Since its introduction in the late 1970s, Magnetic Resonance Imaging (MRI) has become the diagnostic imaging modality of choice for the majority of musculoskeletal disorders in human medicine [1,2]. MRI is a non-invasive diagnostic tool which provides excellent soft tissue contrast and depiction of bone marrow, ligaments, tendons and cartilage without the use of ionizing radiation [3]. In veterinary medicine, MRI use was initially restricted to small animal practice due to magnet design [4]. In 1987, Park, et al. for the first time described MRI of the equine fetlock, using cadaver specimens. During the early 1990s MRI in the horse was limited to cadaver studies [5,6]. MRI was first performed on live horses at the Washington State University College of Veterinary Medicine in 1997 using a ‘high field’ MRI scanner, which is tubular in shape. With this technology it was necessary to perform diagnostic MRI under general anesthesia [7]. In 2000, a 1.5 T MRI scanner was installed at the Animal Health Trust in New Market, UK, scanning horses as well as small animals [8]. Since the late 1990s there has been an exponential increase in the clinical use of high field MRI in equine orthopedics. However, due to the risks of general anesthesia (mortality rate 1%) and secondary complications are crucial considerations for the diagnostic MRI [9]. As results, this led MRI experts to adapt the open coil magnet used in human medicine in standing, sedated horses. In 2000, Hallmarq developed an open coil magnet MRI scanner with U-shaped permanent magnets with field strength of 0.27 Tesla, initially installed at Bell Equine Veterinary Clinic, UK in 2002 [8].

Since the introduction of the open coil magnet MRI scanner as a diagnostic modality, equine orthopedics and equine practitioners have adapted quickly to this technology. It became a routine diagnostic method as MRI provides additional insight into the anatomopathological alterations associated with lameness in comparison to other diagnostic modalities such as radiography and ultrasound. Ultrasound of the foot can provide useful diagnostic information but has not gained great acceptance [8]. In 2013, more than 71 Hallmarq MRI scanners were installed around the world and approximately 40,000 horses examined. Comparatively, the number of horses examined during the last 15 years has increased around 19-fold in 2014 compared to 2004 (Figure 1; www.hallmarq.net). During this period the majority of equine MRI scans (80%) were of the distal limb and foot (Figure 2; www.hallmarq.net). That is not surprising given the magnets’ design and the fact that foot pain represents the major cause of lameness in horses. The fetlock and pastern regions are more prone to motion artefact, which in turn degrades image quality. In 2004, motion-correction software for standing equine MRI was developed. Two years later, Hallmarq released a new update (Eq2 standing scanner), which included the motion correction technique. We believe this technique advanced the use of MRI as a diagnostic tool in equine orthopedics in many ways. Firstly, the image quality of the metacarpophalangeal and proximal interphalangeal joint was significantly improved and thus advanced the diagnostic ability. Secondly, by minimizing motion artefacts, the need for repetition of image acquisition was avoided and thus the examination time significantly reduced.

MRI had a positive effect on our understanding of foot lameness. The high number of foot MRI resulted in further characterization of foot pathologies/lesions and in the identification of new conditions. For instance, lesions of the Deep Digital Flexor (DDF) tendon are now well established and recognized as one of the most important causes of foot-related lameness; which previously was considered navicular syndrome. Deep digital flexor tenonitis is reported in 59% of horses with foot-related lameness undergoing a MRI scan, and in 73% of horses with both DDF tendon and navicular bone lesions [10]. Moreover, the type of DDF tendon lesion can be accurately determined, which in turn allows more accurately establish the patient’s prognosis. Accurate diagnosis has significantly improved the selection of therapeutic approaches, which in turn has resulted in a reduction of neurectomy surgeries. Recently it has been reported that horses with core or linear lesions of the DDF tendon should not be subjected to palmar or plantar...
Manufacture addresses

1. Hallmarq Veterinary Imaging Ltd, Surrey, United Kingdom.
2. Dechra Veterinary Products Ltd, Shrewsbury, United Kingdom.

References