

# The ABCS of foot care in diabetes: B is for blood

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This third article on risk factors for foot problems in people with diabetes discusses the common clinical problems associated with peripheral vascular disease.

The major risk factors for foot problems in people with diabetes are anaesthesia (i.e. peripheral neuropathy), decreased blood supply (i.e. peripheral vascular disease [PVD]), inadequate routine preventive foot care and abnormal foot structure. Together these factors are known as the ABCS of foot care, or the podiatric ABCS – A, anaesthesia; B, blood; C, care; and S, structure. This article reviews the second of these factors – decreased blood supply. Two previous articles in this series discussed the assessment of the ABCS and the various aspects of peripheral neuropathy (published in the November and December 2008 issues of *Medicine Today*, respectively), and future articles will discuss the other risk factors.<sup>1,2</sup> A patient handout on foot care for people with diabetes, 'Your foot report', will conclude the series.

## The foot factor traffic lights

As discussed in the previous articles in this series, a person with diabetes and normal sensation, circulation and structure needs the same foot care and footwear as

someone without diabetes.<sup>1,2</sup> However, if one or more of the risk factors for foot problems are present then more intense foot care and monitoring and special footwear may be necessary to reduce the likelihood of a problem developing and to detect problems early and intervene promptly. The podiatric ABCS can be thought of as a series of 'traffic lights' that provide a practical framework for assessing foot risk: the more amber and red 'lights', the higher the risk (Table 1).<sup>1,2</sup>

## PVD – seek and you shall find

PVD becomes progressively more common with the duration of type 2 diabetes and can cause problems ranging from

nuisance value to limb-threatening ischaemia. It affects about one in five patients who have had diabetes for five or more years and one in three who have had diabetes for over 20 years (Figure 1).<sup>3</sup>

Any patient with diabetes and a foot ulcer and/or leg or buttock pain could have PVD. Such patients should have their symptoms assessed and their peripheral pulses checked. If peripheral pulses are not readily palpable or there is a high suspicion of PVD, the circulation should be objectively assessed. Many podiatrists can measure ankle brachial pressure indices – the systolic pressure of the ankle artery (pedal artery) divided by the systolic pressure of the brachial artery. An index

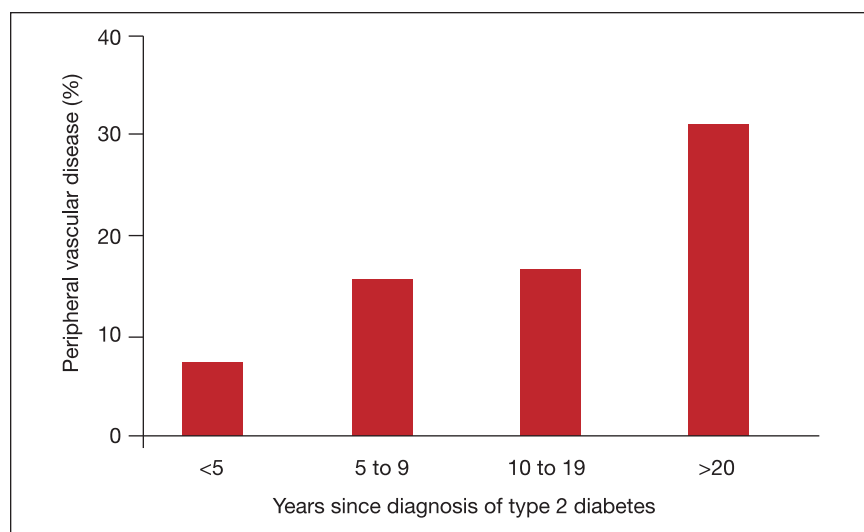
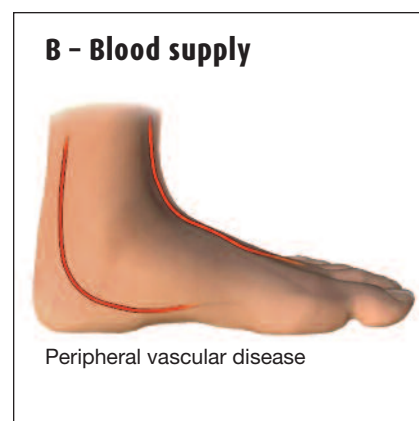


Figure 1. Prevalence of peripheral vascular disease in diabetes.<sup>3</sup>

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**Table 1. Foot factor traffic lights and patient risk assessment**

Foot factor traffic lights			
Foot factor assessment	Red lights – ‘Danger’	Amber lights – ‘Caution’	Green lights – ‘Healthy’
Anaesthesia – Pinprick, light touch – Reflexes	No stimuli felt No reflexes	Reduced stimuli Reduced reflexes	All stimuli felt Normal reflexes
Blood supply – Pulse palpation	No pulses	Reduced pulses	Normal pulses
Care – Questioning* – Observation	– Skin breakdown	Foot care, footwear could be better Threatened skin breakdown	Appropriate foot care, footwear Normal skin
Structure – Observation	Weight-bearing ulcer	Callus or corn	No skin lesions
Patient risk assessment			
Traffic lights	Risk assessment		Recommended action
One or more ‘red lights’	High risk		Refer promptly to a podiatrist
One or more ‘amber lights’	Moderate risk		Regular podiatry care and assessment
All ‘green lights’	Low risk		General foot care advice

\* Inadequate foot care in the absence of any other red or amber traffic lights is not a major risk factor for severe foot problems. Adequate foot care in the presence of one or more red or amber traffic lights is essential and can prevent otherwise inevitable and severe foot problems.

of less than 0.9 is an indicator of PVD and should prompt referral to a vascular surgeon. More detailed investigation such as lower limb ultrasound and/or angiography may be indicated and a vascular surgeon could advise on the potential benefits of revascularisation.

### Review correctable PVD risk factors

*‘His feet are like blocks of ice – we have to sleep with a pillow between us to keep his feet away from me.’*

Betty, Bill’s wife.

Most people with type 2 diabetes have one or more of the fixed risk factors for PVD: personal or family history of cardiovascular events, age over 50 years for men or over 60 years for women and, for women, being postmenopausal. Many also have one or more modifiable PVD risk factors, and treatment of these may allow the peripheral circulation to remain adequate to maintain healthy feet.

Most patients with diabetes are not achieving the target values of the main goals of diabetic care (which aim to control the risk factors for the complications of diabetes), the ‘ABCs’ of diabetes care (Table 2). Getting closer to these targets will improve the modifiable PVD risk factors of high cholesterol, cigarette smoking and hypertension.

Statins decrease cholesterol levels by 1 to 2 mmol/L and decrease the risk of cardiovascular events by 25% (33% in those who adhere to therapy).<sup>4</sup> In this high-risk group of patients with diabetes, the absolute risk reduction is considerable (e.g. 5 to 15% reduction over five years, with a number-needed-to-treat [NNT] of 7 to 20). Statins are now PBS-subsidised for people with type 2 diabetes and symptomatic PVD.

The majority of people with diabetes and symptomatic PVD are current or ex-smokers. Quitting smoking is always a good idea and especially so in someone with symptomatic PVD. The real threat of losing a limb may tip the balance towards a patient successfully quitting.

The presence of vascular disease in one circulation (peripheral) usually means that the other circulations (cerebral and coronary) are also affected. Carotid bruits should be sought, and a recent ECG checked for the presence of an unsuspected

**Table 2. The ABCs of diabetic care**

Diabetic care goal	Target
A – controlling A <sub>1c</sub>	<7%
B – controlling blood pressure	<130/80 mmHg*
C – controlling cholesterol	<4 mmol/L†
s – quitting smoking	0
s – taking salicylates	75 to 150 mg/day

\* <125/75 mmHg if proteinuria >1 g per day exists.  
† Corresponding to LDL cholesterol <2.5 mmol/L.

infarct. As many as one in five infarcts are not recognised as such in the general population, and the proportion in people with type 2 diabetes is even higher (40%).<sup>5</sup>

Symptoms that may not have been recognised as angina (such as chest discomfort, indigestion or shortness of breath with exercise) or TIAs (such as transient loss of vision or use of a limb) should also be sought. If these symptoms are present, the patient should be warned of the possibility of a heart or brain 'attack'. The likely symptoms should be reviewed with the patient and the importance of seeking help early and/or calling an ambulance should be emphasised.

If cerebrovascular disease is present, the combination of aspirin and dipyridamole (Asasantin SR) may be more appropriate than aspirin alone. If coronary heart disease is present, adding a  $\beta$ -blocker may be indicated for cardioprotection. It is now recognised that the previous belief that  $\beta$ -blockers reduce peripheral circulation is not true.<sup>6</sup>

Other specific interventions that are worth considering are:

- haemoglobin level measurement – treating anaemia will increase oxygen availability; treating polycythaemia with venesection will reduce viscosity and improve blood flow
- consideration of treatment with oxpentifylline (Trental 400), which can improve blood flow by reducing blood viscosity.

## Claudication can be a pain in the butt

*'I'm okay on the flat but give me a wind, a cold day, a big lunch or a slope and I'm exhausted. Can't walk much more than 20 metres before the pain makes me stop.'*

Bill, describing his leg pain.

A patient often first notices claudication when leg pain occurs while he or she is doing something unremarkable, such as walking up a hill rather than on the flat (see the box 'Situations when claudication may become apparent' on this page). At

## Situations when claudication may become apparent

- Walking against a wind or uphill – the increased work increases oxygen requirements
- Walking after a meal – muscle blood flow is reduced as postprandial gut blood flow increases
- Being cold – vasoconstriction further depletes peripheral blood flow

first the pain may be dismissed as a 'bit of a cramp', particularly as it goes away after a brief stop. Sometimes, either consciously or unconsciously, people progressively limit their activities to things they can do without pain. It is not obvious to them, or anyone they know, that the 'bit of a cramp' they are getting in their calf or, less likely, their buttock is caused by exercising their muscles. After all, it may occur one day (for example, when walking against the wind) but not on the next (for example, when walking on a calm day). Unfortunately, limiting activity only makes the problem worse and the claudication distance (the distance walked before pain occurs) shorter.

When claudication is identified as being caused by PVD, factors to consider include:

- modifiable medical factors – those influencing vascular disease, blood flow and oxygen delivery (as noted above)
- smoking – which not only accelerates vascular disease but also directly decreases the availability of oxygen. It should be explained to patients that smoking is equivalent to inhaling carbon monoxide and that the immediate benefits of quitting are considerable and ongoing
- activity – walking more, not less, improves the claudication distance. Although blood supply does not improve, extraction of oxygen by the muscles does. A walking program may greatly extend or maintain

## A walking program for a person with claudication

Mobility and function that might otherwise be progressively limited in a patient with claudication can be extended or maintained by participation in a walking program.

Advise the patient to:

- Walk until the leg or buttock pain is moderate to severe
- Stop and wait for the pain to pass
- Repeat the cycle.

The patient should exercise for 10 to 20 minutes each day initially, and then increase the duration over a period of weeks to months to 40 to 60 minutes per day.

mobility and function that might otherwise be progressively limited (see the box 'A walking program for a person with claudication' on this page).<sup>7</sup>

At some stage it will become clear that the claudication distance and functional capacity are progressively decreasing and are affecting the person's quality of life. It would then be time to involve the vascular surgeon. The patient may have a single, proximal, short stenosis with good peripheral run-off, in which case an angioplasty (with or without a stent) would be likely to increase blood flow and functional capacity. Sometimes the improvement in circulation with such treatment is remarkable (Figure 2). Alternatively, a bypass graft might be possible and may be the best option (for example, a femoro-popliteal or femoro-pedal bypass). If angioplasty or bypass is not possible, claudication pain may be reduced by a regional sympathectomy.

## Preserving threatened feet

*'The doctor said I'm between a rock and a hard place. Nothing more can be done to improve the blood supply. I don't want to lose a leg but it seems I have no choice.'*

Bill, seven years later.

PVD sometimes continues to progress

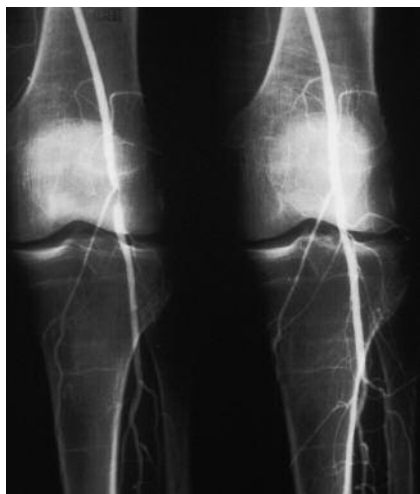


Figure 2. Pre- and post-angioplasty.

despite the best lifestyle management achievable by the patient (quitting smoking, walking more and adhering to medication) and the best medical management achievable by the doctor (review of the diabetes ABCss and other interventions specific for PVD). Surgery may become the only escape from the ischaemia. Sometimes the vascular surgeon will have a solution (as above). However, the stenoses are often multiple, distal, prolonged and without good peripheral run off, and therefore unsuitable for bypass surgery. An optimistic long bypass to an apparently patent peripheral artery might be tempting but the realistic assessment is that this surgery will not help. Eventually, amputation of the affected foot or leg may be necessary.

When angioplasty or bypass surgery is not an option, it becomes a matter of preserving for as long as possible those feet where the diminished circulation is adequate to maintain foot health but not adequate to heal even minor wounds. The integrity of the skin becomes paramount in such cases. The simple action of applying emollient can prevent skin cracks and foot wounds and ward off the demand for increased blood supply for healing, which cannot be met.

A foot protection package can be based

on the podiatric ABCS. These foot care risk factors should be assessed to see if management of the others (A, C or S) could be improved (Table 1):

- A – if sensation is reduced then the normal protection against injury is also reduced and the early detection and action program should be reviewed
- C – if there are deficiencies in foot care and/or footwear, these should be remedied by improved self-care or by involving a lay or professional carer
- S – if there are structural problems, podiatry assessment should provide access to appropriate footwear and orthotics to protect the foot.

In some centres there are multidisciplinary high-risk foot clinics to which patients with acute diabetes-related foot complications can be referred for assessment, monitoring and ongoing management of their feet. Where such clinics are not available, patients should be referred to a podiatrist for monitoring of foot health status and access to appropriate footwear and orthotics. The goal is to maintain the health of both feet so 'one pair' does last a lifetime.<sup>8</sup>

Worldwide, an amputation because of diabetic foot disease occurs every 30 seconds. More than half of these amputations are preventable.<sup>9</sup> If a patient with diabetes requires an amputation, they will need psychological support and intensive rehabilitation. Although below or above knee amputation may be required in some cases, more distal amputations (forefoot or 'ray' amputation of a digit) are usually possible. Orthotics and walking aids help patients retain function. Even if a below or above knee amputation is required, most patients can be rehabilitated, use a prosthetic device and walk again.

Patients facing amputation should be reassured that this is not 'the end of the road' and that much can still be done to maintain their quality of life. Patients, professionals and carers should promote a positive proactive attitude with the expectation of successful rehabilitation.

## Summary

Monitoring and active intervention for the risk factors for PVD (which are the same as those for the complications of diabetes – that is, ABCss) and the markers of foot risk (the podiatric ABCS) can delay or prevent the onset of ischaemia, symptoms and extensive amputations in people with type 2 diabetes. Remember: 'Give diabetes an inch, and it will take a foot.'

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