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MCAUS0330EA 2020-02 CMSC/SO/Printed in Japan

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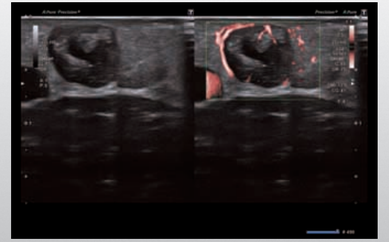
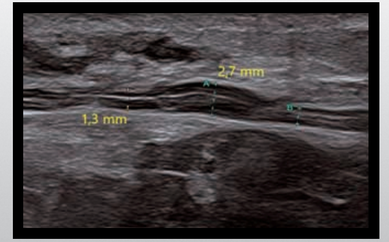
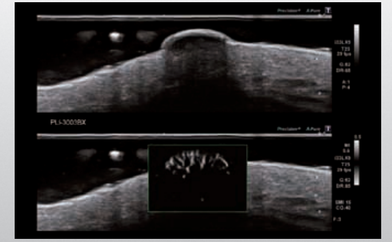
Made For life

UHF
Ultra-High Frequency Transducers

The transducer that lets you simply see more







Aplio i-series

Ultra-High Frequency transducers

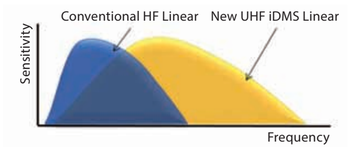
Aplio i-series offers a collection of Ultra-High Frequency (UHF) transducers.

The Canon-developed low attenuation lens, high performance piezoelectric oscillator and optimized matching layer and backing form the foundation for high frequency emission. The elevated frequency range expands the horizon for clinical applications especially for small parts, MSK and other potential clinical regions such as dermatology.

The new UHF linear transducers PLI-2004BX and PLI-3003BX equipped with intelligent Dynamic Micro-Slice (iDMS) technology deliver crystal-clear images with excellent contrast and spatial resolution.

The hockey stick transducer PLI-2002BT offers extraordinary image quality and its small footprint and ergonomic design provide flexibility in use.

The innovative Doppler technology, Superb Micro-vascular Imaging (SMI) is designed for minute, low-velocity flow. With a combination of UHF transducers and SMI high resolution imaging with Doppler can be easily obtained. The improved vascular image quality has the potential to positively impact diagnosis and therapy planning in the future.



Ultra-wide band UHF transducer

Speed of sound in vivo

1540m/s
$=1.54\times10^{6}$mm/s

$$\frac{1.54\times10^{6}\text{mm/s}}{33\times10^{6}} = \frac{1.54\text{mm}}{33} = 0.047\text{mm}$$

For 33MHz

33MHz
$=33\times10^{6}$

Freq	Wavelength
12MHz	0.13mm
24MHz	0.064mm
33MHz	0.047mm

Wavelengths in different UHF transducers

PLI-3003BX

intelligent DMS

PLI-2004BX

intelligent DMS

PLI-2002BT

MSK Rheumatoid arthritis

24MHz

PLI-2004BX

This female patient with known rheumatoid arthritis complained of mild tenderness in the left metacarpophalangeal joint (MCPJ) of her index finger and was referred for an ultrasound scan of the joints in her hand to assess if there was any active synovitis. The detailed B-mode of the 24MHz transducer shows a relatively normal joint with no synovial hypertrophy, effusion or erosions. However, vascular flow can be detected within the joint using SMI but not with Power Doppler (PD). Her other, non-symptomatic joints did not demonstrate any vascular flow with SMI or PD. Doppler Ultrasound is currently the gold standard for denoting active synovitis in small joints and together with state-of-art SMI technology may prove even more effective at early detection of active inflammation in patients with arthritides, thus enabling appropriate treatment without delay and further damage to these joints.

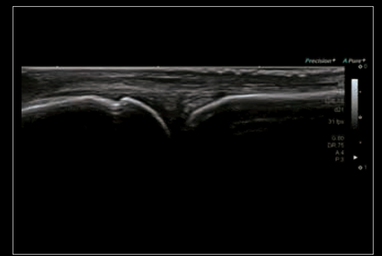


Fig. 1 B-mode

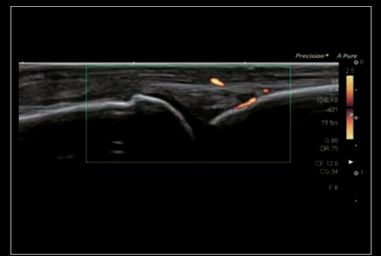


Fig. 2 Power Doppler

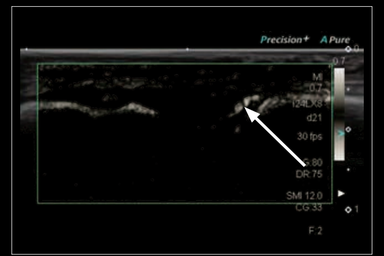


Fig. 3 SMI

“The high resolution images obtained in the near field without loss of penetration of the 24MHz transducer are unprecedented. This has opened up a new horizon of clinical applications which are currently under evaluation.”

Professor Adrian Lim
Imaging Department, Imperial College and Healthcare NHS Trust, United Kingdom

MSK Peripheral nerve injury

This case is a female patient with swollen lymph nodes in the neck. She underwent a left Level V lymph node dissection one months ago. The patient had a left neck pain and weakness of the left shoulder. Then she was referred for an ultrasound scan of the left neck. The detailed B-mode of the 24MHZ probe revealed that superficial cervical plexus was compressed by a swollen lymph node (***Fig. 1***).
The left accessory nerve presented swollen and Power Doppler signals were detected within the nerve (***Fig. 2***). Further, the scar of surroundings branch of the accessory nerve was detected (***Fig. 3***). The classification of peripheral nerve injury is an important basis for clinical treatment. The high resolution ultrasound can provide important morphological basis for accurate clinical diagnosis and treatment.

24MHz
PLI-2004BX

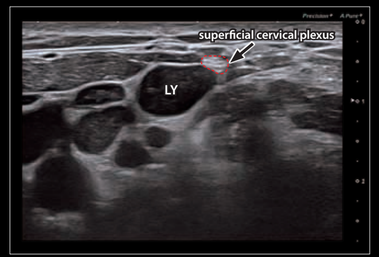


Fig. 1

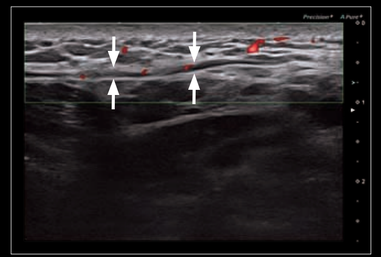


Fig. 2

Fig. 3

“The 24MHz transducer not only provides fine morphological information of small tissue, but also has good blood flow sensitivity, which has opened up a new field of ultrasound diagnosis.”

Professor Jiaan Zhu
Peking University People's Hospital, China

MSK Foreign body in flexor tendon

Fig. 1 is a patient with a foreign body removed from his finger previously but still had ongoing systems. Ultrasound showed a second foreign body present, deep within the flexor tendon. This resulted in reassessment of treatment as different surgical technique was now required.
Fig. 2 shows the thickening of A1 pulley with catching of the flexor tendon. Using the slimline 22MHz hockey stick an interventional procedure was performed to cut the pulley with a 16G needle, thereby releasing the A1 pulley without need for surgery.
A wooden splinter was found in a patients upper arm (***Fig. 3***). Excellent detail of the surrounding inflammatory reaction was seen with increased blood flow on Colour Doppler. Excellent resolution showed good detail of ends of the foreign body and distance from skin MSK which allowed safe extraction with surgical tweezers.

24MHz
PLI-2004BX

22MHz
PLI-2002BT

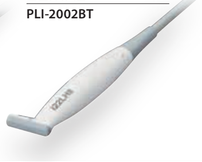


Fig. 1 Foreign body in flexor tendon

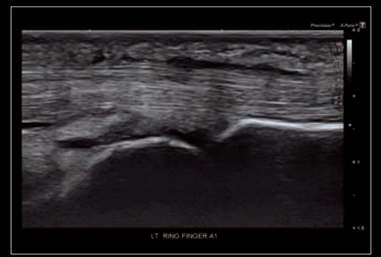


Fig. 2 A1 Pulley

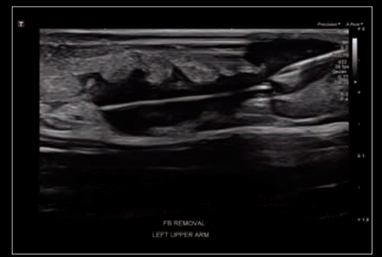


Fig. 3 Wooden splinter removal

“The excellent resolution delivered by the UHF transducer results in easy assessment of treatment or surgical procedure”

Dr Pouria Rezaian
Radiologist and Partner, Benson Radiology, Australia

Sports Medicine

Muscle injury

Muscle injuries in sport are common, often result in games missed and can have a high recurrence rate. The use of high frequency ultrasound imaging is an excellent addition to the return to play decision making process. In this case study, an MRI initially diagnosed a second-degree rectus femoris muscle injury. Ultrasound imaging using a high frequency probe was then performed serially based on a proposed protocol by Hall (2018)*. The images at 4.5 weeks (***Figure 1***), 5.5 weeks (***Figure 2***) and 6.5 weeks post-injury (***Figure 3***) are shown below. Resolution of the anechoic fluid/hematoma associated with healing was progressively seen and indicated the rehab activities were appropriate. Dynamic isometric muscle contraction was observed to improve over the injured tissue over time, indicating progressive scar formation. In conjunction with functional and clinical testing, the addition of ultrasound imaging helped guide the return to play protocol progression.

24MHz
PLI-2004BX

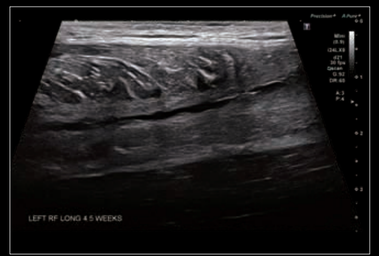


Fig. 1

Fig. 2

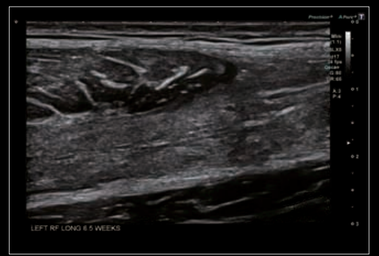


Fig. 3

“Ultrasound imaging done in house with team physical therapists and medical staff allows timely, objective and dynamic monitoring. Ultrasound findings are immediately integrated with the clinical and functional presentation for aiding in return to play decisions for our athletes, post-injury.”

Marilyn Adams, PT, DPT
San Antonio Spurs, USA

*Hall, Mederic. (2018). Return to Play After Thigh Muscle Injury: Utility of Serial Ultrasound in Guiding Clinical Progression. Current sports medicine reports. 17. 296-301. 10.1249/JSR.0000000000000516

Dermatology

Angiosarcoma of the face

This is a case from a patient with angiosarcoma of the face. After radiation therapy, the surface of the skin looked normal so the attending doctor considered the tumor had completely disappeared. However, a small hypoechoic area beneath the skin surface was detected during follow-up ultrasound (***Fig. 1***).
By using the 24MHz transducer (***Fig. 2***), SMI did not show much flow signals, suggesting necrosis or scarring of the lesion. The treatment would be considered as successful and radiotherapy would be terminated. However, rich vasculature was detected using 33MHz (***Fig. 3***), strongly suggesting a residual tumor.

33MHz
PLI-3003BX

24MHz
PLI-2004BX

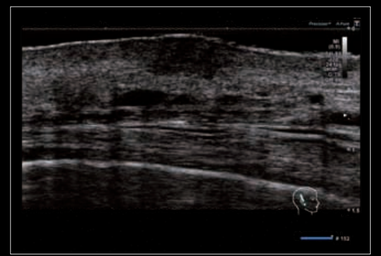


Fig. 1 Grayscale

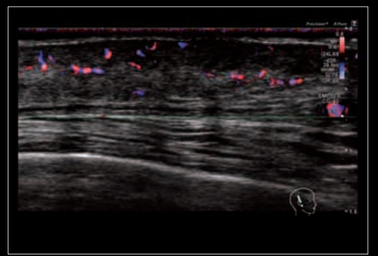


Fig. 2 24MHz with SMI

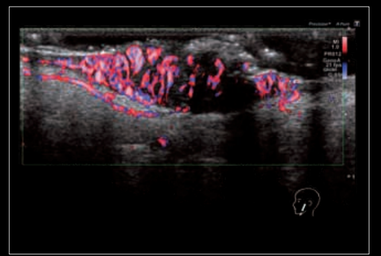


Fig. 3 33MHz with SMI

“This is a case which I realized that a high-performing equipment is critical for the treatment planning and patient’s quality of life. With other imaging modalities, such detail of vasculature can hardly be delineated and by pathological examination blood flow cannot be visualized.”

Professor Jiro Hata
Department of endoscopy and ultrasound, Kawasaki Medical School, Japan