

VI Summary:

Feline thrombocytopenia in particular consideration of the immune-mediated thrombocytopenia, a prospective study (January 1999 – June 2000)

Thrombocytopenia is a common laboratory finding in cats, but there are only a few clinical reports about feline thrombocytopenia. As a result of the relatively large feline platelet size (11-18 fl) and the tendency for clumping automated platelet counts are frequently inaccurate (too low, so called pseudothrombocytopenia). The purpose of our prospective study (January 1999-June 2000) was to determine the relationship between the manual and the automated platelet count. All thrombocytopenic cats, which were presented at the Clinic for Small Animals, Berlin, had a complete examination in order to find the cause of the thrombocytopenia. For the first time platelet-bound antibodies (PBA) in cats were detected by flow cytometry. Further on the buccal mucosa bleeding time of 35 cats was determined and evaluated.

Comparison of automatic and manual platelet counting

The platelet counting was performed manually (Thrombo Plus®, Sarstedt, Nümbrecht) and automatically (Cell-Dyn 3500, Abbott, Wiesbaden) in 217 feline blood samples within 30 minutes after blood taking. The average platelet count was 139,527/ μ l (range 1,000 – 858,000/ μ l) in the automatical count and 177,251/ μ l (range 6,000 – 970,000/ μ l) in the manual count. In 161 samples the automatic counter demonstrated the blood samples to be thrombocytopenic. However, the manual counting proved in 39 of these samples that the automatic counting had given false low results and in further 47 cases the automatic counts were too high. We observed a correlation of only $r = 0.789$ for manual and automatic platelet counts, which means, that reliable platelet counts in cats can only be achieved manually.

Diagnoses of 63 thrombocytopenic cats

The diagnoses of 63 thrombocytopenic cats (range 10,000 – 179,000/ μ l, median [M]: 83,000) were based on history, signalment, the complete blood cell count, serum biochemical screening, serology, the results of radiography and ultrasonography as well as further examinations (for example cytology, histopathology). Platelet-bound antibodies were determined in 42 of these cats.

17 (Tc/ μ l: 16,000 – 179,000, M: 57,000) of these 63 cats suffered from *viral* infections such as FIP (7), FeLV (3), FIV (4) and feline rhinitis with secondary bacterial infection (3). 22 cats had either an *aseptic* inflammation (Tc/ μ l: 15,000 – 178,000, M: 84,000) (fat necrosis [4],

traumata [4], pancreatitis [2], FLUTD [2], (cholangio)-hepatitis [2], nasal polyp [1] and gastritis with ulcer [1,]) or a *bacterial* infection (Tc/ μ l: 37,000 – 168,000, M: 85,000) (pneumonia [2], urolithiasis with obstruction and cystitis [1], pyelonephritis [1], abscess [1], pyometra [1]). Ten (Tc/ μ l: 22,000 – 178,000, M: 88,000) of 63 cats had neoplasia (lymphoma [6], leukemia [2], fibrosarcoma of the kidney [1] and hemangiosarcoma [1]). Three of 63 cats with thrombocytopenia suffered from *bone marrow diseases* (megakaryocytic and/or erythroid aplasia resp. -hypoplasia) and the platelets ranged from 34,000 – 168,000/ μ l (M: 115,000). Three cats were diagnosed with *immune-mediated diseases* (immune-hemolytic anaemia [IHA], primary immune-mediated thrombocytopenia [pIMT], Evans' syndrome) (Tc/ μ l: 10,000 – 83,000, M: 46,000). Four (Tc/ μ l: 18,500 – 175,000, M: 149,500) of 63 cats suffered from a *variety of diseases* (renal failure [1], hyperthyroidism with cardiomyopathy [1], hepatopathy [2]). The thrombocytopenia (Tc/ μ l: 76,000 – 162,000, M: 109,000) was a *random finding* in hemograms of four cats at a routine check up.

Spontaneous bleeding (i.e. bleeding of the gums [4], petechiation [4], epistaxis [1], retinal and scleral hemorrhage [1] resp. abdominal hemorrhage [1]) was observed in only 7 (Tc/ μ l: 10,000 – 57,000, M: 34,000) of 63 thrombocytopenic cats (with diagnosis of FIV [3], pIMT, Evans' syndrome, leukemia and megakaryocytic and erythroid aplasia).

Detection of platelet-bound antibodies (PBA)

This study evaluated the presence of antibodies on the platelet-membrane in a direct assay by flow cytometry (FACScan, Becton Dickinson, New Jersey USA) in cats. First of all feline platelets were determined by using monoclonal antibodies (goat-anti-mouse). With polyclonal antibodies (goat-anti-cat with a specificity against heavy chains on cat IgG) were detected those platelets, which carried antibodies. All of the 47 healthy cats had a negative test result. 19 of 42 thrombocytopenic cats (Tc/ μ l: 6,000 – 179,000, \bar{x} : 59,947) had a positive PBA test result. 17 of these 19 cats had a secondary IMT. The underlying diseases were: fat necrosis (4), FIP (3), FeLV- (2)/ FIV- (2) infection, lymphoma (2), leukemia (2), hepatitis (1), pyelonephritis (1) and hyperthyroidism with cardiomyopathy (1). No underlying disease was discovered in two cats: one cat had an Evans' syndrome and the other pIMT. In 23 cats with thrombocytopenia (Tc/ μ l: 15,000 – 206,000, \bar{x} : 89,108) the PBA test results were negative including cats with FIP (4), with lymphoma (3), FIV (2), pancreatitis (2), cholangiohepatitis (1) and hepatitis (1). Several diseases such as FeLV-infection, IMHA, erythroid and

megakaryocytic aplasia, pneumonia, leukemia, nasal polyp, abscess, FLUTD with obstruction, ulcerative gastritis and peritoneopericardial hernia only occurred once. Similar to humans and dogs, this study suggested that an immune-mediated destruction of platelets could play an important role in the pathogenesis of feline thrombocytopenia. Primary immune-mediated thrombocytopenia seems to be less common or it is difficult to diagnose, maybe because spontaneous bleeding is rare in cats.

Buccal mucosa bleeding time (BMBT)

A disposable spring loaded blade, that made a standardised cut of 3 mm length and 0.5 mm depth, was used to measure the BMBT. Altogether the BMBT was determined in 35 anesthetized cats at the oral mucosa surfaces of the upper lip. The mean \pm 2 standard deviation of 15 healthy cats was 55.3 ± 43.2 sec (range 30 – 105 sec). Seven thrombocytopenic cats had a marked mean prolongation in BMBT (BMBT 45 – 300 sec), while the BMBT (<5 – 120 sec) of 13 cats with various diseases without thrombocytopenia was similar to the mean for healthy cats.