diabetes, most people are told to look after their feet because of the risks that long-term diabetes or poorly controlled diabetes can cause nerve damage. This is just one form of diabetic neuropathy but probably the most common and well known form.

Neuropathy means damage to the nerves supplying any part of the body but is usually divided into two categories peripheral neuropathy or autonomic neuropathy.

- Peripheral neuropathy affects the nerves supplying the skin and muscles.
- Autonomic neuropathy affects the nerves supplying the organs

such as the bladder, bowel or heart. It can damage the nerves responsible for controlling blood pressure, sexual function etc.

Neuropathies fall into two broad groups:

- Diffuse neuropathy affecting many nerves either the sensory or the autonomic nerves. This is the most common form and is the one that can affect the feet.
- Focal neuropathy affecting individual nerves – for example, this is the type that can cause impotence.

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## Neuropathy affecting the feet

Care of the feet is very important for people with diabetes because of the risk of diabetic peripheral neuropathy. Systematic and regular foot care has been shown to reduce ulceration and limb loss by up to 50% and almost half of all diabetes related admissions to hospital are for problems related to the leg and foot.

Prevention is always better than cure and so obviously it is important to have regular checks of your feet by health professionals and to regularly examine your feet yourself.

### The Golden Rules For Looking After Your Feet

- Never go barefoot.
- Wear good fitting shoes – not tight or worn.
- Break in shoes gradually and make sure they don't rub.
- Keep your feet dry, especially between the toes.
- If you need to use powder, use the unscented varieties.
- Use lotion to keep the skin soft so that your feet do not get dry or cracked.
- Cut your toenails straight across, not deep into the corners.
- Wash your feet daily using luke warm water.
- Do not use heating pads, hot water bottles, iodine, Epsom salts or alcohol.
- Check your feet every day and if there are any problems see your

doctor or chiropodist.

### Advice On Cutting Your Toenails

If you have been advised by your consultant or your GP not to cut your toenails yourself, then you should see a chiropodist. If, however, there is no reason why you should not cut your toenails then here is the way you should do it:

- Follow the shape of the toe when cutting.
- Leave no sharp edges.
- Nails are for protection, so do not cut them too short.
- Never cut down the sides.

### Symptoms of neuropathy affecting the feet or hands

- Tingling or buzzing in the feet [called parathesia] that is often worse at night making sleep difficult.
- Pins and needles [called dyesthesia] which can become intense pain or an intense burning sensation and is described by some people as a painful numbness. It can be intermittent or constant according to how much nerve damage there is and which nerves are affected.
- Muscle pain which is different from the above in that it is more diffuse and more like cramp.
- Loss of temperature perception – the hands and feet are less sensitive to heat and can be very sensitive to cold
- Exaggerated sensitivity in the skin [called hyperesthesia] – an unpleasant sensitivity to skin stimulation, just wearing socks or tights can be very irritating to the skin. It seems like an allergic reaction but there are no changes in the appearance of the skin and nothing to actually see. Just minor damage to the skin can be very painful.

### Ways of dealing with loss of pain sensation

Clearly it is important to have comfortable, correct fitting shoes. Your chiropodist can advise about this. Rosemary Murray, a nurse who has diabetic neuropathy, has her rules about shoes:

- The most comfortable shoes are running shoes because they are made of soft fabric, provide a shock absorbing thick sole and a lace up top for a good snug fit.
- Obviously there are times when she wants to wear 'proper' shoes, so when buying new shoes she makes sure that they are not too tight.
- She never wears a new pair longer than 2 hours at first and then inspects her feet for pressure marks or irritations. A hand mirror is useful to ensure that all parts of the feet can be examined. She repeats this to hour test and then gradually builds up her wearing time.
- If the shoes do cause problems, she throws them away and writes off the cost as a small price to pay for avoiding real foot damage.

### **Ways of dealing with loss of temperature sensation**

#### **Cold**

Dealing with increased feelings of being cold in the hands and feet is relatively easy. For the hands wearing gloves and increasing their thickness in winter helps. For the feet wearing heavy socks is not always possible but lined socks are available and these are warm but not very thick. For women thick tights are available.

#### **Heat**

Dealing with loss of sensation of heat is more important because failure to do so can result in severe burns. It is not always the obvious hot water bottle that is the problem but judging everyday things like the washing up water or bath water can be difficult. Usually the forearms or the upper arms are more sensitive to heat so running water over them as a test is a good idea.

**Bath Alert** are interesting devices particularly for people with diabetic neuropathy where the feet have lost the sensations of pain and heat. There is always a danger of scalds if the bath water is too hot and you can't feel it because of the loss of feelings in the feet. Bath alerts can be pre-set to the required temperature and an alert flashes and sounds a buzzer if the temperature of the water goes above this. They

usually also detect the water level and warns if the water has gone above this and the bath is in danger of flooding. This is particularly useful for people who are visually impaired.

Bath Alerts can be obtained easily but one source is:

Lifemax Ltd, 1 Pipers Court, Thatcham RG19 4ER

Telephone: 01635 874 323

Email: [sales@lifemaxuk.co.uk](mailto:sales@lifemaxuk.co.uk)

Website: [www.lifemaxdirect.co.uk](http://www.lifemaxdirect.co.uk)

### **Ways of dealing with painful neuropathy**

- The tingling and buzzing sensation is often helped by physical activity – walking or rubbing the affected area.
- Medical gel packs have been found to help some people. The gel pack has to be chilled in a freezer before use and then is placed on the painful area. These are inexpensive and can be obtained from leading pharmacies.
- The pins and needles extending to varying degrees of pain is often treated with pain killing drugs but other options are available.
- Pain control clinics are becoming more available and you should ask your doctor to refer you to your nearest one.
- TENS machines are convenient, safe and effective, easy to purchase and cheap to run. They can be used at home without training and they have a demonstrable record of producing pain relief. Unlike many drugs, they have no side effects. TENS stands for Transcutaneous Electrical Nerve Stimulation.

### **How does the TENS machine work?**

We all know that if we knock our knee than we automatically rub it and this rubbing cuts down the amount of pain that we feel. The rubbing affects the nerves carrying the messages about pain to the brain by blocking the pain messages. The TENS uses electricity to block the pain messages. It is a small battery operated box with two or four self-adhesive pads that attach to the area around the pain. It can be clipped to your clothes and worn at any time. A 20 minute treatment can give pain relief for quite some time and because there are no

side effects treatment can be repeated or extended. Research has shown that not only do TENS machines block the pain messages but they also can stimulate the body to produce its own pain-relieving hormones.

**NOTE - TENS should not be used near the heart or front of the neck and should not be used by anyone fitted with a pacemaker. They can be purchased in many of the larger pharmacies but always talk to your doctor first.**

**The latest information on drug treatment options for neuropathy appear to be the following:**

- Antidepressants Anticonvulsants
- Selective serotonin reuptake inhibitors
- Narcotic analgesics
- Topical agents such as capsaicin and lidocaine patches.

#### **Note**

IDDT has had quite a lot of queries from people with neuropathy who are being treated with antidepressants - they find this difficult to understand. The reason for prescribing antidepressants for neuropathy is based on the suggestion that it might inhibit the pain pathways in the central nervous system. [Drugs and Therapeutics Bulletin April 2007]. When a simple painkiller such as paracetamol is ineffective in treating painful neuropathy, the next treatment is with what is known as a tricyclic antidepressant such as amitriptyline. Other options are available including duloxetine [sold as Cymbalta and Yentreve] which has been specifically approved for peripheral neuropathic pain. It is recommended that its use is assessed 2 months after starting treatment and then 3 monthly. The trials carried out with duloxetine showed that there was a significant reduction in pain when compared to a placebo [dummy pill].

**You should explore all these options, or a combination of them, with your doctor perhaps before going down the easy and obvious route of taking large doses of painkillers.**



## **Heel fissures**

The Isle of Wight Diabetes Monitoring Group, have kindly given permission for IDDT to reprint an article from their magazine by Oliver Davies, Senior Diabetes Chiropodist.

### **What are heel fissures?**

Heel fissures are a common occurrence in all the population, but in diabetes they can cause serious problems if they are not dealt with effectively. They are essentially cracks or splits in the skin often extending through to the dermis [the inner layers of the skin] and are often painful when pressure is applied to the heel on standing. They can frequently bleed and once the fissure opens it is often difficult to get the two edges of the split to knit back together.

With so many people with diabetes suffering from neuropathic damage [causing loss of feeling, commonly in the feet] these fissures often go unnoticed until they have become quite severe. Frequently they can become infected, and where many people with diabetes can suffer with ischaemia [a reduced blood supply] they are subsequently difficult to heal and may ulcerate.

### **What causes heel fissures?**

Invariably heel fissures are symptomatic of dry skin conditions. Loss of innervation [nerve supply] to the sweat glands in the feet can result in people with diabetes having drier skin than the rest of the population. Hot weather, wearing of sandals, inadequate skin care, abrasive hosiery, poor circulation and possibly some forms of medication can all contribute to the drying of skin.

### **How can I prevent heel fissures?**

Generally, after washing or a short soak of the feet, the application of a good moisturising cream should be sufficient to keep skin more supple and hence prevent their formation. The cream should be

applied EVERY DAY, particularly if you have been instructed to do so by your chiropody/podiatry clinic. The Podiatry Department often recommend Aqueous Cream B.P. which is a water-based cream that helps to rehydrate the skin [and not just in the feet!] Basically, you can use any moisturising cream providing it is done on a regular basis!

### **How do I deal with a heel fissure already present?**

If on your DAILY FOOT INSPECTION you discover a crack in the heel, keep a close eye on the area and initiate the daily moisturising routine maybe 2 or 3 times a day. If there is no improvement after a week it is advisable to contact your local Chiropody/Podiatry Clinic and let them assess it and advise you. At the clinic they will be able to apply suitable dressings to heal the fissure and suitable padding materials to prevent the inevitable shoe rubbing that might prevent them healing.

**Remember if in doubt about any foot problems always contact your local chiropody/podiatry clinic for advice.**

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## **Charcot foot**

Charcot foot It is a non-ulcerative foot condition that can occur in people with diabetes and is associated with nerve damage [neuropathy]. It is a condition that affects people who have lost their sense of pain in their feet. Pain protects the feet as it warns people that they are doing too much walking, standing or exercising. In Charcot foot the foot changes shape due to destruction of the bones and joints and this is not caused by infection.

However it is difficult to detect and is often treated as an infection because areas of the foot become red and swollen. It may also be mistaken for cellulitis. Another problem with diagnosis is that the initial X-ray of the foot may appear normal. Sometimes people are alerted to Charcot foot if they have a history of injuries caused by tripping

or falling. If the condition goes untreated or is badly managed, then it can have very serious results. Despite difficulties with diagnosis, immediate diagnosis and putting the foot out of action is essential.

The treatment of Charcot foot is continuous foot care education, protective footwear and routine foot care to prevent the formation of ulcers.

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## **Diabetic holiday foot syndrome**

Research [ref1] has shown that there is a greater risk of foot ulceration that can lead to serious complications, during holidays and especially those taken in hot countries, hence the name 'Diabetic holiday foot syndrome'. Among 435 people studied 17 experienced foot lesions during foreign holidays, 10 of whom reported a foot lesion for the first time. The people with holiday foot damage were a younger age, mainly male and their diabetes was of shorter duration than foot lesions from other causes.

### **The causes of diabetic holiday foot syndrome were:**

- direct injury
- unaccustomed exercise
- walking barefoot on the beach or in the sea
- burns from walking barefoot on hot pavements
- wearing inappropriate inflexible bathing shoes.

If you need further warnings for your holidays, research showed that nine out of the 17 people had to be hospitalised for infections as a result of the foot damage and the average stay in hospital was 11 days.

The researchers conclude that there is a need to increase education about foot care at holiday periods and that this should include

preventative measures for those people at high risk of foot lesions.  
Ref1 Prac Diab Int March 2001 Vol 18 No2

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## Hearing loss and diabetes

Researchers in Italy are exploring the effect that diabetes may have on hearing loss. Forty seven people with insulin dependent diabetes and still with normal hearing abilities were studied and all of them had impairments in the spiral canal in the ear. These problems usually begin with a lesion in the inner ear spiral canal and can be caused by neuropathy. Previous studies have found that hearing loss is in the high frequency area of the ear with a progressive loss over time.

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## Gastroparesis

Gastroparesis is a stomach condition estimated to affect 25% of people with diabetes to a greater or lesser extent. It is caused by neuropathy affecting the nerves of the stomach so that the stomach muscles do not work properly and the food remains in the digestive system for a long time. The symptoms include:

- nausea
- vomiting
- abdominal bloating, discomfort and/or pain
- feeling full soon after eating
- indigestion or heartburn

In addition to this, gastroparesis affects blood glucose control because the food remains in the stomach for longer than it should and this can lead to erratic blood sugar

## New development

In the US a company, Medtronic, Inc, have developed an implantable device that has been shown to improve the symptoms of gastroparesis. The device delivers mild electrical pulses to the nerves in the stomach which stimulate digestion. A study involving 100 patients from various countries, showed that there was a variety of responses to the device but 93% of the participants vomited less than half as many times after using the device and most of them felt better after using the device. This treatment is called Enterra therapy and has been available in the US since March 2000.

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## Wrong sized shoes

People with diabetes who also have neuropathy [nerve damage] and loss of sensation in their feet can cause damage with ill-fitting shoes which can go unnoticed.

If shoes are too narrow, tight or loose, they can cause blisters or ulcers which can be slow to heal and lead to infections. Another concern is that people with neuropathy may choose shoes that are too tight because the increased pressure makes them feel the right size. In addition, feet get larger and broader in older people but they often continue to buy the same size. One study showed that a third of the patients said they took a different shoe size from the one they were actually wearing, probably due to the fact that shoes sizes vary from maker to maker. It also showed that only 29% of people checked their feet and legs regularly for any sign of damage that could lead to problems and 22% never checked their feet.

There is a clear message here for people with diabetes – having well-fitting shoes may be expensive but not as costly as the damage that can be done by not doing this!

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## Neuropathy and antidepressants

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When a simple painkiller such as paracetamol is ineffective in treating painful neuropathy, the next treatment is with what is known as a tricyclic antidepressant such as amitriptyline. Other options are available including duloxetine [sold as Cymbalta and Yentreve] which has been specifically approved for peripheral neuropathic pain. It is recommended that its use is assessed 2 months after starting treatment and then 3 monthly. The trials carried out with duloxetine showed that there was a significant reduction in pain when compared to a placebo [dummy pill].

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## Patient and family carer experience

### Dealing with diabetic foot problems - A dual perspective

By Arabella Melville, Research Fellow, NHS Centre for Reviews and Dissemination, York

My partner has been insulin dependent for 48 years. I'm fortunate, as a carer, to have access through my job to detailed and wide-ranging information about medicine and health. Naturally whenever Colin has a difficult problem, I use all the resources available to me to research the problem and seek out the evidence on the effectiveness of treatment options.

We are having to cope with the long-term effects of diabetes, including foot problems and painful neuropathy. I'd like to share what we

have learnt.

### First how to avoid it

Medical research shows that neuropathy develops later in people who maintain a consistently low blood glucose level through intensified insulin treatment. We have no personal experience of this: Colin wouldn't be willing to consider all the obsessive monitoring and careful control. While it seems to be true that better control improves a diabetic's long-term prospects, we worry about what it does to the quality of the greater part of his/her life. It is an individual decision, I guess.

Even with the best control, people who have been diabetic a long time [and even some people who have only just become diabetic] are likely to end up with foot problems.

### Neuropathic pain

Nobody seems to know what causes it, beyond in the most general terms, nerve damage being associated with fluctuating blood sugar. But the effects are all too familiar to Colin: pain in a variety of forms – scalding or burning, a sensation akin to having a nail driven into the foot or having a toe pinched hard with pliers. It sounds to me like torture. It keeps him awake at night sometimes and even when he falls asleep, his legs go into spasm and he's restless.

### So what answers have we found?

**First the medical approaches.** These have been systematically reviewed by the Pain Relief Unit in Oxford. Basically, there are two types of prescription only drugs that work to some extent, for most people. They are tricyclic antidepressants [imipramine and amitriptyline] and anticonvulsants [carbamazepine]. They appear to be equally effective, so if one doesn't work, you try the other. They also have roughly equal levels of side effects, but overall are pretty safe in the doses used for neuropathic pain. Pain-killing drugs generally are not effective, nor is the application of heat, cold or transcutaneous electrical stimulation. Capsaicin cream may also be effective in some people, but can cause skin irritation.

**Colin and I have experimented with others methods**, some of which seem effective. We'd be interested to hear from other people who've tried these. He takes the herb hypericum [St John's Wort]; we also use it in foot baths and in the form of hypercal cream [available from chemists and health food shops]. Careful research has shown that hypericum tablets are equivalent in antidepressant action to tricyclic antidepressants, but a lot safer; no formal research has been done of the effects on neuropathy. I suspect that the same parts of the nervous system are affected in similar ways by the two types of product, and that someone will one day demonstrate that hypericum can be helpful for neuropathic pain. We have also tried ibuprofen cream on the foot, and found it worked; but this was a recent experiment that we haven't repeated because Colin has been free of pain since! We don't attribute this to ibuprofen – he was only getting the odd twinge when we tried it and the benefit could be due to chance or the placebo effects. But we shall try it again when the pain recurs.

#### **How did we achieve this wonderful pain-free period?**

With shiatsu, a Japanese technique in which the therapist uses pressure on specific trigger points to adjust energy flow in the body, like acupuncture without needles. This is another method that has not been tested as a treatment for neuropathic pain by scientific research, but which I believed [from my knowledge of pain relief generally] was worth trying. I would expect acupuncture to be equally effective, but have no experience of it in this context. Shiatsu, carried out by a competent professional therapist, has a dramatic effect on Colin. In our experience, the benefit lasts for about a month, when the treatment has to be repeated.

#### **Ulcers**

Inevitably, after many years of neuropathy, Colin's feet are affected in other ways. When he developed his first ulcer, I was fortunate to have access to the best information through the Research Centre where I work assessing the effectiveness of health care interventions. Some of my colleagues had completed a systematic review of interventions for diabetic foot ulcers and they advised me to find a specialist clinic

where Colin could get expert treatment. He had to argue with the GP to go there, but succeeded in the end. He now sees the specialist chiropodist at regular intervals.

The most important aspect of treatment is to take the pressure off the ulcerated area. There are several facets to this:

1. The first is the padding over the ulcer itself. I bathe and check his feet at least twice a week and dress any area that starts looking at all red, cracked or blistered, using felt padding held in place by highly porous sticking plaster. I then massage moisturising cream into his feet and this helps to stop sores developing.
2. We were given some invaluable advice on socks. He now wears thick, cushioned walking socks inside out and if there's likely to be a lot of stress on his feet, such as walking around town for an extended period, then he will wear a pair of fine cotton inner socks as well.
3. Another way of reducing the pressure is wearing made to measure shoes. These are available on the NHS and they are simply wonderful. Colin has both boots and shoes supplied by the clinic – they fit like gloves, are soft and feel marvellous on his feet, and he wears them all day. Since he got these shoes he has not had any significant ulceration, just little lesions that I can normally treat at home.

#### **Rest**

Colin was told very firmly to rest and put his feet up. While we agree that it is important to elevate the feet for part of the day, we dispute the suggestion that he should rest completely. Exercise is very good for him, it's good for his diabetic control and good for the circulation, particularly in his legs and feet where it is so important. We are convinced that one reason for his continued health is that he takes regular exercise. So he carries on walking every day. The doctors and nurses are amazed at how fast his ulcers heal and the orthopaedic appliance staff are amazed at how often his shoes come back to be repaired.



I checked the research on this question and found there was none. The advice on rest is based on assumptions and beliefs, not scientific evidence. However, I must emphasise that walking is only likely to be beneficial if further damage to the foot is prevented by multiple layers of soft padding and NHS made to measure shoes.

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## Useful information from research

- Two types of lipid-lowering drugs, statins and fibrates, significantly lower the risk of developing peripheral diabetic neuropathy [nerve damage] in people with Type 2 diabetes. Statins and fibrates are already widely recommended for people with Type 2 diabetes to help prevent heart attacks and it appears that they may have another use – to prevent nerve damage [neuropathy], a common complication of diabetes.
- Intensive glycaemic control [tight control] reduces the incidence of neuropathy and improves the actions of the nerves. It has been shown to sometimes improve the symptoms when insulin is given by subcutaneous infusion [pump therapy].
- Neuropathy can have a significant detrimental effect on quality of life due to energy levels, sleep, pain, physical mobility, emotional reactions and social isolation.
- Diabetic foot ulceration can be caused by elevated plantar pressure [pressure on the sole of the foot] and severe neuropathy. Running shoes can give a similar reduction in pressure as the custom made sole. Recent research has also shown that prefabricated insoles are just as effective as custom made insoles in reducing peak pressure but are much less expensive.

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