

## Lower limb complications

### Prediction of wound closure after debridement



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**T**wo years ago *The Diabetic Foot*, one of the sister journals of *Diabetes Digest*, published a paper by Smith and Thow (2001) on the role of debridement in the management of diabetic foot ulcers. They concluded that debridement was probably a good thing and should be encouraged, but there was a paucity of good evidence to support this.

The lead paper in this quarter's *Diabetes Digest* supplies another study to add weight to their conclusions. Saap and Falanga describe a debridement performance index and its use as an independent predictor of wound closure in 143 patients. Their index is based on the appearance of the wound before and after debridement using clinical photographs.

One slight criticism is that the debridement index was higher if there was no callus before debridement; consequently, if the patient was not walking at all, and no callus had built up, the score – and the outcome – would

automatically be better. However, it seems like a common-sense application of a useful tool for small-scale audits and major trials.

Both the paper by Saap and Falanga and a similar study by Steed et al (1996), which looked at frequency of debridement, were add-on studies to large multicentre trials of adjuvant healing products. With Saap and Falanga it is the bilayered skin equivalent, Apligraf, and in Steed's paper it was platelet-derived growth factor-B (marketed as Regranex).

What is clear from both these papers is that while the overall efficacy of the adjuvant product has been demonstrated elsewhere, the influences of good wound care on healing rate is as large, or larger.

Therefore, before turning to these expensive additional therapies, it is important to ensure that all the basic aspects of wound care, including pressure relief, infection, and particularly debridement are optimal.

Smith J, Thow J (2001) Is debridement effective for diabetic foot ulcers? A systematic review: 3. *Diabetic Foot* 4(4): 165–72

Steed DL, Donohoe D, Webster MW et al (1996) Effect of extensive debridement and treatment on the healing of diabetic foot ulcers. *Journal of American College of Surgeons* 183(1): 61–4

### WOUND REPAIR AND REGENERATION



### New scoring system a useful predictor of wound closure

Readability	✓✓✓
Applicability to practice	✓✓✓✓✓
WOW! factor	✓✓✓✓

**1** There is currently no established way to judge the appropriate extent of debridement and its performance.

**2** This paper describes the development of a scoring system (the debridement performance index) to assess whether debridement has been performed adequately.

**3** Scores were assigned to the debridement of callus, ulcer's edge undermining, and wound bed necrotic tissue. A score of 0–2 was assigned as follows: 0 = debridement needed but not done; 1 = debridement needed and done; and 2 = debridement not needed. The three scores were added to give a total between 0 and 6.

**4** The score was applied to 143 patients with diabetic foot ulcers to determine its predictive value for wound closure. Sequential digital photographs of each foot ulcer were assessed.

**5** Ulcers with a debridement index of between 3 and 6 were 2.4 times more likely to heal than those with a score of 0–2.

**6** After controlling for treatment, the score was found to be an independent predictor of wound closure (odds ratio 2.4; 95% CI 1.0–5.6).

**7** The scoring system appears to be very promising as a predictive tool for determining outcome in clinical trials and, most likely, in clinical practice.

Saap LJ, Falanga V (2002) Debridement performance index and its correlation with complete closure of diabetic foot ulcers. *Wound Repair and Regeneration* 10: 354–59

### DIABETES CARE



### MNCV can predict foot ulceration and death in diabetes

Readability	✓✓✓✓
Applicability to practice	✓✓✓✓
WOW! factor	✓✓✓

**1** Vibration perception threshold, pressure perception threshold, temperature perception threshold, autonomic neuropathy, muscle strength, reflexes, and neuropathy disability score all predict foot ulceration to some degree.

**2** The involvement of motor nerve conduction velocity (MNCV) in the development of foot problems in patients with diabetes has not been examined in a long-term study.

**3** This study examined the contributions of various peripheral nerve tests, vascular tests and other general assessments to the development of foot ulceration, lower limb amputation and mortality.

**4** A total of 169 patients with diabetes (without significant peripheral vascular disease) and 22 controls were recruited to the study and followed for 6 years.

**5** MNCV was the best predictor of new ulceration. The best predictors of amputation were pressure perception threshold and medial arterial calcification.

**6** Healthcare professionals can use this knowledge to tailor intervention strategies to individual patients.

Carrington AL, Abbott CA, Shaw JE et al (2002) Can motor nerve conduction velocity predict foot problems in diabetic subjects over a 6-year outcome period? *Diabetes Care* 25: 2010–15

**'Cardiovascular risk reduction measures need to be applied intensively to neuropathic patients with diabetes as preventive measures before they develop ulceration.'**



## Neuropathic ulcers may explain higher IHD mortality rates

Readability	✓✓
Applicability to practice	✓✓
WOW! factor	✓✓✓✓

**1** Ischaemic heart disease (IHD) is the commonest cause of death in patients with diabetes both with and without foot ulcers, yet the mortality rate of those with foot ulcers is more than twice that of those without ulcers.

**2** The study sample comprised 242 patients attending a clinic with diabetes and foot ulcers, who had died, and 121 controls (no foot ulcers).

**3** IHD was the major immediate cause of death for 110 (45%) patients with diabetes and foot ulcers and for 55 (45%) of controls. About 82% of patients with neuropathic foot ulcers died of IHD compared with about 43% with neuroischaemic ulcers.

**4** Results suggest that the increased mortality seen in patients with foot ulcers is due to neuropathic rather than ischaemic ulceration.

**5** Cardiovascular risk reduction measures need to be applied intensively to neuropathic patients with diabetes as preventive measures before they develop ulceration.

Chamas NK, Hill RLR, Foster AVM et al (2002) Is neuropathic ulceration the key to understanding increased mortality due to ischaemic heart disease in diabetic foot ulcer patients? A population approach using a proportionate model *The Journal of International Medical Research* **30**: 553–59



## How best to manage painful diabetic neuropathy

Readability	✓✓✓✓
Applicability to practice	✓✓✓✓
WOW! factor	✓✓

**1** Up to 60% of people with diabetes worldwide may develop diabetic polyneuropathy.

**2** This review presents the mechanisms behind normal and altered pain perception, and the treatments that are available for painful neuropathy.

**3** A care pathway for a logical approach to management based on best current evidence and clinical experience is described.

**4** This care pathway should help diabetes care teams to adopt a safe and logical approach to treatment.

Spruce MC, Potter J, Coppini DV (2003) The pathogenesis and management of painful diabetic neuropathy: a review. *Diabetic Medicine* **20**: 88–98.



## Abnormal VEGF activity impairs healing in diabetes

Readability	✓✓✓
Applicability to practice	✓✓
WOW! factor	✓✓✓✓

**1** The mechanisms behind the impaired wound healing seen in people with diabetes remains unclear.

**2** This study analysed the behaviour of early-passage fibroblasts cultured from diabetic leptin receptor-deficient mice.

**3** Adult diabetic fibroblasts showed a seven-fold impairment in vascular endothelial growth factor (VEGF) production compared with wild-type fibroblasts. Wild-type fibroblast production of VEGF increased three-fold in response to hypoxia, whereas diabetic fibroblast production of VEGF was not upregulated in hypoxic conditions.

**4** The abnormal VEGF activity and response to hypoxia may have a profound effect on the healing process in diabetic wounds, particularly as many diabetic wounds are located in ischaemic extremities.

Lerman OZ, Galiano RD, Armour M et al (2003) Cellular dysfunction in the diabetic fibroblast impairment in migration, vascular endothelial growth factor production, and response to hypoxia. *American Journal of Pathology* **162**(1): 303–12



## IMT and PWCV can predict peripheral vascular disease

Readability	✓✓✓
Applicability to practice	✓✓✓
WOW! factor	✓✓✓

**1** Identification of arterial structural and functional changes before the development of stenoses may be useful in preventing progression of atherosclerotic peripheral vascular disease.

**2** Intimal-medial thickness (IMT) and pulse wave conduction velocity (PWCV) were determined in the lower limb arteries of 79 patients with type 2 diabetes and 77 controls.

**3** Enzymatic assays were used to measure plasma lipids and gradient gel electrophoresis was used to measure LDL particle size.

**4** Patients with diabetes had greater superficial femoral artery IMT and PWCV, and popliteal artery IMT. PWCV and IMT correlated with increased waist-to-hip ratio, triglycerides and fibrinogen, and inversely with HDL cholesterol and LDL size.

**5** Participants with the greatest number of features of the metabolic syndrome had the highest IMT and PWCV.

**6** IMT and PWCV are parameters of arterial structure and function that can be measured reliably, safely and non-invasively.

**7** Intervention at an early stage to correct the relevant risk factors could be more effective in the preservation of the lower limbs in patients who are at increased risk of gangrene and amputation.

Neal DN, Balazs N, Dragicevic G et al (2003) Cross-sectional study of the effects of type 2 diabetes and other cardiovascular risk factors on structure and function of nonstenotic arteries of the lower limb. *Diabetes Care* **26**(1): 199–205

**'The abnormal VEGF activity and response to hypoxia may have a profound effect on the healing process in diabetic wounds, particularly as many diabetic wounds are located in ischaemic extremities.'**