Vascular Medicine Group, Cairo University

# Ultrasonic Assisted Wound Treatment

## A NEW MODALITY IN TREATMENT OF DIABETIC FOOT ULCERS

*By*

*Prof. Dr. Mona A. Nashaat*

# Ultrasonic Assisted Wound Treatment (UAW)



using the
Sonoca 180


It is new modality used in wound treatment as an alternative to mechanical wound debridement.

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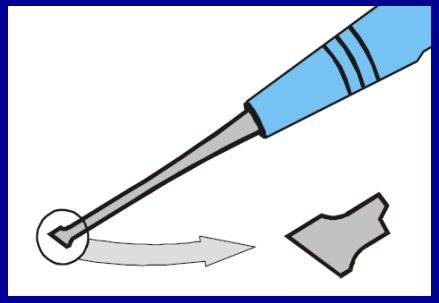
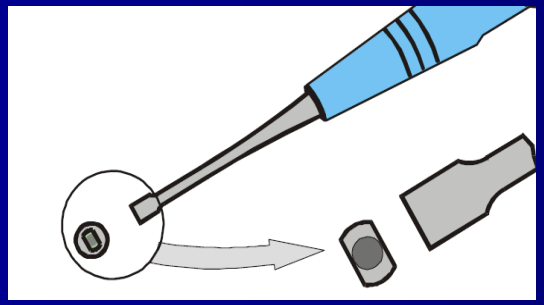
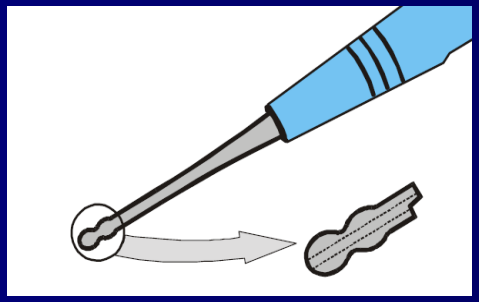
# UAW Handpieces



**The tip of the probe (Sonotrode) has a central liquid supply developed to allow its direct application to a specific required area**







**Sonotrode will be moved on the polluted wound:**

- **Continuously touching**
- **Bubbling over**

**This depends on:**

- **Nature of the pollution**
- **Sensitivity of the patient.**

**After therapy of the primary disease**

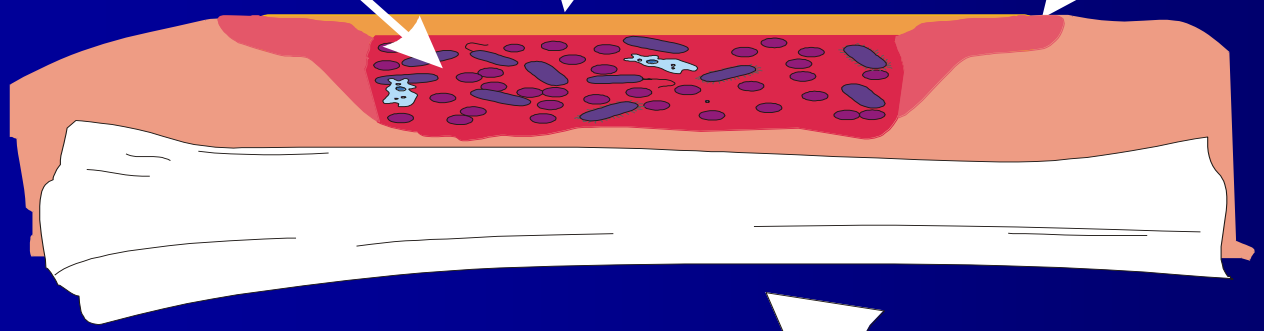
**It is used to treat coated, infected or partly necrotic wounds**

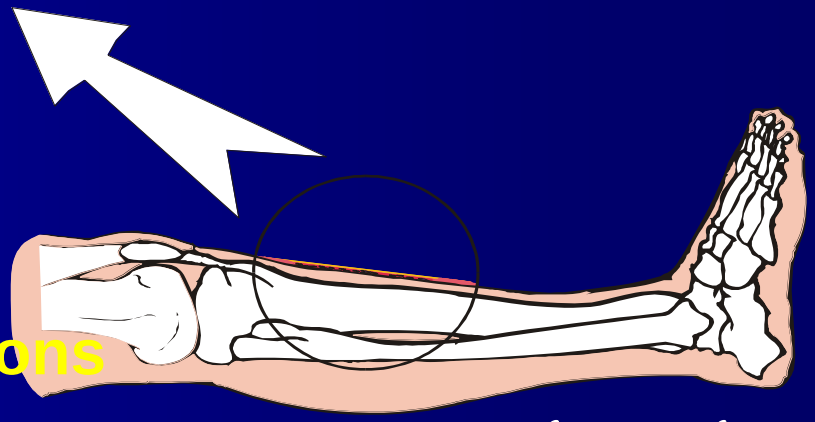
# Chronic infected wound

Infected wound area containing bacteria

Fibrin cover

Infected surrounding wound





Fibrin cover seals
Bacteria in wounds &
Offers best growing conditions

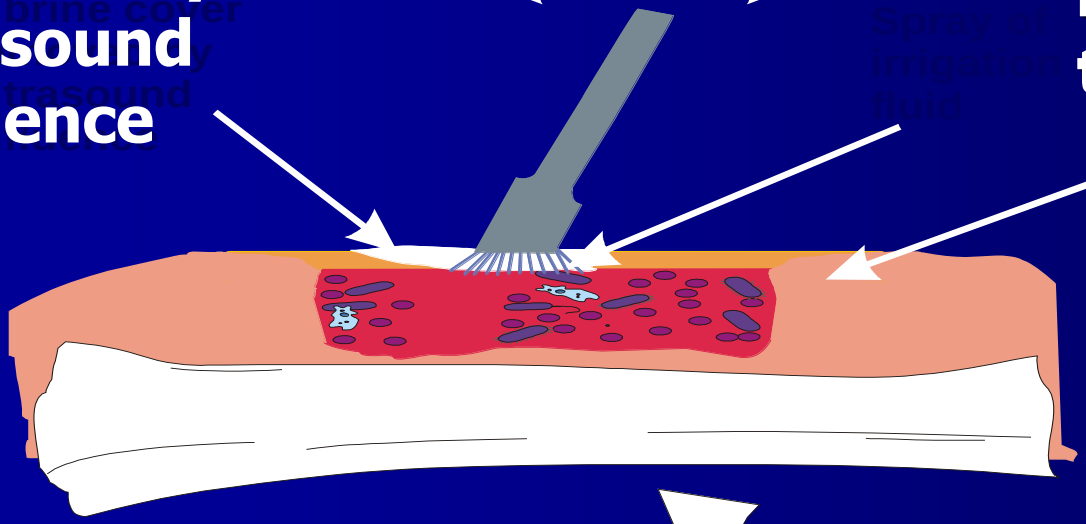
# Treatment principle

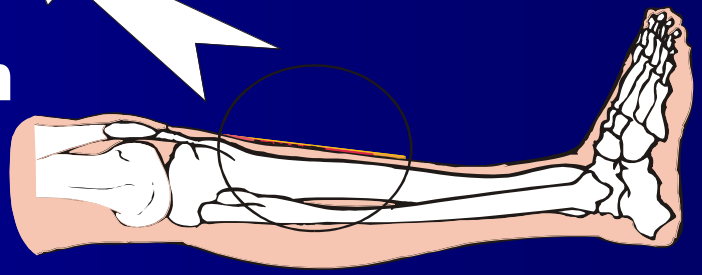
Movement of Ultrasound Probe

Fibrin cover removed by Ultrasound influence

Spary of irrigation tissue

Surrounding infection disappears





**Ultrasound** in combination With **fluid** destroys fibrin layer and kills bacteria



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**UAW** penetrates with high-efficiency in deep cavitations, Where micro gas bubbles imploding cyclically

↓

**destruction of bacteria, viruses and fungi**

The ultra-sound pulse → wound treatment solution penetrates more deep into fissures

↓

**mechanical rinsing effects**

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– Bacterial remnants are broken down, wound environment turns

**Neutral**

permanently free of pain

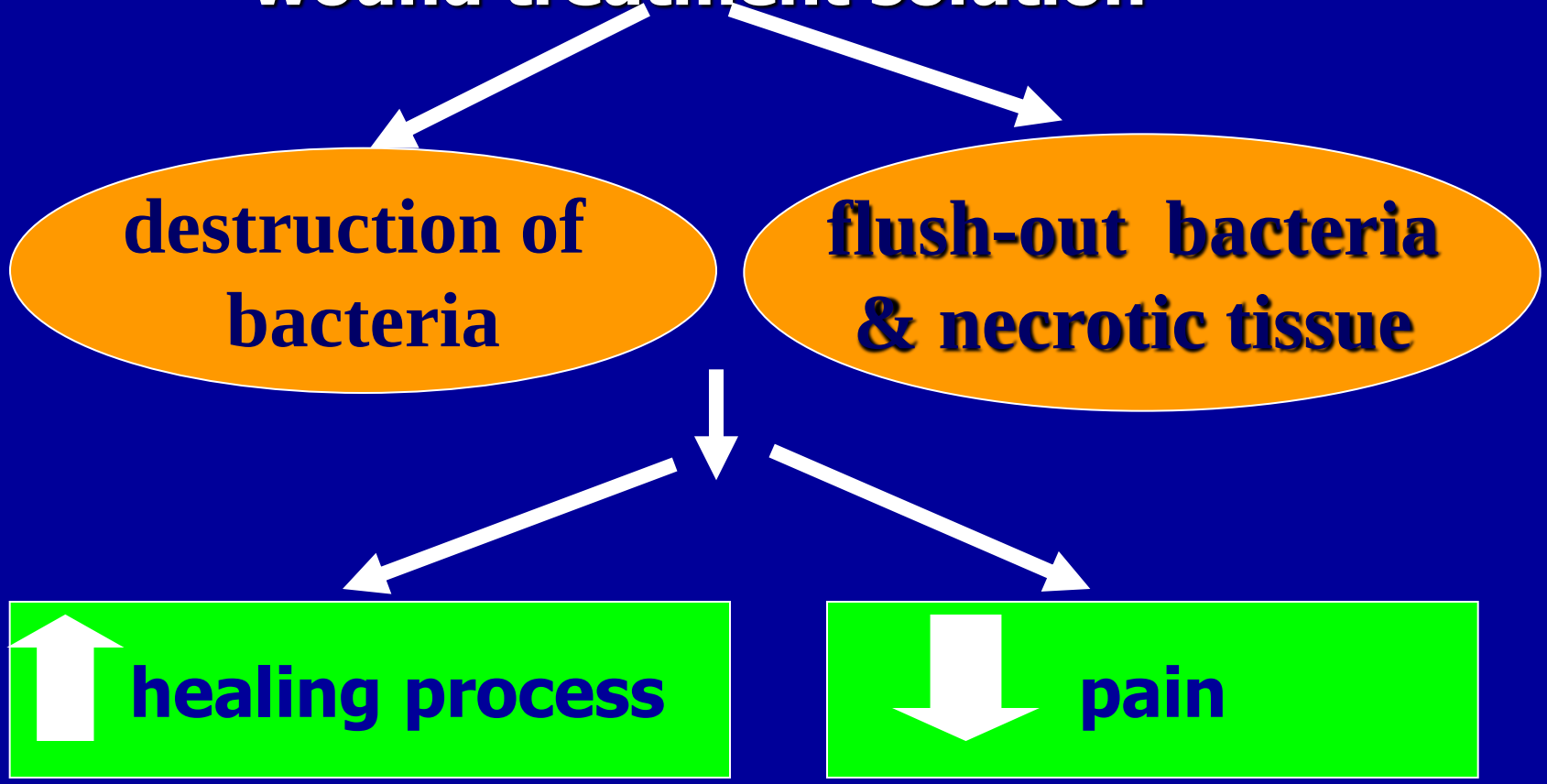
heal more quickly

**N.B. : Infected chronic wounds are acidic that induces pain.**

# UAW Treatment



**low-frequency ultrasound wound treatment solution**

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# wounds can profit from UAW?

*** After therapy of the primary disease
*** Treatment of Chronic slowly healing and resistant wounds of the following type:

- Infected wounds.
- Wounds that need repeated debridement (large amount of necrotic tissue).
- Wounds that benefit from irrigation.
- Wounds with impaired microcirculation.

# Wounds in which underlying illness are best to be treated?

- Diabetic foot.
- Lower limb ischemia.
- Combinations of a) and b)
- Venous ulcers, to a lesser extent.



- 1 UAW Application
- 3min. Application time

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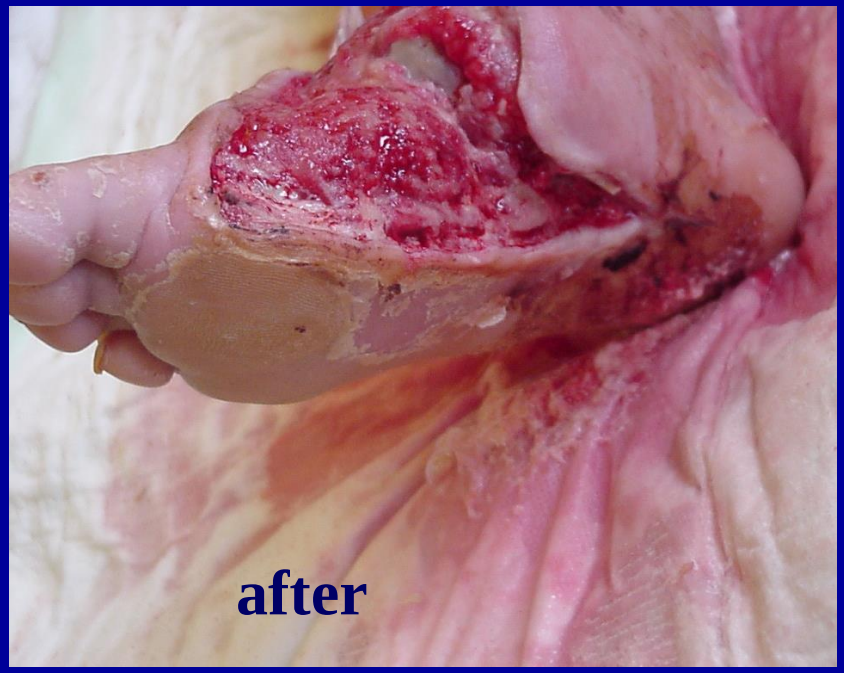
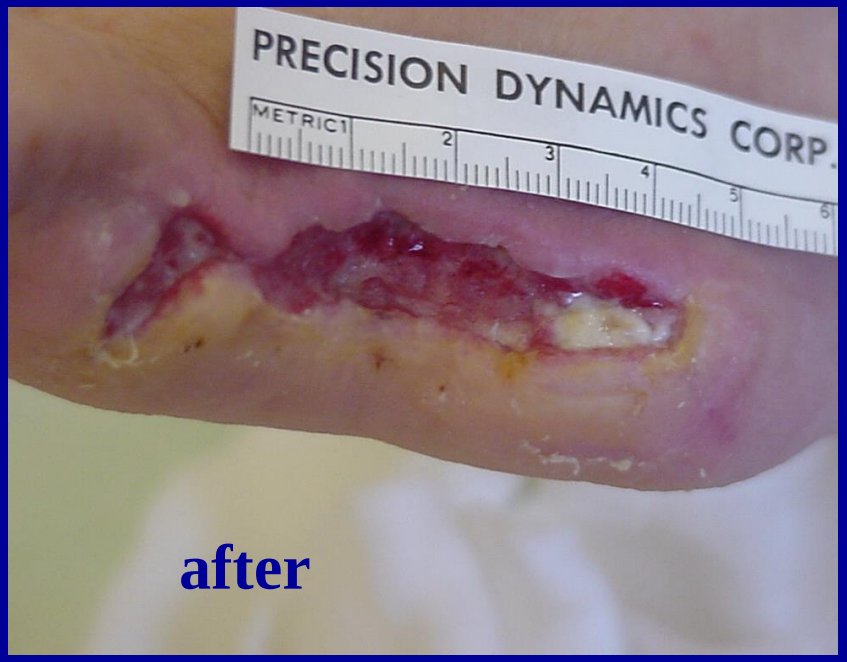
- **Hoof sonotrode**
- **23 Applications**


- **30min Application time**




- **7 X 5min Applciation time**

# Disturbed circulation and infected wound after fracture of talus



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**Complete wound closure**


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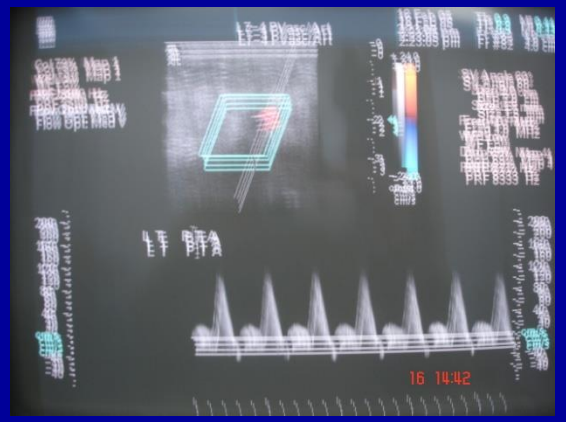

- A.S. ♀ , **48ys** ,
- DM= 12ys
- On insulin therapy
- Left heal trophic ulcer
- Resistant to treatment since 1 year

**Heal Ulcer**

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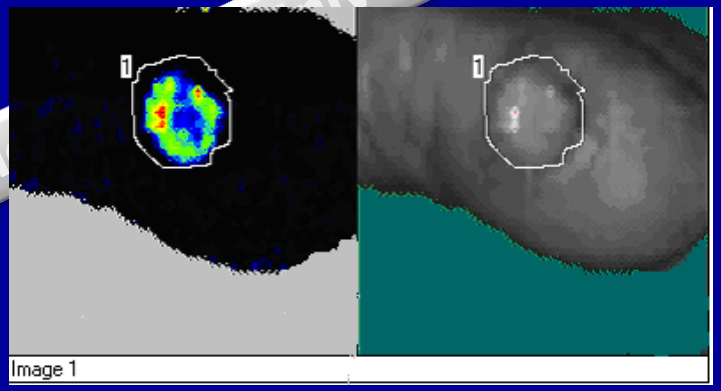
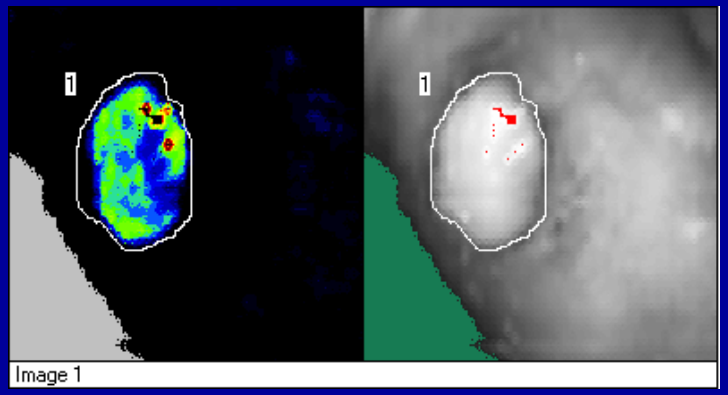
Before TT

Immediate after 1est session

**16 Feb**

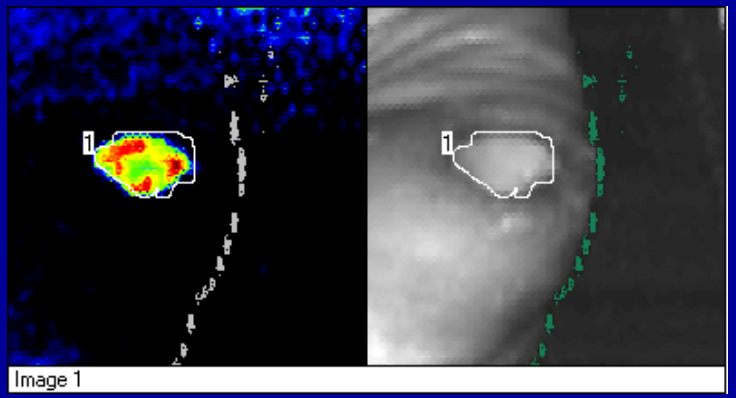



**Mean= 0.77**
**Std.dev=0.68**
**Max= 3.21**

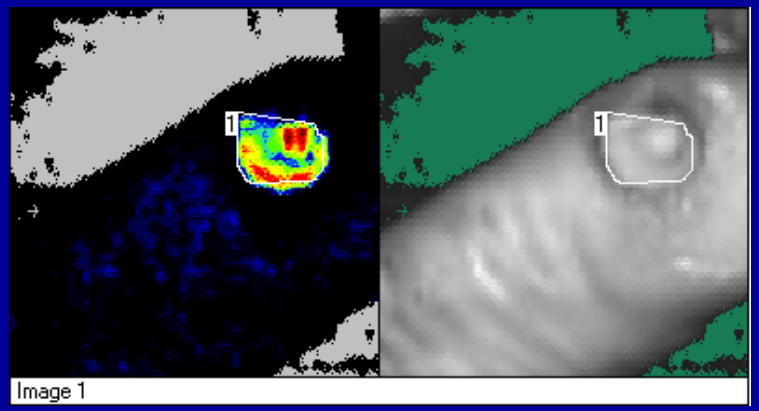



**Mean= 0.92**
**Std.dev=0.59**
**Max= 2.16**

**19 Feb**




**Mean=1.11**
**Std.dev= 0.70**
**Max= 4.81**




**Mean= 1.17**
**Std.dev=0.58**
**Max= 2.46**

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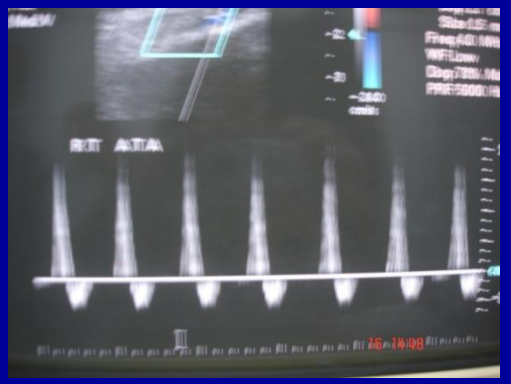


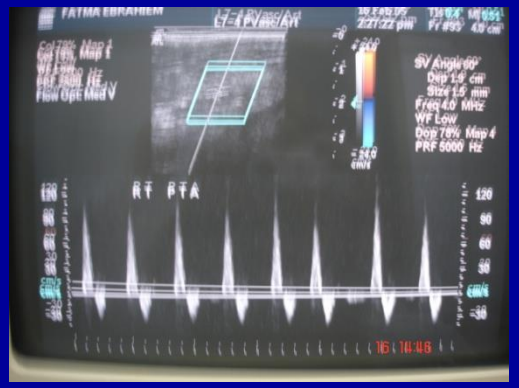


- F.k. ♀ 42yeas,
- 3m diabetic discovery
- On insulin therapy
- No proper control
- Ulcer on dorsum of right big toe
- resistant to treatment 3months

16 Feb 2005

19 Feb 2005

21 Feb 2005

23 Feb 2005

28 Feb

2 mars 2005

15 mars

Complete closure of the wound after 6 sessions

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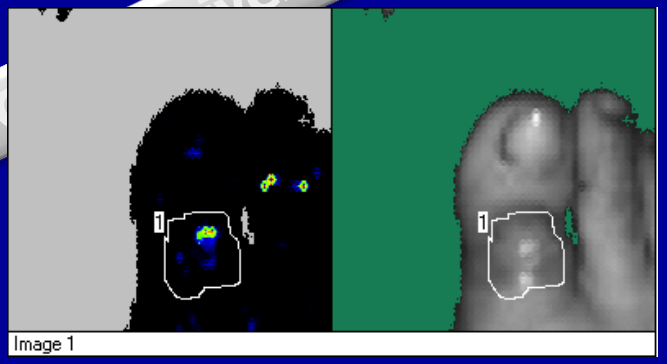
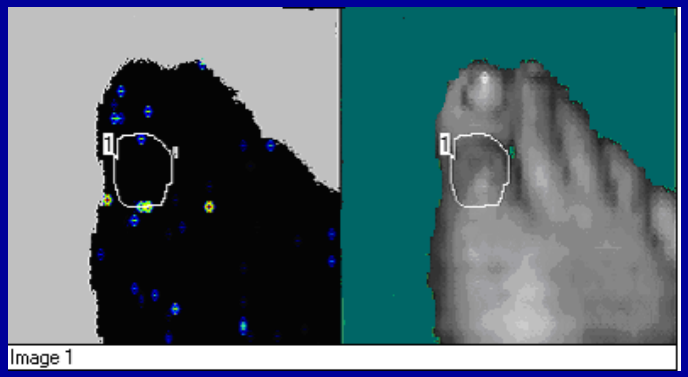
Before TT

Immedialy after 1est session

16 Feb 2005

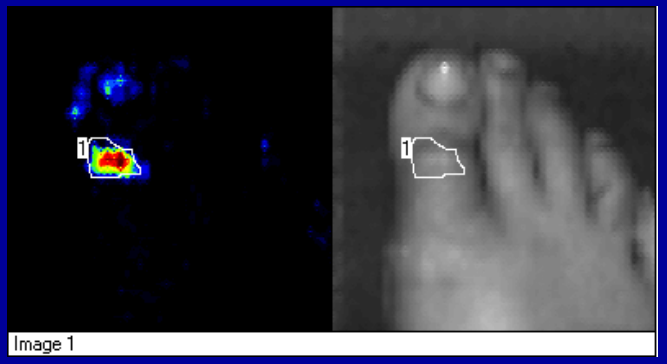



**Mean=** 0.4
**Std.dev=0.01**
**Max=** 0.66

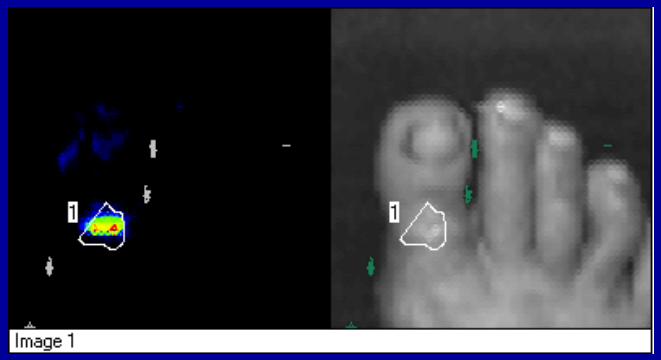



**Mean=** 0.01
**Std.dev=0.21**
**Max=** 0.21

**19 Feb 2005**




**Mean= 1.46**
**Std.dev=1.03**
**Max= 3.42**




**Mean=** 0.99
**Std.dev=0.95**
**Max= 3.85**

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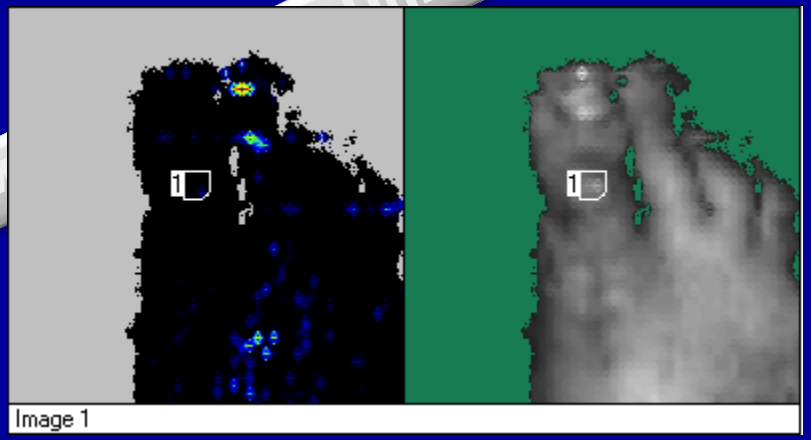
Before

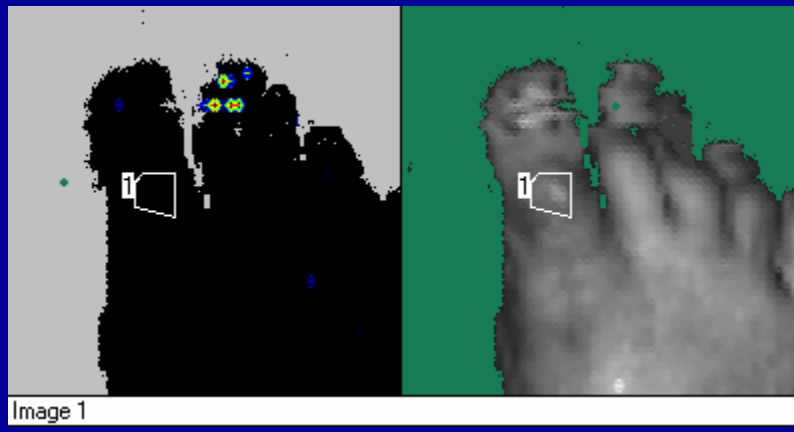
After



23 Feb

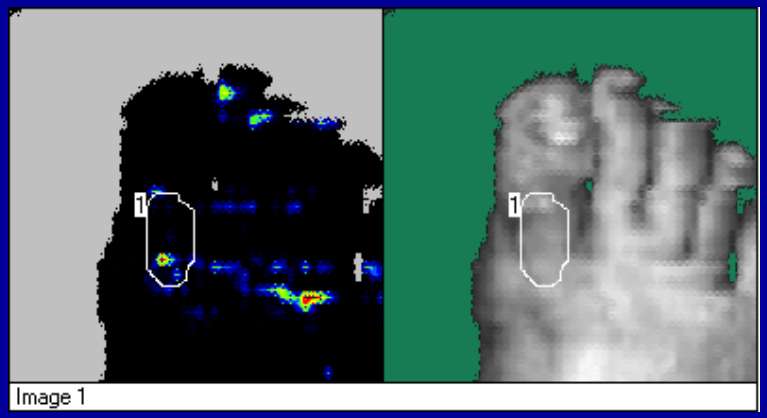



Mean= 0.04
SD= 0.09
Max= 0.28



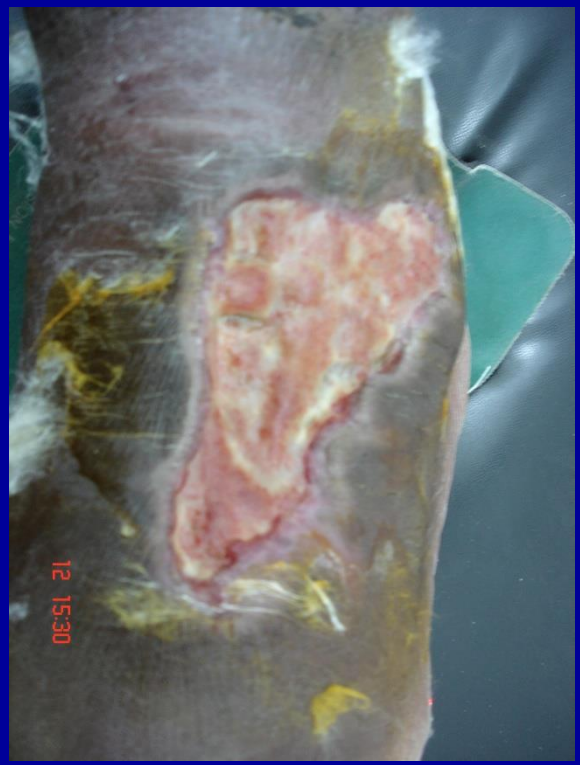

Mean= 0.00
SD= 0.00
Max= 0.01

28 Feb




Mean= 0.18
SD = 0.34
Max = 2.41

- S.M.B. ♂ 60 years
- Erysipelas of the left L.L. since > 1 year
- Surgical debridement the ulcer
- Resistant to treatment




12 Feb 2005

23 Feb 2005

28 Feb 2005

2 mars 2005

7 mars 2005

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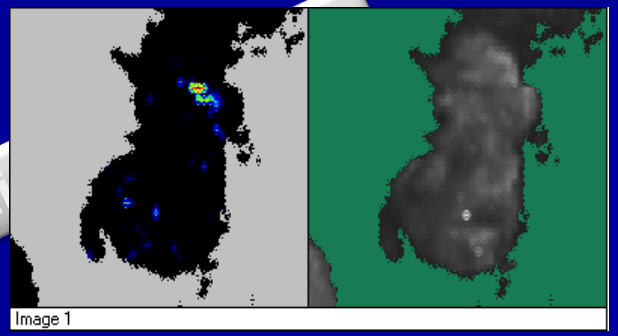
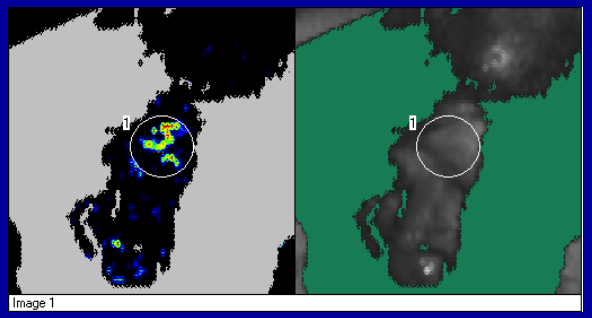
Vascular Medicine Ca

23 Feb 2005



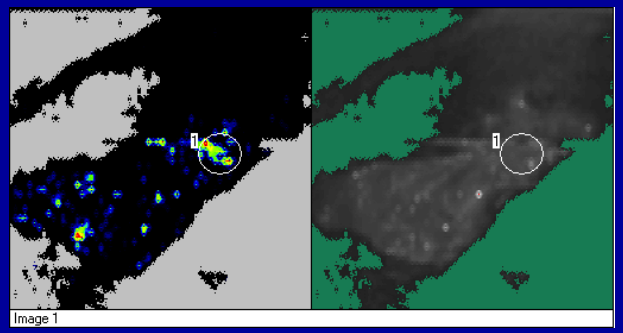

Max= 0.63
S.D.=0.14
Mean=0.08

7 mars2005



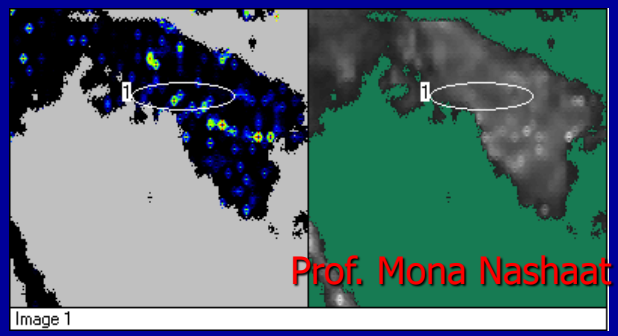

Max=0.82
Std.dev.=0.2
Mean=0.15

14 mars 2005




Max= 1.09
Std.dev.=0.14
Mean=0.15

12 April 2005




Max= 0.59
Std.dev.=0.1
Mean=0.06

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- UAW a debridement less painful than by mechanical and more effective than enzymatic measures .
- UAW debride down to the first layers of tissue but not beyond them i.e. Preserve more granulating tissue than mechanical treatment
- UAW kills bacteria not only those on the surface but also in the tissue .
- UAW seems to improve the microcirculation in some wounds .

# Advantage of UAW



- UAW does not cause any allergic side effects .
- UAW less painfull than mechanical procedures
- UAW helps to avoid operations.
- UAW is an outpatient treatment.
- UAW has an impact on drug cost by decreasing the need of analgeics, antibiotics & repeated long term treatment of chronic wounds

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# *Thank You*

*Prof. Dr. Mona A. Nashaat*