UPDATE on ACTIVITIES
of THE FELINE HEALTH RESEARCH FUND

CURRENT ACTIVITIES

1. **Meetings**

Since our last update in November last year, the Trustees have met in March, June and September and our next meeting is scheduled for the first week of December. The frequency of meetings has increased over time as the workload of the Fund increases. Our meetings are being held by teleconference and this technology is working well and is economical.

2. **Annual Report 2019-2020**

It has been a busy 2019-20 for the Fund and particularly chaotic with the outbreaks of Covid 19 in early 2020. Our 2019-2020 accounts have been approved by our Trustees and audited pro bono by Ms Denise Spurrell. I have included the end of year figures as approved by the Trustees for your information and will forward the auditor's report as soon as we receive it. I would like to thank Denise very much for giving her time so generously to do this for the Fund – the Trustees are grateful for her kind support and professionalism. Financially the year produced a deficit, but we have funded a new project (see details below) from Murdoch University in WA looking at the prevalence of a blood parasite in WA Cats, important in ensuring safety for blood transfusions. Record low interest rates and the cancellation of many cat shows, due to Covid and therefore the opportunity for fundraising were contributing factors to the deficit.

3. **Finances:**

The FHRF assets total $97,200.50 as of 30th June 2020. The end of the year saw a deficit of $9940.93. As reported above this was largely due to record low interest rates and the cancellation of many cat shows, due to Covid. The Trustees decided that due to the increasing costs of research it would be more effective to fund one grant per year of $10000 (a requirement of the ATO to retain our DGR status) rather than 2 grants of $5000 and so one grant was funded in this financial year. Please refer to the attached report.

As previously reported the ATO now require public ancillary funds to complete an Annual Return – this must be lodged by the end of February each year and is part of the ATO process in increasing the accountability of Trust Funds and maintaining our invaluable DGR status. The ACNC has now taken on this function which means only one return needs to be lodged.

4. **Governance.**

As previously reported, the Fund completed a review of the Trust Deed to update this in line with the ATO requirements. The updates have basically increased the number of Trustees from 5 to 7 greatly assisting in the administration of the Fund (in terms of workload), will broaden the skills base of the Trustees (could include a person skilled in marketing and fundraising) and allows for a nominee from the ACF (to continue to foster good relations between the national bodies). In light of the updated Deed Dr Isobel Johnstone was nominated by the ACF and joined our Trustees and we are delighted to have her. The CCCA nominates a representative as a Trustee of the Fund and this position is filled by Ms Bernadette Roberts and we are delighted to have her – Bernadette has been instrumental in getting our website launched and I would like to thank her for her great contribution. Two new Trustees have been sought and Dr Vicki Lomax and Dr Christopher Jensen both from Queensland have been appointed and we welcome them on board. The Trustees have however noted that having potential new Trustees identified is essential for the Fund's ability to continue to operate seamlessly – we are all getting older!!

It is important to note here that the Trustees are directly accountable to the ATO and the ACNC for the operation and management of the Fund and as the complexity of the bureaucracy grows, processes to comply with these statutory requirements need to be developed and reviewed. It is essential we retain our DGR status.

As part of the new Trust Deed, we are currently in the process of reviewing our Governance documents to update them.

5. **Applications.**

A significant amount of the meeting time continues to be taken up with the assessment of applications – a fortunate position for the Fund to now be in. There is a requirement for ancillary funds to distribute $8800 per year. Capital must be retained to generate ongoing interest, and the funding must be issued on merit and spent wisely. It is clear with the number of requests that there is a need to prioritise our funding and a scoring system has been developed and refined. For example – is the project within the scope of the Fund, will the project contribute significantly to the improvement of feline health and welfare, how important an issue is the area being investigated i.e., how many cats will it benefit, how is the grant going to be used and the money allocated, what is the score from the Peer Review Panel, have all the animal ethics requirements been met etc. The costs of research are continuing to increase and in 2019-2020 the Trustees reviewed our grant funding. Previously two grants of $5000 were funded each year in two rounds of applications. It was decided that our funds would be used more effectively if we allocated one grant each year of $10000 (to meet our ATO obligations).

As reported previously, the FHRF is now receiving several grant applications at each funding round. The standard of grant application is very high and the process very rigorous to receive funding. Since our last update we have approved one application for the 2019-2020 financial year.

If there are any special interest areas we are more than happy to be advised of this (aware of the renal interest from our memorial to Helen Menrath, the FIP interest from Governing Council, cardiomyopathy in Birman cats and Abyssinian health from The Abysinnians Cats in Distress Club) and can give projects with this as the subject a priority listing.

6. **Marketing:**

- The new updated website (www.flhrf.org.au) was finally completed and launched last year and Bernadette, Bernadette has taken over the reins of this project. We feel that the new website is much more user friendly and most importantly easier to update and keep current with information. Paypal has been embedded to enable donations online. We would be very interested in receiving your feedback on how you find it so we can make improvements in its usability. Please send comments through to our secretary Helen.
- Information re guidelines for fund raising shows held on our behalf to ensure that we comply with legislation regarding fundraising has been sought and included on our website. As the legislation is different in each State, there are links to the correct information source listed.
- As mentioned above we are currently actively seeking a person with marketing experience to help us with fundraising and promotion – we are approaching Pro Bono to see if there is anyone who can donate some time to this task.
- As already reported, promotional material has been designed – grief cards and brochures available on request. A new advertisement has been designed and is currently being used in show catalogues. We are also advertising with ProBono and Donate Direct Charity Directory - the ad will be adjusted for the different audiences - targeting legacies
- The Trustees will take every opportunity to promote and talk about the Fund's work so please ask us if you would like a presentation
- Thank you as always for all the help provided to the Fund – to the Trustees for all of their work in guiding the Fund's progress, to our Peer Review Panel for all the time spent in assessing our applications and to all of our donors without whom which we would be unable to continue.
- I would like to take this opportunity to wish you all a very Merry Christmas and every happiness in the New Year.
- Please note updated contact details for the Fund.

PROJECTS FUNDED IN 2019-2020

- Determining the prevalence of haemotropic mycoplasmas in Western Australian Cats

  Dr Charlotte Oskam, Murdoch University June 2020

  Haemotropic mycoplasmas (haemoplasmas) are obligate epierythrocytic parasitic bacteria. In cats, haemoplasmosis presents a full suite of clinical signs and is a cause of life-threatening feline infectious anaemia in immunocompromised cats. While fleas have been implicated as the vector arthropod for transmission of haemoplasmas to vertebrate hosts (Barrs et al., 2010), spread of infection has also been shown in cohabited cats, blood exchange through fighting and via blood transfusions (Lappin, M.R., 2014; Sacristán et al., 2019). The emergence of veterinary transfusion medicine has afforded significant advancements in veterinary emergency medicine and critical care. Despite the life-saving intervention that blood transfusion allows, it is not without risk. In addition to immune-mediated reactions, infectious disease secondary to the transmission of blood-borne pathogens, including haemoplasmas (transfusion-transmissible infections, TTI) is of great concern following blood transfusion in recipient cats. As such, feline blood donors should undergo thorough screening for specific infectious agents (Wardrop et al., 2016). An international guideline for feline blood transfusion has been developed in the US and adopted in Europe, which includes a recommendation for screening for haemoplasmas, however the same risks of TTI is currently unknown in Australia. A recent molecular survey (unpublished) of blood donor cats at The Animal Hospital Murdoch University (TAHMU) revealed 6% prevalence for haemotropic mycoplasmas, which has prompted this project to ascertain the prevalence of haemotropic mycoplasmas in WA cats

PREVIOUS STUDIES FUNDED BY FHRF

- The feline urinary microbiome: exploring its influence in feline chronic kidney disease (CKD)

  Associate Professor Mary Thompson, Murdoch University June 2019

  The aim of this project is to characterise the urinary microbiome in cats with chronic kidney disease (CKD). The hypothesis is that cats with CKD will have substantial differences in the numbers and types of bacteria that constitute the microbiome of the bladder in comparison to healthy cats.

  This study is a vital component of a larger case-control study and will be undertaken in two overlapping sections. The first part concerns description of the urine microbiome in 40 healthy cats with the addition of collection and storage of urine collected from 20 cats with CKD (for future microbiome characterisation). This part of the study will be funded independently.

  The second part of the study is the focus of the grant and involves recruitment of a further 10 cats with CKD followed by microbiome analysis of the urine of the total of 30 CKD cats (i.e., from both parts of the study).

  Based on this preliminary data (including the control cases) a power analysis will be conducted to determine the number of additional cases required. The purpose of statistical analysis will be to compare the number and variety of bacterial phyla in the urinary microbiome between healthy cats and cats with CKD.

  This project is likely to impact cats in the longer term. Chronic kidney disease is common in feline practice but understanding of the complications and potential contributors to progression such as subclinical bacteriuria is lacking. Gaining insight into the difference in the bladder microbiome between cats with CKD and healthy cats may allow identification of key interventions that may delay the development and/or slow the progression of feline CKD with potential improvements to quality of life for affected cats. Cats receive a limited diet and may thus be amenable to interventions that alter the urine microbiome, including diet, pharmaceuticals, and even urine microbiome transplant. Additionally, more prudent use of antimicrobials in cats with CKD is a likely sequela to increase knowledge regarding the feline urinary microbiome. It is estimated that the project will take two years to complete.

- Development of a rapid diagnostic method for feline infectious peritonitis
  Dr Seyed Ghorasi, Dr Joanne Connolly, Dr Martin Combs, Dr Randi Rotne, Dr Alison Montgomery Charles Sturt University December 2018
  Feline Infectious Peritonitis (FIP) is a systemic, fatal, viral-induced immune-mediated disease that affects cats globally. The disease is caused by virulent biotypes of feline coronaviruses (FCoV), known as feline infectious peritonitis virus (FIPV). The disease is characterised by fibrinous-granulomatous serositis, often with protein-rich effusions in body cavities, with pyogranulomatous lesions found in several body organs and around blood vessels. Although there are some immunomodulatory therapeutic agents to temporarily dampen clinical signs, there are no treatments that address the underlying problem of viral replication. For cats that develop the disease therefore there is no effective treatment, and it is invariably fatal. Diagnosing the disease quickly is therefore vital for determining prognosis and recommendations e.g., euthanasia. Currently the diagnosis is complex and takes time. This project aims to investigate and develop a rapid diagnostic method for FIP.

- Investigating feline morbillivirus epidemiology in domestic cats in Perth, WA
  Dr Claire Sharp, Murdoch University Dec 2017
  Chronic kidney disease (CKD) is extremely common in cats and is associated with high morbidity and ultimately mortality. It is estimated that CKD is three times more prevalent in aged cats than aged cogs and the basic question of why cats appear to be particularly susceptible remains unanswered. Most recently a newly documented virus feline morbillivirus has been associated with cytopathic (cell killing) effects in culture. It has also been found overseas that there is a possible association of FeMV infection and CKD. This study will investigate whether FeMV infection is associated with CKD in cats in WA.

- Molecular surveillance for haemotropic parasites and bacterial pathogens in cats from Brisbane
- **Ms Telleasha Greay, Murdoch University June 2018**
  This project aims to investigate recently discovered tick-associated bacteria and parasites in cats in Brisbane and will determine the prevalence of these infections in cats. These pathogens are commonly associated with causing immune mediated anaemia and may be present in cats without associated clinical signs initially – if left undiagnosed and untreated they may lead to significant disease. They may also be of significance to cat owners as a zoonosis.

- Duration of antibody response in feline immunodeficiency virus (FIV) vaccinated cats and the resulting impact on FIV testing using point of care kits **Dr Mark Westman University of Sydney May 2017**
  In 2014 FHRF funded a project by the investigator which found that two commercially available FIV antibody kits (Witness and Anigen Rapid) were able to differentiate FIV vaccinated and FIV infected cats. Further work was funded by FHRF in 2015 which investigated this in greater depth and found that false positive results were obtained in some cats for up to six months after their primary vaccination course. The results of this study have recently been published in the Journal of Feline Medicine and Surgery. This project continues this work and looks at whether false positive FIV results can occur using point of care antibody kits in cats that have recently been given an annual FIV vaccination. The hypothesis is that this will not occur with the Witness and Anigen Rapid kits. Other FIV antibody test kits will also be investigated.

- Isolation of the recently discovered feline virus FcaGHV1 in culture **Professor Julia Beatty University of Sydney December 2016**
  In 2014 the investigators identified a novel viral infection Felis catus gammaherpesvirus 1 (FcsGHV1) in domestic cats and this has now been found in 10-16% of cats in Australia, Singapore, USA, and central Europe. Infections in other species with similar viruses have a range of outcomes from asymptomatic infection to fatal diseases such as lymphoma. The investigator's laboratory is looking at the consequences of FcaGHV1, an apparently common feline virus infection, for cat health to determine whether a vaccine needs to be developed. In a previous study funded by FHRF (ongoing) it has been shown that the virus can infect feline lymphocytes. The investigators now aim to grow the virus in culture in the laboratory which preliminary work suggests may be challenging. Isolating the virus and culturing will enable further investigation into the role this virus plays in feline disease.

- **Determination of mefloquine's intrinsic clearance by feline microsomes; could this be a suitable treatment for Feline Infectious Peritonitis (FIP)?** Dr Govendir University of Sydney June 2016

  The overall aim is to investigate some in vitro pharmacokinetic indices of mefloquine specific to cats. Given that clinically normal cats have problems clearing some drugs, e.g., paracetamol, sick cats may have even greater difficulty with hepatic clearance. As such, the aim of this study is to use an in vitro model of feline hepatic metabolism to ascertain whether mefloquine is likely to accumulate in the cat. This information will be used to model a starting dosage and determine whether administration of mefloquine is likely to accumulate in live cats thus assessing its safety. Background: Feline infectious peritonitis is a systemic, fatal, viral-induced immune-mediated disease that affects cats globally. The disease is caused by virulent biotypes of feline coronaviruses (FCoV), known as feline infectious peritonitis virus (FIPV). The disease is characterised by fibrinous-granulomatous serositis, often with protein-rich effusions in body cavities, with pyogranulomatous lesions found in several body organs and around blood vessels. Although there are some immunomodulatory therapeutic agents to temporarily dampen clinical signs, there are no treatments that address the underlying problem of viral replication. Recently, we made a fascinating break-through in identifying that commonly used human antimalarial prophylactics, namely mefloquine and chloroquine, substantially reduced the viral load of FIPV in infected Crandall feline kidney cells without cytotoxic effects. These experiments demonstrated a marked inhibition of the cytopathic effect (CPE) and marked inhibition of viral replication at low mefloquine concentrations, making this compound a strong candidate for further investigation as a potential antiviral therapeutic agent for the cat. As this compound is currently used for malaria prophylaxis, information on the disposition (degree of drug absorption, drug distribution and rate and extent of elimination) is available in people. As the observation that mefloquine inhibits FIPV in vitro is very recent, there are no pharmacokinetic studies on mefloquine in the cat. However careful consideration of the metabolism of medicines proposed for the treatment of cats is required to minimise potential for harm. Some medicines in the cat are known to have issues with hepatic metabolism which results in delayed elimination and consequent toxicity e.g., paracetamol

- **Duration of antibody response in feline immunodeficiency virus (FIV) vaccinated cats and the resulting impact on FIV testing using point-of-care kits**

  Dr Westman University of Sydney December 2015

  Aim: To determine if recent FIV vaccination can impact on FIV testing using point-of-care antibody kits and cause false-positive results

  Background: FIV is an important retrovirus of felids worldwide with persistent lifelong infections capable of causing various states of immune dysfunction (immune hyperactivity or immune suppression), as well as the most common cancer of cats, malignant lymphoma. In cats infected by FIV, the virus can be found in various fluids such as saliva, blood, queen's milk, and cerebrospinal fluid, but is most commonly transmitted between cats by biting. The reported prevalence of FIV in Australia is highly variable, depending on geographic location, socioeconomic status, and housing conditions (especially whether or not outdoor access if available for cats and the cat population density). A 2007 study in Sydney by Norris, Malik and colleagues found a FIV prevalence of 16% amongst adult cats with outdoor access. Since the discovery of FIV in 1986 the mainstay for diagnosis of FIV infection has been antibody detection using cheap, fast, and simple to use point-of-care test kits. Generally, these kits have excellent sensitivity and specificity and reliably diagnose FIV infection in most FIV-infected cats (only exceptions are recently infected cats [<12 weeks since infected] and terminally ill cats with severe immunosuppression]). However, in 2004 a vaccine against FIV was released in Australia which was shown to interfere with antibody testing in FIV-vaccinated cats. FIV-vaccinated cats were shown to produce antibodies to FIV indistinguishable from those produced in response to natural infection, meaning that a positive FIV antibody test result indicated FIV-infection, FIV-vaccination, or both. This diagnostic dilemma is particularly a concern in shelters where an incorrect FIV test result may lead to unnecessary euthanasia. Consequently, FIV diagnostics has shifted towards molecular methods such as nucleic acid testing, which although unaffected by FIV-vaccination status are more expensive (approximately double the price of point-of-care antibody testing) and time-consuming (three days instead of ten minutes). This group recently published seminal research which for the first-time reports that some FIV antibody detection kits are actually able to differentiate antibodies produced in response to FIV vaccination *versus* natural FIV infection.

Around the same time as this work was published, another group in USA (Lappin *et al.* 2015) reported conflicting results. Although there were many flaws in the Lappin *et al.* (2015) study, such as not giving the FIV vaccine in accordance with manufacturer guidelines and not following all animals through the study, it is imperative that the possibility of false-positive FIV results due to recent FIV-vaccination be further examined in order to create guidelines for antibody testing in FIV-vaccinated cats. This proposal is to repeat the Lappin et al. study in Australia with a similar framework but greatly improved study design, methodology and robustness. This will result in a better understanding of the antibody response following FIV vaccination and enable us to refine recommendations for FIV testing if any vaccine induced test interference in the study is observed.

- <u>"Does the recently discovered feline virus, FcaGHV1, cause lymphoma in cats? Identification of the target cell"</u>
  Assoc Professor Julia Beatty and Dr Alicia McLuckie, University of Sydney June 2015.
  The investigators have recently identified a new virus infection of cats *Felis catus* gammaherpesvirus 1 (FcaGHV1) and found that 11.4% of Australian cats are already infected with FcaGHV1. It is now imperative to understand the potential of this new virus to cause disease in Australian cats. They have recently shown that cats infected with FcaGHV1 are three times more likely to be sick than healthy which supports a role for FcaGHV1 in feline diseases. We know that in other species, including humans, viruses similar to FcaGHV1 infect white blood cells called B-cells. These virus-infectedB-cells can become immortalised resulting in the malignant cancer B-cell lymphoma. If FcaGHV1 behaves similarly in cats, we could design better cancer treatments and even a vaccine that might prevent cats from getting some cancers in the first place. The aim of this study is to determine which white blood cells from cats naturally infected with FcaGHV1 contain the virus. These cells are called the "target cells."

- <u>Feline Immunodeficiency Virus (FIV) diagnostic test study, University of Sydney, July 2014</u>
  Dr Mark Westman, A/Prof Jacqueline Norris and Dr Richard Malik have been awarded a grant from the FHRF for their study entitled 'Diagnosis of Feline Immunodeficiency Virus (FIV) – is testing saliva a valid alternative to testing blood?'
  Feline Immunodeficiency Virus (FIV) can cause immune dysfunction and malignant lymphoma in cats. It can be transmitted between cats by biting. A vaccine against FIV was first sold in Australia in late 2004 but its efficacy remains controversial, and it can interfere with serum antibody tests that are used to detect FIV. In 2013, a FIV test was developed using saliva. This study aims to determine if saliva sampling can be used to accurately diagnose FIV infection in cats, regardless of their FIV vaccination status. It is hoped that results from this study will reduce the need for collecting blood from cats for FIV testing while increasing the number of cats that can be screened for FIV.

- <u>Diabetes gene study, University of Sydney, August 2013</u>
  Dr Bianca Haase and A/Prof Julia Beatty have been awarded a grant from the FHRF for their study entitled 'Genetic Investigation of Diabetes in Burmese Cats'
  The aim of this study is to generate whole genome sequence for two well characterised control cats for comparison with sequence data from Burmese cats affected with diabetes. This study could lead to the identification of the causative mutation for diabetes in Burmese cats, enabling genetic testing and facilitating the breeding of healthier cats.

- <u>Diabetes gene study, University of Queensland, April 2013</u>
  Prof Jacquie Rand and Dr Caroline O'Leary have been awarded a grant from the FHRF for their study entitled 'Pilot study – What are the Genetic Loci Associated with Diabetes Mellitus in Australian Burmese Cats?'
  The aim of this study is to identify chromosomal regions and genetic elements associated with diabetes in Burmese cats in Australia. This could lead to improved diagnosis and clinical care for cats, and development of new strategies for diagnosis and prevention of feline diabetes, including improved tools for breeding management for use by cat breeders.

- Diabetes clinical management study, University of Melbourne, April 2013

  Dr Caroline Mansfield, Dr Linda Fleeman and Dr Katie Lott have been awarded a grant from the FHRF for their study entitled 'Evaluating effectiveness of continuous glucose monitoring systems (CGMS) for monitoring glycaemic control in diabetic cats'

  The aim of this study is to determine whether using a sensor device as a continuous glucose monitoring system (CGMS) for diabetic cats will result in a different clinical decision compared with monitoring serum fructosamine or clinical examination findings. A secondary aim is to determine the incidence of acromegaly (cataracts, clubbed paws, broad facial features) in a population of Australian diabetic cats. It is hoped that CGMS will offer a superior method for monitoring diabetic cats that could replace more traditional methods that involve repeated blood testing.

- Haemotropic mycoplasma infection study, University of Sydney, November 2012

  Dr Stuart Fraser, Dr Richard Malik and Dr Angeles Sanchez-Perez have been awarded a grant from the FHRF for their study entitled '*A novel system for diagnosing and monitoring haemotropic mycoplasma infection in cats.*'

  The aim of this study is to develop a new laboratory test that allows the determination of the level of mycoplasma infection in the red blood cells of cats. Haemotropic mycoplasmas (previously termed *Hemobartonella spp*) bind to the surface of red blood cells and are the causative agent of life-threatening feline infectious anaemia. The development of a novel flow cytometric laboratory test for measuring levels of Haemotropic mycoplasmas will be a world-first for Australian researchers in the fields of feline infectious diseases and veterinary laboratory medicine. It is hoped that this new test will significantly improve the timely diagnosis, treatment, and monitoring of this common feline infection.

- Feline leprosy syndrome study, University of Melbourne, August 2012

  Dr Tim Stinear, Dr Carolyn O'Brien, and Dr Janet Fyfe have been awarded a grant from the FHRF for their study entitled '*Investigation into the ecology and epidemiology of an emerging cause of feline leprosy syndrome in Victoria; Mycobacterium species Tarwin.*'

  The aim of this study is to characterize "Feline Leprosy" infections caused by Mycobacterium species Tarwin, including investigations into the ecology and possible environmental reservoir of this bacterial species. The term "Feline Leprosy" describes a condition in which solitary or multiple lumps form in the skin, gum, or external eye tissue of affected cats. These lesions can be initially confused with cancerous lumps, but biopsy and pathological examination reveals the presence of inflammation and bacteria belonging to the Mycobacteria group. These bacteria are related to the causative agents of tuberculosis and leprosy in people. It is envisaged that this study will lead to the development of a PCR test for detecting Mycobacterium species Tarwin in affected cats and their geographical surroundings. It is hoped that these findings may shed light on possible prevention strategies for cat owners.

PRIOR STUDIES FUNDED BY THE FHRF

- Feline herpesvirus-1 (FHV-1) vaccine study, University of Melbourne, March 2014

  Dr Joanne Devlin, Dr Fiona Sansom and Ms Paola Vaz have been awarded a grant from the FHRF for their study entitled 'Feline herpesvirus vaccines and the potential for vaccine recombination'.

  Background information: Herpesviruses are large, double stranded DNA viruses that cause disease in a wide range of animal species. Feline herpesvirus-1 (FHV-1) causes serious respiratory disease in cats worldwide. Veterinary medicine uses attenuated (live) herpesvirus vaccines to help control disease caused by these viruses. These vaccines are used in cats, as well as in horses and production animals (poultry, cattle, pigs).

  In 2012, Dr Devlin's laboratory used high-throughput DNA sequencing to show that recent outbreaks of severe respiratory disease in Australian poultry were due to multiple, natural recombination events between commercial vaccine strains of the herpesvirus infectious laryngotracheitis virus (ILTV). This has never before been shown to occur under field conditions. These events had devastating consequences for animal health and demonstrated that live herpesvirus vaccines can recombine under natural conditions, with subsequent restoration of virulence. These recent findings, reported in *science* in 2012, show that potential recombination events need to be considered for the safe, future use of veterinary herpesvirus vaccines. This requires an understanding of the nature and extent of herpesvirus recombination that occurs naturally in the field.

The aim of this study is to use high-throughput DNA sequencing and PCR techniques to investigate the nature and extent of natural (field) FHV-1 recombination in Australian cats, especially recombination involving live FHV-1 vaccines. To achieve this, the researchers will use an extensive archive of historical and contemporary field isolates of FHV-1. It is anticipated that this study will contribute fundamental knowledge on FHV-1 evolution and pathogenesis and facilitate the safe use of FHV-1 vaccines in the future.

Findings: No evidence of recombination between FHV-1 strains was identified, including recombination between either of the live vaccine strains of FHV-1 that were sequenced. This suggests that field recombination involving FHV-1 vaccines to generate virulent recombinants is unlikely in cats; relative to some herpesvirus in other species we have studied. Although the genomes of the vaccine and field isolates of FHV-1 have a very high degree of similarity, analyses of the genome sequences revealed small genetic differences between the vaccine and field isolates which could be targeted using PCR-based techniques to differentiate field strains and vaccine strains of FHV-1. This could be useful for future epidemiological studies of FHV-1 and for investigating any potential cases of adverse vaccination events where vaccine virus may be suspected of causing disease.

- Hyperthyroidism and environment study, University of Sydney, August 2012

Dr Vanessa Barrs and Dr Julia Beatty have been awarded a grant from the FHRF for their study entitled *'Are common household flame retardants (PBDEs) associated with feline hyperthyroidism?'*

This study aims to compare levels of polybrominated diphenyl ethers (PBDEs) in normal cats with cats that have hyperthyroidism. The aim is to definitively identify whether the introduction of PBDEs into households are linked with cats developing hyperthyroidism. Feline hyperthyroidism emerged as a new disease in the late 1970s. Interestingly, this coincided with the introduction of PBDEs. PBDEs are flame retardants incorporated into household products such as carpets, construction materials and electronic equipment. PBDEs have been implicated as endocrine disruptors and are known to particularly affect thyroid function in humans. If this study finds that PBDEs are not associated with hyperthyroidism in cats, future studies can be directed at other potential causes of hyperthyroidism in cats. Until the cause of feline hyperthyroidism is identified, disease cannot be prevented. This study is now complete and has been submitted for publication Findings: *Contrary to recent reports performed in other countries we did not find any association between PBDEs and feline hyperthyroidism, suggesting that these environmental goitrogens are unlikely to be a cause of feline hyperthyroidism in Australian cats. Problems identified in previous studies including small group sizes, not age-matching the hyperthyroid and non-hyperthyroid cats and not measuring the lipid content in serum samples, were addressed in our study.*

- Hyperthyroidism study, University of Sydney, October 2011

Dr Deepa Gopinath and Dr Max Zuber have been awarded a grant from the FHRF for their study entitled '*Diagnosis of latent (occult) hyperthyroidism in cats using thyroid scintigraphy.*'

One of the aims of this study is to examine the incidence of cats that have previously presented with symptoms of hyperthyroidism (e.g., weight loss and heart problems), that upon testing have normal thyroxine levels but display an increase in thyroid radionuclide uptake during thyroid scintigraphy*. These cats have what is known as 'latent' or 'occult' hyperthyroidism, and without a definitive diagnosis using thyroid scintigraphy they may not have been diagnosed due to lack of evidence. This study also aims to investigate outcomes of treatment for these cats, to determine if the response to treatment is similar to that of hyperthyroid cats with elevated thyroxine levels. This study found that *Thyroid scintigraphy* is a highly valuable diagnostic test for use in cats with clinical signs of hyperthyroidism and reference range thyroxine levels. This study and its findings were presented by Dr Gopinath at the Australian Veterinary Association (AVA) Annual Conference as part of the AVA peer-reviewed abstracts section.*

**Thyroid scintigraphy is a nuclear medicine procedure that uses the selective uptake of administered radionucleotide by thyroid tissue to provide a visual display of functional thyroid tissue.*

- Diabetes study, University of Queensland, September 2011

  Prof Jacquie Rand and colleagues have been awarded a grant from the FHRF for their study entitled '*Developing a reliable DNA resource bank for identifying genetic factors associated with susceptibility of cats to diabetes.*'

  This study has established a 'bank' of samples from 38 diabetic and 91 non-diabetic cats that were over eight years of age to exclude cats with other diseases that may cause diabetes, which develop at an earlier age. Case samples were from specialist feline practices (The Brisbane Cat Clinics) and specialist diabetes clinics (Dr Linda Fleeman, Animal Diabetes Australia, Melbourne; University of Queensland Small Animal Hospital, St Lucia, Brisbane) and Idexx Laboratories. Genomic DNA was extracted from the samples using QIAmp DNA Blood Mini Kit (Qiagen). The bank of genomic DNA samples will be used as a future resource to identify genes that will predict which cats are at high risk for developing feline type 2 diabetes. Early diagnosis in cats would be helped by DNA screening tests that indicate a genetic predisposition to diabetes. If diabetes in predisposed cats is diagnosed early, good blood sugar controls can be achieved by managing these cats with diet alone, which increases the quality of life of cats and owners.

- Permethrin insecticide toxicity treatment study, Murdoch University, Western Australia, April 2011

  Dr Katrina Swindells, Dr Rachel Peacock and colleagues have been awarded a grant from the FHRF for their study entitled '*Evaluation of the use of intravenous lipid for the treatment of permethrin toxicity in cats.*'

  The aim of this study was to determine whether intravenous lipid therapy is a beneficial adjunctive treatment for permethrin toxicity in cats. Permethrin is a type of flea treatment applied to the skin of dogs. When inadvertently used in cats this product may result in toxicity, which manifests as tremors and seizures. Cats are often euthanized due to the financial constraints of the owners. This study found that *that the affected cats that received 20% lipid emulsion therapy had significantly lower clinical signs recorded over time when compared to the control of cats that received saline solution.* In December 2012, Dr Rachel Peacock, Dr Katrina Swindells and colleagues advised the FHRF that they are preparing the results of their study for publication.

- Feline Calicivirus study, University of Melbourne, August 2010

  Ms Natalie Job, Dr Sally Symes and colleagues have been awarded a grant from the FHRF for their study entitled '*Development and validation of a qRT-PCR assay for the detection of feline calicivirus (FCV) in clinical samples.*'

  The aim of the study was to develop and validate a diagnostic laboratory qRT-PCR test for the detection of feline calicivirus in cats. This contagious virus is a major cause of upper respiratory tract disease in cats. It is envisaged that this study will lead to a more reliable diagnostic assay and thus improve the management of cat flu outbreaks by better understanding the pathogenesis and epidemiology of the feline calicivirus infections. In January 2013, Ms Natalie Job, Dr Sally Symes, and colleagues advised the FHRF that they have collected swab samples from cats at different locations over several years. These samples have been tested for feline calicivirus using their newly developed and refined qRT-PCR test for the detection of feline calicivirus. *The interim results of this study indicate that this new qRT-PCR test is far more sensitive than the current RT-PCR diagnostic assay.*

- Invasive Aspergillosis (fungal) infection study, University of Sydney, May 2009

  Dr Vanessa Barrs has been awarded a grant from the FHRF for her study entitled *'Evaluation of a New Diagnostic Test and Therapeutic Monitoring Tool for Invasive Aspergillosis in cats – Serum Galactomannan Detection'*.

  Invasive Aspergillosis (fungal) infection is a rare but aggressive condition that affects the upper respiratory tract of cats, dogs and humans. During the fungal growth cycle, one of the fungal wall components known as Galactomannan may be secreted into the bloodstream. In humans, this antigen has been used as a marker to monitor the infection. One of Dr Barrs Master's students, Dr Whitney used this knowledge to assess the diagnostic value of a serological test to detect levels of serum Galactomannan in the diagnosis and monitoring of anti-fungal therapy in cats with invasive feline upper respiratory aspergillosis. *They found that serum galactomannan testing for detection of these fatal fungal infections in cats is insensitive, in contrast to similar infections in humans – indicating that another type of serological test will need to be found for this type of fatal fungal infection in cats.* Dr Whitney, presented the interim results of this study at the Australian and New Zealand College of Veterinary Scientists, Science Week Conference in mid 2011 and was awarded the Edmund Barton Alumni Medal by the University of Sydney for the best Coursework Masters across the whole of the University in 2012. Dr Whitney with Dr Barrs and their colleagues have published the results of this study in Veterinary Microbiology 162 (1):180-5 in February 2013 (see also Epub ahead of print, Sept 2012).

- Feline Leukaemia Virus Study Stage II, University of Sydney, June 2009

  Dr Julia Beatty was awarded a further grant from the FHRF to extend for her study entitled *'Should Australian cats be vaccinated against feline leukaemia virus (FeLV)? A pilot study of FeLV prevalence using a new methodology. Stage II'*

  Feline leukaemia virus (FeLV) is a significant cause of disease in domestic cats with up to 18 % of pet cats infected worldwide. Some cats that are exposed to the virus make an immune response and eliminate the infection whereas others are unable to fend off the virus and become persistently infected. These persistently infected cats eventually develop FeLV-related diseases including anaemia, immunodeficiency, and lymphoma. The prognosis for FeLV-infected cats is very poor with 85% of persistently infected cats dying within 3.5 years of diagnosis. Fortunately, effective vaccination against FeLV is available however it is not widely practiced in Australia. This is primarily because the threat posed by FeLV to cats in this country is not clear. This Stage II study aims to determine the prevalence of FeLV infection among 180 young cats (less than one year old) of unknown retroviral status that are undergoing routine veterinary treatment at local veterinary clinics in Sydney. This study builds on the first stage of this project that looked at FeLV prevalence in 90 cats with anaemia or lymphoma that had presented to the Valentine Charlton Cat Centre (see FHRF Prior studies, 2007). Dr Beatty and her colleagues have published the results of their studies in Journal of Feline Medicine and Surgery 13(10):772-5 in October 2011.

- Feline Leukaemia Virus study, University of Sydney, April 2007

  Dr Julia Beatty was awarded a grant from the FHRF for her study entitled 'Should Australian cats be vaccinated against feline leukaemia virus (FeLV)? A pilot study of FeLV prevalence using a new methodology'.

  This pilot study tested the prevalence of FeLV infection among high-risk cats at the Charlton Valentine Cat Centre, University of Sydney, using a number of laboratory methods including a new, more sensitive method. The result of this collaborative work is expected to provide a solid foundation on which to base FeLV vaccination policies for Australian cats.

- Investigations into glomerular disease in young, related Abyssinians, University of Sydney, April 2007

  Dr Joanna White and Dr Jacqueline Norris have been awarded a grant from the FHRF for their study entitled 'Investigations into glomerular disease in young, related Abyssinians'.

  This study used advanced techniques (immunohistochemistry and electron microscopy) to characterize the histopathological features of a rare kidney disease in young, related Abyssinian cats so that treatment and prevention strategies can be developed. Dr White and Dr Norris have been concerned that this disease may be under-recognised by veterinarians or cat owners or may be misdiagnosed as renal amyloidosis. During the course of their study, Dr White and Dr Norris have published the clinical features of these cats (White et al, Journal Feline Medicine and Surgery 10(3): 219-229). At present (May 2009), the authors are preparing a manuscript for publication in a peer-reviewed journal describing the detailed histology of the kidney pathology that was found in the FHRF-funded study. This should aid veterinarians in the diagnosis and thus early treatment of the disease.

PRIOR STUDIES – NO FUNDING

Osteoporosis study

When working at the University of Melbourne, Dr Linda Abraham and Dr Sue Bennett asked for assistance with the collection of urine samples and bone density measurements from cats 6-year-old or older. These studies aimed to help answer whether cats are likely to develop weak bones when suffering from age-onset conditions such as hyperthyroidism or chronic renal failure.

Hypokalaemic Myopathy in Burmese cats, University of Sydney

Previously, Dr Richard Malik has requested help with blood samples from Burmese cats affected or related to cats with Hypokalaemic Myopathy. This study is part of an international collaboration that aims to identify the rogue gene responsible for cats that develop episodes of blood weakness due to low blood potassium.

Feline Behaviour study, East Chatswood Cat Clinic, NSW

As part of her interest in cat behavior, Dr Kim Kendall contacted the FHRF for help with conducting some research into feline behavior. Dr Kendall and Dr Jacqui Ley completed their studies and presented their results at the International Veterinary Behavior Meeting in Italy in June 2007. Dr Kendall would like to thank the supporters of the FHRF for their participation in the research survey. Thank you very much! Dr Kendall and Dr Ley are both Members of the Australian College of Veterinary Scientists in Animal Behavior, so are Veterinary Behaviorists.