

Clinical pathology updates: Pleural and peritoneal fluids - another modified transudate?

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This article outlines the categories into which pleural and peritoneal fluids are placed and presents data from cavity effusions analysed at our laboratory over a four month time period. There are three broad categories of effusion: transudates, exudates and modified transudates. These are 'artificial' categories but they aim to reflect the underlying physiological or pathological processes leading to effusions.

Transudates have low cellularity (<1000/ μ L) and low protein (<25g/L). Causes include decreased serum osmotic pressure, early myocardial insufficiency, portal hypertension, portosystemic shunt and hepatic insufficiency. Transudates form secondary to decreased osmotic pressure if serum albumin is <15g/L unless there is concurrent hypertension (in which case albumin may be higher). It is worth noting that early uroperitoneum will often fall into this category of effusion. History and ancillary fluid analysis (potassium/creatinine) will point to uroperitoneum.

Modified transudates (including chylous effusions Fig. 1) are just that, transudates modified by increased protein, chyle or cells. Protein values may be 25–75g/L, cell counts 1000–7000/ μ L. They reflect leakage of fluid from lymphatics or blood vessels resulting from either increased hydrostatic pressure or increased vascular/lymphatic permeability due to a multiplicity of underlying pathologies including congestive cardiac disease, neoplasia and trauma.

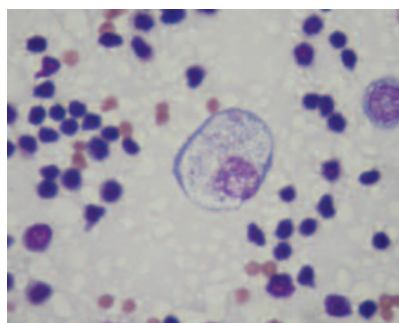


Fig. 1: Reticular background, frothy activated macrophage and predominance of small lymphocytes typical of a chylous effusion.

Exudates usually reflect increased vascular permeability due to the effects of chemotactants secondary to inflammation. Typically protein values are >30g/L and cell counts are >7000/ μ L. The underlying cause is often infectious (bacteria, viruses, protozoa, fungi) but they may reflect inflammation of intra-abdominal organs (e.g. pancreatitis), neoplasia and the effects of irritants (e.g. bile/urine).

Basic fluid analysis (protein, SG, cell counts and cytology) is only a part of the work-up in patients with effusions. In many cases it dramatically reduces the list of differential diagnoses and in many more it provides a rapid diagnosis. The assessment of cholesterol, triglycerides, lactate, LDH, glucose, urea, creatinine, lipase/amylase and bilirubin may allow further differentiation. Table 1 shows the breakdown of pleural and peritoneal fluids in dogs and cats at TDDS over a four-month period.

It may seem to veterinary practitioners that analysis of pleural and peritoneal fluids is rarely definitively diagnostic. Modified transudates (including chylous and haemorrhagic effusions, excluding FIP and neoplastic effusions) in this sample of cases

account for 50% of effusions and may be considered the least specific of the three categories. Exudates (including FIP/septic effusions) and neoplastic effusions (Figs: 2 and 3) combined in this sample of cases account for 41%. Many of these fluid analyses point to a specific diagnosis. Transudates have a narrower range of underlying causes and account for 9%. Granted, these figures represent samples analysed in an external/reference laboratory and it is possible that a degree of selection may have occurred in practice prior to submission of fluid samples, but a high proportion of these fluid analyses resulted in either a specific diagnosis or a very much shortened list of differential diagnoses.

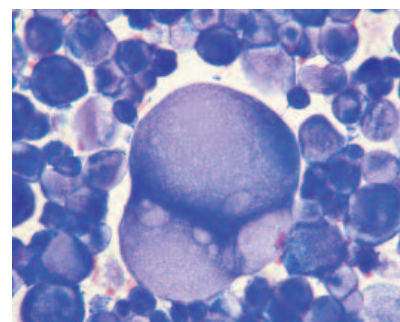


Fig. 2: Highly atypical cohesive cells in pleural fluid from a cat with intrathoracic carcinoma.

TABLE 1: Breakdown of pleural and peritoneal fluids in dogs and cats at TDDS over a four-month period

Classification	Canine Pleural (27)	Feline Pleural (89)	Canine peritoneal (22)	Feline peritoneal (38)
Modified transudate	11	42	9	13
Transudate	1	5	8	2
Haemorrhagic	0	1	0	0
Chylous*	1	11	0	0
Exudate	3	4	2	3
Septic	3	6	2	1
FIP**	n/a	0	n/a	16
Lymphoma	1	6	1	1
Other neoplastic	7	14	0	2

* Fluids designated as chylous effusions had a typical cytological appearance (Fig. 1). Either fluid triglyceride concentration was greater than serum triglyceride or the cholesterol:triglyceride ratio was <1 (N.B. triglycerides and cholesterol both expressed in mg/dl for this ratio).

** Fluids designated FIP were high protein modified transudates or exudates from cats with albumin:globulin ratios <0.6 and moderate to high positive fluid or serum coronavirus serology and no evidence of sepsis.

The diagnostic rate can be enhanced by sending good quality samples and some tips are set out below:

- EDTA fluid is adequate for cytology and biochemistry but not suitable for culture.
- Some laboratories recommend the addition of formalin to EDTA fluids. Check with your laboratory whether this is required. It will depend largely on the staining technique employed. At TDDS we prefer EDTA alone.
- If culture is required submit fluid in a sterile plain tube.
- Where possible submit fresh smears of fluid. Direct and concentrated air-dried smears provide optimum cell preservation, even if the sample is delayed in transit.
- Smears packaged before drying usually suffer from severe artefact rendering cytological examination extremely difficult. Smears should be allowed to dry for at least 30 minutes prior to packaging.
- If only a small volume is obtained smears alone can be submitted. It should be specified whether these are direct or concentrated. For culture, with small volume effusions, a transport swab may be submitted.

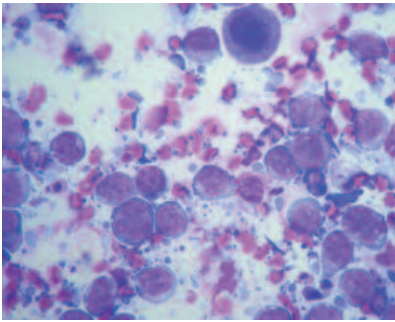


Fig. 3: Large atypical lymphoblasts in a pleural fluid from a dog receiving chemotherapy for lymphoma.