

Diagnosis of non-effusive FIP just got easier.

By Diane D. Addie

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🐾 Non-effusive FIP diagnosis by painful biopsy is a now thing of the past.

Over the years I've been distressed to hear about cats with suspected feline infectious peritonitis (FIP) being put through invasive and painful biopsy procedures, but this was the only way to diagnose non-effusive (dry) FIP with any certainty in a living animal. I have had a Tru-cut biopsy myself – they are about the thickness of a pencil - and the one I had was excruciatingly painful, therefore I cringed to hear that such biopsies were being taken from tiny little cats, and often from the kidneys. How painful and stressful those procedures must have been! However, the best way to ensure treatment success is to be certain that one is treating the correct disease: **treating for FIP if the cat does not have FIP can have fatal consequences**, which is why such biopsies were previously necessary.



🐾 Enlarged mesenteric lymph node (MLN) biopsy reports often only say non-specific pyogranulomatous inflammation.

Cats with dry FIP often present with simply an enlarged mesenteric lymph node (MLN) and the node is often removed and sent to a pathologist, but frequently the pathologists can only say that there is pyogranulomatous inflammation, and from there they recommend extra stains to try to establish if the cause is FIP, mycobacteria, or something else. All this generally takes weeks to perform, while time is ticking away for the cat.

🐾 We thought – what if you did FCoV RT-qPCR on a fine needle aspirate (FNA) from the mesenteric lymph node – would that be diagnostic of FIP?

At **Glasgow Veterinary School** we have a diagnostic laboratory where we offer a non-effusive FIP profile consisting of FCoV antibody titre, alpha-1 acid glycoprotein (AGP) measurement, and basic haematology and biochemistry: if the profile is negative, we often recommend a toxoplasma antibody test, since toxoplasmosis is one of the conditions most frequently misdiagnosed as FIP. However, when the FIP profile indicates that FIP is a possible diagnosis, we suggest submitting a fine needle aspirate (FNA) from the mesenteric lymph node (MLN) for FCoV RT-qPCR instead of a biopsy: if the result is positive, then we advise beginning treatment with Virbagen Omega and meloxicam immediately.

I had the idea for this test many years ago, and one of our undergraduate vet students, Wendy Kwok, did a summer project on cadavers sent to our post mortem room: her mission was to take FNAs and biopsies from MLNs of cats suspected of FIP, and a control group who clearly did not have FIP: this was to answer the question of whether we'd get enough RNA for a FCoV RT-qPCR test from a FNA, compared with a biopsy. The control group was to see whether cats without FIP might coincidentally be positive for FCoV RNA in the MLN. In the PM room she was supervised by the excellent head veterinary pathology technician Richard Irvine, and in the laboratory, by Dawn Dunbar and Mike McDonald. Pamela Johnston performed histopathology to establish whether the cats really had FIP or not and the whole project was coordinated and supervised by Dr. Libby Graham, who was then Head of Diagnostic Virology.

Dr. Graham obtained funds and ethical permission for the summer project, and, when it was found to be a success, she began to solicit samples from veterinary surgeons in the field, so that we could

obtain statistically significant numbers of samples. The results of our pilot study were encouraging: they showed that although there was some loss of signal using a MLN FNA, compared with a MLN biopsy, we didn't get any false negatives. All this gave Dawn a taste for research and she volunteered to do a PhD in FIP! This was great news for the project since Wendy had to go back to her undergraduate veterinary studies.

🐾 MLN FNA FCoV RT-qPCR was 90% sensitive and 96% specific for diagnosing FIP.

The veterinary surgeons around Glasgow, and from all over the UK, who use VDS as their laboratory are an awesome bunch! For years they have supported the veterinary school and its undergraduates, gently suggesting to their clients who have just lost a pet, that the body be donated for veterinary education and research. FIP is a relatively rare condition and it wouldn't be fair to say that samples flooded in – but in they came and gradually we built up a bank of 20 samples from cats with dry FIP, and 26 samples from cats without FIP. As far as we can tell, given that our numbers are still relatively small, our test is 90% sensitive and 96% specific for non-effusive FIP. We did get two negative results from cats with neurological manifestations of FIP. I was worried that asymptomatic FCoV carrier cats – cats who are healthy, but persistently infected with FCoV – might have positive results, and Dorothy Montgomery and Lesley Nicolson tested stored MLN biopsy samples from two carrier cats: they were both negative.

So at last we can offer a test to diagnose non-effusive FIP with a good degree of certainty, without putting cats through the trauma and risk of a general anaesthetic and exploratory surgery.

This research also lays the groundwork for FIP treatment research: too often journal reviewers claim that cats who recovered from FIP, or who went into remission, didn't really have FIP because there were no post mortem or biopsy results to prove that it was FIP. It is my opinion that one clinical trial of feline interferon omega appeared to give poor results because all of the cats had been biopsied in order to avert this possible charge. (In that study the cats were also given enormous doses of corticosteroids which the authors forgot to reduce the doses of, which further sabotaged the trial since so many cats died of secondary bacterial infections due to immunosuppression.)

From now on, if a cat has had a positive MLN FNA FCoV RT-qPCR test that should be sufficient evidence in a clinical trial for journal reviewers to accept that the cat really did have FIP.



What a relief! NO more stressful biopsy to confirm diagnosis.

🐱 MLN FNA can be sent in a small amount of saline, without ice or even RNA-preservative.

RNA is notoriously fragile: one of our most exciting findings was that it isn't necessary to put the FNA into special RNA-preserving liquid, or to mail it on ice – the samples survived just fine in a small (0.25-0.5ml) amount of saline, in a small plain plastic tube, sent first class post. One sample had even been dried onto a slide and we managed to scrape off the cells and get a positive result from that!

🐱 Conclusion

Cats will still require biopsies to diagnose diseases such as cancer. However, we have developed a test where cats suspected of having non-effusive FIP will no longer have to undergo a stressful biopsy to confirm the diagnosis, prior to commencing treatment. We believe that an earlier and less invasive diagnosis will enhance the cat's chance of a favourable response to treatment. Our paper can be found here: <https://journals.sagepub.com/doi/full/10.1177/1098612X18809165>.



We will continue to amass data to check our sensitivity and specificity results.

🐱 HUGE THANKS!

This work could not have been done without the amazing people who, in spite of their grief, allow samples from their sick or dead cats to be used for research or for teaching veterinary students: this enables research without experimenting on laboratory cats and for that I am IMMENSELY grateful. Such work could not have been done without the many veterinary surgeons who took and parceled up the samples and mailed them, or brought them, to the [University of Glasgow](#). Vets – you ROCK!!!

Although the main contributors to this specific research were authors on the paper, there were many others at [Veterinary Diagnostic Services](#) without whom this work would not have been possible: thank you Ronnie, Kenny, Lynn, Andrea, Leigh, Janet, Maria, Laura, Claire and Karen.

Research is expensive, and I give an enormous thank you to all the people who have donated to the [Angelica Trust for FIP Research](#) on my [catvirus.com](#) website over the past decade. I am immensely grateful to [catvirus subscribers](#) who support me personally, providing an income which enables me to continue my research and publish it. I also thank Maria Bonino for her help and support in memory of her beloved Luca.



🐱 Want to fund more research like this?

You can help support Diane by becoming a [catvirus.com](#) subscriber here: www.catvirus.com/#subscribe and you can donate to her FIP research and leave a memorial for your cat on the [Angelica Memorial Trust](#) page which can be found here: www.catvirus.com/AngelicaMemorialTrust.htm.

American donors can also contribute to the [Luca Fund for FIP Research](#) which is committed to exclusively support research that does NOT use laboratory cats, and does not conduct experimental infection of healthy cats with a deadly virus. Sadly, Maria's experience of acquiring a diagnosis for Luca was traumatic, and from the moment she first heard about the research on the test described in this newsletter she embraced it, and was inspired to help fund future research of this nature.

🐱 Where are they now?

This project gave Dawn a taste for FIP research and she is now working towards a [PhD in FIP](#). Our paper was Dawn's third paper and is published in the [Journal of Feline Medicine and Surgery](#). You can read about Dawn's project here: www.gla.ac.uk/schools/vet/cad/researchprojects/fip/about/

Wendy qualified as a veterinary surgeon and is now working in [the Department of Infectious Diseases and Public Health](#) in the City University of Hong Kong. Her webpage is here: www.cityu.edu.hk/cvmls/en/staff/Staff_WendyKwok.html

Elisabeth (Libby) Graham left Glasgow to take up a post in New Zealand and Dr. Willie Weir took her place as head of diagnostic virology and lead supervisor of Dawn's PhD.

Lesley and *Pamela* are still senior lecturers at Glasgow Veterinary School.

Mike still works in the **Veterinary Diagnostic Laboratory of Glasgow Veterinary School** and *Richard* recently retired.

Dorothy left the veterinary school to work in QCMD.

Elise is a **free-lance endoscopy** (and FIP!) specialist.

Andy specialised in adipose stem cell therapy in **his practice in St Boswell's**, where he makes lame animals walk again.

Diane continues to research feline coronavirus and FIP – pushing for eradication of this dangerous virus. Her website is www.catvirus.com.



Reference

Dunbar D, Kwok W, Graham E, Armitage A, Irvine R, Johnston P, McDonald M, Montgomery D, Nicolson L, Robertson E, Weir W, Addie DD 2018. Diagnosis of non-effusive feline infectious peritonitis by reverse transcriptase quantitative polymerase chain reaction from mesenteric lymph node fine needle aspirates. JFMS published online:

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