NEW RESEARCH PROJECTS COMMENCING IN 2015

Professor Peter Clegg **University of Liverpool**

Post-Natal Development of the tendon inter-fascicular matrix for long-term tendon health

How do tendons develop their function from birth to adulthood?

Tendon injuries remain one of the most common problems in the Thoroughbred horse; however, how tendons function and how they become injured are both poorly understood. Tendons, which are particularly prone to injury, are highly loaded during use and have to be stretchy to make locomotion more efficient. The mechanism by which such tendons work to allow stretching and recoil during locomotion has recently been discovered. It has also been shown that tendons develop this specific ability to stretch and recoil after birth, and this specialist property is fully developed by 2 years old. The study will look at developing tendons to fully understand the process by which a key tendon develops its unique properties which are vital for orthopaedic function.

This opens up exciting opportunities to develop approaches, such as training or conditioning, which can fully optimise tendon quality to maximise orthopaedic health through life, ultimately reducing the incidence of tendon injuries.

Dr Debra Elton **Animal Health Trust**

Prediction of antigenic drift in equine influenza viruses

Is it possible to identify equine influenza strains that will cause problems in the future?

Influenza viruses gradually change their surface proteins, enabling them to escape host antibodies induced by previous infections. This process of antigenic drift means that viruses used in vaccines must be updated regularly. The World Organisation for Animal Health (OIE) recommends suitable strains for equine influenza vaccines, which are reviewed annually. It takes 3-4 years for manufacturers to update their products, but there are no predictive methods in place to allow for this delay and changes to recommendations tend to be conservative. To improve selection of vaccine strains, traditional techniques will be combined with new technology to attempt to predict future antigenic changes. Mutations will be made in current OIE viruses to measure their effect on antibody recognition; viruses will also be grown under selective pressure in the presence of horse antibodies to determine which changes occur. Longer term, these methods will be applied to recent viruses to predict future variants.

Dr Nicola Menzies-Gow **Royal Veterinary College**

Blood outgrowth endothelial cells: a novel non-invasive method for studying equine endothelial cell biology in health and disease

Developing non-invasive methods for studying blood vessel lining cell function

Endothelial cells line every blood vessel and play an important role in maintaining health through regulating blood flow, clotting and inflammation. Alterations in their function are implicated in numerous equine diseases including endotoxaemia, pulmonary inflammation, equine herpes virus

pathogenesis, gastrointestinal disease and laminitis. To date, studying equine endothelial cell function in health and disease has relied on using tissues obtained from euthanased animals, severely limiting the research questions answerable. This project proposes to develop a novel non-invasive method of isolating and culturing equine endothelial cells from the blood, an approach showing promise in human research. If successful, the technique will be used to investigate equine endothelial dysfunction. This methodology will potentially deliver valuable insights into equine endothelial cell biology, facilitating for the first time non-invasive assessment of the effects of disease and direct interventions on the function of these important cells.
Furthermore these cells may have diagnostic and therapeutic application.

Dr Pablo Murcia **University of Glasgow**

Intrinsic barriers to influenza virus infections in the horse

Examination of how viruses counter interferon defence mechanisms

Equine influenza virus (EIV) is an important pathogen of the horse, posing a constant threat to the horse industry. Over the last 51 years, three avian influenza viruses (AIVs) have jumped the species barrier from birds and established in horses. The interferon (IFN) system is one of the first barriers against viruses that allow humans and animals to fight viral infections. Using modern sequencing technologies and powerful cell culture methods the project will analyse how EIV and AIVs counteract the IFN response and identify genes that are important to block viral infections and that are likely to play an important role against the emergence of novel influenza viruses. The project will also assess the risk of emergence of novel, avian-derived equine viruses. As the IFN response is non-specific, the results will be applicable to other equine viruses, likely leading to novel approaches to treat diverse diseases of the horse.

Professor Roger Smith **Royal Veterinary College**

Rationally designing bespoke topical delivery systems for equine therapeutics

Designing new skin delivery systems for administering equine medicines

The delivery of drugs through equine skin is poorly understood and therefore has been mainly limited to application of cooling agents and topical anti-inflammatories. This unique project will exploit emerging state-of-the-art strategies from human medicine to develop scientifically-based drug delivery systems. However, equine skin is structurally different from human and therefore the first phase of the project will explore the fundamental barrier properties of horse skin by measuring diffusion of commonly used drugs into and through the skin. These results will then build a database of the relationship between drug properties (molecular size, solubility, and lipid nature) and their delivery as has been used successfully in developing formulations for human skin. This data will highlight challenging molecules for the second phase of the project, which will concentrate on applying novel methods of enhancing drug delivery to and through the skin including penetration enhancers, liposomes, supersaturation, and microneedles.

Dr Andrew Waller **Animal Health Trust**

Identification of new vaccine targets for the prevention of Streptococcus equi

Using new DNA sequencing techniques to identify the genes required by *S. equi* to cause Strangles

This project will generate invaluable and unprecedented new information on how this bacterium causes disease and identify new targets that can be used to improve vaccines.

Small Projects

	Project Title
Safia Barakzai *Chine House Veterinary Hospital*	Investigation of the effect of unilateral laser ventriculocordectomy on exercising respiratory noise in horses with naturally occurring vocal fold collapse
Dr Alastair Foote *Rossdales Equine Hospital*	Genetic diversity of *Streptococcus zooepidemicus* isolated from Thoroughbred horses with inflammatory airway disease, and correlation with clinical and cytological findings
Dr Gayle Hallowell *University of Nottingham*	Development of a saddle mounted ECG system for documenting fatal dysrhythmias in Thoroughbred racehorses
Dr Rita Jabr *University of Surrey*	Investigation of Potential Biomarkers for Diagnosis of Paroxysmal Atrial Fibrillation in Thoroughbred horses
Dr Mandi de Mestre *Royal Veterinary College*	Development of an ethical, welfare friendly method of oestrus suppression in mares
Andrew McGladdery *Rossdales Equine Hospital*	Assessment of the umbilical cord by Doppler ultrasonography during pregnancy in Thoroughbred mares
Dr Thilo Pfau *Royal Veterinary College*	Improving shock absorption in horses on hard and soft surfaces
Dr Luis Rubio-Martinez *University of Liverpool*	*In--vitro* study of the effects of magnesium sulphate, morphine and mepivacaine on equine joints.