Medilux Healthcare Ltd.
Healthcare for the Internet Age

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Medilux Healthcare Ltd.

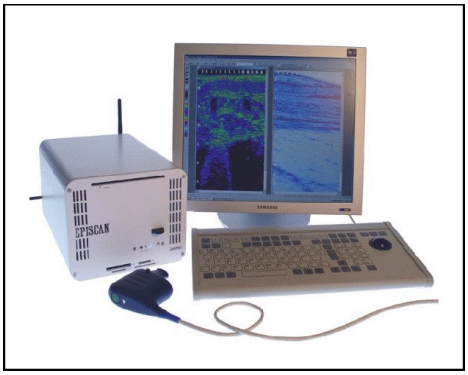
Medical Products: We introduce innovative and class-leading health care products from around the world for the prevention, diagnosis or treatment of a wide variety of acute and chronic medical conditions.

Medical Services: We promote new healthcare options internationally including specialist, high-technology treatment centres.

Education and Training: We disseminate information on new diagnoses and treatments to doctors, patients, medical charities and the media, organise presentations and run training seminars.

Episcan® I-200 Dermal Ultrasound Scanner

from Longport International Ltd.



Diagnosis ✧ Treatment guidance ✧ Virtual biopsies

Evidence and record keeping ✧ Validation of products and protocols

Episcan® has been developed to examine the human skin and first few centimetres of subdermal soft tissue using ultrasound with three alternative transducers of centre frequency 20MHz, 35MHz and 45MHz. The system can resolve features down to 40 microns and displays the digitised information obtained as B scans. Principal uses are for:

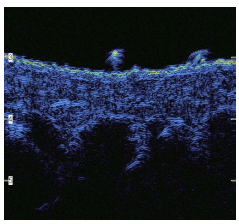
Skin cancer ✧ Plastic surgery ✧ Dermatology including aesthetic applications ✧ Burns

Nursing and wound care ✧ Early detection, prevention and treatment of pressure sores

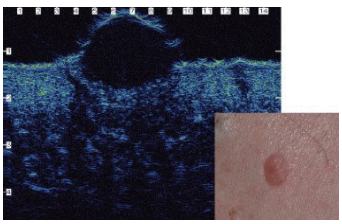
The region that **Episcan®** has been designed to image, although including the body's largest organ, the skin, and the subject of countless diseases and traumas, is virtually neglected in regard to imaging instrumentation.

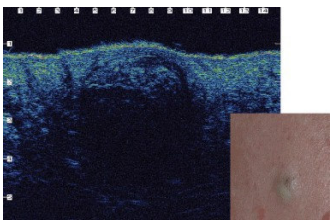
To date only optical imaging has been widely applied and this exclusively provides the clinician with surface data. Information from below the surface is normally only obtained through biopsies and the subsequent preparation of tissue slides.

Cellulite



Skin lesions





Photos show computer screen images obtained with Episcan. Images are displayed in a variety of colour or monochrome options with clear linear scale for accurate diagnosis and precise evaluation of treatments given.

High resolution imaging

Longport has developed a high frequency ultrasound system that allows clinicians to image the skin and underlying few centimetres of soft tissue at a very high resolution. This system enables a non-invasive visualisation of a wide range of injuries, diseases and conditions, many for the first time.

Episcan® has found applications in a large number of disciplines, including the appraisal of cosmetic procedures, the mapping of skin lesions and burn assessment.

Wound assessment and prevention

Wound assessment and prevention is proving to be one of the most significant applications of **Episcan®**. In this field Longport's technology has been found to give clinicians three main advantages:

- Early and more reliable detection of developing pressure ulcers
- Improved diagnostics of existing wounds, leading to better treatments
- Advanced record keeping for wound care patients

Earlier Detection of Pressure Ulcers

Episcan® can visualize soft tissue through to bone at the sites where pressure ulcers normally develop and image tissue changes that precede the development of a visible pressure ulcer. Significantly, this ultrasound imaging technique can detect developing pressure ulcers earlier than conventional visual techniques.

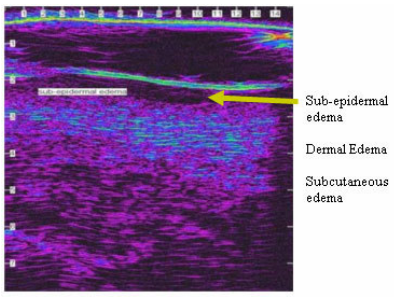
Using **Episcan®,** pressure ulcers have been found to develop in subcutaneous tissue over a hard prominence, normally a bone, and then spread out through the dermis to the epidermis, where at some point, an open wound often develops. Three distinct early phases (pre Stage 1) of pressure ulcer development can be determined using Longport's technology. The three early phases of pressure ulcer development are shown in the ultrasound images below.

Studies have shown that the Longport ultrasound phase data can be used to initiate earlier and more targeted intervention and that this can significantly reduce the occurrence of open pressure ulcers.

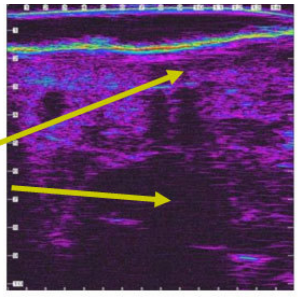
It is also possible to differentiate between a) friction ulcers or those caused by incontinence and b) pressure ulcers.

Friction ulcer

Generated at the surface



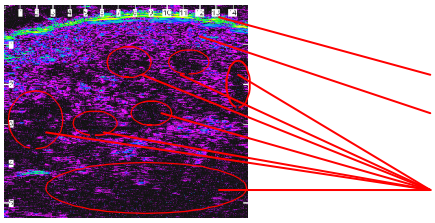
Sub-epidermal Edema



Subcutaneous Edema

Pressure ulcer

Generated over e.g. bony protuberance and propogating out to the surface

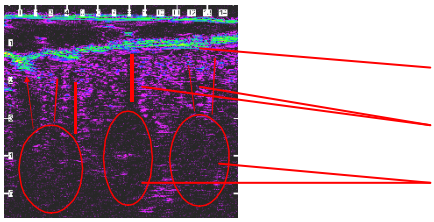


Stage one: pre-pressure ulcer

Intact Epidermis

Normal Dermis

Pockets of subcutaneous inflammation

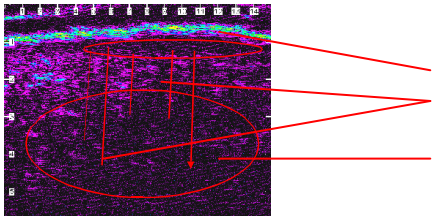


Stage two: pre-pressure ulcer

Intact Epidermis

Strips of dermal damage

Increased subcutaneous damage



Stage three: pre-pressure ulcer

Intact Epidermis

Strips of dermal damage

Increased subcutaneous damage

Optimization of Treatment Protocols

Episcan® can generate a cross sectional image through a wound that can be assessed like a biopsy. The ability to obtain these non-invasive, but histological-like images is providing clinicians with valuable data on the state and progression of wounds without the need for tissue damaging biopsies.

The ability of **Episcan®** to visualise deep into a wound, including the imaging of the wound bed, where changes to wound state often originate, and to monitor changes to this region is allowing clinicians to develop patient-specific treatment protocols in a more timely manner. Image data generated by **Episcan®** is therefore helping clinicians to heal chronic wounds faster and more effectively.

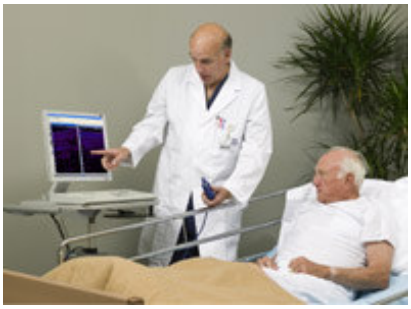
Features such as sinus tracking, wound undermining, oedema and the presence of foreign bodies can also be imaged and recorded.

Record Keeping and Audit

Centres are finding data generated by **Episcan®** to be a useful new record of their activities and the health of their patients and that these records provide a valuable input into subsequent audits. This capability has been found to be a particularly valuable in the assessment of patients on admittance to a facility.

Longport's system has been developed to integrate patient and wound assessment data (including Braden indexing), treatment protocols in relational databases together with digital photographic and ultrasound images.

The ability to generate and maintain a comprehensive electronic record in this way is expected to reduce a facility's exposure to wound related litigation and sanctions as well as save staff time.



Potential Applications

Many clinical disciplines are expected to benefit from the use of **Episcan®**. These include the following groupings, representatives of which Longport has met to discuss the role of **Episcan®**.

Chronic Wound Care, Doctors and Nurses	Assessment and monitoring of wounds
Plastic Surgeons	Tissue assessment surgery and monitoring of burns
Oncologists	Mapping of skin tumours
Podiatrists	Lower extremity ulcers including pressure ulcers, venous stasis, diabetic ulcers, tendon and ligament injuries
Vascular Surgeons	Superficial vein disorders
Dermatologists	Skin disorder assessment and monitoring
Physiotherapists	Monitoring of tendon and other soft tissue injuries during treatment
General Surgeons	Oedema monitoring permitting early detection of, for example, renal transplant rejection
Paramedics/Emergency Room Staff	Tissue trauma and X-ray lucent foreign body, (e.g. glass) detection
Gynecologists and Midwives	Monitoring and identification of hypersensitive pregnancies
Dialysis Nurses	Assessment and monitoring of oedema changes during dialysis leading to the more effective use of equipment
Orthopedic Surgeons	Wound healing assessment, tendon repairs, Dupuyten's contracture etc.
Cosmetic Surgeons	Monitoring the softening/thickening of skin prior to and following surgery, cellulite measurement, assessment of breast implants and liposuction
Dentists	Periodontal disease
General Practitioners and District Nurses	Monitoring and diagnosis of many of the listed applications in the Community
Sport Injury Clinics	Assessment of tendon and other sports injuries
Nursing Home Staff	Early diagnosis of pressure ulcers and monitoring of wound healing
Veterinary	Assessment of tendon/ligament injuries, superficial tumour detection etc.
Pharmaceutical and Medical Device Industry	Assessment of established skin care products and the impact of new products (drugs, creams etc.) on the skin and underlying soft tissue

System specification

System

- Ultrasound imaging mode A and B or brightness scans
- Digitalisation rate up to 200 Mega samples/sec at 8 bits non- interleaved
- Scan depths 3.8 – 22.4mm (user selectable)
- Image size selectable up to 2048 x 1024 pixels (2MB picture)
- 17" TFT display, 178/178 view angle, 1280x1024 pixels
- User adjustable gain and time gain compensation
- 2.8GHz CPU
- 40GB hard disk drive
- Smart card readers
- Read/Write CD Drive
- Cable/wireless networking plus Blue Tooth
- Wipeable keyboard with integrated pointer function

Probes

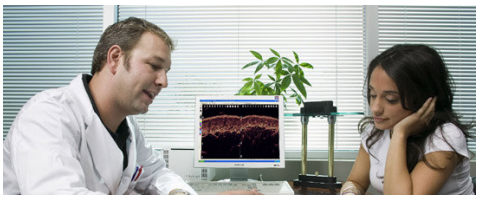
- Centre frequency 20-50MHz
- Transducers of different focal characteristics available
- Bandwidth of most probe designs exceeds 100%
- Scan length 15mm
- Scan rate 1 frame per second

Software

- Windows XP Professional operating system
- Multifunctional relational database
- Feature measurement (linear and area)
- User defined ultrasound image size from 66KB to 2MB
- Grey scale and colour palettes plus multiple viewing modes
- Digital photographs can be integrated into patient files
- Multiple images, scans and photographs can be viewed
- DICOM compatible output
- Annotation of ultrasound images and digital photographs
- Image analysis functions
- Multiple images retained following imaging
- Automated transfer functions
- Help function

Approvals

- CE and UK kite marked
- FDA marketing clearance obtained



High Frequency Ultrasound References

Calvin, M., Modari, B., Young, S.R., Koffman, G. and Dyson, M. (1997) Pilot study using high-frequency diagnostic ultrasound to assess surgical wound in renal transplant patients. Skin Research and Technology, 3, 60-65

Dyson, M.. (1997) Advances in wound healing physiology: the comparative perspective. Veterinary Dermatology, 8, 227-233.

Gniadecka, M. (1997) Potential for high-frequency ultrasonography, nuclear magnetic resonance, and Raman spectroscopy for skin studies. Skin Research and Technology, 3, 139-146.

Harland, C.C.,, Bamber, J.C., Gusterson, B.A. and Mortimer, P.S. (1993) High Frequency, high resolution B-scan ultrasound in the assessment of skin tumours. British Journal of Dermatology, 128, 525-532.

Hu, D., Phan, T.T., Cherry, G.W. and Ryan, T.J. (1998) Dermal oedema assessed by high frequency ultrasound in venous leg ulcers. British Journal of Dermatology, 138, 815-820.

Karim, A., Young, S.R., Lynch, J.A. and Dyson, M. (1994) A Novel Method of Assessing Skin Ultrasound Scans. Wounds 6(1), 9-15.

Kelly, D.A., Walker, S.L., McGrgor, J.M. and Young, A.R. (1998) A single exposure of solar stimulated radiation suppresses contact hypersensitivity responses both locally and systemically in humans: quantitative studies with high-frequency ultrasound. Journal of Photochemistry and Photobiology B: Biology, 44, 130-142.

Kolbe, L., Stoudemayer, T. and Kligman, A.M. (1998) Assessment of atrophogenicity of corticosteriods to human skin using non-invasive methods. Skin Research and Technology, 4, 167-173.

Pvergaard Olsen L., Takimaki, R., Serup, J. (1995) High-frequency ultrasound characterization of normal skin. Skin thickness and echographic density of 22 anatomical sites. Skin Research and Technology, 1, 74-80.

Rippon, M.G., Springett, K., Walmsley, R., Patrick, K. and Millson, S. (1998) Ultrasound assessment of skin and wound tissue: comparison with histology. Skin research AND technology, 4, 147-154.

Whiston R.J., Melhuish, J. and Harding, K.G. (1994) High Resolution Ultrasound Imaging in Wound Healing. Wounds: A Compendium of Clinical Research and Practice. pp. 116-121.

Whiston, R.J., Young, S.R., Lunch, J.A., Harding, K.G. and Dyson, M. (1992) Application of high-frequency ultrasound to the objective assessment of healing. WOUNDS: Proceedings of the 2nd Conference on Advances in Wound Management. Macmillan Press, London, pp.26-29.

Young, S.R., Lynch, J.A., Liepins, P.J. and Dyson, M. (1992) Ultrasound imaging: a non-invasive method of wound assessment. Proceedings of the 2nd Conference on Advances in Wound Management. Macmillan Press, London, pp. 29-31.

Young, S.R., Erian, A. and Dyson, M. (1996) High Frequency Diagnostic Ultrasound: A Noninvasive, Quantitative Aid for Testing the Efficacy of Moisturizers. International Journal of Aesthetic and Restorative Surgery, 4 (2), 1-5.