Ultrasound / Interview report

On the move in sports imaging

Dr. Iñigo Iriarte
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Introduction

Canon strives daily to improve image quality in all its systems. Higher-quality imaging has enabled better understanding of sports injuries, more precise diagnosis and a clearer picture of the evolution of the athlete's physiology and its potential problems. One of the world's leading experts in the field, Dr. Iñigo Iriarte, explains how sports medicine has been able to progress as a specialism with advanced imaging and how it differs from general medicine.

For many years, Canon has strengthened its commitment to sports medicine through development of its technologies and expertise in musculoskeletal (MSK) imaging, as well as provision of onsite medical imaging facilities for major international sporting events, such as the Tour de France, the Birmingham 2022 Commonwealth Games, and the Dakar Rally. It has worked hand-in-hand with pioneers in the field to enhance its knowledge and ensure that Canon's developments address key clinical and practical issues.

Driving MSK imaging forwards

Dr. Iriarte, one of the world's top experts in MSK imaging and rehabilitation of athletes, collaborates regularly with Canon. He is an author of one of the most comprehensive anatomical and diagnostic books available for one of the best MSK ultrasound textbooks ever published: "Ultrasound of the Musculoskeletal System: Anatomical Exploration and Pathology" Mskroom Books, 2021, as well as many scientific research papers. Dr. Iriarte has worked as an Orthopedic Rehabilitation Consultant at Ars Médica in Bilbao, Spain, since 2000. He has been Professor of the Board of MSK ultrasound of the Spanish Society of Rehabilitation (SERMEF) since 2014; a lecturer in several courses in MSK and US guided procedures in Spain; Book Editor of Ecografía Musculoesquelética. Atlas Ilustrado. Ed. Panamericana 2015; and he has served as a Consultant to Athletic de Bilbao F.C. Medical Services since 2018.

"Through higher-quality imaging, we now have a better understanding of sports' injuries, even small ones," he remarked. "We can make a more precise diagnosis, and we can better understand the evolution of the athlete's injury and implement a better treatment to return to sports safely."

"And with the high-resolution probes, we can see very, very, small structures of one millimeter or less. So, we can assess structures that we couldn't before. We can even see terminal nerves," he continued. "And we are able to continue to discover more and learn while all this is very new and very amazing."

The advances made in imaging embodied in Canon's Aplio i800 for example, have enabled several studies by Dr. Iriarte.

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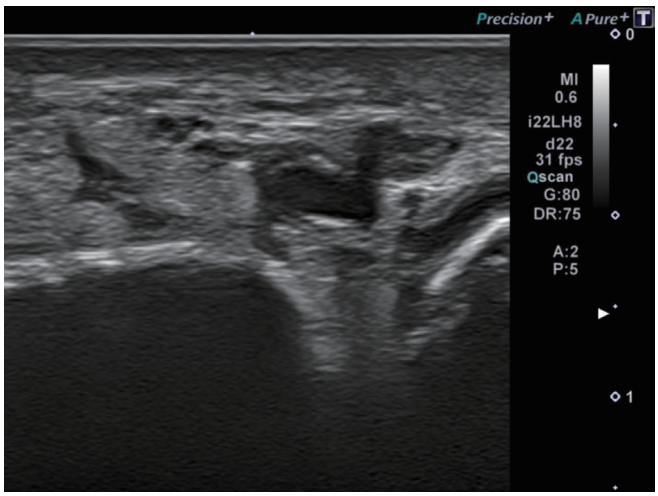

Figure 1

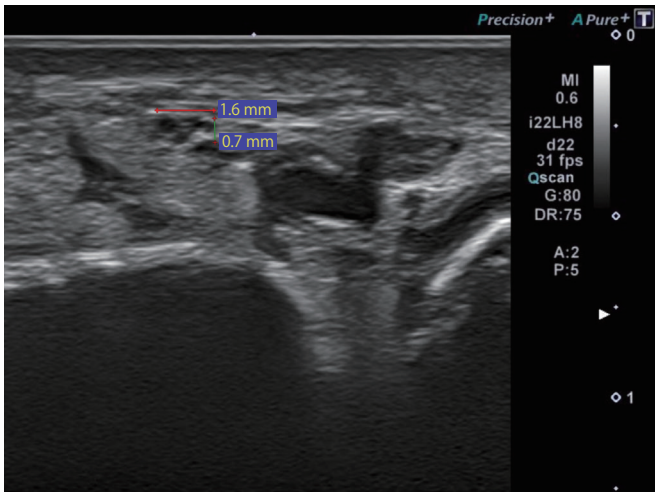

Figure 2

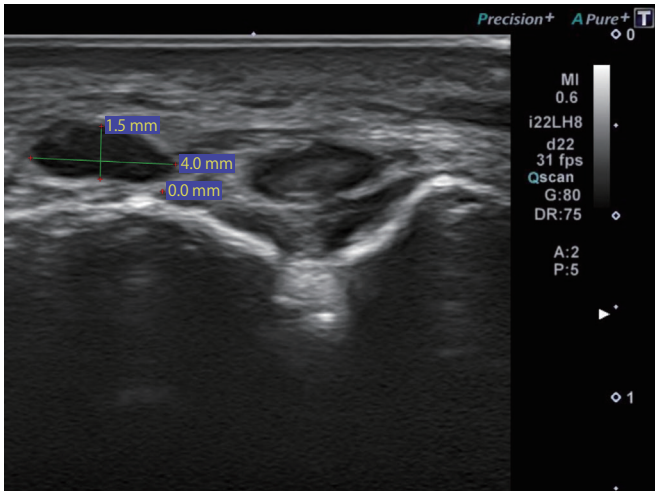

Figure 3

Deep peroneal nerve neuroma at the dorsum of the foot. Figs. 1 and 2: Normal deep peroneal nerve and its measurement (1.6 x 0.7 mm).
Fig. 3: Neuroma at injury site and its measurements (4 x 1.5 mm)

Meeting key challenges in sports medicine

Due to the urgency in returning the athlete safely to competition as soon as possible, sports medicine for professional athletes in particular differs from general medicine in that it involves a far wider network of professional collaboration. Practitioners are required to work within a team that includes athletes, coaches, physiotherapists, rehabilitation specialists, psychologists, nutritionists, management and even sponsors. While fewer professionals may need to be consulted in diagnosis and treatment of amateur athletes, the aim of the patient is also usually to return to sport as soon as possible.

"We aim to return the player to competition as quickly as possible and as safely as possible with the minimal recovery period but ensuring that there is no re-injury, because this would be a disaster," said Dr. Iriarte. "That's why precise diagnosis is so essential. The more precise diagnosis is, the better return to competition will be."

"With the social and economic importance of professional sport, there are a lot of investigations about the injuries of professional athletes. We work in very, very close contact with the entire team — the physiotherapist and the rehabilitation specialist etc. It is a team decision between the physicians and the rest of the professionals and the beneficiaries are also the general population. When we know more about the evolution, and maturation of the athlete´s injuries, so everyone will benefit from this."

The distinction between professional and amateur athletes is also a caveat of sports medicine that is not mirrored in general medicine.

Choice of modality

While MRI is a gold standard in sports medicine, ultrasound is very often used initially and as a preferred modality for many examinations. As well as offering the advantages of a non-invasive modality that does not involve exposure to radiation, advances in the image quality of ultrasound enable remarkable levels of clarity, even of small structures.

"MRI is more sensitive and more specific, but it is also more expensive, and is not always available. We usually use ultrasound at the first assessment at point-of-care, which is when the patient or the player, has been injured," explained Dr. Iriarte. "For professional athletes, we need more information. We need to be sure. So, we usually perform an MRI in professional players."

"Ultrasound, for me, is the best imaging tool to assess nerves because you can follow all of the path of the nerve — from its origin until its end. You can perform dynamic maneuvers to assess if the nerve is compromised in some areas," he continued. "And you can interact with the patient to confirm where the problem is. No other technique has these particularities. So, for me the best technique — if we are talking about nerves image — is ultrasound."

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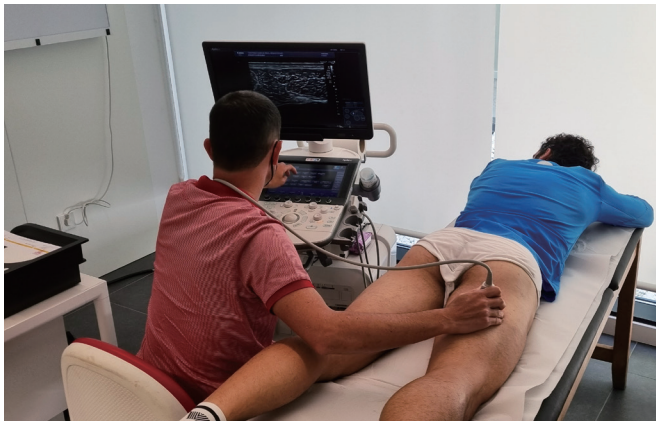


Canon onsite imaging facilities for athletes

Impact of the pandemic on sports

The Covid-19 pandemic affected sports people in some similar and some different ways than the trends seen in general medicine.

"At the peak of the pandemic, people were not allowed to go outside their homes here in Spain and other countries. So, no sports were allowed outdoors, only at home," Dr. Iriarte said. "We saw a huge quantity of patients injured after taking up indoor sports. People who didn't usually exercise started, and many became injured. However, now, it's returning to more normal conditions."

With the particularly close contact of ultrasound in sports medicine, the emphasis on careful preventative measures against Covid-19, such as the use of masks, disinfection of imaging facilities between each patient and opening windows in examination rooms, has changed permanently since the beginning of the pandemic, as it has done in general medicine.

Onsite imaging facilities

One major difference of sports medicine compared to general medicine is the practice location. Sports events are held in specific sports grounds or routes, and often these are outdoors. When an athlete is injured, access to immediate medical imaging is essential for rapid and accurate diagnosis to enable decisions to be made as to whether the athlete can continue in the competition or not. Canon provides mobile onsite imaging facilities equipped with its state-of-the-art imaging systems of all modalities at many major global sporting events.

Futurescape

While the pandemic has placed a lasting emphasis on physical health, exercise and the role of sport on all levels on well-being, the future of sports medicine will undoubtedly include further growth. On a technology level, Dr. Iriarte sees enhanced resolution at depth as the next goal in advancing imaging.

"We have amazing quality in superficial scans, but still there is lack of resolution and discrimination of the deeper structures at 4 or 5 cm depth, which is very important for assessment of some structures," he said. "If we achieve this improvement, I am certain it will be very, very important, and we will develop the technique a lot."

And as top sports events across the world resumed in 2022 with lifting of pandemic restrictions, Canon has been able to continue developing its important role in providing on-the-spot sports imaging solutions to competitors.

Deep understanding of the science of movement

Much of Canon's latest technology is used with elite sporting clubs from around the world. We strive continually to develop new solutions and improvements that are meaningful and accurate and have relevance in a working environment that supports the user, as well as the patient. At Canon, we are committed to developing imaging solutions that are built on our deep understanding of the science of movement. Meaningful innovation made possible for MSK.

Find out more about Canon Medical's commitment to sports imaging:
https://global.medical.canon/specialties/sportsmed

Find out more about the work of Dr. Iñigo Iriarte:
https://www.youtube.com/c/inigoiri
https://mskroom.com/books.php

Canon's Aplio i-series / Prism Edition - Advanced ultrasound

The Aplio i-series ultrasound is designed to provide a complete host of imaging and quantification capabilities for high-quality diagnostics, outstanding versatility and exceptional ease of use.

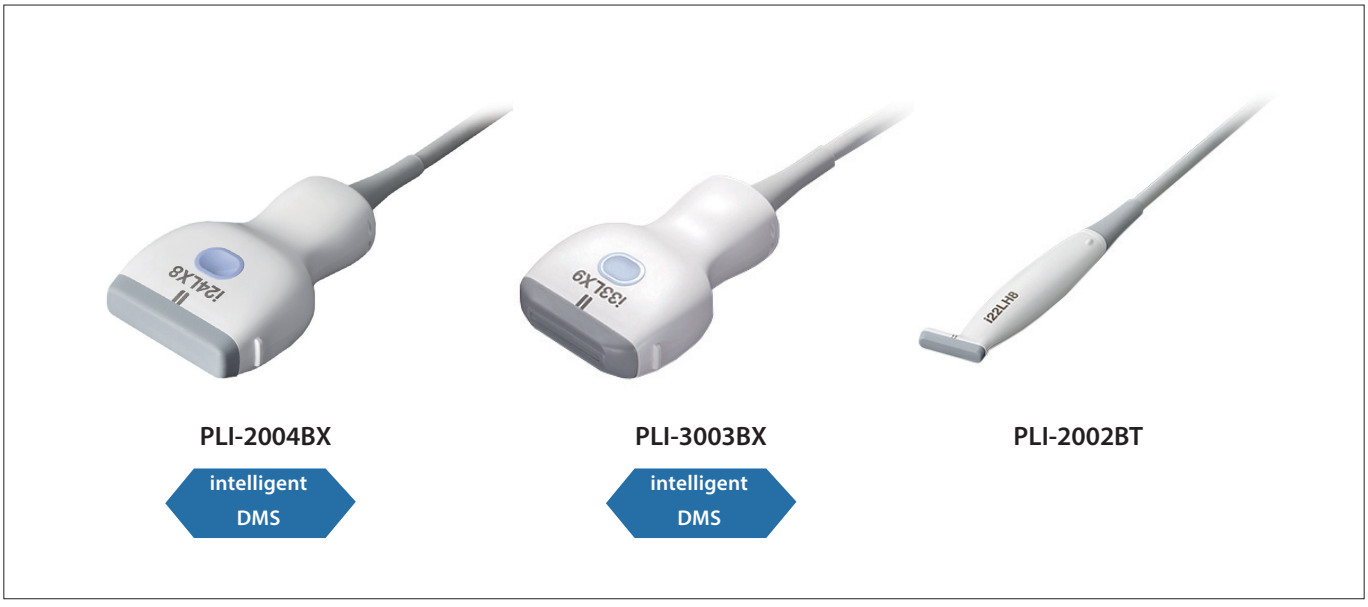
- High quality, robust image quality for a wide range of patients
- Customizable user interface with advanced workflow navigation capability
- Automated measurements for fast and easy workflow
- High-frequency transducer

Aplio's wide band linear transducers with up to 33 MHz and intelligent Dynamic Micro-Slice (iDMS) technology offer outstanding details for a wide range of MSK applications. Advanced imaging techniques also enable in-depth quantitative assessment of small tissue structures

Read more about the Aplio i-series / Prism Edition: https://global.medical.canon/products/ultrasound/aplio_i-series_prism_edition

High-frequency transducer

Aplio i-series offers a collection of high-frequency 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.



High-frequency 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 hockeystick transducer PLI-2002BT offers extraordinary image quality and its small footprint and ergonomic design provide flexibility in use.

Canon's Vantage Galan 3T MRI – Advanced imaging for extra detail

The Vantage Galan 3T features Advanced intelligent Clear-IQ Engine (AiCE), in combination with the Compressed SPEEDER. This MRI not only produces stunningly crisp and beautiful images, the combination of intelligent AI, Parallel Imaging and Compressed sensing means whole body images can be captured quickly and efficiently. It enables you to tackle the most complex procedures with automated slice alignment and rapid scan technology, and our unique AI to remove noise and improve SNR1 and assist in diagnostic decision-making.

Advanced intelligent Clear-IQ Engine (AiCE)

Canon's AiCE is an innovative Deep Learning Reconstruction technology that's been trained to reduce noise and boost signal to deliver sharp, clear and distinct images at speed.

AiCE images have:

- Low Noise
- Natural Image Texture*
- Sharp High Contrast Resolution
- Clear Low Contrast Detectability

*Compared to MBIR

CANON MEDICAL SYSTEMS CORPORATION
https://global.medical.canon

MOIUS0133EA 2023-03 CMSC/Produced in Japan

Canon Medical Systems Corporation meets internationally recognized standards for Quality Management System ISO 9001, ISO 13485. Canon Medical Systems Corporation meets the Environmental Management System standard ISO 14001.

The clinical results described in this paper are the experience of the author.
Results may vary due to clinical setting, patient presentation and other factors.

Made For *life*