The purpose of this study is to discuss the results of magnetic resonance imaging (MRI) performed in horses in which pain was localised to the foot, but in which a definitive diagnosis could not be reached by other means. Local analgesic techniques included perineural analgesia of the palmar (plantar) digital nerves (immediately proximal to the cartilages of the foot) and the palmar (plantar) nerves (at the base of the proximal sesamoid bones); intra-articular analgesia of the distal interphalangeal (DIP) joint; intrathecal analgesia of the navicular bursa. Radiographic images (a minimum of lateromedial, dorsoproximal-palmarodistal oblique and palmaroproximal-palmarodistal oblique views and often dorsopalmar and flexed oblique views of the interphalangeal joints and palmar processes of the distal phalanx) were examined. Scintigraphic images (vascular, pool and bone phase images; dorsal, lateral and solar views) were analysed both subjectively and objectively using region of interest (ROI) analysis. The results of ultrasonographic examination of the palmar aspect of the pastern, the dorsal aspects of the coronary band region, and images of the foot obtained via the bulbs of the heel and the frog were reviewed.

The pastern region and both front (or hind) feet of all horses were examined using a human extremity radiofrequency coil, with the feet positioned in the isocentre of a short-bore, flared-end 1.5 Tesla GE Signa Echospeed magnet. Sagittal, dorsal and transverse MR views were obtained using three dimensional (3D) T1 weighted spoiled gradient echo (SPGR), 3D T2* gradient echo (GRE) and short inversion recovery (fast STIR) or fat saturated 3D T2* GRE sequences, with a slice thickness of 1.5 mm (SPGR and T2*GRE images) or 4 mm (fast STIR).

One hundred and seventy-five horses examined between 01.01.01 and 31.10.03 were included in the study. Many horses had more than one lesion, but generally one lesion was considered the most likely to be the major cause of pain resulting in lameness. Horses classified as having multiple lesions were those in which several structures were damaged, often all on the same side of the foot, and all were thought to have similar significance. Primary deep digital flexor tendon (DDFT) lesions were the most common injury (65 horses), with lesions predominantly localised to either proximal to the navicular bone or at the insertion. Lesion types included core lesions, dorsal border lesions and sagittal plane splits. A further 25 horses had lesions in both the DDFT and the navicular bone, both of which were thought likely to be contributing to lameness. Six horses had primary navicular bone pathology. Twenty-four horses had primary desmitis of a collateral ligament of the DIP joint, with medial injuries predominating. A further 21 horses had collateral desmitis of the DIP joint in conjunction with other injuries. Eleven horses had primary lesions of the distal sesamoidean impar ligament (DSIL), but many horses with insertional injuries of the DDFT also had adhesion formation between the DDFT and the DSIL. Twelve horses had primary lesions in the distal phalanx, either focal or diffuse, and 4 horses had primary DIP joint disease. One horse had primary injury of the middle phalanx. Other lesions included multiple lesions (e.g., medial collateral ligament DIP joint, insertional injury of DDFT and DSIL, medially and medial oblique distal sesamoidean desmitis) (17 horses), straight sesamoidean desmitis (1 horse [also seen as a concurrent abnormality in horses with primary DDF tendonitis]), desmitis of the collateral ligament of the navicular bone (3 horses [also seen as a concurrent abnormality in horses with other primary injuries]). Distension of the navicular bursa was frequently seen in the lame limb only in unilaterally lame horses, whereas distension of the DIP joint capsule, with or without synovial proliferation, was a frequent finding in both lame and non-lame limbs. Osseous cyst-like lesions in the proximal and middle phalanges were seen unilaterally or bilaterally as incidental abnormalities of unlikely clinical significance. Evidence of laminitis was seen concurrent with other injuries in several horses in either the lame or non-lame limb.

Lameness in horses with primary injuries of the navicular bone alone was generally abolished by palmar digital analgesia, whereas lameness in horses with other injuries was either not affected or only improved. Analgesia of the DIP joint often
improved lameness due to navicular bone pathology and DDFT lesions, but had little effect on lameness due to primary CL injuries of the DIP joint. Analgesia of the navicular bursa improved lameness due to navicular bone pathology and in some horses with DDFT injury.

Radiography was relatively insensitive in the diagnosis of some primary injuries of the middle and distal phalanges. Small well-circumscribed radiolucent areas in the distal aspect of the navicular bone separate from the distal border were generally associated with marked fluid accumulation in the distal aspect of the navicular bone. Several horses had significant disruption of the flexor cortex of the navicular bone that was not detectable radiographically. Ultrasonography was relatively insensitive in the detection of lesions of the DDFT. Injury of one of the oblique distal sesamoidean ligaments or a branch of the superficial digital flexor tendon was sometimes identified ultrasonographically and confirmed using MRI, but had not been thought to explain the degree of lameness identified clinically and was invariably accompanied by some other more serious injury detected using MRI. Horses with positive nuclear scintigraphic findings generally had predictable lesions detectable using MRI, but negative findings were not unusual in horse with lameness of more than 3 months duration.