

Practical considerations in holistic diabetic foot care

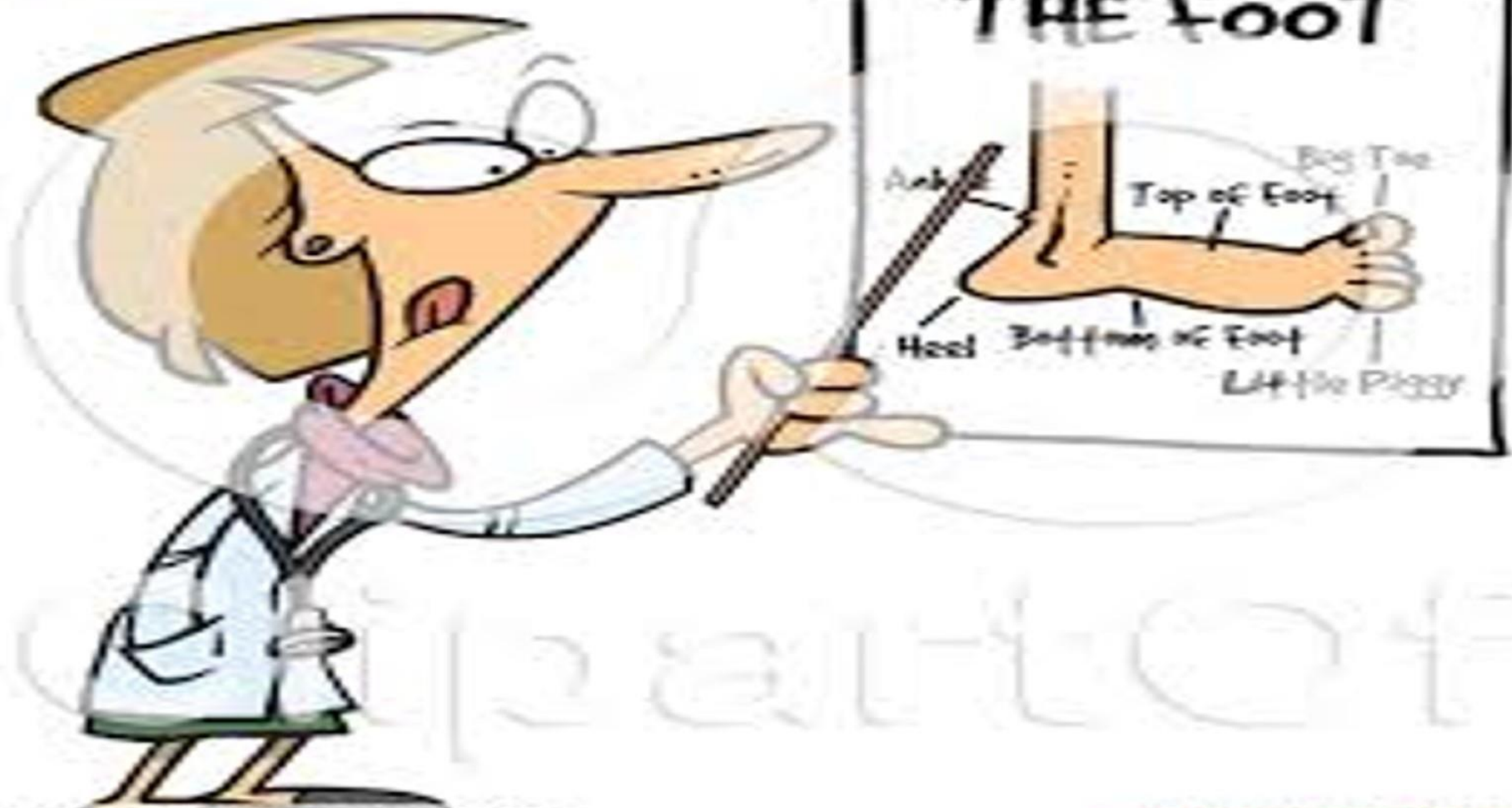
Raj Mani

Academic Division of Human Development & Health

University of Southampton

“15% of patients with diabetes get a foot ulcer: a foot ulcer is a major cause of amputation” Gayle Reiber

- Amputation is offered in order to save a part of a limb to save a life.
- The aim is to restore adequate perfusion, deliver healing and help to manage the patient to walk as best as possible.



Effects of diabetes mellitus on the foot

- Neuropathy (loss of sensation)
- Ischaemia
- Neuroischaemia
- The Charcot Foot
- Trauma, foot skin dryness, cracks and fissures. Increased susceptibility to moisture/fungal/bacterial invasion. Impaired wound healing.
- Pain, cell death and ulceration. Impaired wound healing.
- Increased risk of above.

Why is this wound difficult to heal?

- Acute infection with necrosis (?gangrene)
- Chronic wound slough with exudate
- Has infection penetrated to bone?
- Patient condition is poor
- Diabetes not well controlled
- Needs tissue debridement/surgery and after care and then mainstay care



Essential considerations

- Is diabetes controlled?
- CT, ABI data enable suitable repair
- What about tissue perfusion?

What about the skin?

- Of course there are clinical assessments of the skin.
- To ensure wound healing, we should be aware objective assessments of tissue viability.

Tissue perfusion

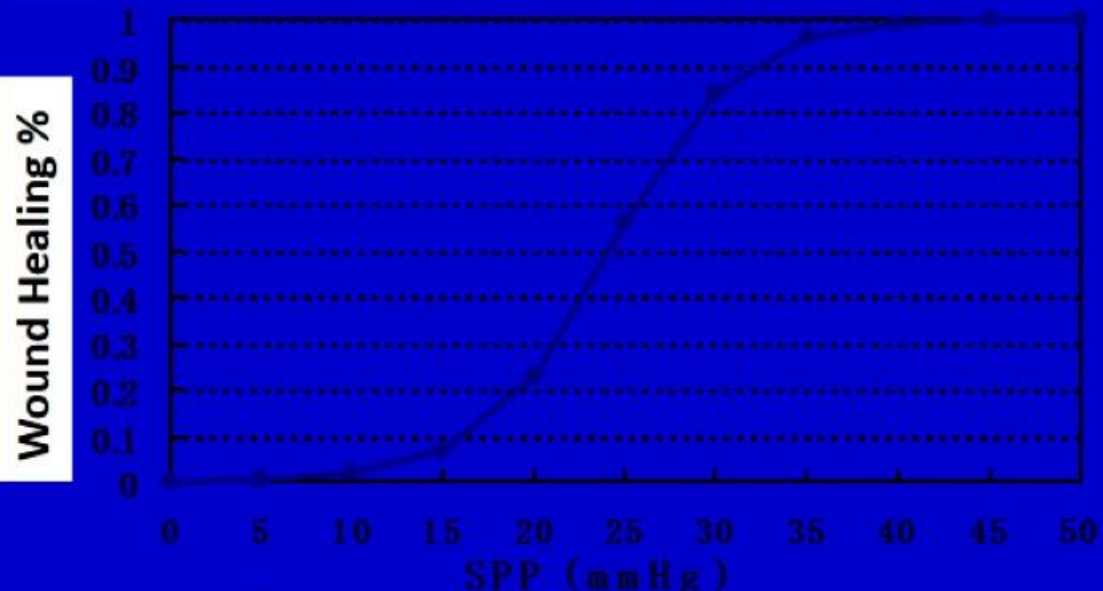
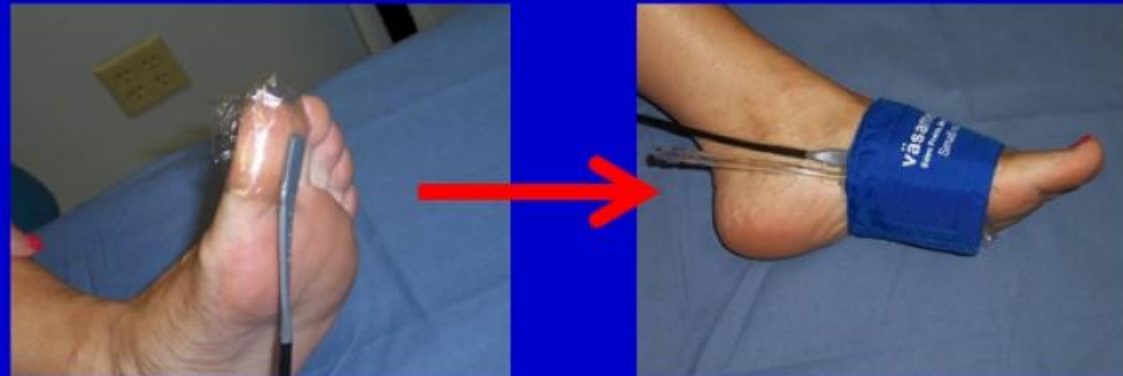
- Tissue perfusion (tissue microcirculation)
- Toe blood pressure (TBI)
- Transcutaneous oxygen tension (TcPO₂)
- Indocyanine angiography
- Hyperspectral imaging (HSI)
- Depends on the number of patent functional small vessels in the skin over the foot.
- Measured using an optical device and a pressure cuff.
- Skin surface heated electrode
- Map tissue perfusion
- Images tissue oxygen saturation

Skin Perfusion Pressure (SPP)

a)



b)



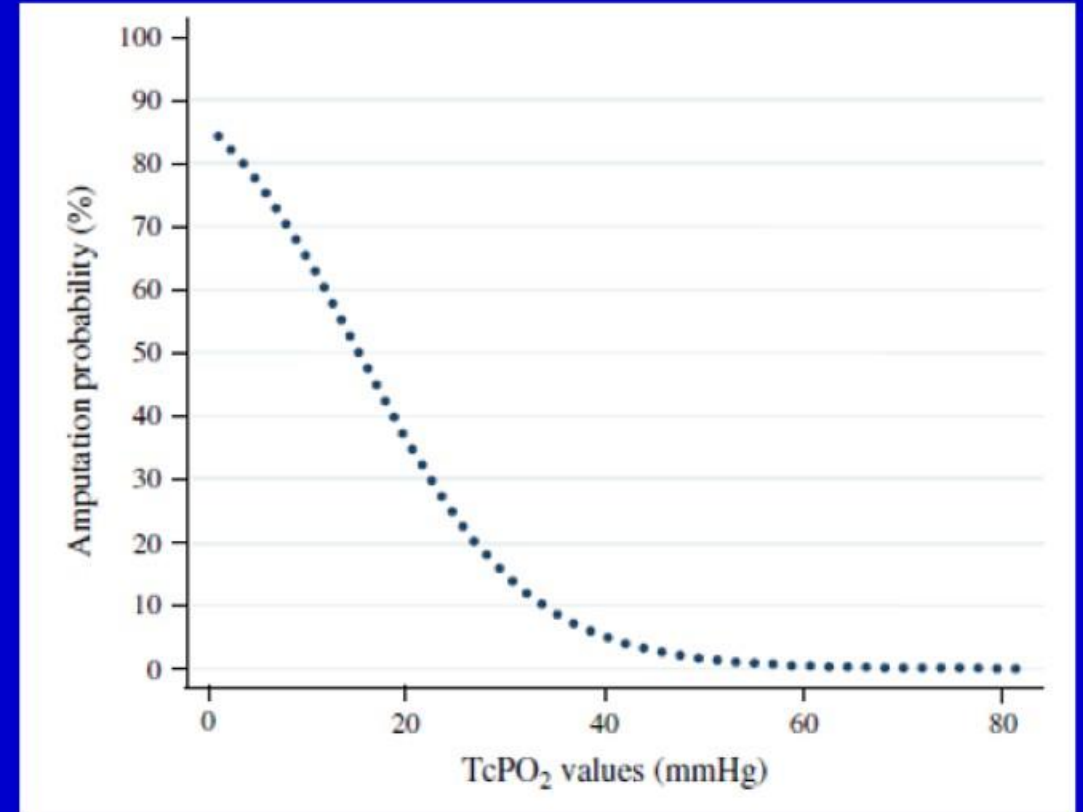
SPP < 30 mmHg : Critical limb ischemia

SPP ≥ 40 mmHg : Possible wound healing

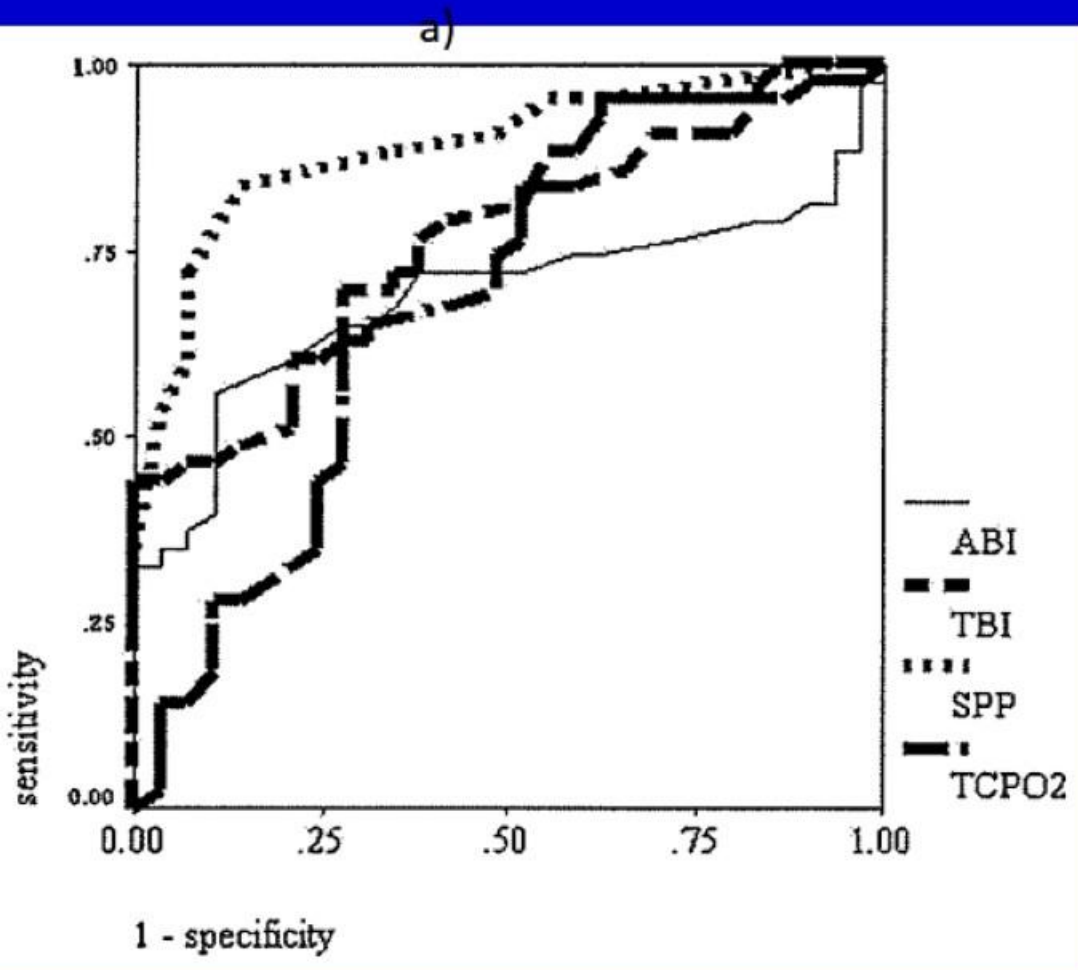
Transcutaneous oxygen tension (TCPO₂)



b)



Comparison of clinical reliability of noninvasive diagnostic methods.



b)

	Cut-off-value	Sensitivity (%)	Specificity (%)
ABI	0.9	29.9	100
TBI	0.6	45.2	100
tcpO ₂	50	61.1	70
SPP	50	84.9	76.6

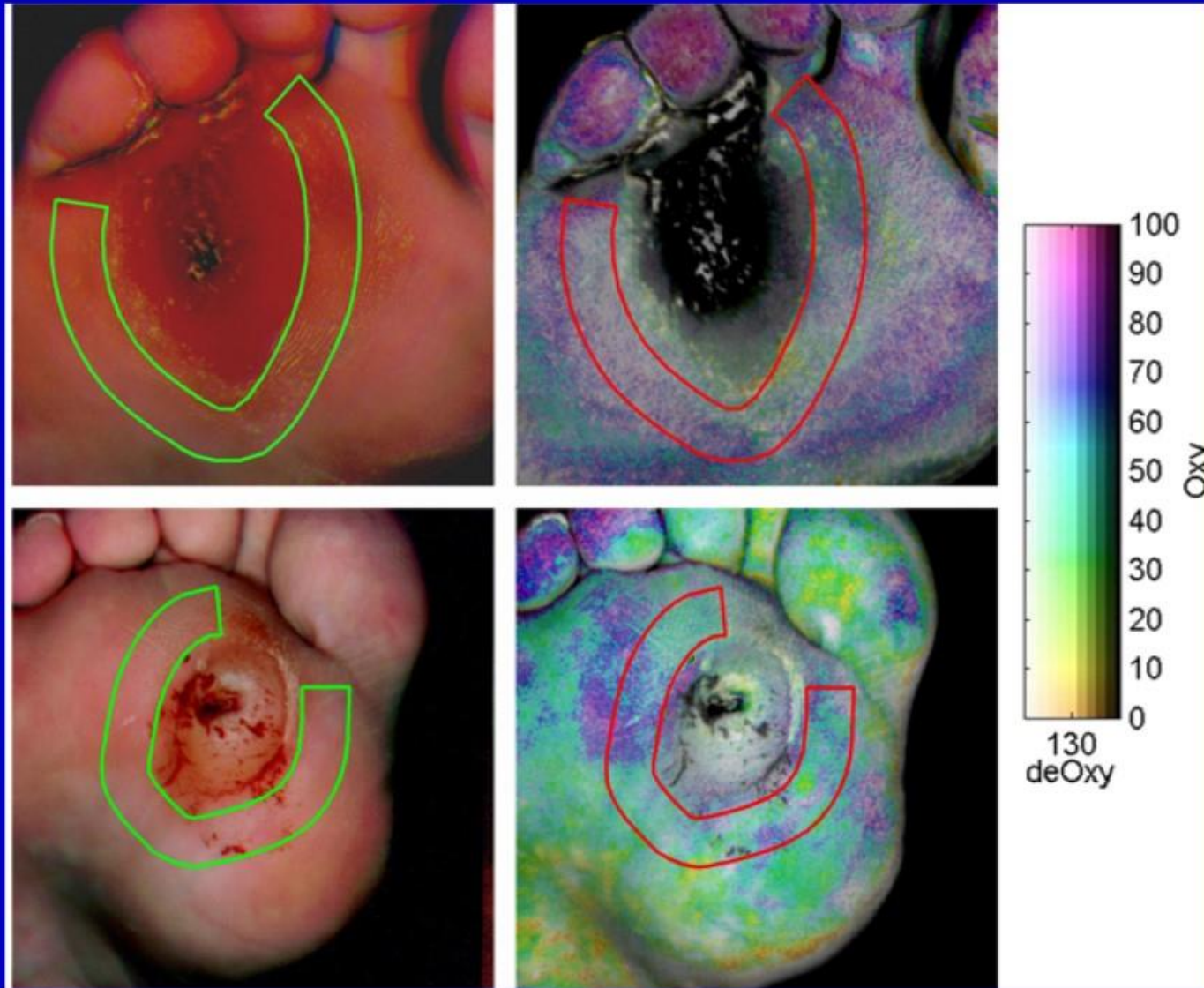
Spy Catcher

- Indocyanine imaging using a laser diode
- It yields images of skin perfusion
- The technique is safe (non hepatotoxic), quick and repeatable.
- Early data are impressive, its use is reimbursed in USA.
- Gurtner GL et al. *Annals of Surgery Innovation Research*. 2013; 13(7): 1

Hyperspectral imaging

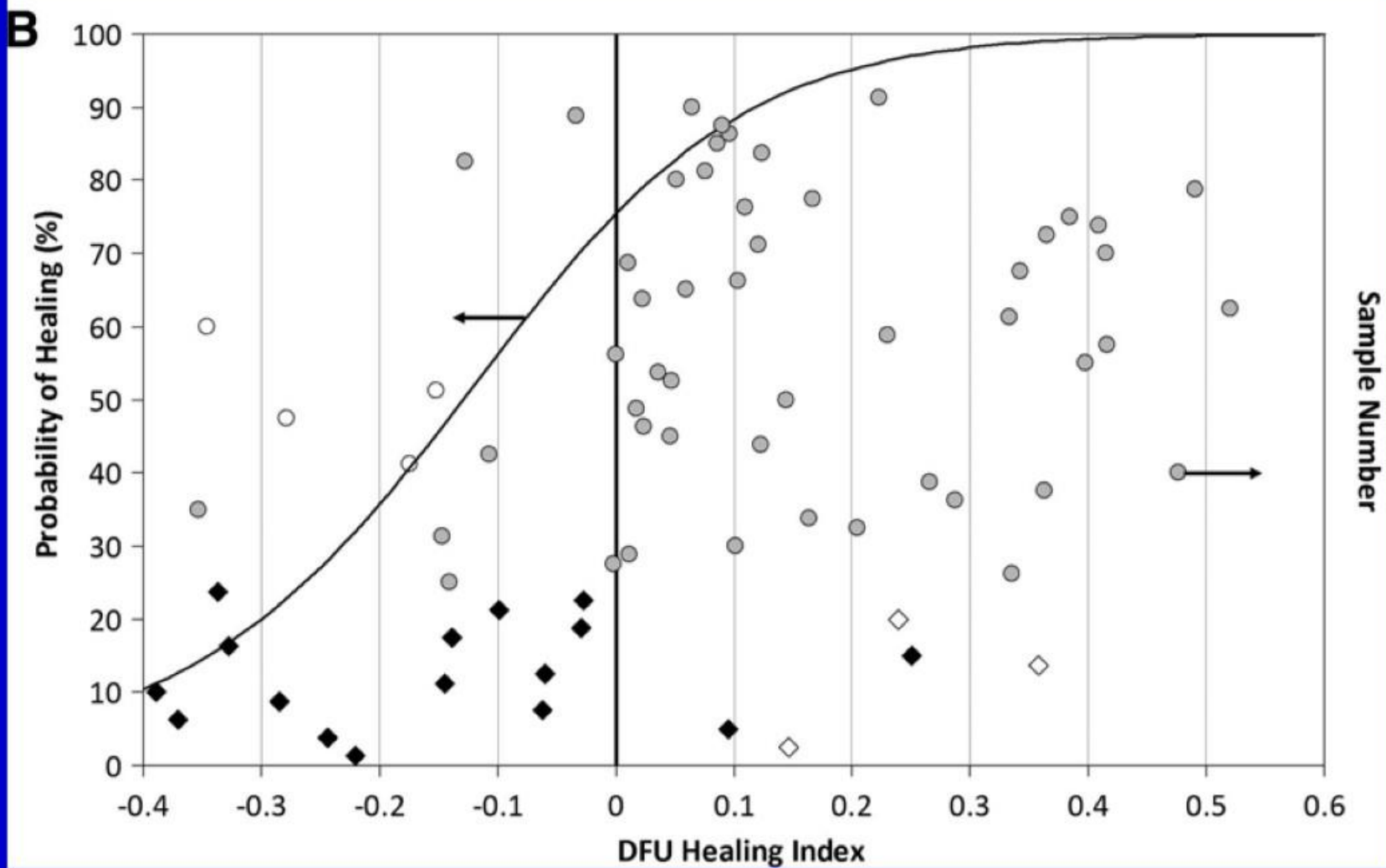
- A new application for an old technique.
- It uses the different reflectance of oxyhaemoglobin and deoxyhaemoglobins to detect oxygen saturation of tissues.
- It yields a reliable estimate of tissue oxygen saturation (fraction of HbO₂ in superficial vessels).
- **Tissue Oxygen Saturation**=% of Oxyhaemoglobin/[% of Oxyhaemoglobin + % of deoxyhaemoglobin]

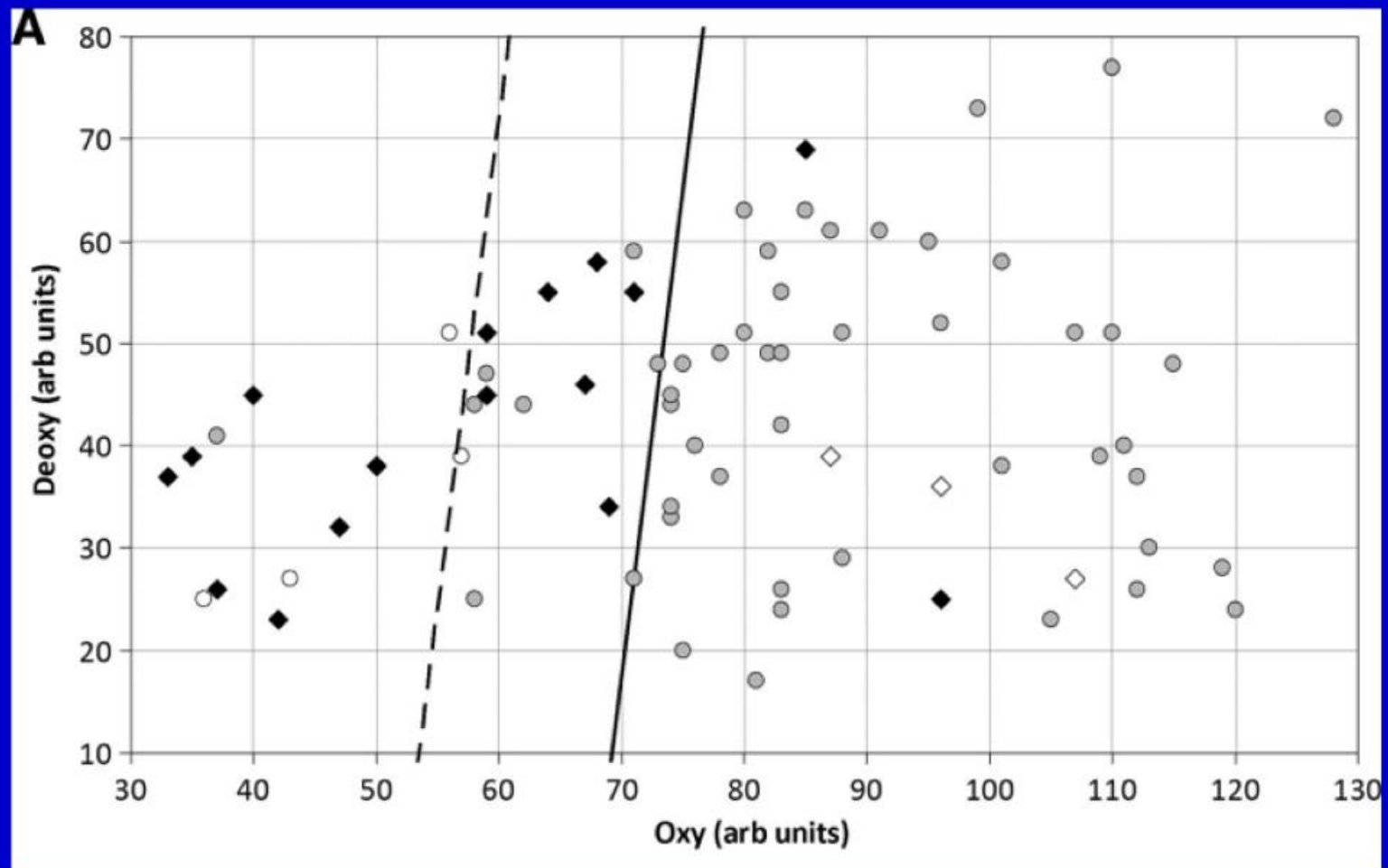




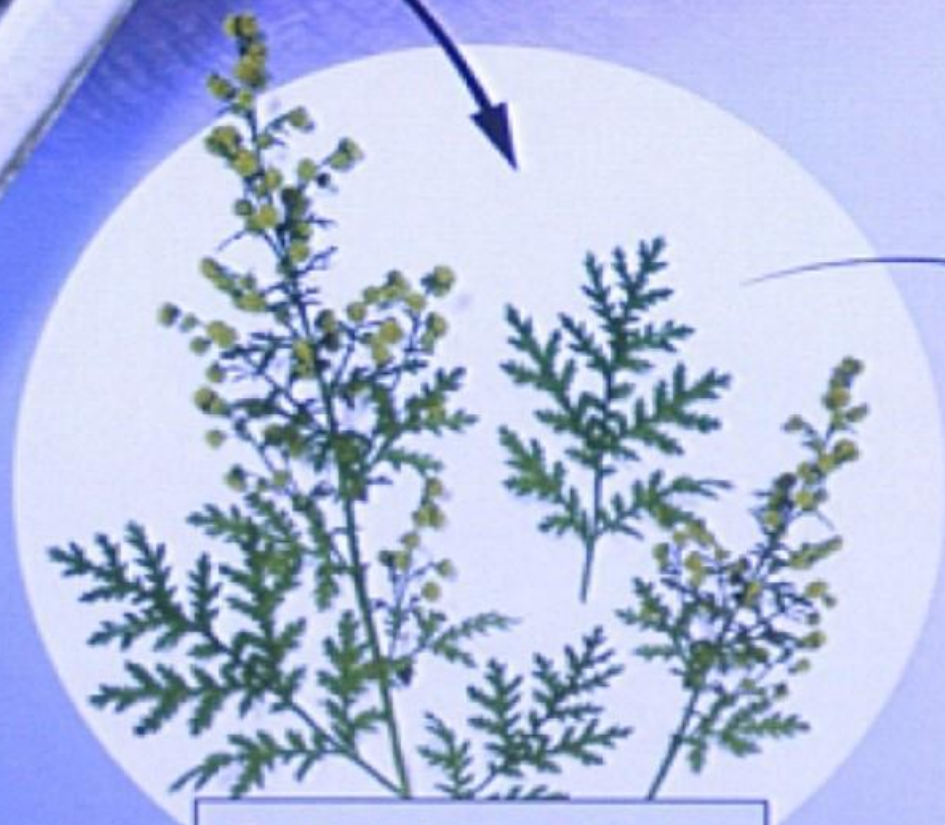
HSI offers an accurate estimate of wound healing potential

- Nouvang conducted an RCT in diabetic neuropathic foot wounds to determine accuracies of predicting healing (N=66, T1 and T2 DM. N=54 completed the study). Nouvang A et al Diabetes Care 2009; 32: 2036-2061.
- Sensitivity 81%, specificity 74%, 90% positive predictive value.
- When re-ulcerations and osteomyelitis were excluded, these figures increased to 86%, 88% and 96% respectively,





- Holism = consideration of a problem in its entirety.
- Focus of this presentation has been on objective means of assessing tissue viability.
- All other aspects of care must be suitably addressed to promote healing and well being of patients (and carers).
- Offloading of the neuropathic foot is a mainstay of care: it has preventive values too.
- Our considerations must include prevention to improve care.



Artemisia annua

