common in horses used for fast galloping disciplines such as racing. It has been previously documented that cracks in the calcified cartilage and underlying subchondral bone are common in animals such as the Thoroughbred racehorse (TBs). A repair mechanism occurs in these animals in which microcracks are healed and sealed by the intrusion of very dense mineralised matrix. In this study we aimed to determine the relationship between the presence of such cracks (and their subsequent repair) with hyaline articular cartilage (HAC) pathology.

Methods: In the present study we examined the 75 palmar/plantar condyles of metacarpus/metatarsus III of 43 race trained TBs euthanased for welfare reasons. Five 2mm thick parasagittal slices were cut from the palmar/plantar quadrant of the condyle. The most abaxial slice was macerated and the morphology of the mineralised tissue at the joint surface was examined by 3D back-scattered electron SEM (BSE SEM). The adjacent B slice was embedded in PMMA, and the resulting block surface polished and studied using combined autofluorescence confocal scanning light microscopy (AFCSLM) and quantitative BSE SEM. Histology of the block surface layer could be obtained by AFCSLM before or after the SEM study. A more axial slice was fixed in 10% formaldehyde, stored in 70% ethanol prior to decalcification and paraffin embedding. Sections (8 μM) were cut and stained with H&E, Safranin-O, Alcian Blue and Massons Trichrome stains.

Results: In a number of cases dense projections were observed extending from cracks at the plane of the articular calcified cartilage (ACC) mineralising front into the HAC. These correlated with highly mineralised projections into the HAC seen by BSE SEM of block face preparations. These projections matched the density of the crack infill material seen in the same study, and in samples from previous studies, and are surrounded by normal healthy looking HAC with the cartilage being cleaved to provide the space. These mineralised projections could extend up to half to two-thirds through the thickness of the HAC, and in all cases were associated with focal HAC fibrillation directly overlying their site. These mineralised projections were visualised using AFCSLM and SEM, but were not identified on any section using conventional paraffin embedded decalcified sections.