

the non-ionic species and this in turn is influenced by the pH and volume of tubular fluid. As a consequence, urine flow and urine pH are important factors in determining the rate of excretion of salicylates, probenacid, other benzoates and many tertiary amines. Thus the use of bicarbonate in sport can influence the elimination of acidic drugs by raising the pH of the urine. Phenobarbitone, which is a weak acid of pKa 7.2 is 8 per cent ionized at pH 7.9, but only 33 per cent ionized

at pH 6.9, and has its urinary clearance markedly enhanced by the alkalization of the urine. Forced alkaline diuresis by an intravenous infusion of sodium bicarbonate in a solution containing saline, fructose, and potassium chloride can be used to accelerate urinary clearance of phenobarbitone in cases of intoxication. It is possible therefore that the misuse of sodium bicarbonate in sport could hinder the detection of drugs in the urine by decreasing their retention time in the body.

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## FELINE INFECTIOUS PERITONITIS : A LIMITED SEROLOGICAL SURVEY

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### Introduction

Feline infectious peritonitis (FIP) was first described as a specific entity by Wolfe and Griesemer (1966) in the United States of America. In the intervening years it has been widely recognised throughout the world including Ireland where its existence was suspected by Hartigan and Wilson (1972) who based their opinion on the clinical and pathological findings observed in a kitten. There has been no further literature reference to FIP in Ireland.

Affected cats, which may vary in age, are usually presented with a history of lethargy, anorexia, swollen abdomen (due to peritoneal effusion), and diarrhoea. The main clinical signs include elevated temperature, depression, anaemia and sometimes diarrhoea.

In recent years considerable advances have been made regarding the physical properties of the casual virus which, on this basis, was demonstrated to resemble members of the Coronaviridae family (Osterhaus, Horzinek and Ellens, 1976; Horzinek, Osterhaus and Ellens, 1977). More recently neutra-

lization and immunofluorescence studies have shown an antigenic relationship between FIP virus and the coronavirus causing transmissible gastroenteritis (TGE) of pigs (Osterhaus, Horzinek and Reynolds, 1977; Reynolds, Garwes and Gaskell, 1977; Witte, Tuch, Dubenkropp and Walther, 1977; Pedersen, Ward and Mengeling, 1978).

As part of a world-wide investigation (Horzinek and Osterhaus, to be published), a serological survey to determine the incidence of serological response to FIP infection was carried out on cats presented at the small animal clinic at the Veterinary College, Dublin.

### Materials and Methods

Thirty serum samples were taken in a random manner from a total of 112 cats during the period January to May, 1978. No case of FIP was diagnosed during this time. The serum samples were recovered from at least 2.0 ml of blood withdrawn from the cephalic vein into clean sterile tubes. Clotting for one hour at 4°C was followed by detaching the

Table 1—Details of Cats Selected for Serological Testing

Patient No.	Age	Sex*	Reason for Presentation	Titre
1	7 months	F	Ovarohysterectomy	< 10
2	6 months	F	Ovarohysterectomy	< 10
3	1.5 years	F	Ovarohysterectomy	< 10
4	9 months	F	Ovarohysterectomy (nasal discharge)	30
5	5.0 years	M	Traumatic eye injury	30
6	2.0 years	F	N.A.D.**	< 10
7	2.0 years	M	Recurrent abscessation and osteomyelitis	30
8	2.0 years	M	Purulent pododermatitis	30
9	3.0 years	F	Ovarohysterectomy	30
10	1.0 years	F	N.A.D. (pregnant)	30
11	6 months	M	Ruptured cornea	30
12	7.0 years	M	Ruptured cornea	>100
13	6 months	F	Fractured femur	< 10
14	9 months	M	Superficial wounds	< 10
15	4.0 years	F	Purulent pododermatitis	< 10
16	2.0 years	F	Ruptured eyeball	< 10
17	6 months	F	Dislocated right hip joint	< 10
18	1.0 year	F	Caesarean hysterotomy	< 10
19	7 months	F	Ovarohysterectomy	< 10
20	1.5 years	M	Osteomyelitis of tarsus	< 10
21	4.0 years	M	Ventral hernia	30
22	4.0 years	F	Ovarohysterectomy	< 10
23	2.0 years	F	Ovarohysterectomy (pregnant)	60
24	1.0 years	M	Fracture (femur)	< 10
25	8 months	F	Ovarohysterectomy	>100
26	10 months	F	Ovarohysterectomy	< 10
27	8 months	M	N.A.D.	< 10
28	6 months	F	Fracture (femur)	< 10
29	1.0 year	M	Castration (nasal discharge)	< 10
30	9.0 years	F	N.A.D.	30

\*F = Female.

M = Male.

\*\*N.A.D. = No Abnormality Detected.

clot from the tube wall with an individual glass rod for each sample and the tubes were then placed in the refrigerator for an overnight period. The separated serum fraction was clarified by centrifugation at 2,500 r.p.m. for 10 minutes, and the supernatant portion then transferred into clean sterile tubes. After being tightly stoppered the tubes were frozen at  $-20^{\circ}\text{C}$  and maintained at that temperature until dispatch to Utrecht.

### Serological Testing Procedure

For the determination of antibody in the cat sera a heterologous, indirect immunofluorescence test (IFT) was employed. The procedure followed was essentially the same as published by Osterhaus *et al.* (1977); instead of TGE virus-infected porcine thyroid cells, however, antigen-containing cells of the porcine PD5 line were dried onto slides, acetone-fixed and incubated with serial dilutions of the cat serum to be tested. Staining was performed by reacting the preparation with a suitable dilution of FITC labelled rabbit anti-feline IgG immunoglobulin. The preparations were examined using an epifluorescence microscope, the reciprocal of the highest dilution showing fluorescence was regarded as the antibody titre.

### Results

Details of age, sex and nature of each patient along with its serological status are given in Table 1 from which it is seen that half of the selected cats were one year old or less. The remaining patients ranged up to 9 years of age.

Although the majority of the titres are not very high they are considered to be coronavirus-specific. Of the animals with titres  $>100$ , patient no. 12 had not been observed to have manifested clinical signs of illness, but in the case of no. 25, the owner reported that the cat had been ill about two months prior to the blood sample being taken. The cat was not, at that time, presented for veterinary examination so that no diagnosis was made.

### Discussion

The results of this limited survey, in revealing that 40% of animals were seropositive, clearly indicate that FIP or a related virus is present in the cat population of Dublin; both the highest titre samples were obtained from animals domiciled within this area. At the time of the swine fever outbreak 20 years ago the number of pigs produced within the city limits was dramatically reduced so that contact between cats and pigs is unlikely. In addition because transmissible gastroenteritis of swine has not been diagnosed in Ireland the titres revealed in the survey are unlikely to represent infections with a non-feline coronavirus.

Although the serological findings indicate the existence of an immune response to a coronavirus antigenically related to that of FIP, no clinical case of the disease has been diagnosed since 1972. In the circumstances, however, veterinary practitioners would be well advised to be on the alert for cases of FIP. Details of the clinical aspects have been described by many investigators, including Colegrove and Parker (1971), and Pedersen (1976).

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