

MICROSTRUCTURAL CHARACTERISATION OF ARTICULAR CALCIFIED CARTILAGE AT FRACTURE PREDISPOSITION SITES USING SPECULAR REFLECTANCE FOURIER TRANSFORM INFRARED MICROSCOPY AND DISCRIMINANT ANALYSIS

Catherine L. Nicholson^{1,2*}, Mark R. Waterland¹, Elwyn C. Firth³, Geoffrey Jones¹ and Siva Ganesh⁴

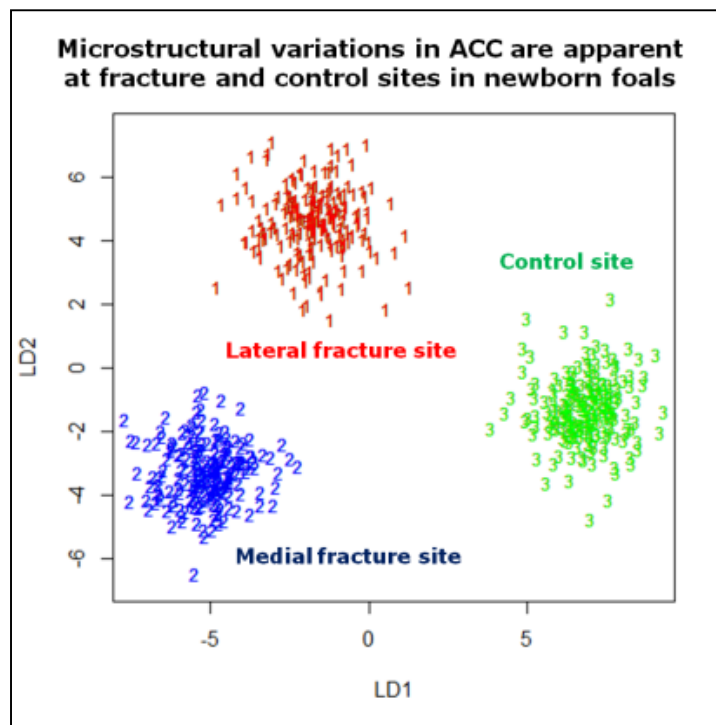
¹*Institute of Fundamental Sciences, Massey University, Palmerston North, New Zealand*

²*BRANZ, Private Bag 50 908, Porirua, New Zealand*

³*Department of Exercise Sciences, University of Auckland, Auckland, New Zealand*

⁴*Agresearch Limited, Grasslands Research Centre, Palmerston North, New Zealand*

Email: c.nicholson1@massey.ac.nz



The locations of fracture predisposition sites are well established in the Thoroughbred racehorse. The purpose of this study was to compare the microstructure of articular calcified cartilage (ACC) at a particular fracture predisposition site and an adjacent control site in newborns and young, clinically healthy subjects. Specular reflectance Fourier transform infrared (SR FTIR) microscopy was used to characterise third metatarsal bone samples from 30 young Thoroughbred horses, with the resulting data examined using discriminant analysis.

There were inherent differences in the microstructure of ACC at fracture predisposition and control sites, apparently from birth. Thus, there may be a chemical basis for fracture predisposition, irrespective of athletic activity. Following the unexpected discovery of cartilage defects in clinically normal age-matched animals, marked microstructural variations between some horses were also observed, potentially enabling individuals with abnormal bone microstructure to be identified long before such defects become clinically evident.