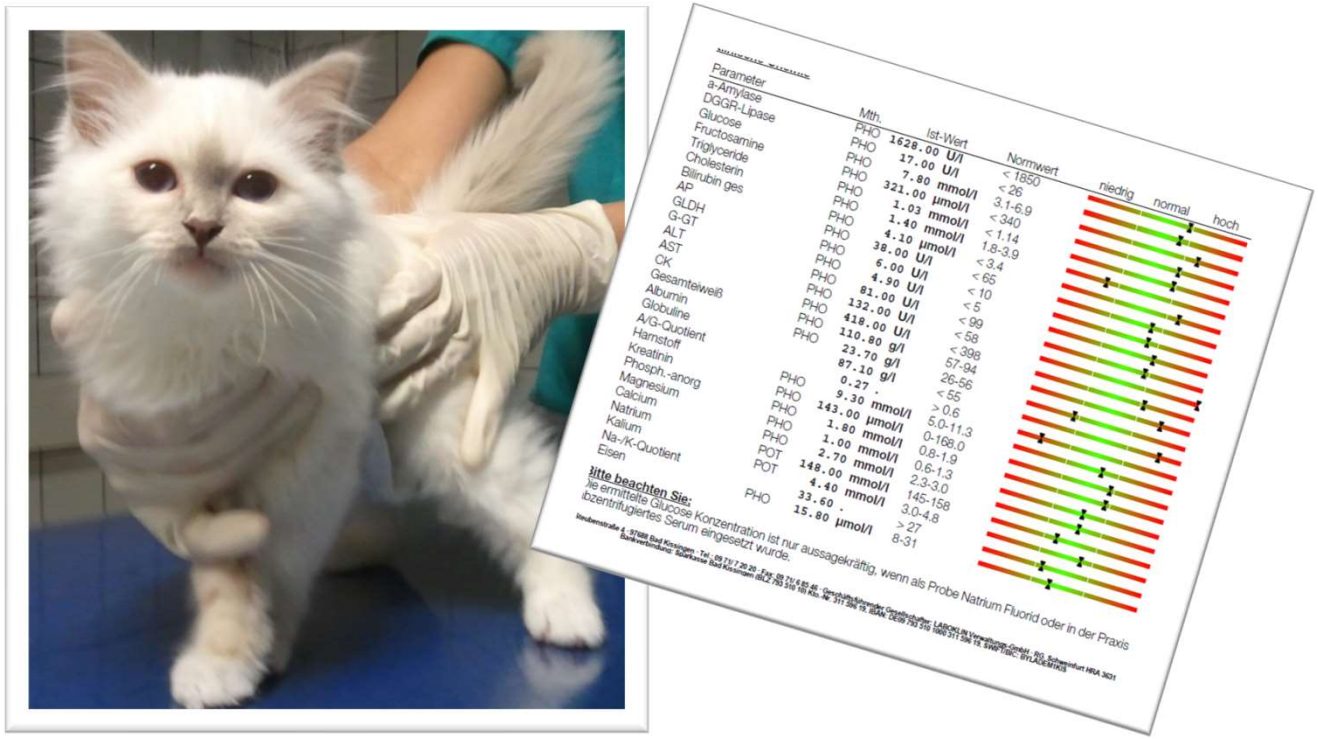
Feline case management: FIP

Short introduction

The puzzle pieces that lead to diagnosing FIP

Suspicion | Signalement | Clinical sings | Blood results



Parameter		Mth.	Ist-Wert	Normwert
a-Amylase		PHO	1628.00 U/l	< 1850
DGGR-Lipase		PHO	17.00 U/l	< 26
Glucose		PHO	7.80 mmol/l	3.1-6.9
Fructosamine		PHO	321.00 µmol/l	< 340
Triglyceride		PHO	1.03 mmol/l	< 1.14
Cholesterin		PHO	1.40 mmol/l	1.8-3.9
Bilirubin ges		PHO	4.10 µmol/l	< 3.4
AP		PHO	38.00 U/l	< 65
GLDH		PHO	6.00 U/l	< 10
G-GT		PHO	4.90 U/l	< 5
ALT		PHO	81.00 U/l	< 99
AST		PHO	132.00 U/l	< 58
CK		PHO	418.00 U/l	< 398
Gesamteiweiß		PHO	110.80 g/l	57-94
Albumin			23.70 g/l	26-56
Globuline			87.10 g/l	< 55
A/G-Quotient		PHO	0.27 .	> 0.6
Harnstoff		PHO	9.30 mmol/l	5.0-11.3
Kreatinin		PHO	143.00 µmol/l	0-168.0
Phosph.-anorg		PHO	1.80 mmol/l	0.8-1.9
Magnesium		PHO	1.00 mmol/l	0.6-1.3
Calcium		POT	2.70 mmol/l	2.3-3.0
Natrium		POT	148.00 mmol/l	145-158
Kalium			4.40 mmol/l	3.0-4.8
Na-/K-Quotient		PHO	33.60 .	> 27
Eisen			15.80 µmol/l	8-31

niedrig normal hoch

Bitte beachten Sie:
Die ermittelte Glucose Konzentration ist nur aussagekräftig, wenn als Probe Natrium Fluorid oder in der Praxis
abzentrifugiertes Serum eingesetzt wurde.

Which cats are affected the most often

- < 2 years of age
- Male
- Pedigree cat / certain families

- Multicat household
- Indoor cats
- Other cats with FIP in direct proximity
- Stress factors: vaccination, spay, rehoming

⇨ There is a genetic predisposition

⇨ Genetic testing ist not available

⇨ Clear breed predispositions do not exist

The most common clinical signs

- Weight loss / failure to thrive
- Fever
- Icterus
- Pale mucous membranes
- Undulating abdomen
- Dyspnoea
- Neurological signs (ataxia, seizures, irritability)
- Uveitis (discoloured iris, intraocular precipitates)

Blood profile

Parameter	Method		Unit	Ref.	low normal high
a-amylase	PHO	1628.00	U/l	< 1850	
DGGR-lipase	PHO	17.00	U/l	< 26	
Glucose	PHO	7.80	mmol/l	3.1-6.9	
Fructosamine	PHO	321.00	µmol/l	< 340	
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AP	PHO	38.00	U/l	< 65	
GLDH	PHO	6.00	U/l	< 10	
G-GT	PHO	4.90	U/l	< 5	
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CK	PHO	418.00	U/l	< 398	
Protein	PHO	110.80	g/l	57-94	
Albumin	PHO	23.70	g/l	26-56	
Globulins		87.10	g/l	< 55	
A/G ratio		0.27	.	> 0.6	
Urea	PHO	9.30	mmol/l	5.0-11.3	
Creatinine	PHO	143.00	µmol/l	0-168.0	
Phosphate	PHO	1.80	mmol/l	0.8-1.9	
Magnesium	PHO	1.00	mmol/l	0.6-1.3	
Calcium	PHO	2.70	mmol/l	2.3-3.0	
Sodium	POT	148.00	mmol/l	145-158	
Potassium	POT	4.40	mmol/l	3.0-4.8	
Na/K-ratio		33.60	.	> 27	
Iron	PHO	15.80	µmol/l	8-31	

Bilirubin ⇧

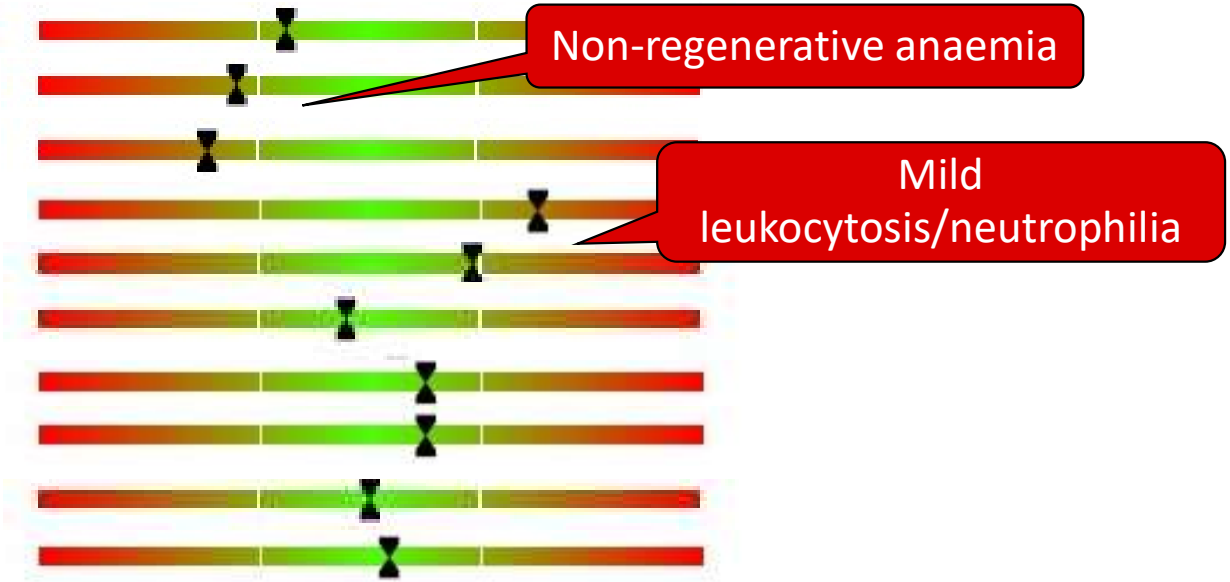
Liver enzymes ⇧

Total protein + globulins ⇧

Albumin ⇩

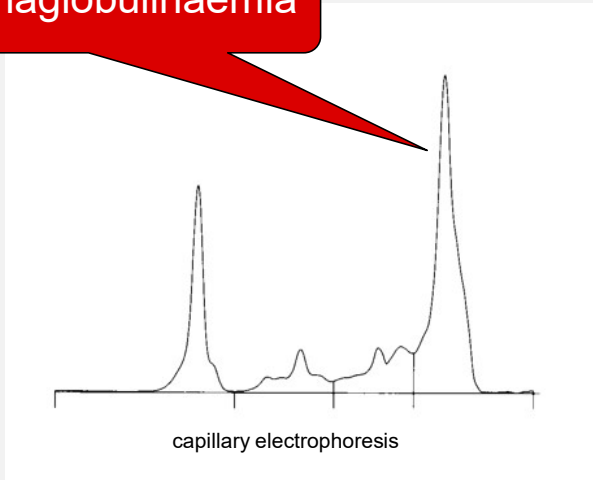
Blood profile

Parameter		Unit	Ref.
Erythrocytes	6.8	T/l	5.0 – 10.0
Haematocrit	0.29	l/l	0.30 – 0.44
Haemoglobin	85	g/l	90 – 150
Leukocytes	12.7	G/l	6.0 – 11.0
Neutrophils	11.0	G/l	3.0 – 11.0
Lymphocytes	1.3	G/l	1.0 – 4.0
Monocytes	0.25	G/l	0.04 – 0.5
Eosinophiles	0.03	G/l	< 0.04
Basophiles	0	G/l	< 0.6
Thrombocytes	344	G/l	180 - 500

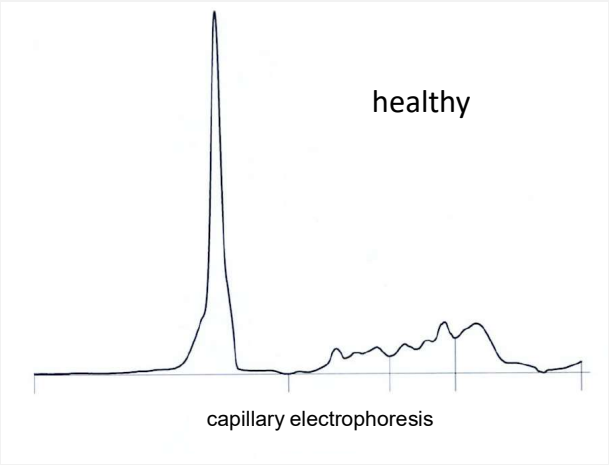


Serum protein electrophoresis

Hypergammaglobulinaemia



capillary electrophoresis



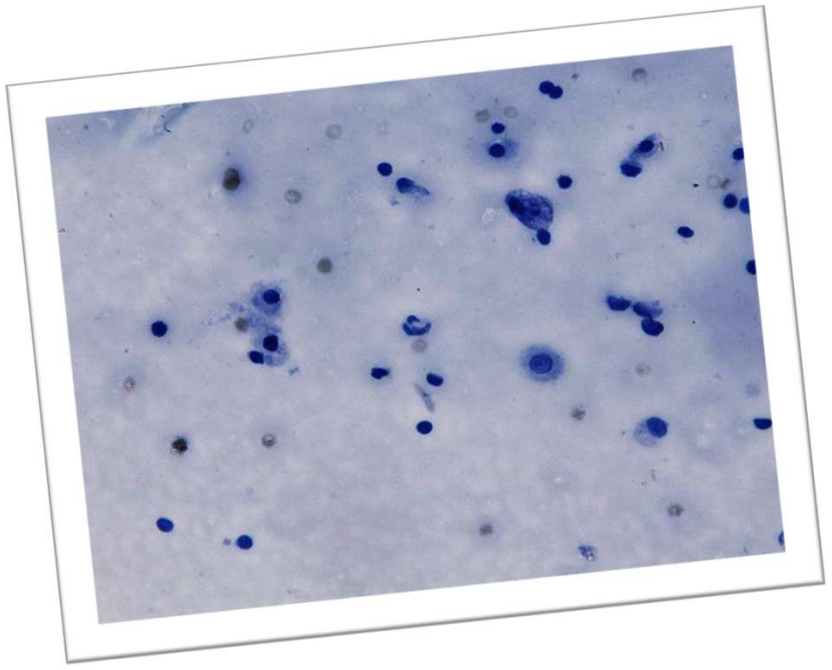
capillary electrophoresis

Albumin/Globulin Ratio (A:G) < 0,4 characteristic
(AG >0,8 uncommon)

Reference for A:G > 0,56

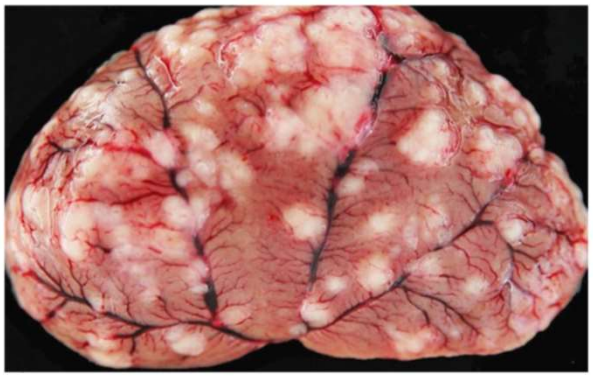
Serum protein electrophoresis may even be helpful if there is no clear hyperglobulinaemia

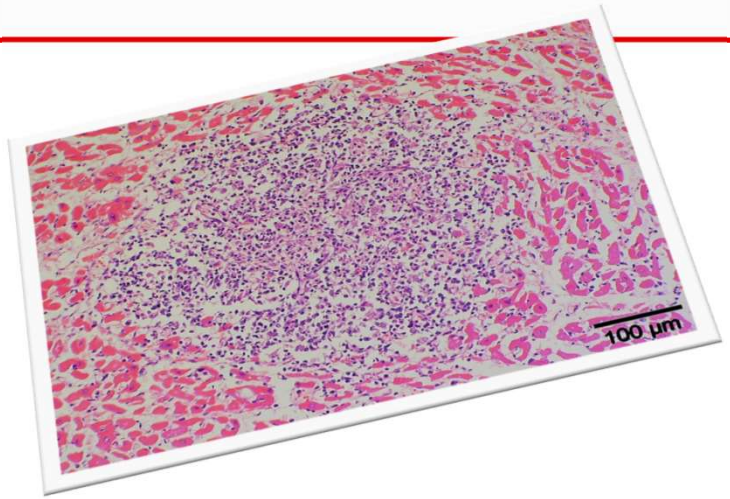
Suspicion	Signalement	Clinical signs	Blood results
Increased suspicion	Abdominal/thoracic fluid analysis	Cytology	Alpha-1-glycoprotein



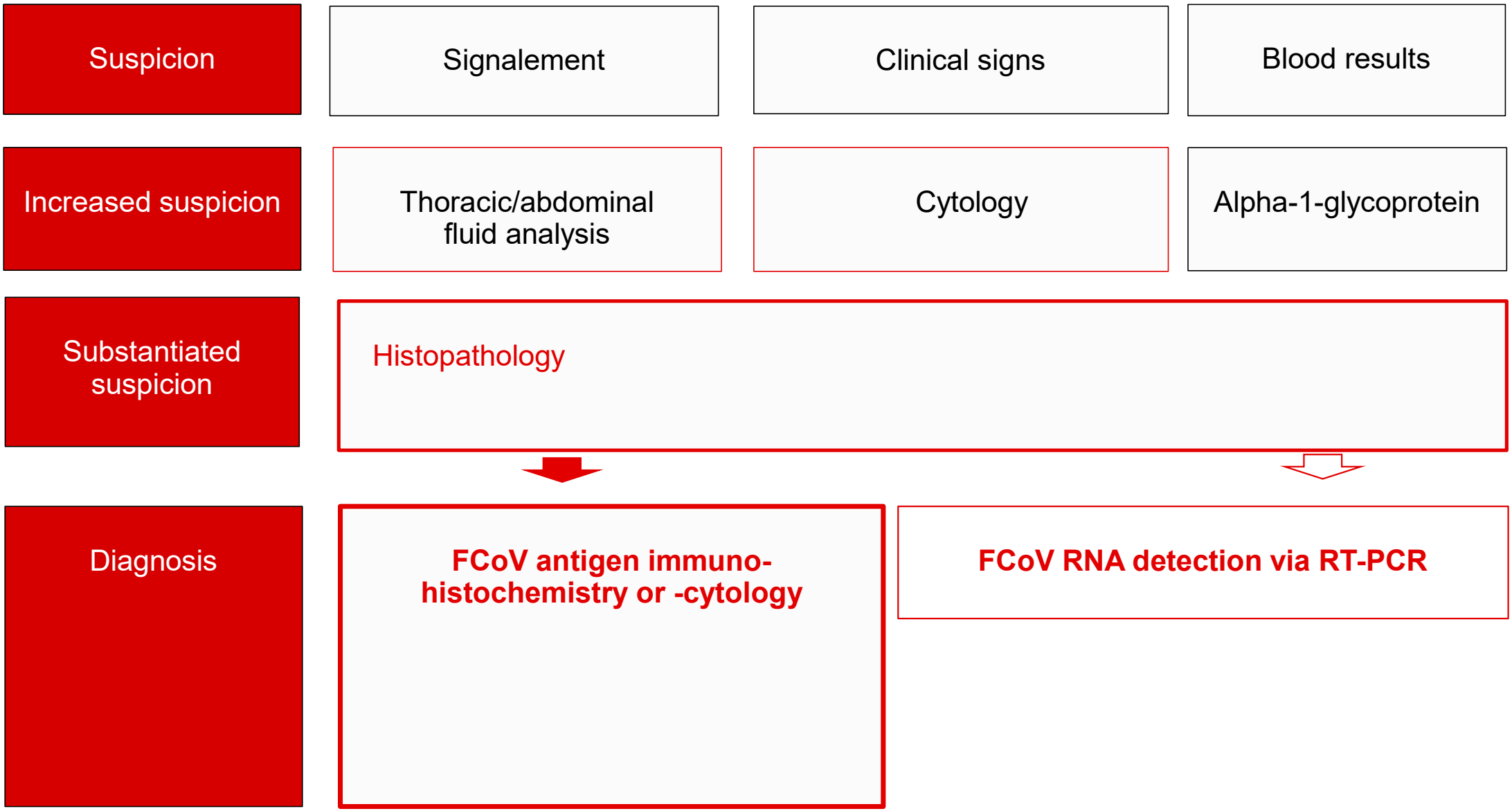
Fotos: PD Dr. Heike Aupperle-Lellbach

Suspicion	Signalement	Clinical signs	Blood results
Increased suspicion	Thoracic/abdominal fluid analysis	Cytology	Alpha-1-glycoprotein
Substantiated suspicion	Histopathology		





Pictures: PD Dr. Heike Aupperle-Lellbach


Suspicion
Signalement
Clinical signs
Blood results
Increased suspicion
Thoracic/abdominal fluid analysis
Cytology
Alpha-1-glycoprotein
Substantiated suspicion
Histopathology
Diagnosis
FCoV antigen immuno-histochemistry or -cytology
FCoV RNA detection via RT-PCR

Three cases to remember

Typical FIP – atypical FIP – look a like?

Case 1: Charlotte

Typical FIP – atypical FIP – look a like?

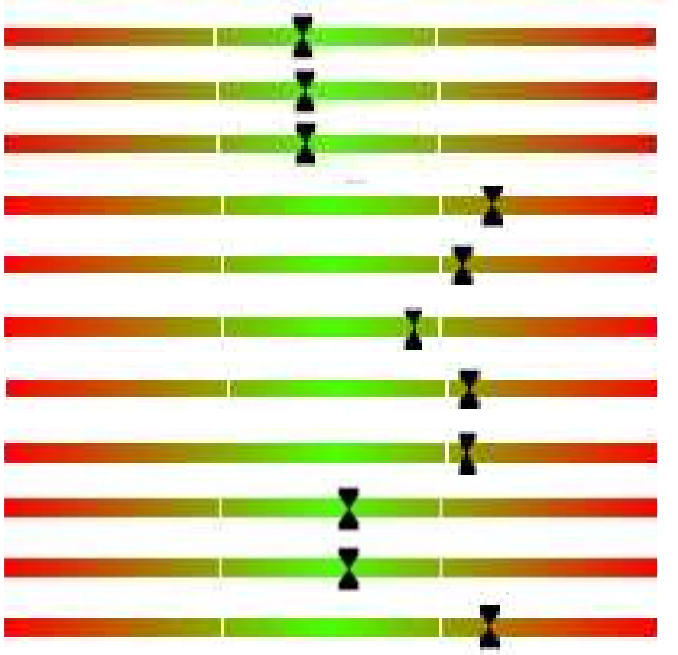
Charlotte – domestic shorthair, female spayed, 9 years, 4.2 kg

- First signs 4 weeks ago: vomiting (at several occasions with some fresh blood)
- Liquid diarrhoea
- Good appetite
- Polydipsia
- Some sneezing and mild nasal discharge since last week
- Today she is reduced
- T: 39.1°C

- Exclusively indoor cat
- No other pets in the household
- Not vaccinated, not dewormed

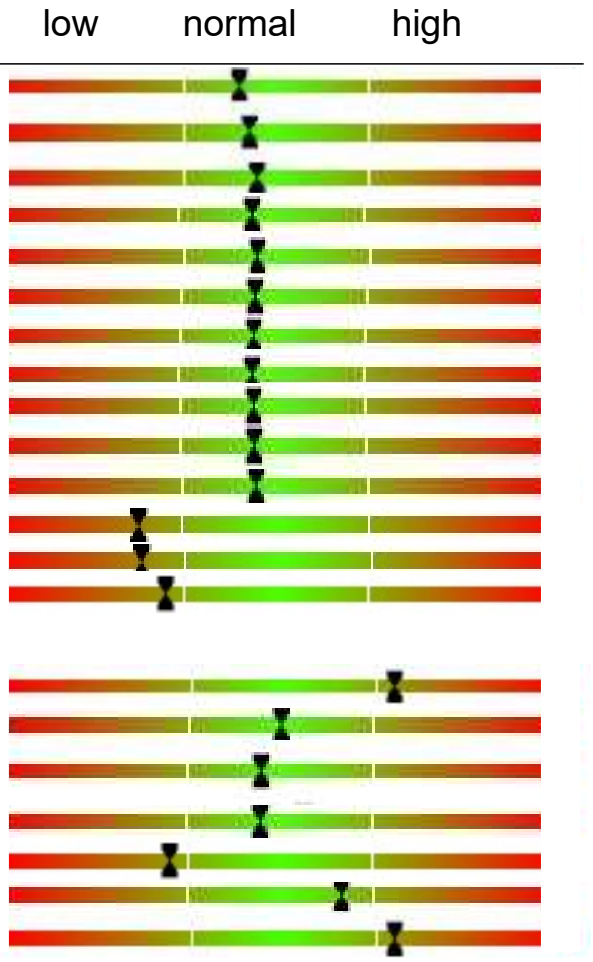
Charlotte – domestic shorthair, female spayed, 9 years, 4.2 kg

			Ref.
Erythrocytes	8.19	T/l	5.0 – 10.0
Haematocrit	0.42	l/l	0.29 – 0.47
Haemoglobin	122	g/l	80 – 170
Leukocytes	19.7	G/l	6.0 – 11.0
Neutrophiles	13.3	G/l	3.0 – 11.0
Lymphocytes	3.5	G/l	1.0 – 4.0
Monocytes	0.8	G/l	0.04 – 0.5
Eosinophils	1.9	G/l	0.04 – 0.6
Basophils	0.0	G/l	0 -0.04
Thrombocytes	388	G/l	180 - 43
Reticulocytes	128	/nl	< 40

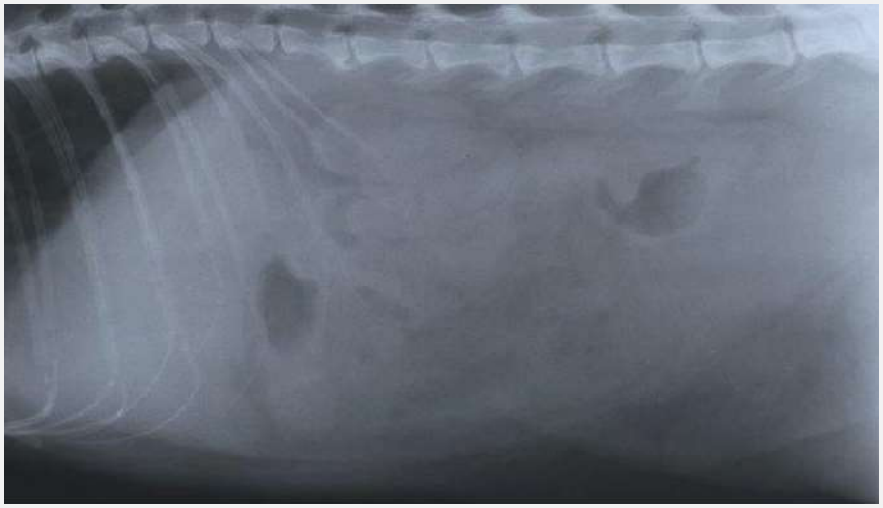


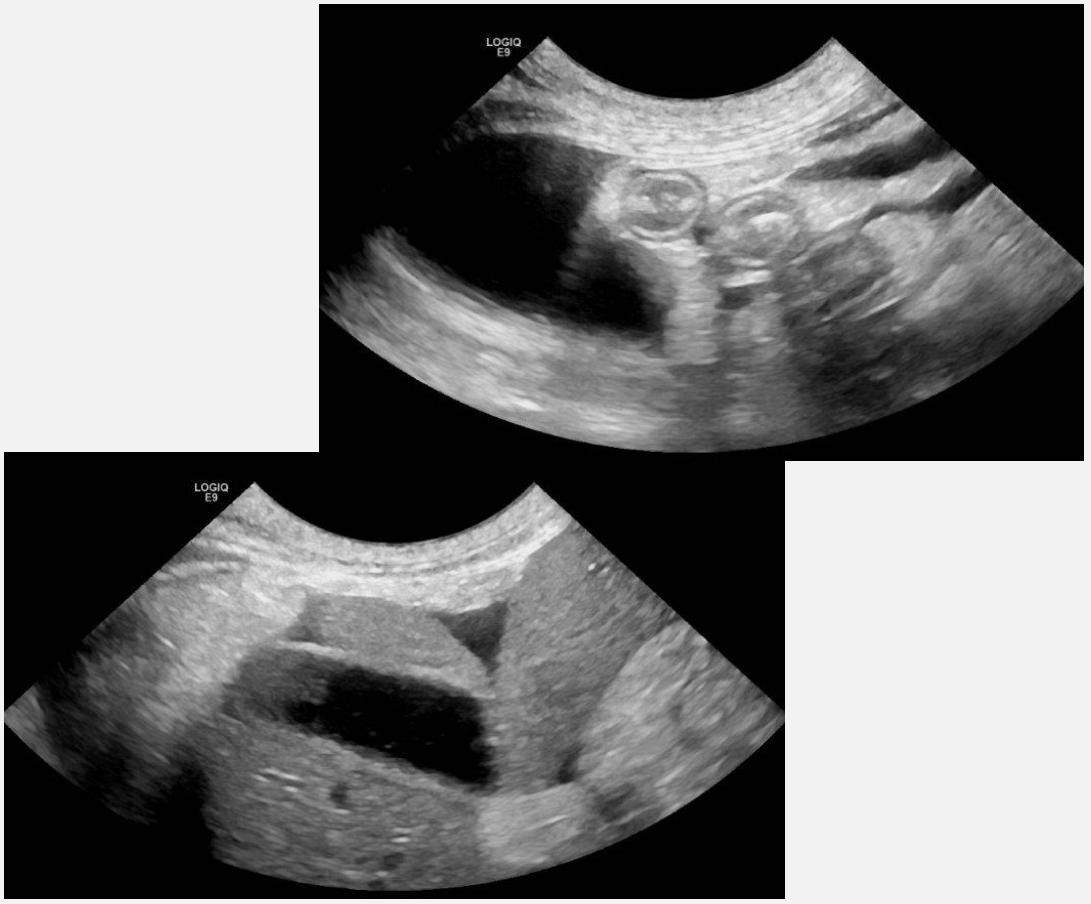
Charlotte – domestic shorthair, female spayed, 9 years, 4.2 kg

			Ref.
DGGR-Lipase	15	U/l	< 26
Glucose	5.28	mmol/l	3.9 – 8.3
Fructosamine	115	mmol/l	< 340
Bilirubin	1.5	umol/l	< 8.55
AP	23	U/l	< 65
GLDH	9.2	U/l	< 11.2
ALT	26	U/l	< 91
AST	44	U/l	< 59
Cholesterol	2.47	mmol/l	1.81 – 3.88
Triglycerides	0.51	mmol/l	0.23 – 1.23
CK	306	U/l	< 247
Protein	36	g/l	65 – 87
Albumin	15.5	g/l	22 – 37
Globulins	20.5	g/l	< 55
A/G-ratio	0.8		
Urea	11.7	umol/l	5.0 -11.4
Creatinine	126.0	umol/l	0 – 168.0
Phosphate	1.33	mmol/l	0.87 – 1.84
Magnesium	0.96	mmol/l	0.6 – 1.3
Calcium	1.87	mmol/l	2.3 – 3.0
Sodium	152	mmol/l	145 – 158
Potassium	5.3	mmol/l	3.4 – 5.0



Charlotte – domestic shorthair, female spayed, 9 years, 4.2 kg





Abdominal fluid analysis

Specific gravity 1006
Protein 0
Cell count 0

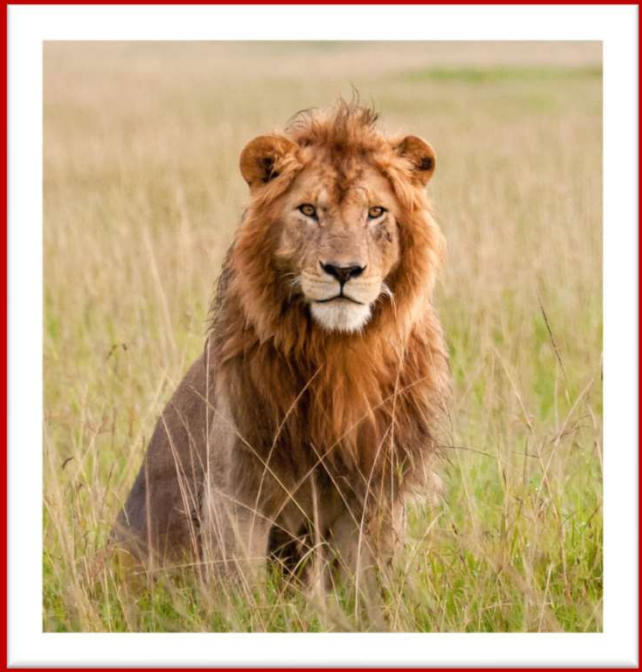
Tasks

1. Take a look at Charlotte`s signalement and history. Which aspects are uncharacteristic for FIP?

2. How do you feel about the blood work – which results would you not expect with FIP?

3. What about the ascites – is this a typical fluid analysis associated with FIP?

Case 2: Bruno



Typical FIP – atypical FIP – look a like?

Bruno – domestic shorthair, male neutered, 1 ½ years

- Imported from Rumania into Germany
- Has always been a slim cat and never put on a lot of weight despite good appetite
- Waxing and waning well-being
- Recurrent fever

→ Referred for FIP diagnostics
→ In the clinic: intestinal adenocarcinoma suspected – CT +/- surgery recommended

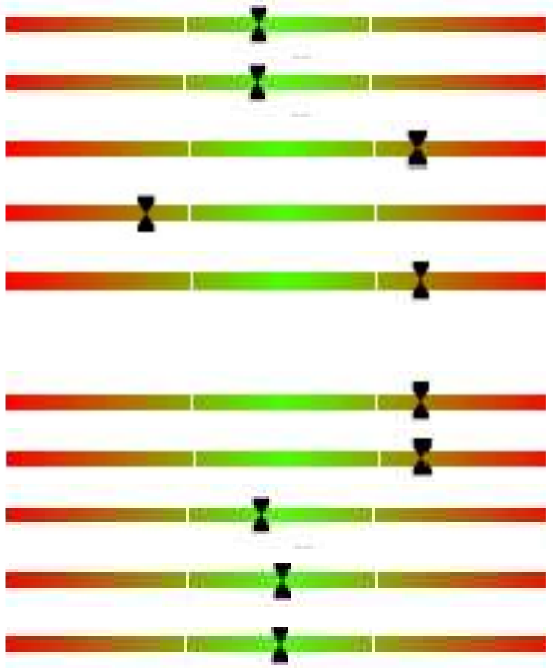
Bruno – domestic shorthair, male neutered, 1 ½ years

Clinical examination

- Alert
- Oval intraabdominal structure palpable
- Body temperature 38,9°C
- Remainder of the clinical examination unremarkable

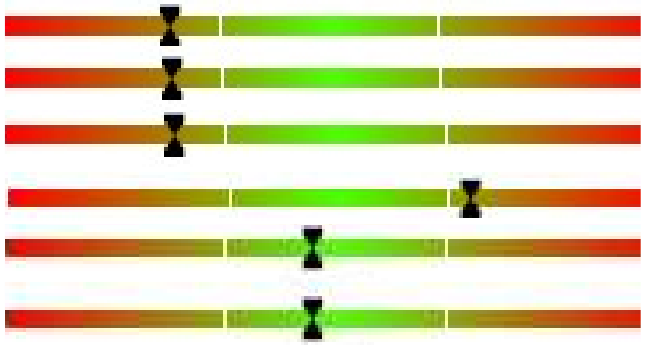
Bruno – domestic shorthair, male neutered, 1 ½ years

			Ref.	low normal high
AP	35	U/l	< 65	
ALT	24	U/l	< 99	
Protein	102	g/l	57 – 94	
Albumin	25	g/l	26 – 56	
Globulins	77	g/l	< 55	
A/G-ratio				
Urea	17.2	umol/l	5.0 -11.3	
Creatinine	270	umol/l	0 – 168.0	
Sodium	155	mmol/l	145 – 158	
Chloride	118	mmol/l	112 – 129	
Potassium	3.7	mmol/l	3.0 – 4.8	



Bruno – domestic shorthair, male neutered, 1 ½ years

			Ref.	low	normal	high
Erythrocytes	4.01	T/l	6.54 – 12.2			
Haematocrit	0.20	l/l	0.30 – 0.52			
Haemoglobin	5.9	mmol/l	9.8 – 16.2			
Leukocytes	13.37	G/l	2.87-17.02			
Thrombocytes	237	G/l	151 - 600			
Reticulocytes	19.2	/nl	3 - 50			



Bruno – domestic shorthair, male neutered, 1 ½ years

FIV Ab	negative	
FeLV Ag	negative	
FCoV Ab	136	[Ref. < 36.6 TE]
L. infantum Ab	negative	
E. canis Ab	negative	
D. immitis Ag	negative	
D. immitis Ab	negative	

Bruno – domestic shorthair, male neutered, 1 ½ years

Serum protein electrophoresis		Ref.
Protein	102	58-87 g/dl
Albumin	21	31-47 g/dl
Alb/glob ratio	0.25	>0.57
Alpha-1 globulins	2.4	2.2-7.6%
Alpha-2 globulins	4.3	5.7-19.9%
Beta-1 globulins	6.4	2.8-11.3%
Beta-2 globulins	7.4	3.1-11.7%
Gamma globulins	59.3	5.9-23.6%

My problem list

- Recurrent pyrexia
- Waxing and waning well-being
- Abdominal mass
- Non-regenerative anaemia - moderate
- Azotaemia – mild
- Hyperproteinaemia/hyperglobulinaemia
  - Alb/Glob 0,3
  - Hypergammaglobulinaemia
- FCoV antibodies markedly increased

1 ½ years, male

Rumania
Vector borne diseases negative
FeLV/FIV negative

Has always been slim

My grouping/sorting of problems

Primary problem/
Clinically relevant/
Easy to work up

Pyrexia

Abdominal mass

Hypergammaglobulinaemia

FCoV Ab positive

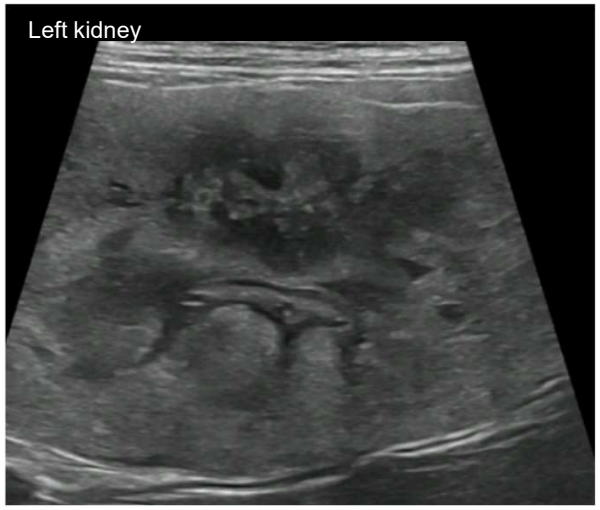
Secondary problem

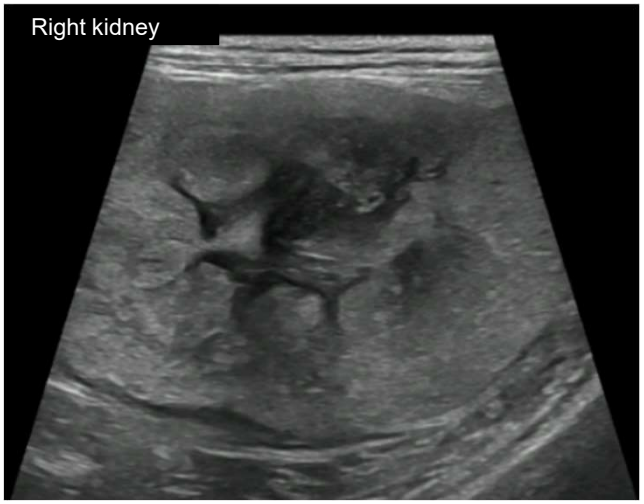
Mild azotaemia

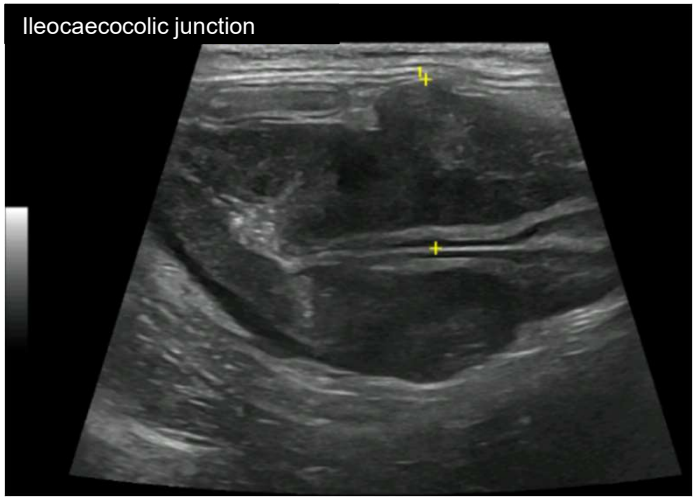
Non-regenerative anaemia

Waxing and waning well-being

Bruno – domestic shorthair, male neutered, 1 ½ years







Diagnostic ultrasound of the abdomen

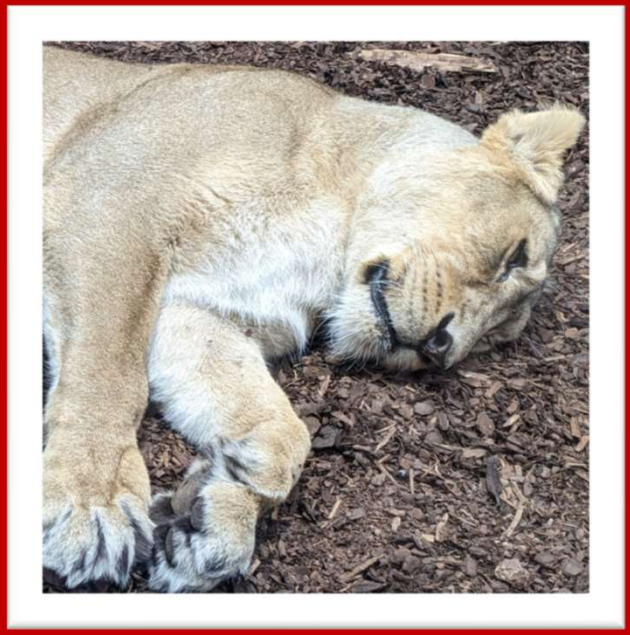
Tasks

1. **Why did I put the FCoV antibodies aside when sorting/grouping the problems?**

2. **Is Bruno`s hypergammaglobulinaemia indicative of FIP?**

3. **How would you interpret the ultrasonographic findings of Bruno`s kidneys?**

Case 3: Rani



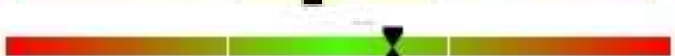
Typical FIP – atypical FIP – look a like?

Rani – Bombay, female spayed, 2 years

- Vomiting once a month for a while
- Two weeks ago some sisal threads have been found in the faeces
- Progressive inappetence since one week
- Weight loss (300 g within one week)
- Less grooming observed

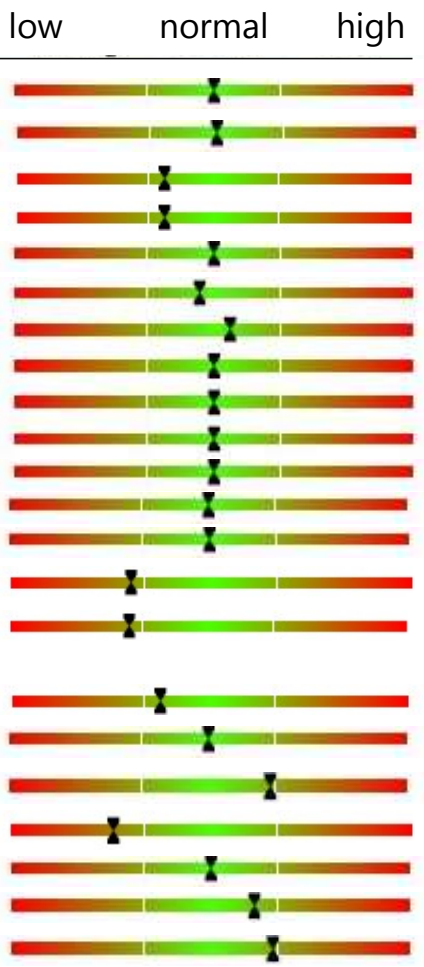
- Sibling living in the same household is healthy

Rani – Bombay, female spayed, 2 years

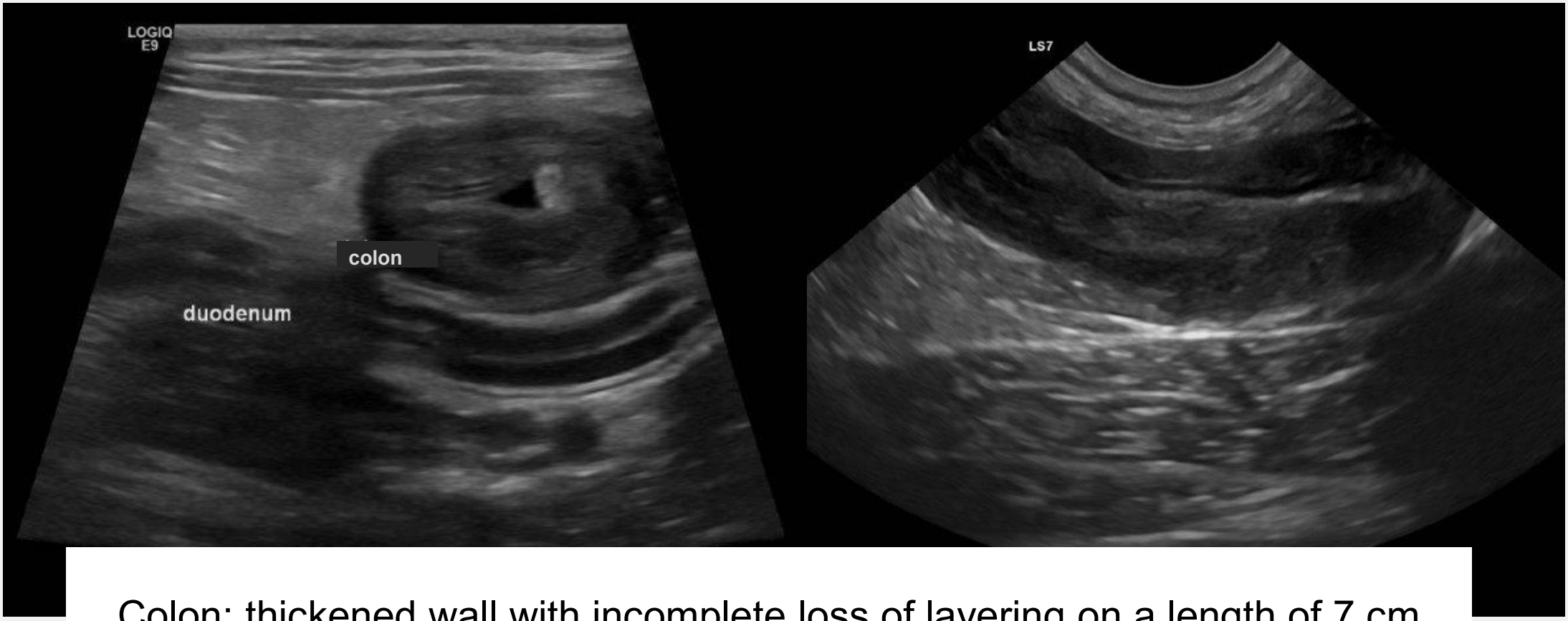
Parameter		Unit	Ref.	low normal high
Erythrocytes	6.8	T/l	5.0 – 10.0	
Haematocrit	0.29	l/l	0.30 – 0.44	
Haemoglobin	85	g/l	90 – 150	
Leukocytes	12.7	G/l	6.0 – 11.0	
Neutrophils	11.0	G/l	3.0 – 11.0	
Lymphocytes	1.3	G/l	1.0 – 4.0	
Monocytes	0.25	G/l	0.04 – 0.5	
Eosinophiles	0.13	G/l	< 0.04	
Basophiles	0	G/l	< 0.6	
Thrombocytes	344	G/l	180 - 500	

Rani – Bombay, female spayed, 2 years

Parameter		Unit	Ref.
Glucose	4.1	mmol/l	3.1 – 6.9
Fructosamines	209	mmol/l	< 340
Triglycerides	0.8	mmol/l	< 1.14
Cholesterol	1.8	mmol/l	1.8 – 3.9
Bilirubin	1.3	umol/l	< 3.4
AP	7	U/l	< 65
GLDH	<1	U/l	< 10
G-GT	<1	U/l	< 5
ALT	20	U/l	< 99
AST	23	U/l	< 58
CK	191	U/l	< 398
Protein	71	g/l	57 – 94
Albumin	24	g/l	26 – 56
Globulines	47	g/l	< 55
A/G ratio	0.52		
Urea	5.2	mmol/l	5.0 -11.3
Creatinin	100	umol/l	0 – 168.0
Anorg. phosphate	1.8	mmol/l	0.8 – 1.9
Calcium	1.6	mmol/l	2.3 – 3.0
Magnesium	1.0	mmol/l	0.6 – 1.3
Sodium	156	mmol/l	145 – 158
Potassium	4.7	mmol/l	3.0 – 4.8

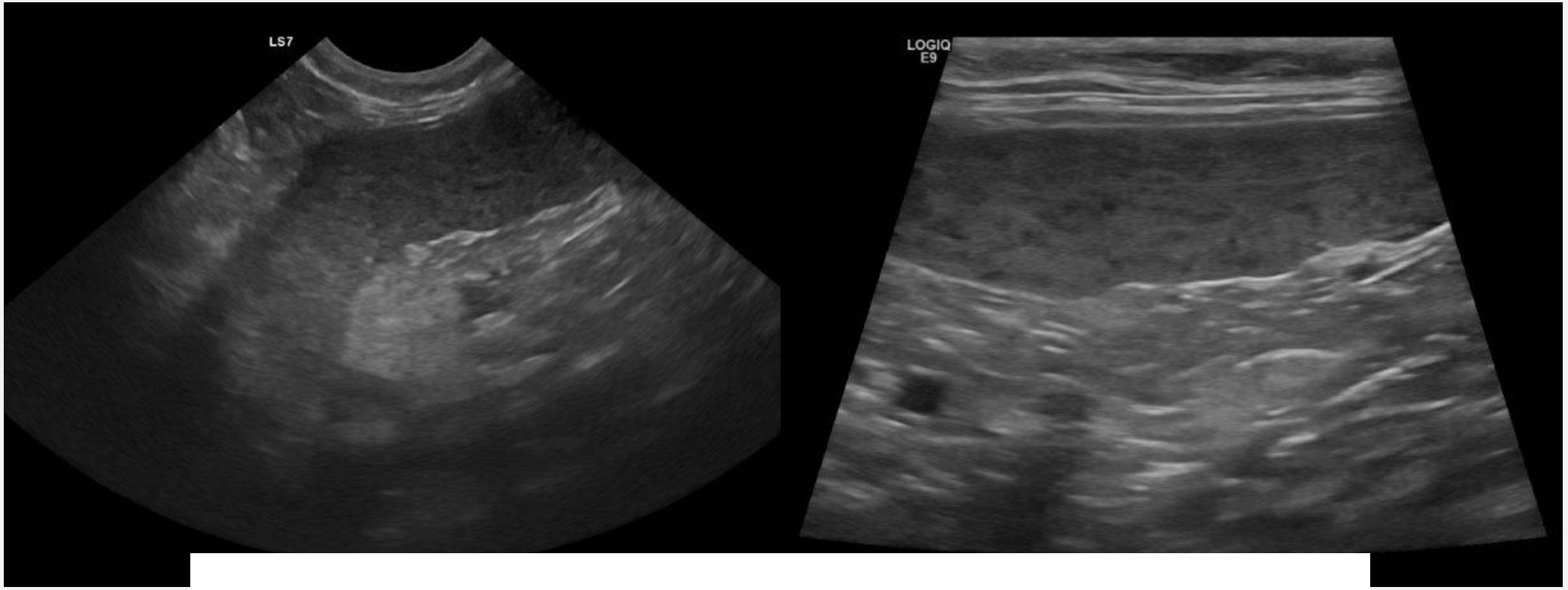


Rani – Bombay, female spayed, 2 years



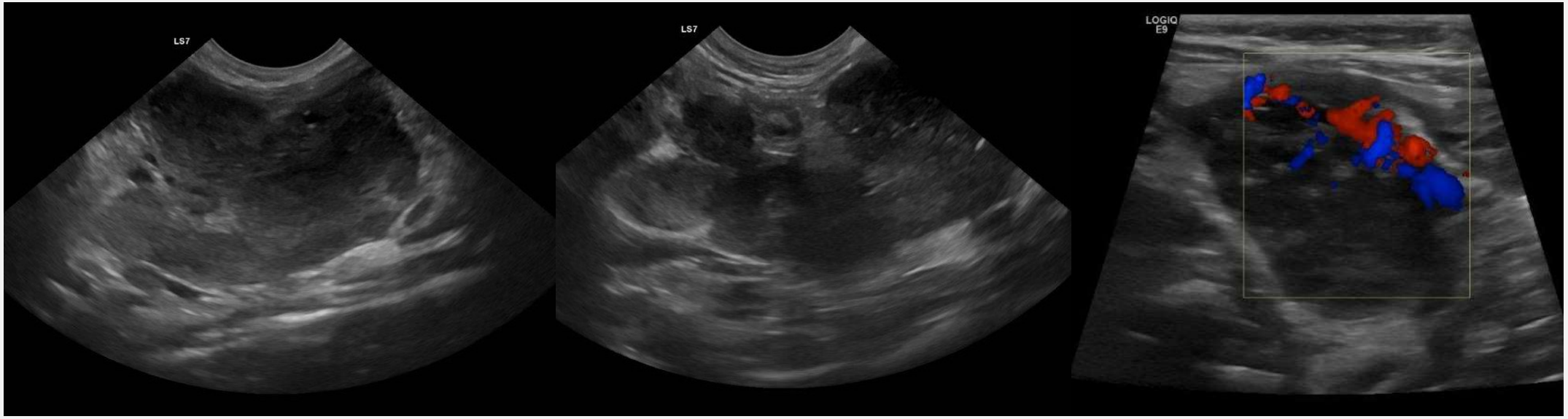
Colon: thickened wall with incomplete loss of layering on a length of 7 cm

Rani – Bombay, female spayed, 2 years



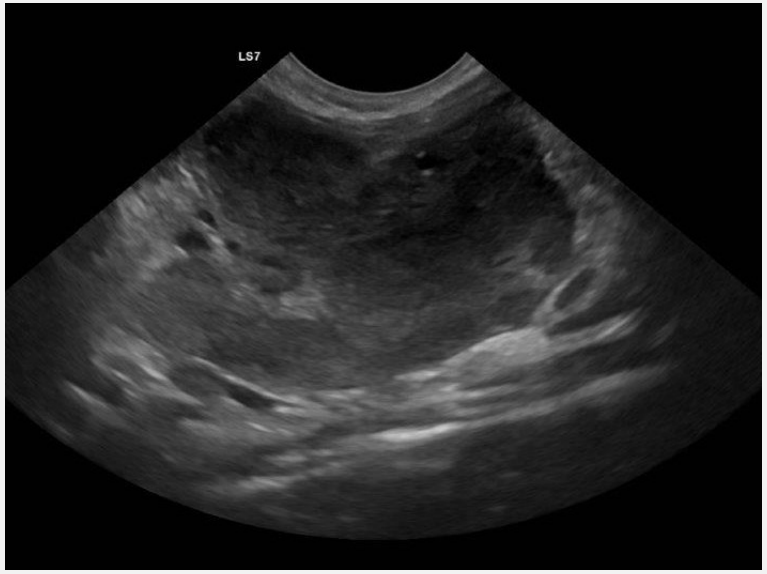
Splenomegaly + multiple hypoechoic lesions

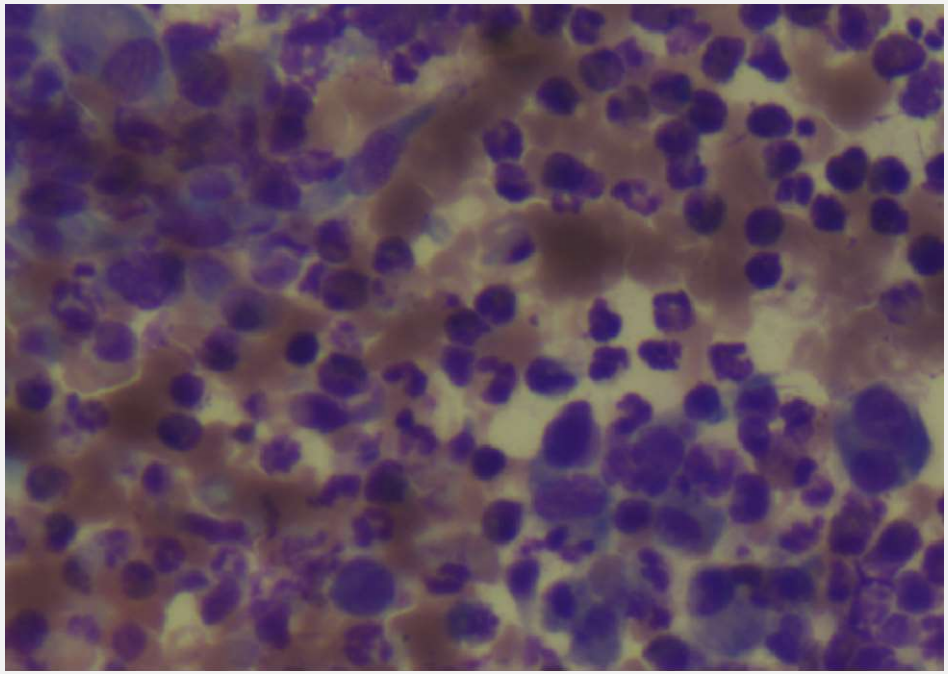
Rani – Bombay, female spayed, 2 years



Mesenteric lymph nodes markedly enlarged, rounded + hypoechoic

Rani – Bombay, female spayed, 2 years

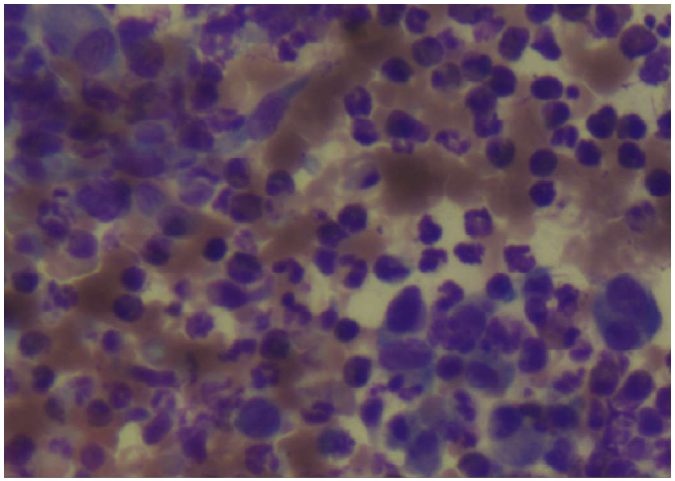




Cytology from one of the mesenteric lymph nodes:

Moderate to marked pyogranulomatious inflammation

Rani – Bombay, female spayed, 2 years



PCR from aspirated lymph node material:

FCoV-RNA real time PCR	positive
Mutation M1058L	negative
Mutation S1060A	negative

Tasks

1. **SAA is increased in Rani –**
   acute phase proteins help with diagnosing FIP?

2. **What kind of cytology result from a lymph node do you expect in FIP?**

2. **Can this be FIP if the FCoV PCR is positive but the PCR for mutation is not?**