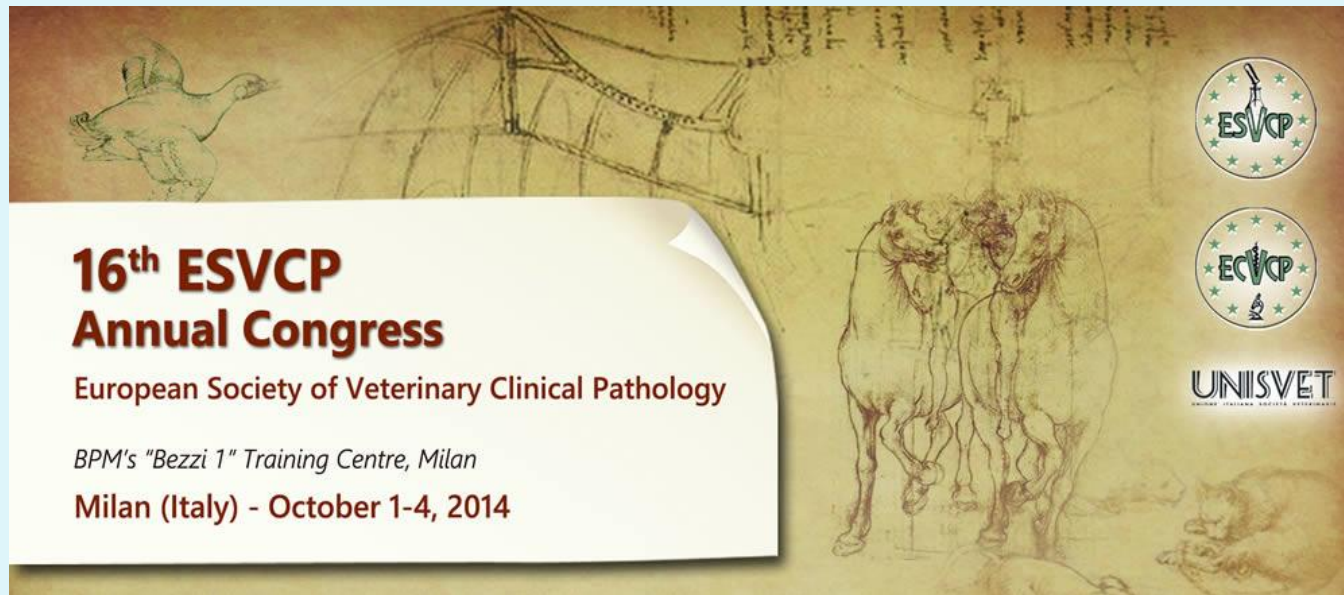


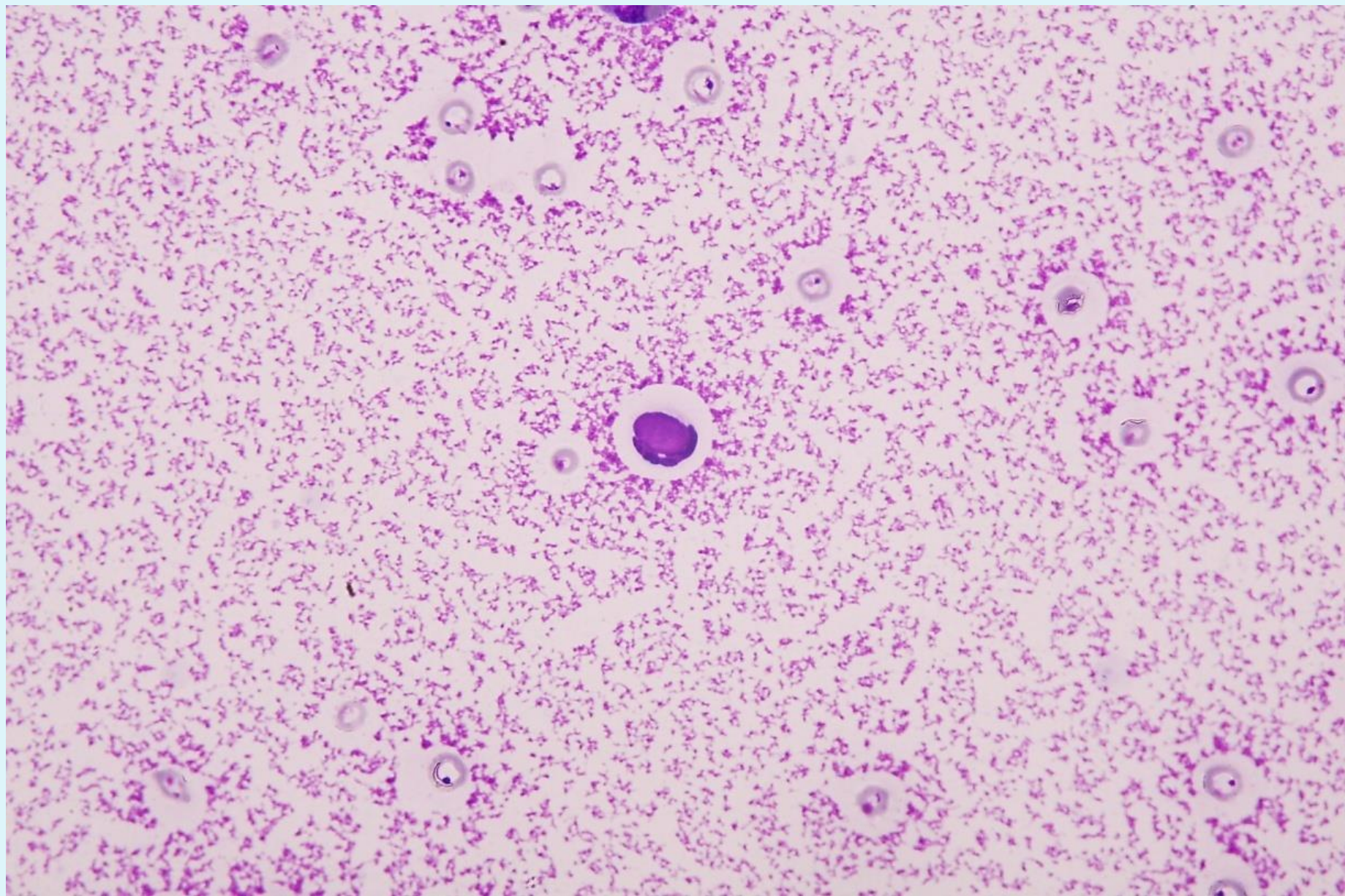


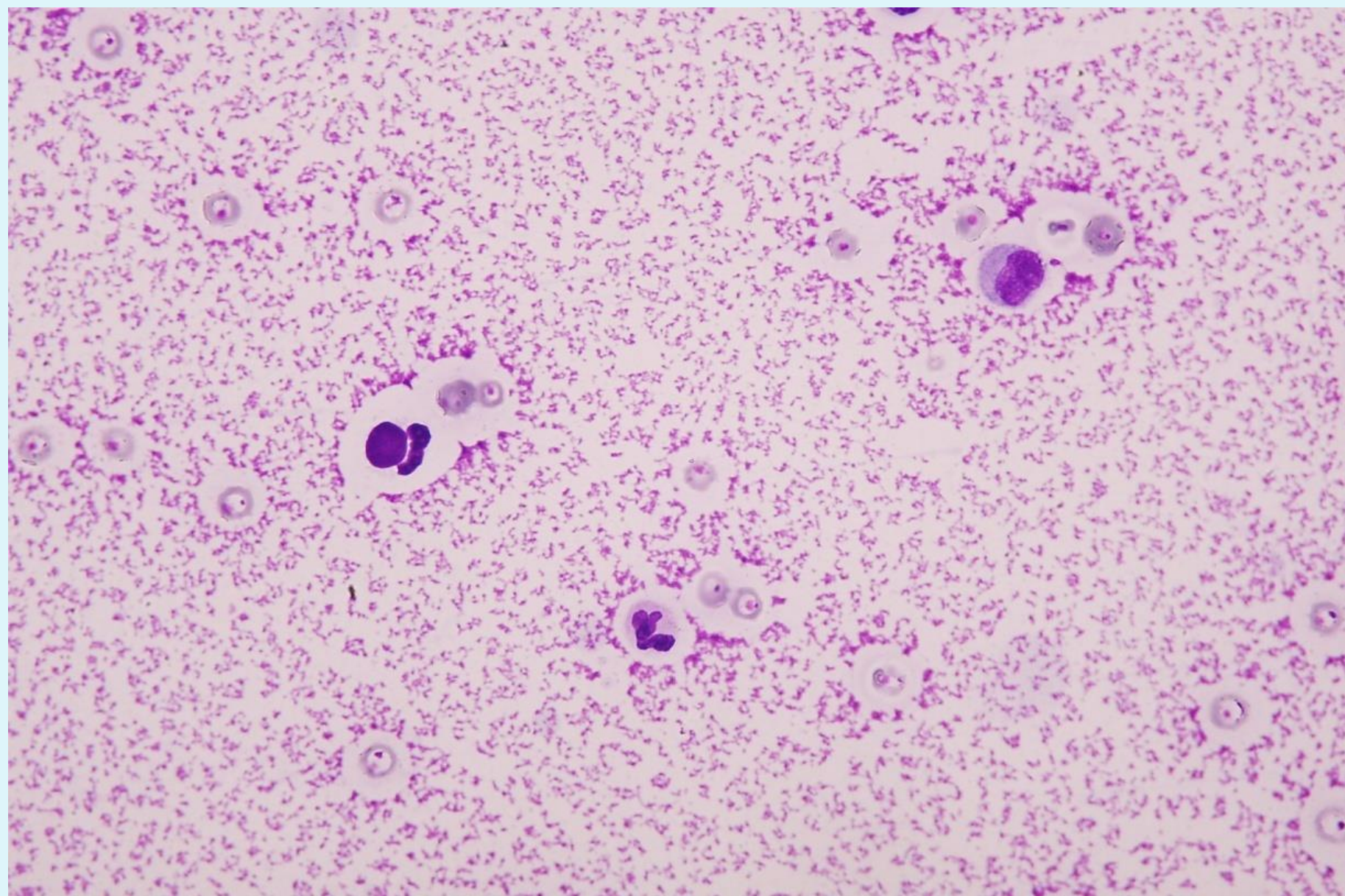
MISTERY SLIDES SESSION - CYTOLOGY -

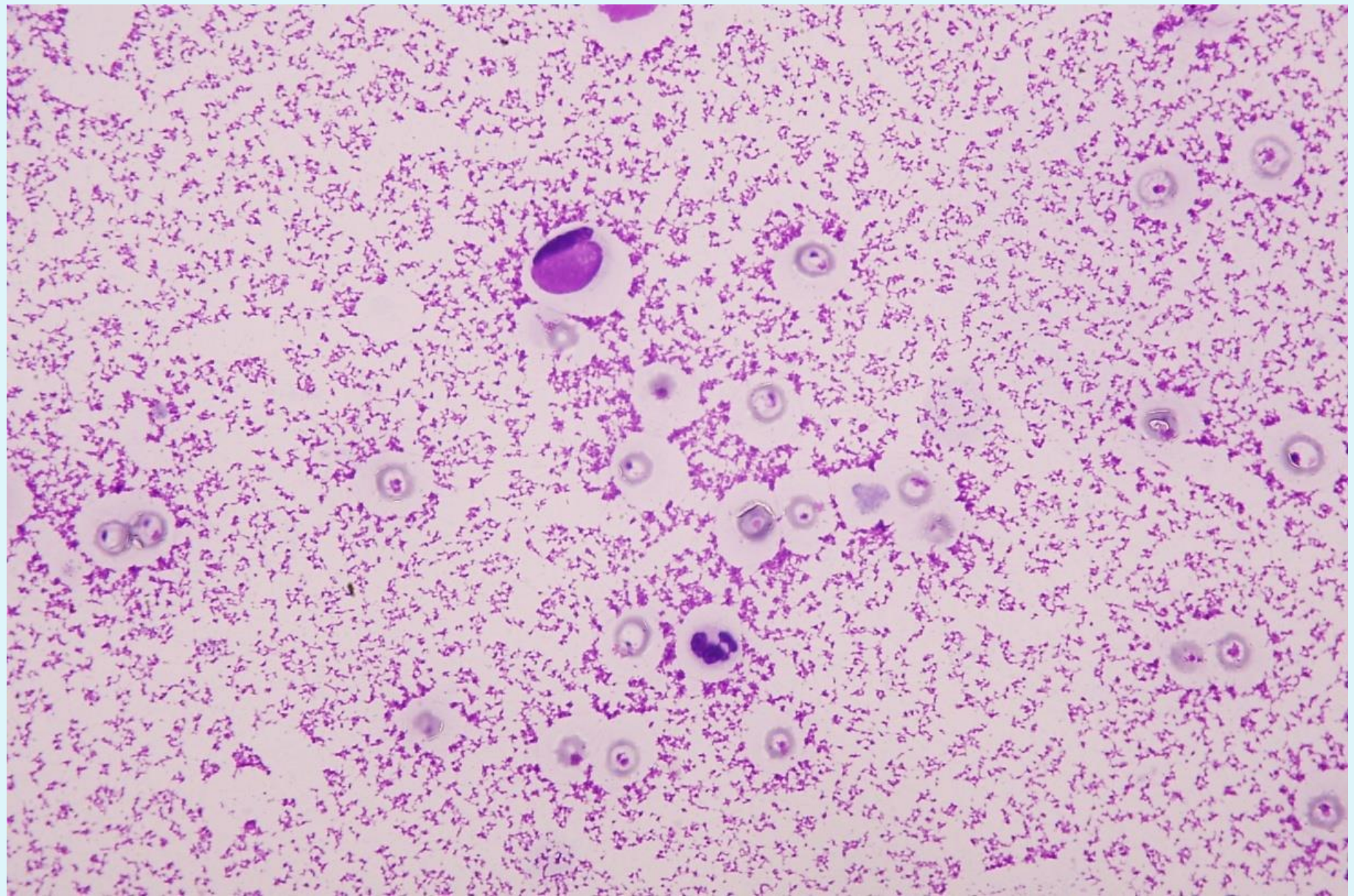
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Padova

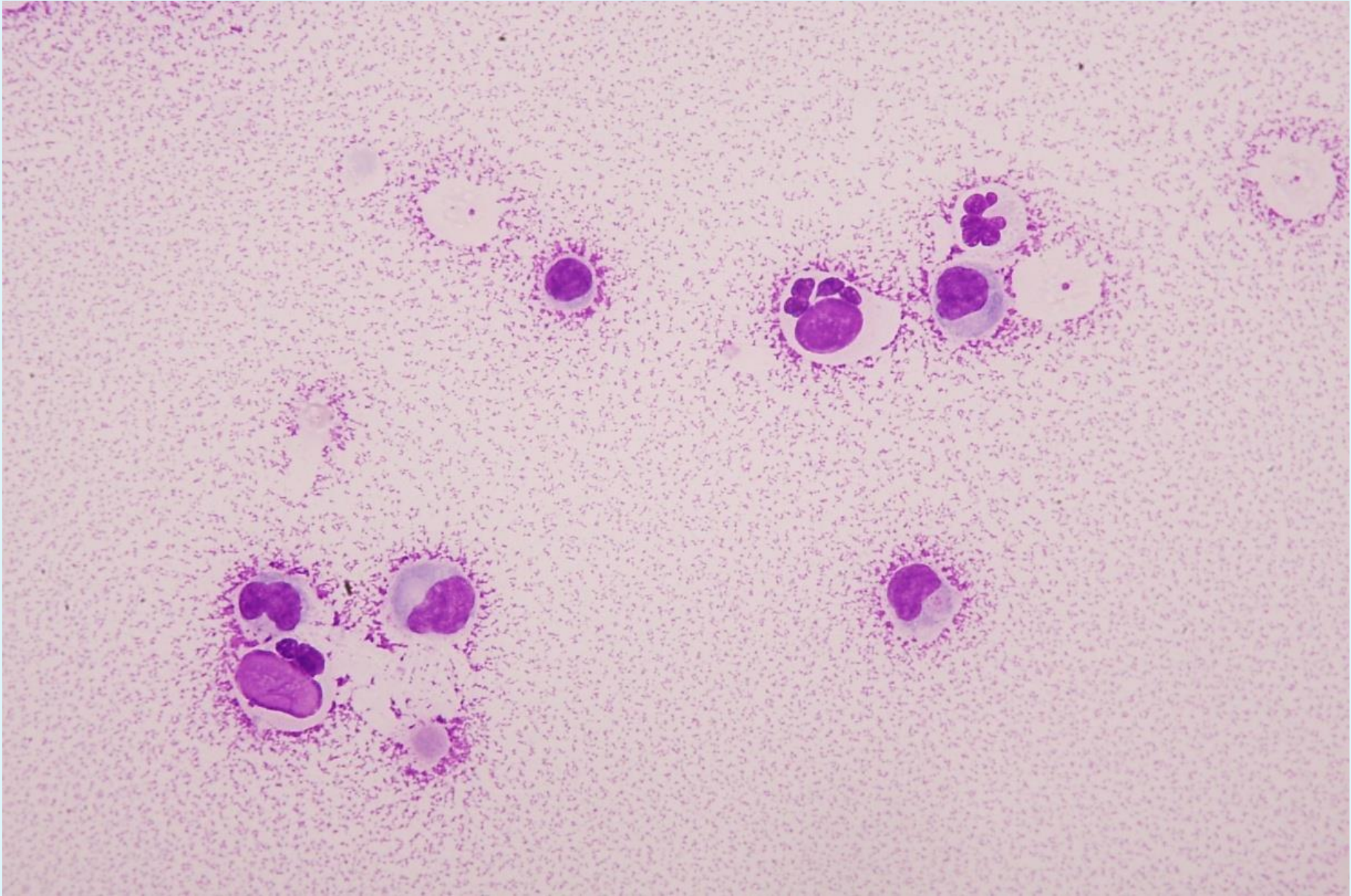
Case #1

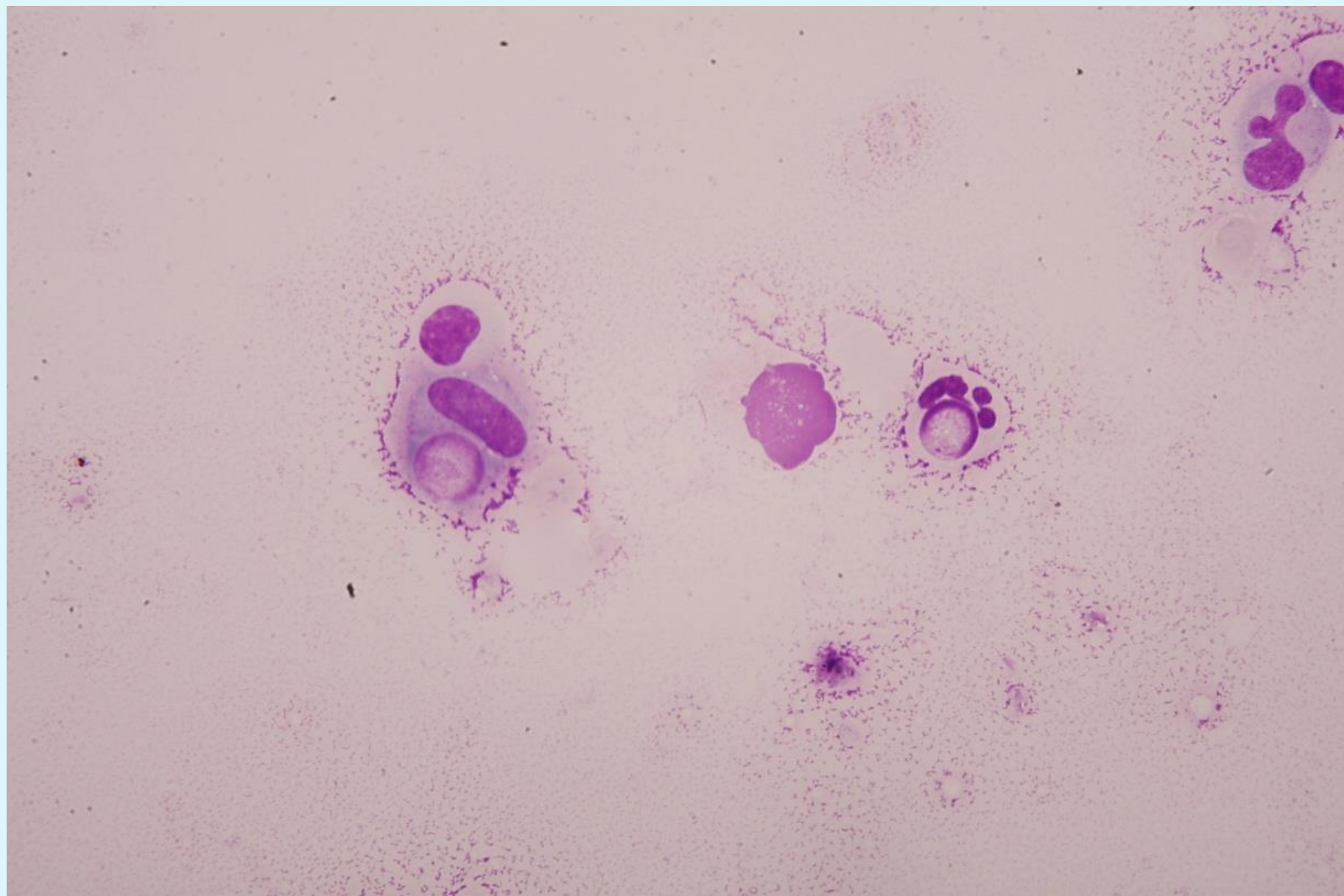
- Dog, Segugio breed, male, 6-years-old
- Lameness and swelling of joints
- Synovial fluid
 - Color: pale pink
 - Cell count: 6500 c/mcL
 - Total protein: 6.2 g/dl

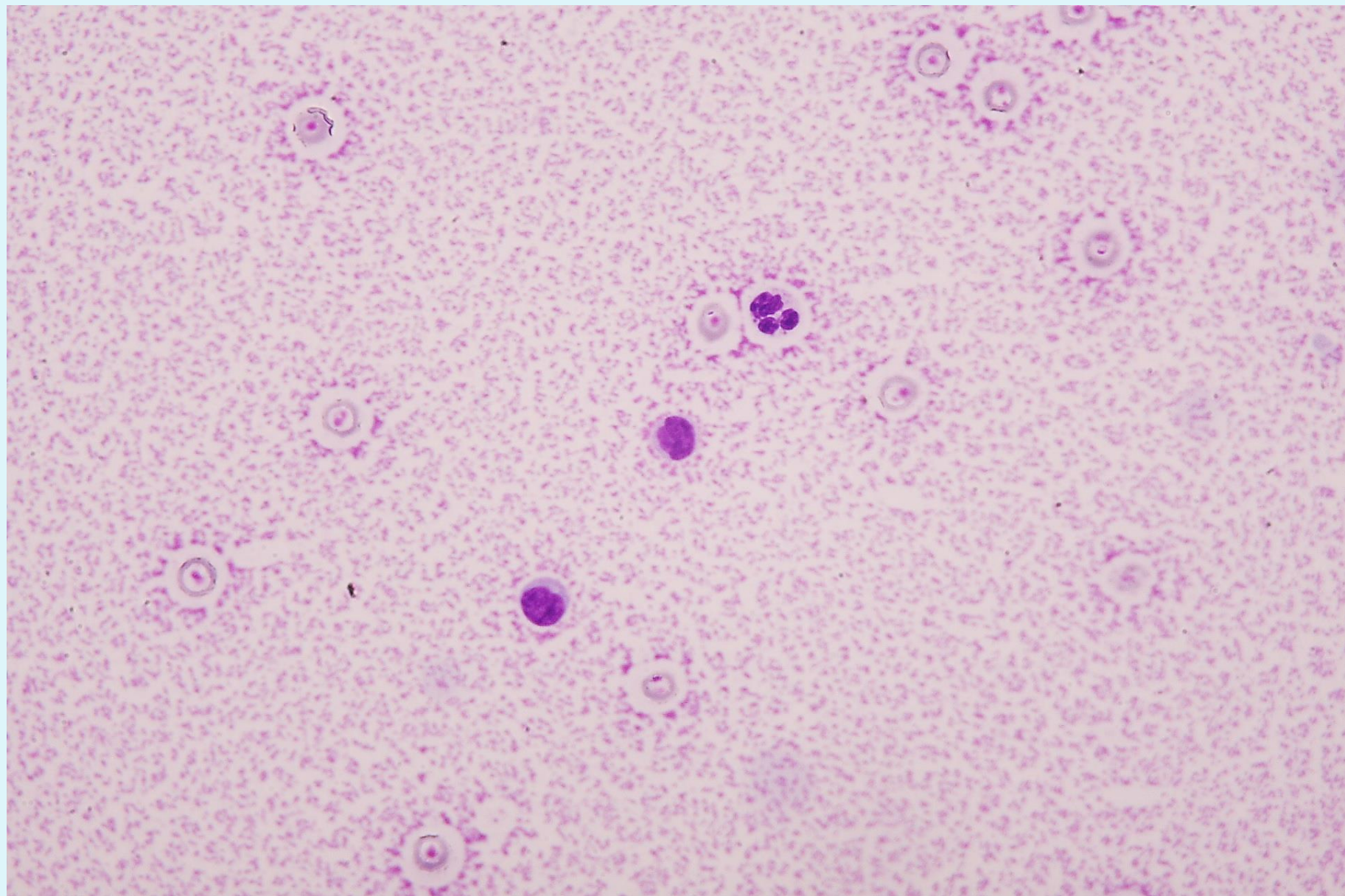












What Is Your Diagnosis?

Anne Provenscher Bolliger¹
Charles DeCamp²
Harold Tvedten¹

Case Presentation

A 2-year-old female chocolate Labrador Retriever was presented to the Michigan State University Veterinary Clinical Center with a history of anorexia for 3 days, trembling of all four limbs and difficulties in rising. The animal had one reported incidence of an acute onset of pain in the left stifle 3 months prior to presentation that had resolved following treatment with dexamethasone. The dog was on a regular vaccination schedule and preventive heartworm medication. Physical examination revealed a slightly elevated body temperature (40°C) with a panting respiration and a rapid heart rate (120/minutes). The dog showed pain at the extension of the left hip and at palpation of the right stifle. Radiographs of both stifles were inconclusive.

Results of hematology and serum chemistry profiles were unremarkable. Synovial fluid from the right stifle was submitted for cytologic examination. The fluid was characterized macroscopically by the following: Color: pale yellow pre- and post-centrifugation; Character: moderate turbidity (3+) pre-centrifugation and clear post-centrifugation; and Viscosity: good. Total nucle-

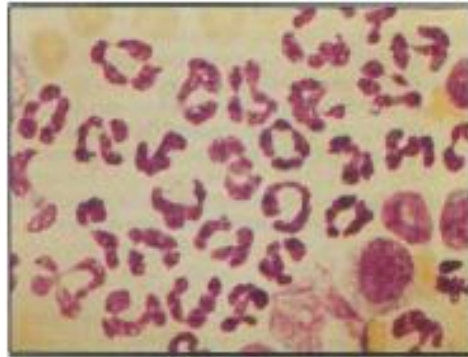


FIG. 1 — Photomicrograph of stifle synovial fluid obtained from a 2-year-old female chocolate Labrador Retriever. (Modified Wright stain; 100X oil objective).

ated cell count was 20,556/mL, total solids (refractometer): 5.0 g/dL and specific gravity: 1.031.

A photomicrograph illustrating the primary nucleated cell types in the synovial fluid is presented (Fig. 1).

(SEE PAGE 129 FOR ANSWER)

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²Department of Small Animal Clinical Sciences, College of Veterinary Medicine, Michigan State University, East Lansing, MI 48824

- Ragocytes
 - Neutrophilic granulocytes with small dark granules in the cytoplasm
 - Barger A. 2010
- Lupus cell
 - Neutrophilic granulocytes with magenta globules in the cytoplasm

- Ragocyte are described as being leukocytes with intracytoplasmic granules
 - Davis MJ, Denton J, Freemont AJ, Holt PJ. Comparison of serial synovial fluid cytology in rheumatoid arthritis: delineation of subgroups with prognostic implications. Ann Rheum Dis. 1988 Jul;47(7):559-62.
 - Hollander JE, Mc Carthy DJ, Astorga J et al. Studies on the pathogenesis of rheumatoid joint inflammation. Ann Intern Med. 1965;62: 271-80
 - Delbarre F, Kahan A, Amor B et al. Le ragocyte synovial. Presse med. 1964;72: 2192-32
- Immunofluorescence and others techniques have shown that the granules are the result of leukocytes taking up immune complexes from the fluid
 - Zwaifler NJ. The immunopathology of joint inflammation in rheumatoid arthritis. N Engl J Med. 1972;286: 141-7

- LE cell: a neutrophil containing a large, round, homogeneous eosinophilic inclusion that displace the nucleus to the periphery.
- The material is thought to be nuclear material that has been structurally altered by antinuclear antibodies

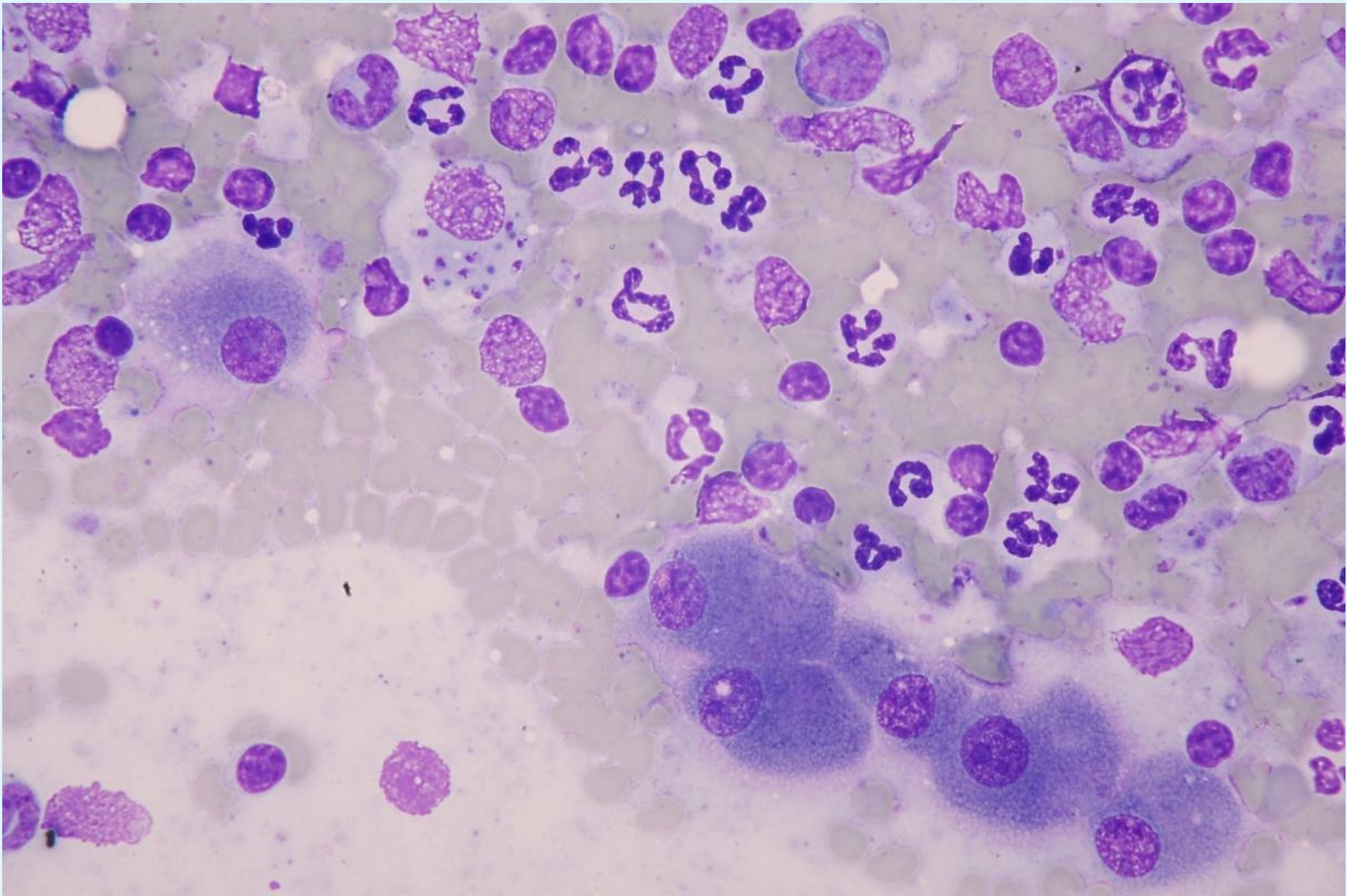
– Barger A. In Musculoskeletal System, Raskin RE, Meyer DJ
Canine and Feline Cytology, 2010, Saunders: 309-324

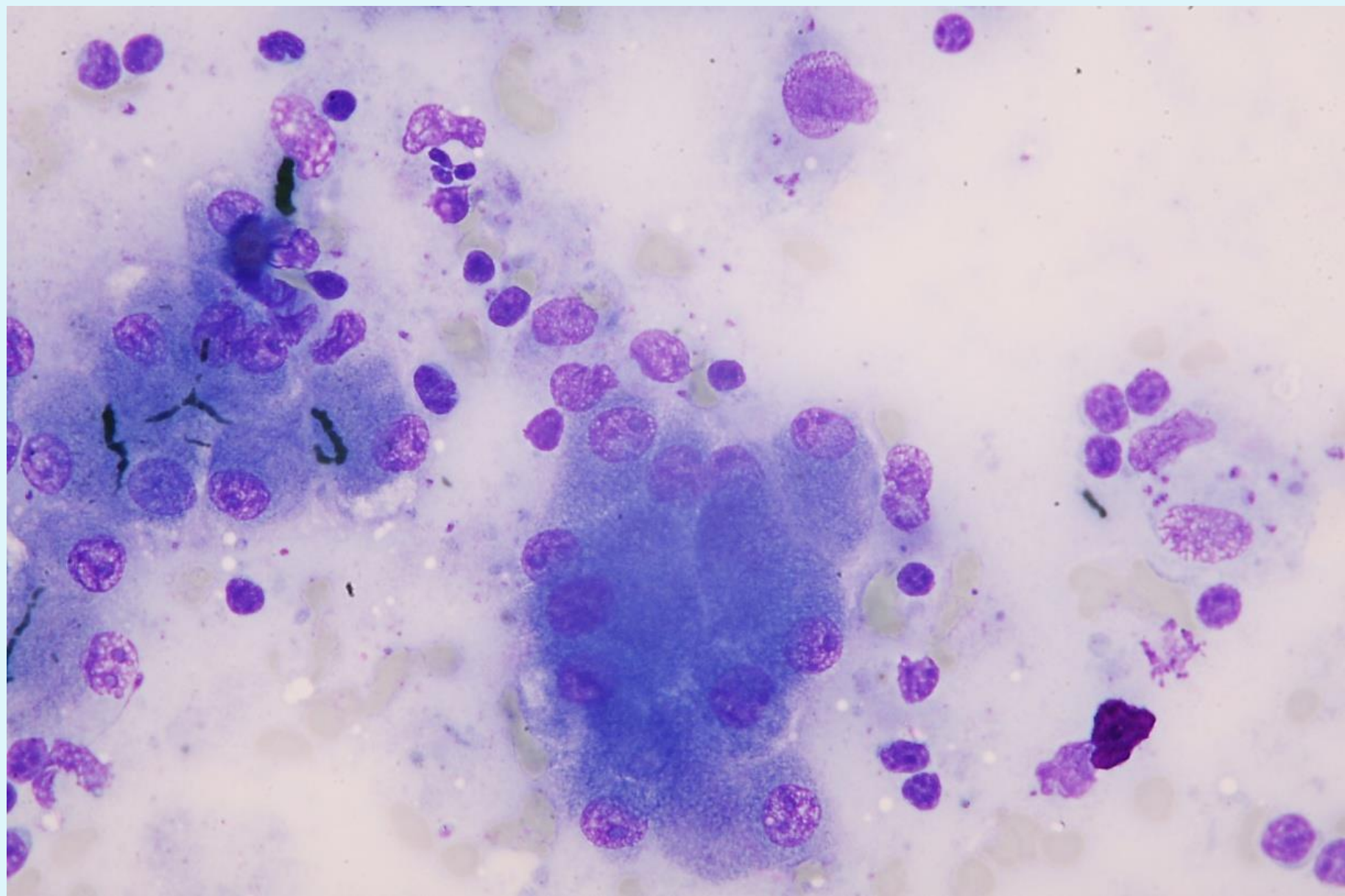
DIAGNOSIS

- ANA test: positive 1: 2560
- Diagnosis: lupus arthritis

Case #2

- Dog, Yorkshire terrier, male, 8-years-old
- Anorexia, diarrhea, vomiting, depression
 - Liver enzymes elevation
- FNCS of liver



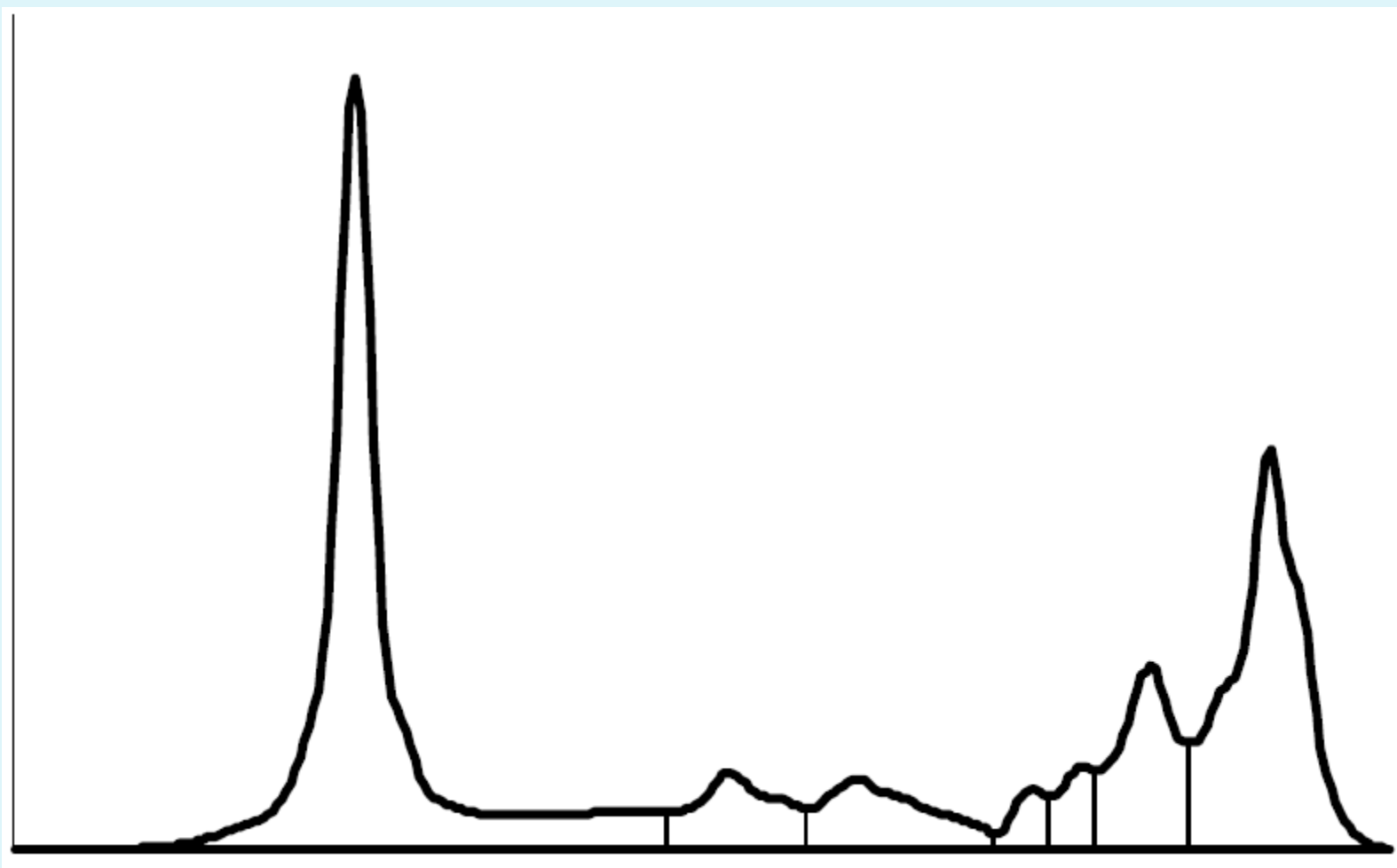


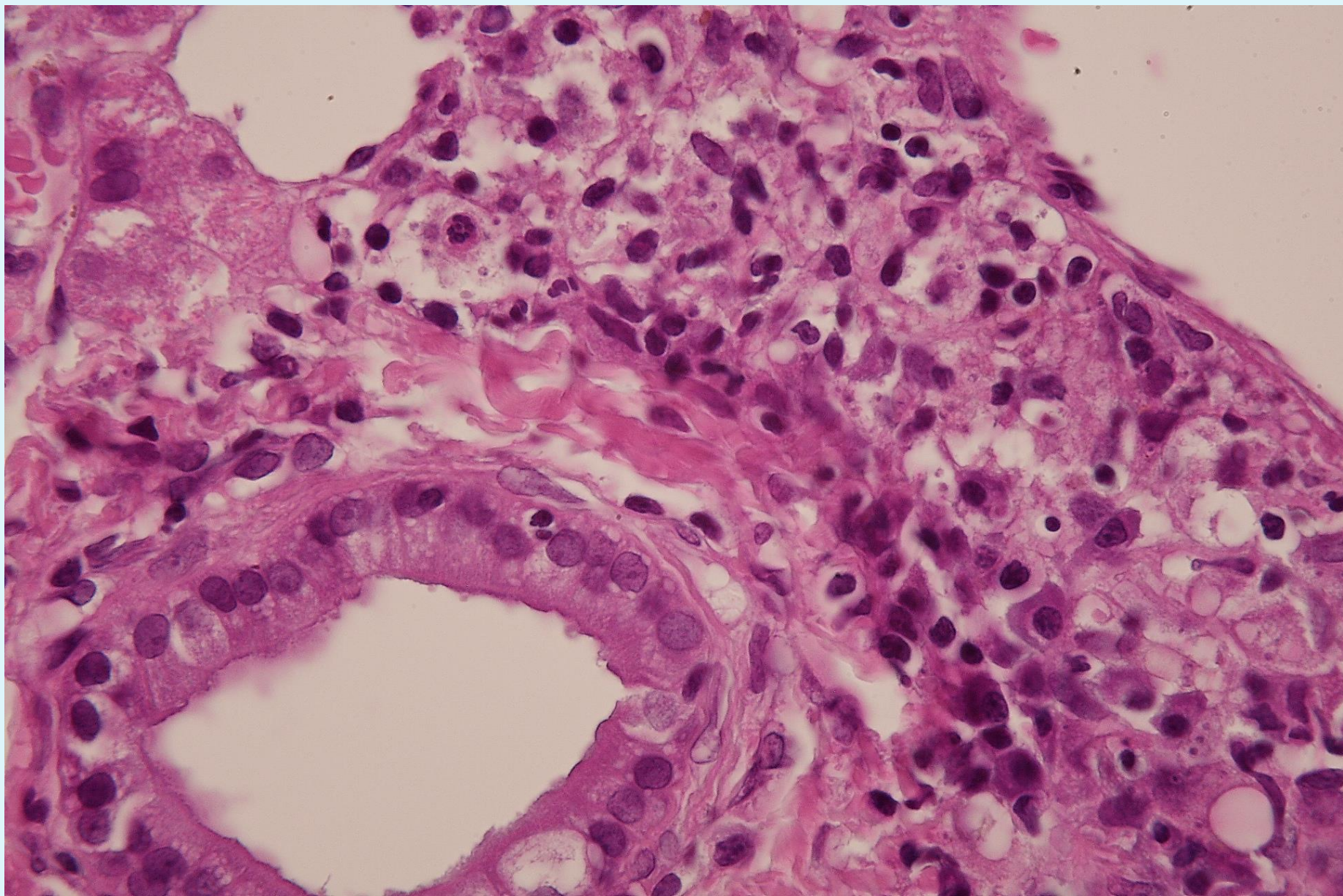
Test	Risultato	Min	Max	U.M.
RBC	6.17	5.70	8.56	milioni / μ L
Hgb	15.0	14.1	21.2	g/dL
Hct	49.5	39.0	59.2	%
MCV	80.3	63.1	72.6	fL
MCH	24.4	21.8	25.4	pg
MCHC	30.4	33.3	36.8	g/dL
RDW	13.0	11.6	14.7	%
NRBC/100 WBC	0	0	0	

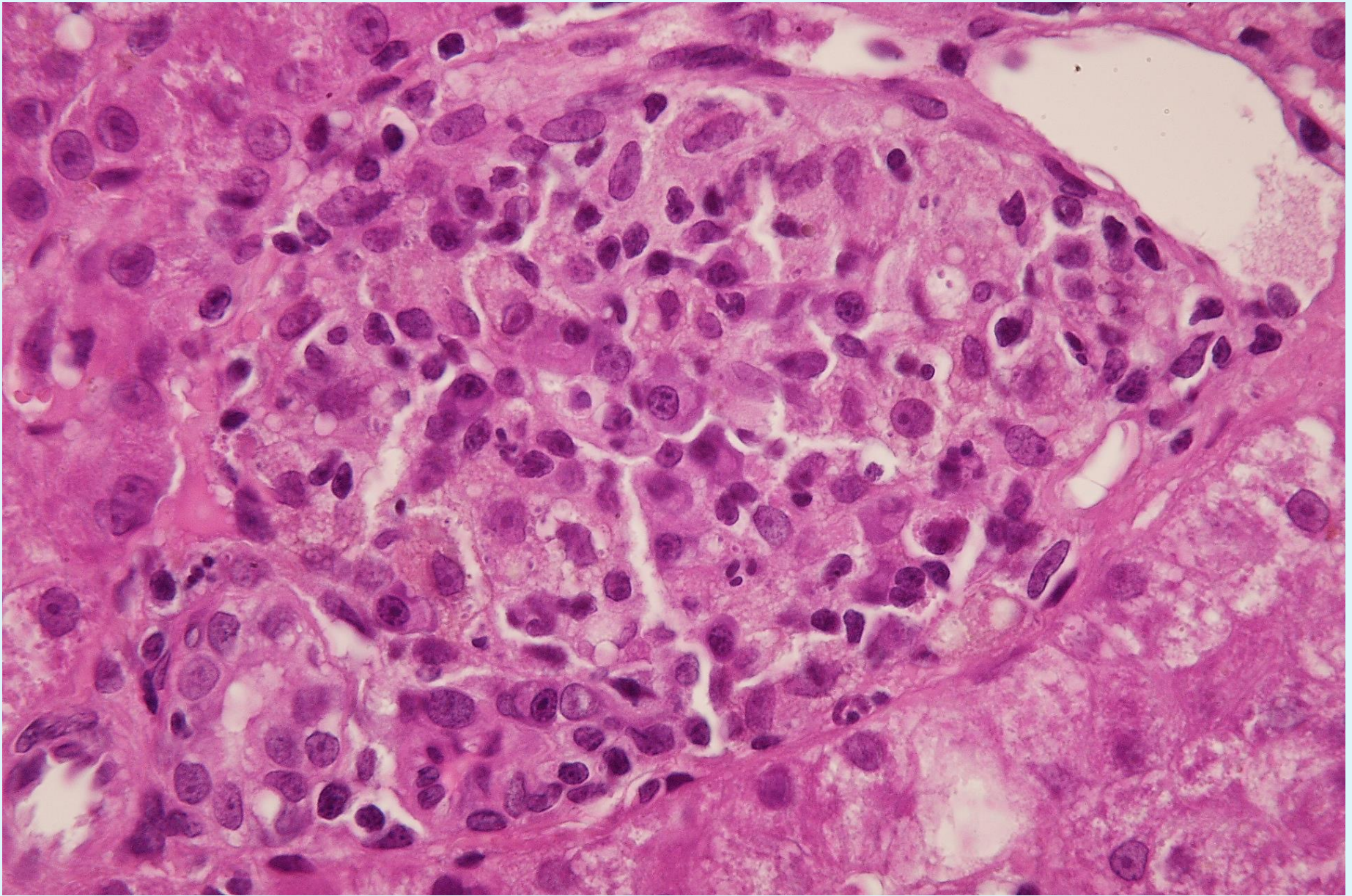
Test	Risultato	Min	Max	U.M.
WBC	37.5	5.45	12.98	migliaia / μ L
Neutrofili banda	0	0	286	/ μ L
Neutrofili segmentati	34500	3555	9314	/ μ L
Linfociti	750	1169	3810	/ μ L
Monociti	2250	186	798	/ μ L
Eosinofili	0	104	1164	/ μ L
Basofili	0	0	106	/ μ L

Test	Risultato	Min	Max	U.M.
PLT	215	176	479	migliaia / μ L
MPV	14.5	8.9	15.0	fL
PCT	0.31	0.21	0.52	%
PDW	60.9	51.8	74.5	%
Large PLT	44	7	63	migliaia / μ L

Test	Risultato	Min	Max	U.M.
CK	153	42	155	IU/L
AST	223	21	44	IU/L
ALT	991	22	78	IU/L
ALP	727	16	119	IU/L
GGT	18.1	1.2	10.9	IU/L
Colinesterasi	11942	3347	7074	IU/L
Bilirubina totale	1.23	0.11	0.31	mg/dL
Proteine totali	8.0	5.7	7.1	g/dL
Albumine	2.5	2.7	3.6	g/dL
Globuline	5.5	2.6	3.9	g/dL
Rapporto A/G	0.45	0.79	1.35	g/dL
Colesterolo	427	156	369	mg/dL
Trigliceridi	99	30	112	mg/dL
Amilasi	832	338	1101	IU/L
Lipasi	130	121	725	IU/L
Urea	25	16	49	mg/dL
Creatinina	0.69	0.83	1.42	mg/dL
Glucosio	85	88	119	mg/dL
Calcio	9.6	9.2	11.1	mg/dL
Fosforo	3.4	2.3	5.0	mg/dL
Magnesio	0.74	0.67	0.94	mmol/L
Sodio	146	143	151	mEq/L
Potassio	4.5	3.9	5.1	mEq/L
Rapporto Na/K	32.3	28.5	37.4	mEq/L
Cloro	111	109	118	mEq/L
Cloro corretto	110.9	109.1	115.9	mEq/L
Ferro totale	154	95	226	µg/dL
UIBC	268	182	306	µg/dL
TIBC	422	318	479	µg/dL
Saturazione	36.5	28.2	56.8	%
Proteina c reattiva	1.65	0.01	0.22	mg/dL







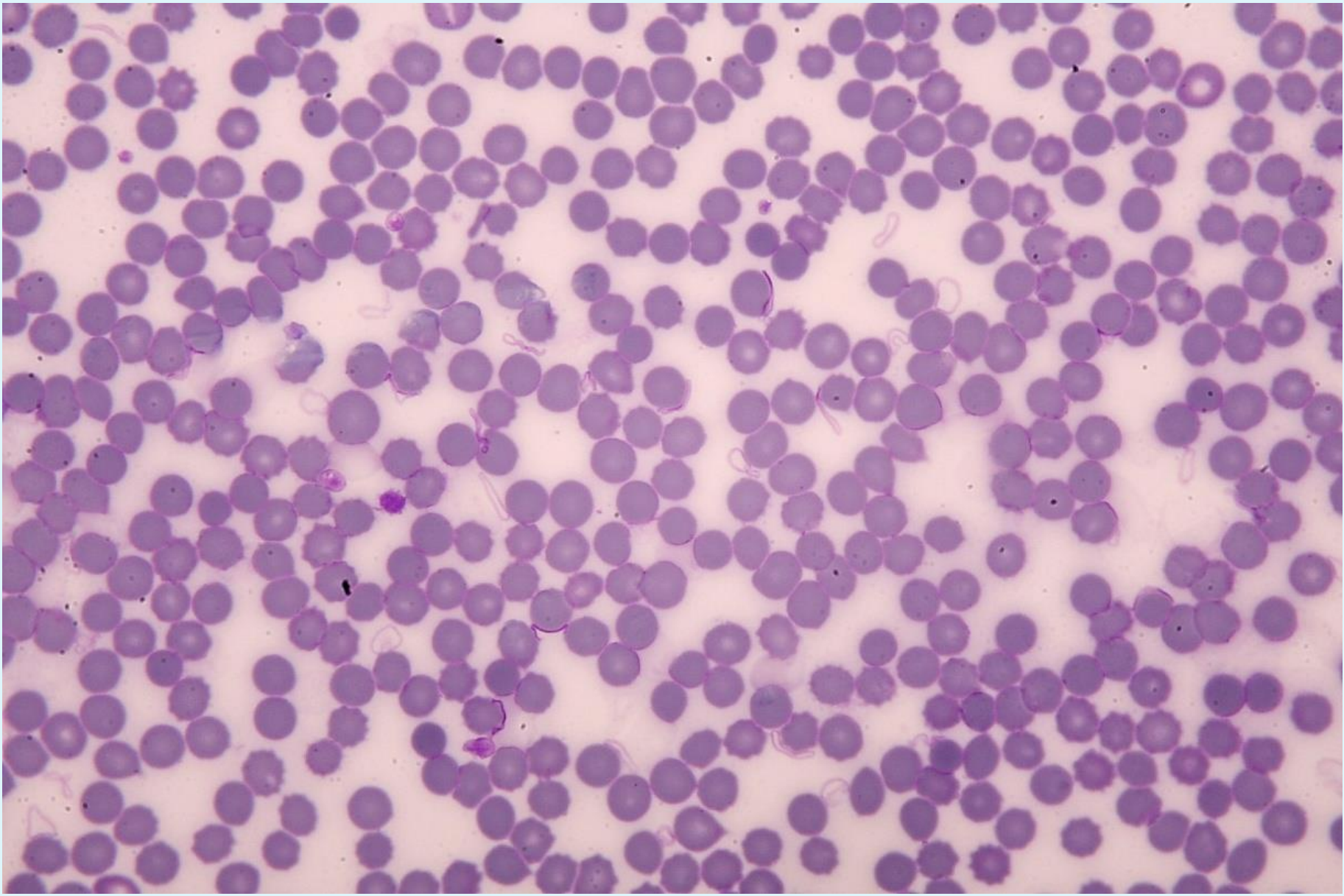
DIAGNOSIS

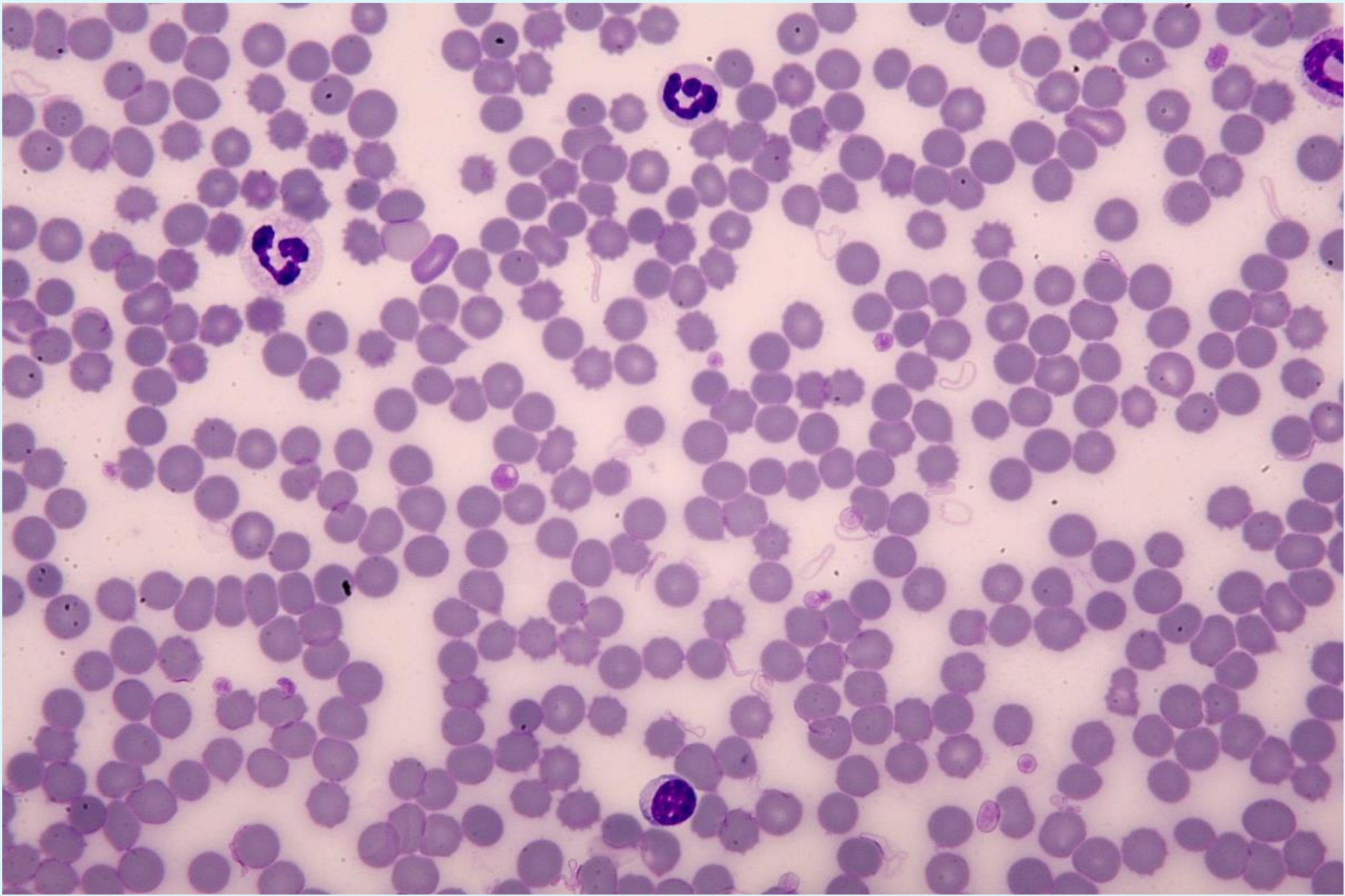
- IFAT: positive 1:1280
- Cytologic diagnosis: extracytoplasmic cholestasis with mixed inflammation and phagocytosis of *Leishmania* amastigotes
- Histologic diagnosis: periportal granulomatous hepatitis (*Leishmania* hepatitis)

Case #3

- Dog, Setter, male, 3-years-old
- Acute onset of severe anemia after a trip in the wood
 - Hematuria
 - Depression
- SAMPLE: Blood smears

Test	Risultato	Min	Max	U.M.
RBC	3.01	5.70	8.56	milioni / μ L
Hgb	7.5	14.1	21.2	g/dL
Hct	20.5	39.0	59.2	%
MCV	68	63.1	72.6	fL
MCH	25	21.8	25.4	pg
MCHC	36.9	33.3	36.8	g/dL
RDW	12.6	11.6	14.7	%
NRBC/100 WBC	0	0	0	





CASE REPORT

Unusual "erythroid loops" in canine blood smears after viper-bite envenomation

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Key Words

Dog, envenomation, erythrocyte morphology, intravascular hemolysis

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DOI:10.1111/j.1939-165X.2009.00145.x

Abstract: Northern Italy is a habitat for many species of viper; *Vipera aspis* is responsible for most reported bites of humans and animals. Five dogs of different breeds and ages were presented by their owners to a veterinary clinic in northern Italy between September 2004 and August 2007 with a history of being bitten by a viper within the past 2 hours. On physical examination, all of the dogs were depressed, had pale mucous membranes, and had a painful area consistent with a recent viper bite wound on the nose (2), distal front leg (2), or lip (1). Hemoglobinemia and hemoglobinuria were observed in plasma and urine from all dogs. CBCs were done at the time of presentation, daily for 4 days, and 10 days after presentation in all dogs with the exception of one dog that died after 2 days. All dogs had an acute decrease in HCT within 24 hours of presentation; all dogs had neutrophilia, 3/5 had a mildly toxic left shift, and 4/5 had thrombocytopenia. On Diff-Quik-stained blood smears, moderate numbers of echinocytes, spherocytes, and erythrocyte ghosts were observed. In addition, moderate numbers of unusual erythrocyte membrane-like structures ("erythroid loops") were observed. The loops were annular in shape and sometimes disrupted, appearing as thin pale blue bands. Erythrocyte morphologic abnormalities decreased by day 3 and were no longer observed on day 10. The unique appearance of the erythroid loops together with evidence for intravascular hemolysis and other erythrocyte morphologic changes suggest they may be a consequence of erythrocyte lysis. Echinocytes, spherocytes, and erythrocyte ghosts are known to result from the action of phospholipase in viper venom; however, erythroid loops have not been reported previously and their exact mechanism of formation is unknown.

North Italy, particularly the area of Lake Garda, is a natural habitat for many species of viper. *Vipera aspis*, *Vipera ammodytes*, *Vipera berus*, and *Vipera ursinii* are 4 of the 23 species of vipers found in Italy, and are the only ones that are poisonous for human beings and domestic animals, although different susceptibilities do exist among various types of vertebrates and invertebrates.^{1,2} *Vipera aspis* is responsible for the highest number of reported bites in the region. Hematologic abnormalities, including echinocytosis, erythrocyte membrane ghosts, spherocytosis, and hemolysis have been observed in human beings with viper envenomation.^{3,4} In this report, unusual erythrocyte structures or alterations, arbitrarily called "erythroid loops," are described in blood smears from 5 dogs with viper-bite envenomation.

Case Presentations

A 4-year-old male Cocker Spaniel (dog 1), 9-year-old female Labrador Retriever (dog 2), 6-year-old male mixed breed (dog 3), 6-year-old female Italian Hound (dog 4), and 4-month-old male Epagneul Breton (dog 5) were presented to San Antonio Veterinary Clinic in Salò, Garda Lake, between September 2004 and August 2007 by their owners for clinical examination, within 2 hours after a viper bite. On physical examination, all the dogs were deeply depressed, hyperthermic, had pale mucous membranes, and had a painful area consistent with a recent viper bite wound located on the nose (dogs 1 and 2), the distal front leg (dogs 3 and 4), or on the lip (dog 5).

Blood samples were collected from the jugular vein with a 20-gauge needle attached to a syringe.

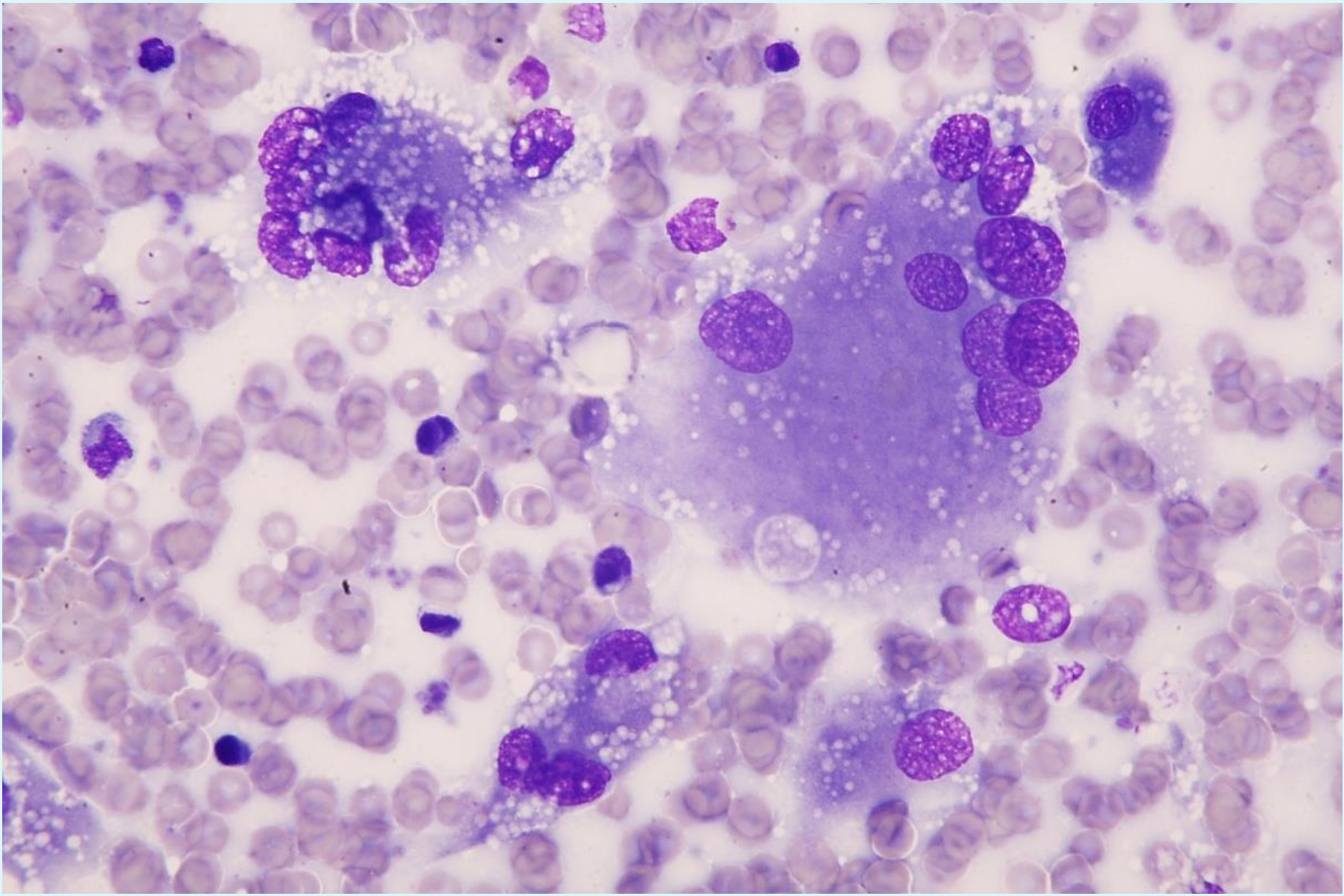
- Erythroid loops
 - Expression of hyperacute intravascular haemolysis

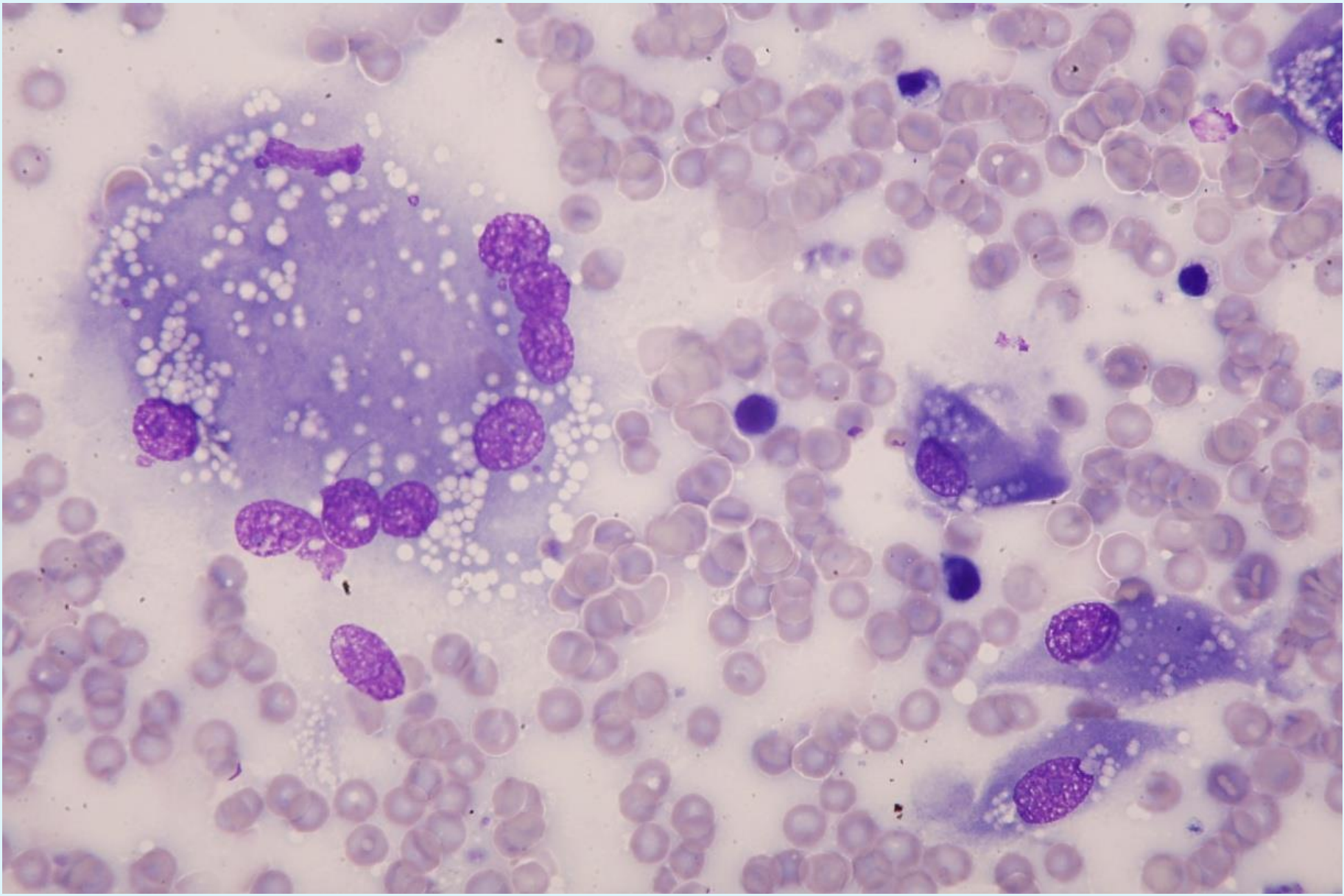
DIAGNOSIS

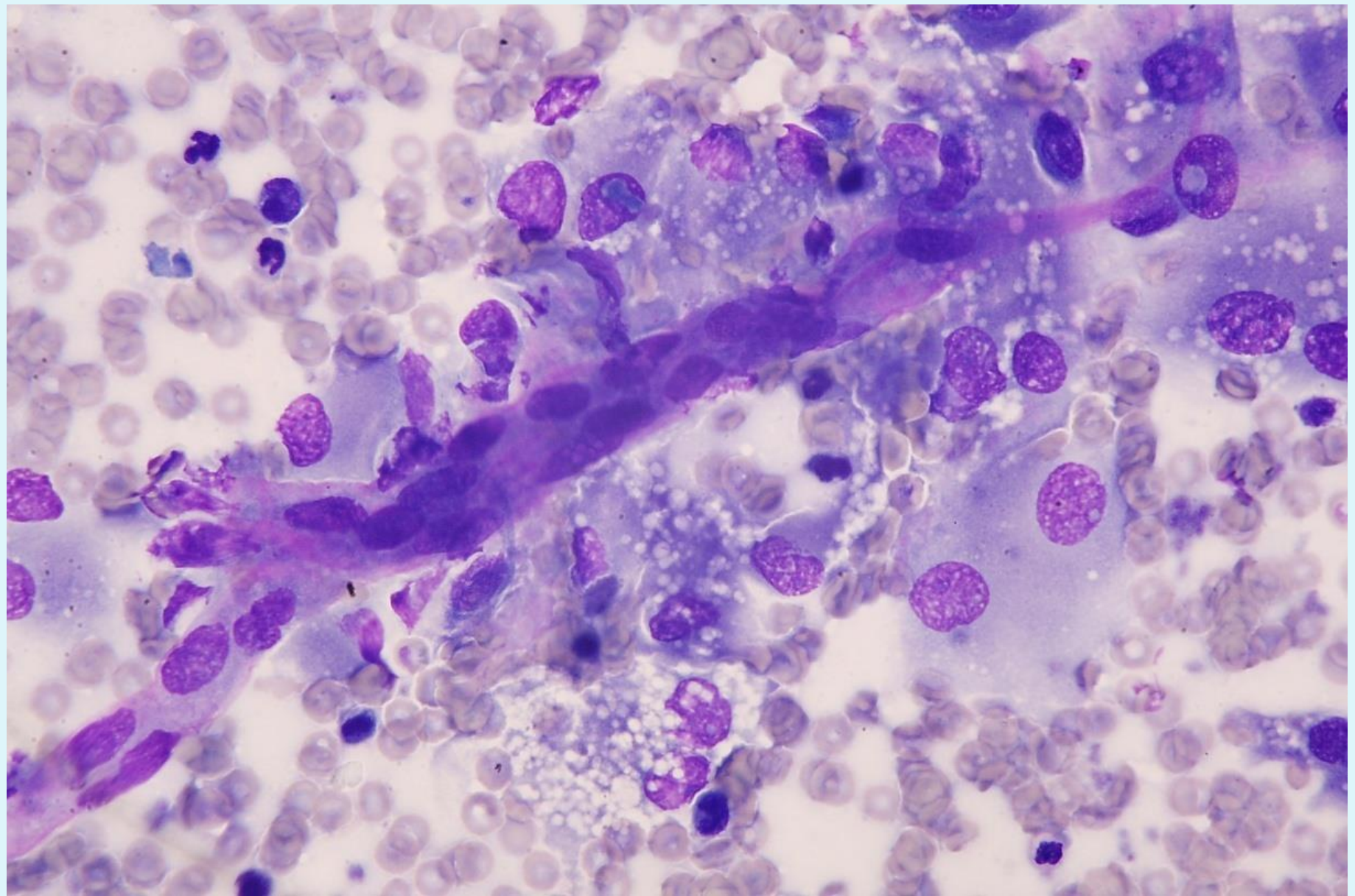
- Acute intravascular hemolysis after viper-bite envenomation

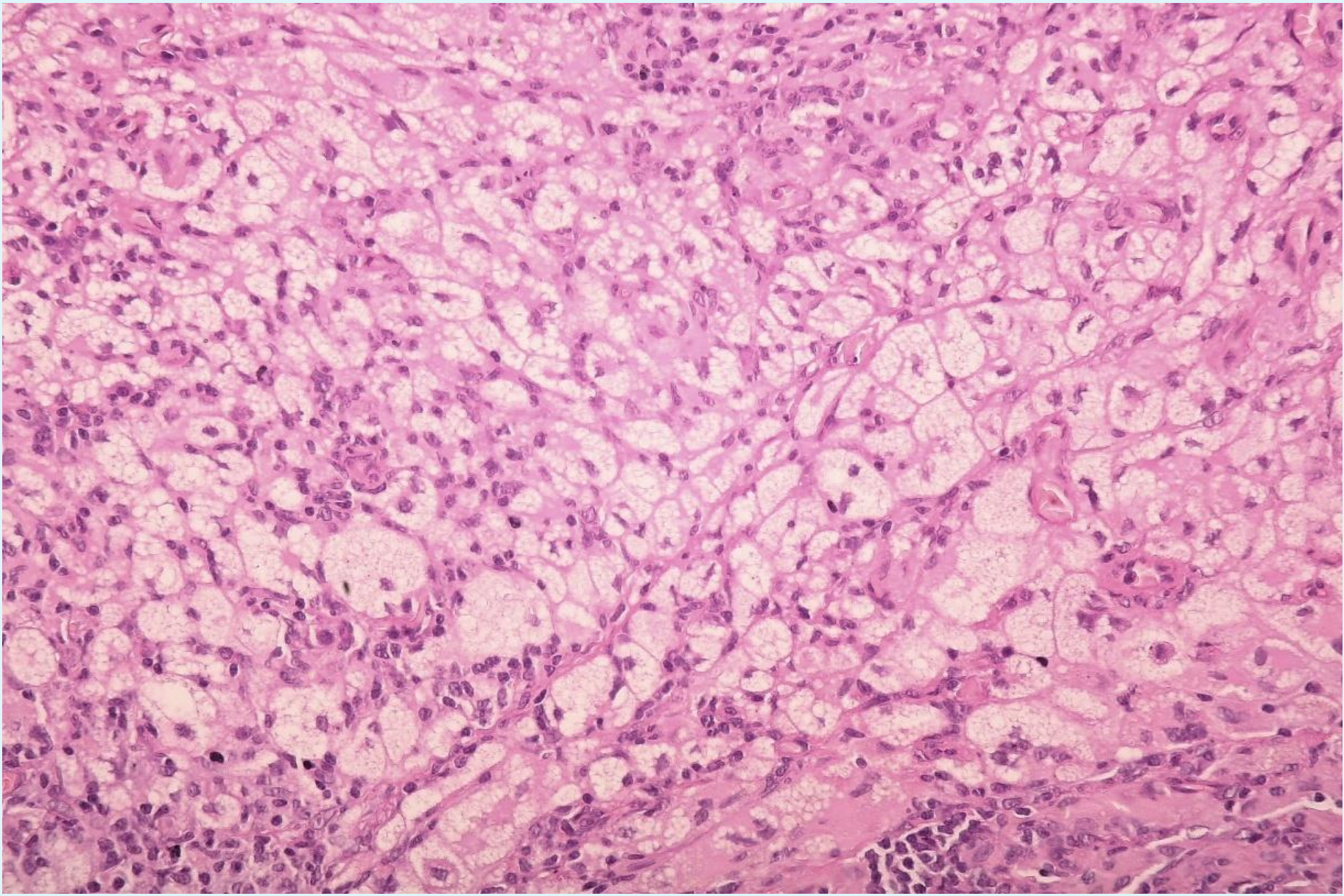
Case #4

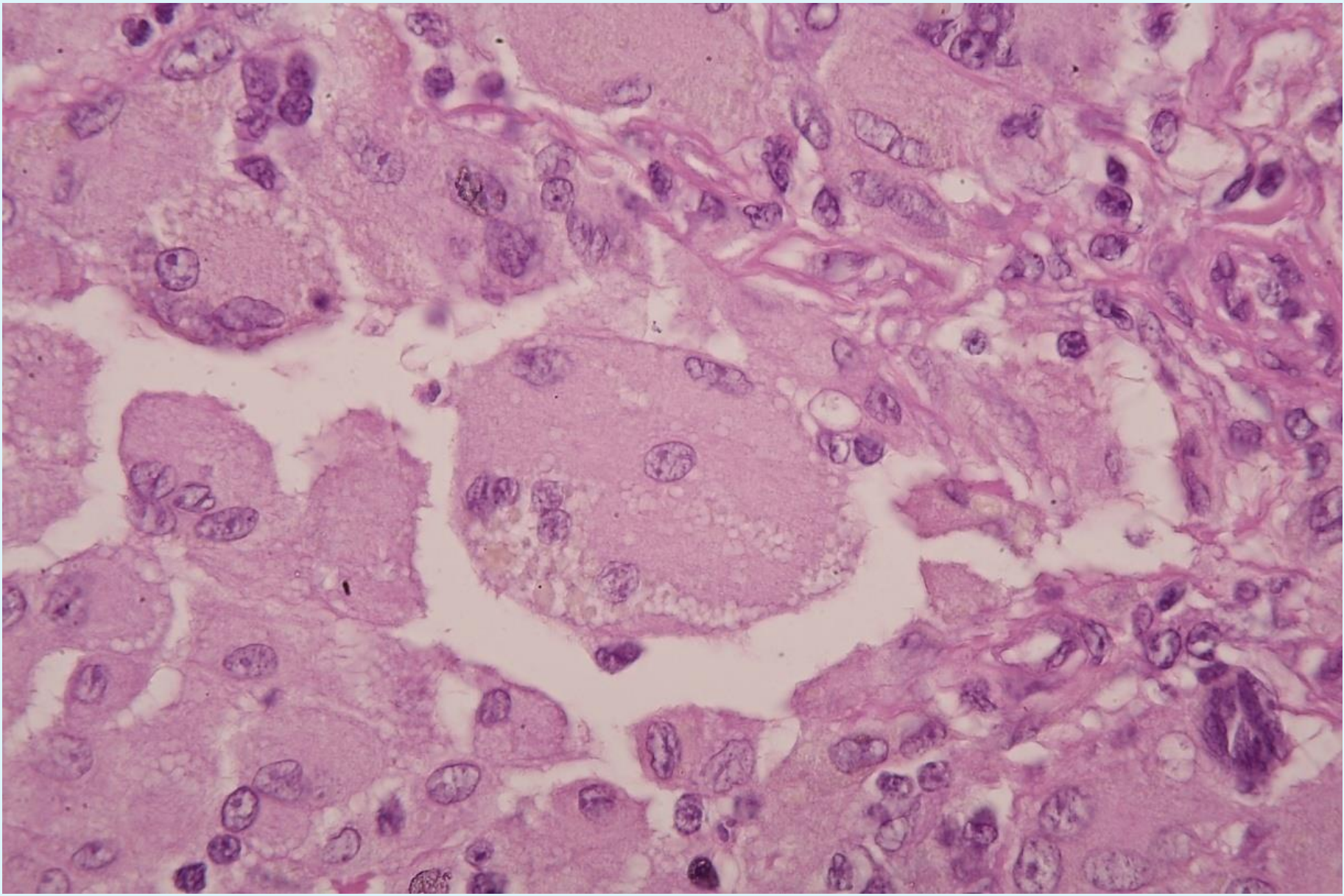
- Dog, Labrador, male, 8-months-old
- Cutaneous nodule on III phalanx
- SAMPLE: FNCS of nodule

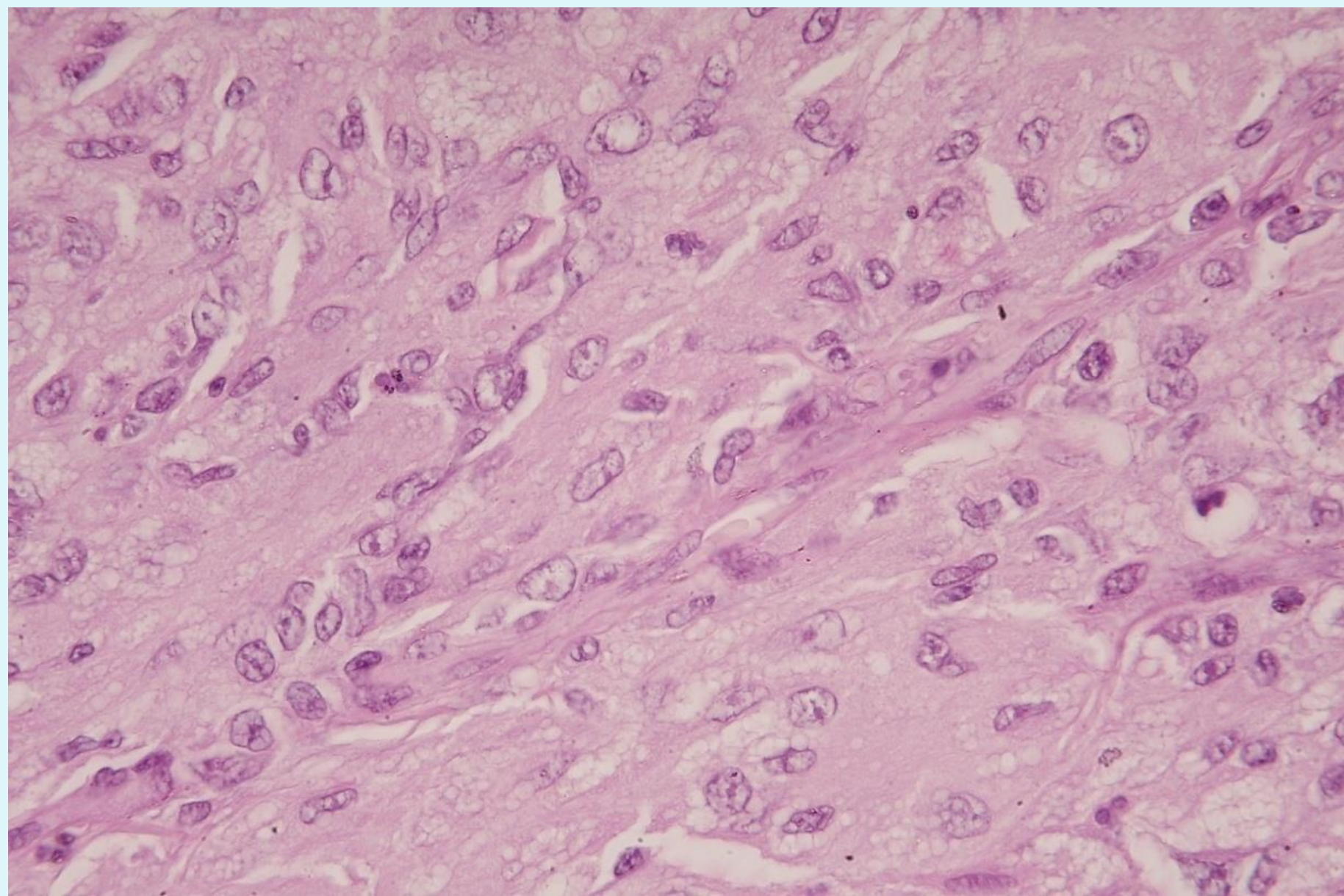










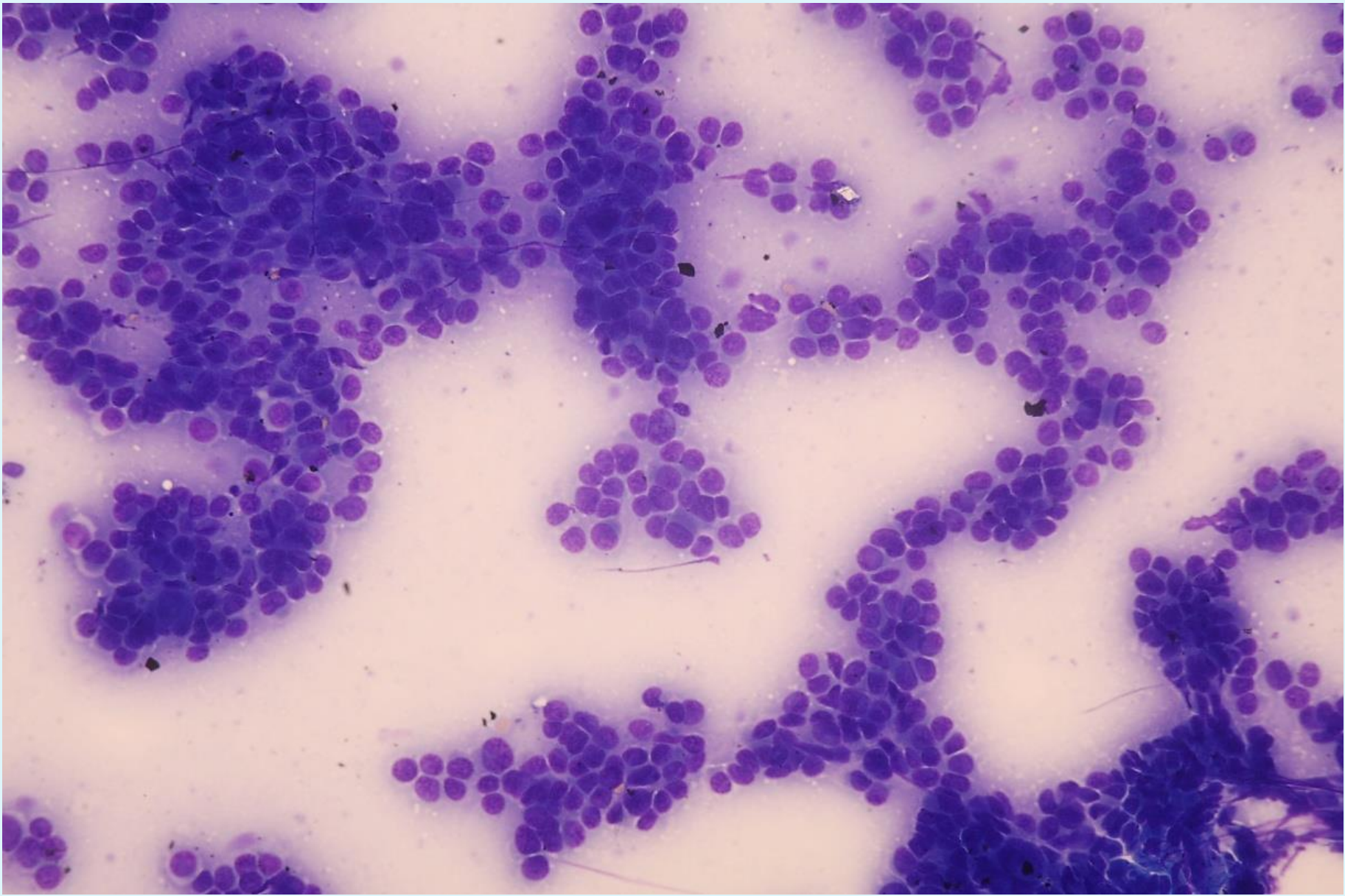


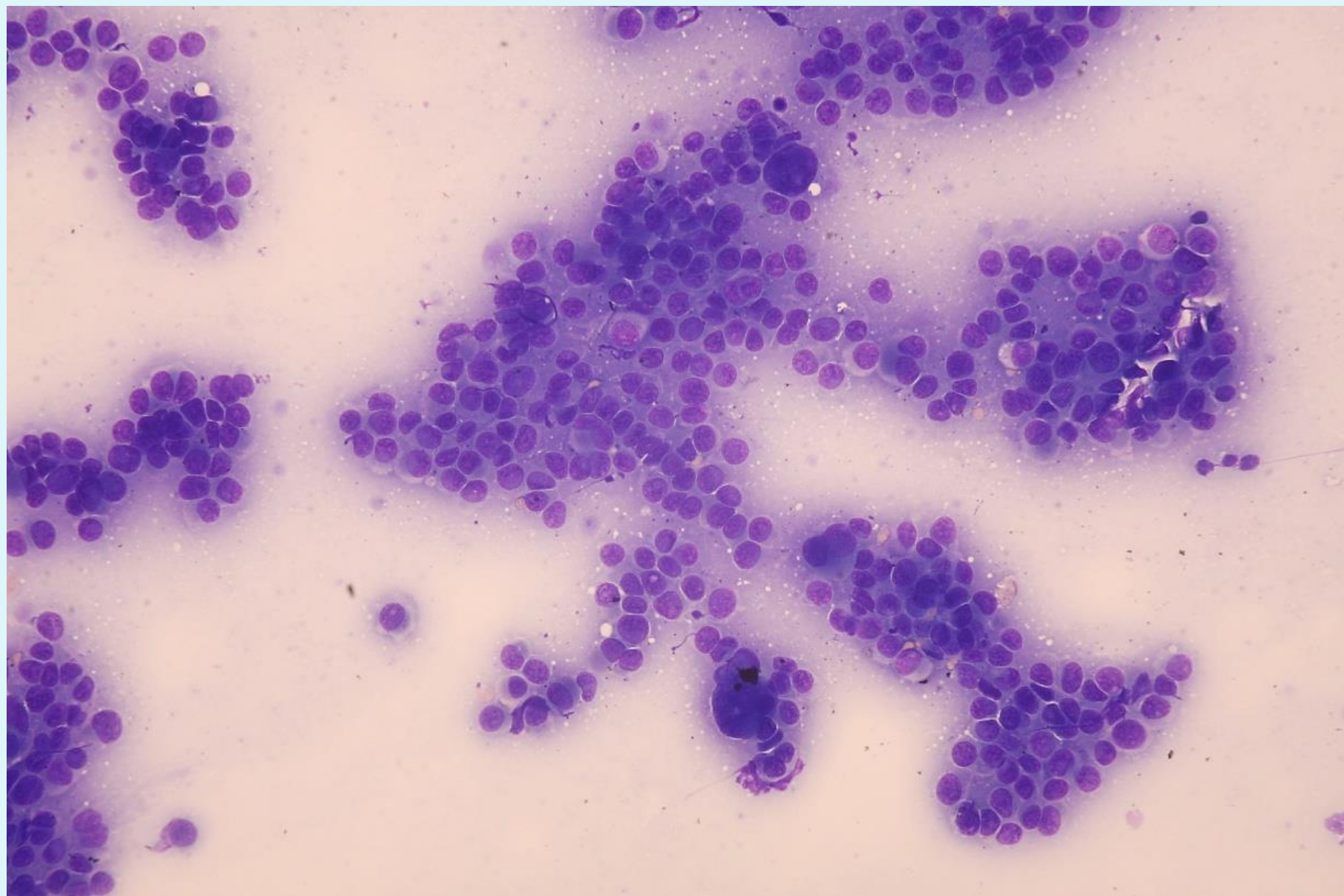
DIAGNOSIS

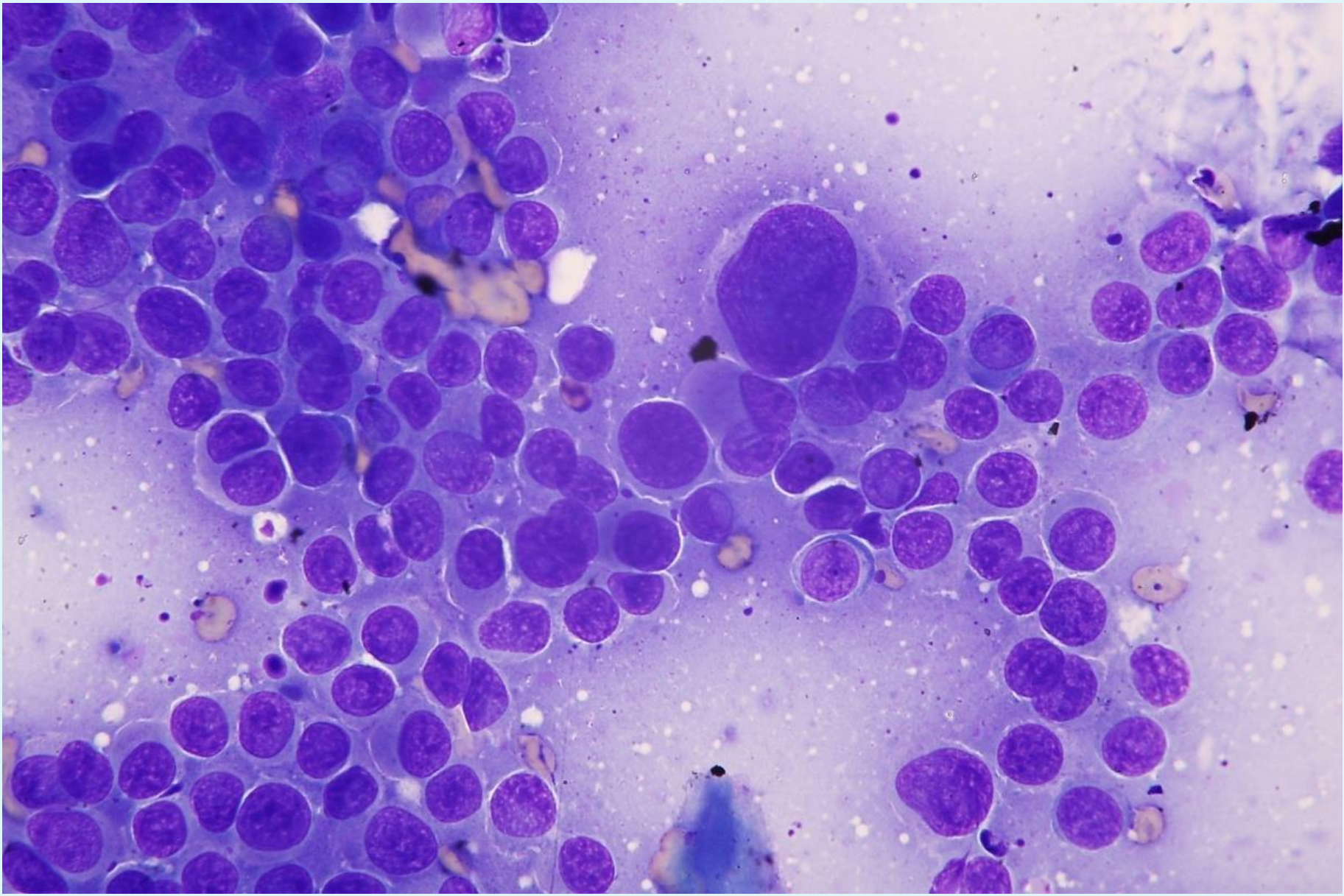
- Cytologic diagnosis: pyogranulomatous inflammation with lipophagocytosis
- Histologic diagnosis: Xantogranuloma
- Very rare in dog
- Consequence of the infiltration and deposition of lipoprotein into tissue, secondary to elevated serum lipid levels

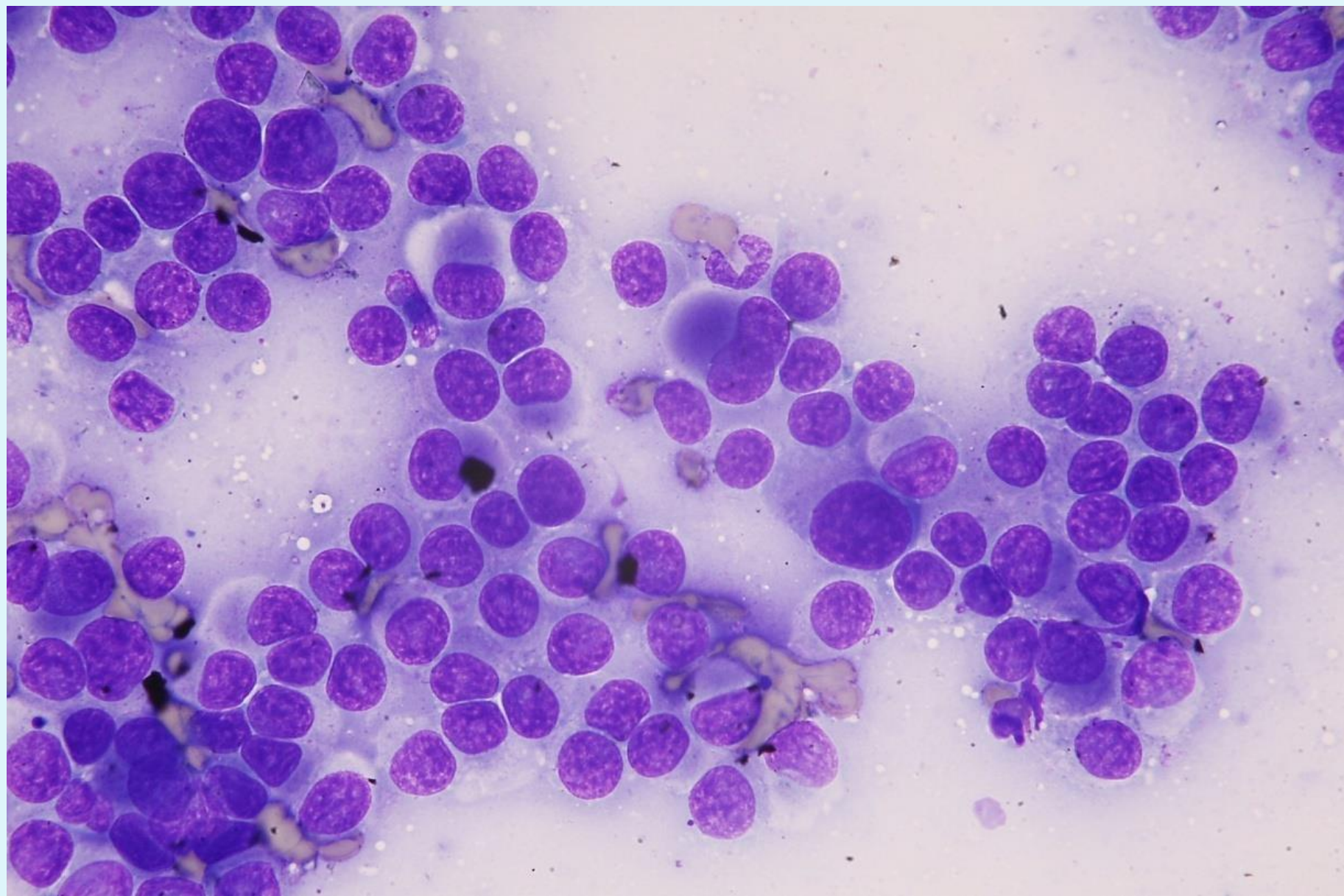
Case #8

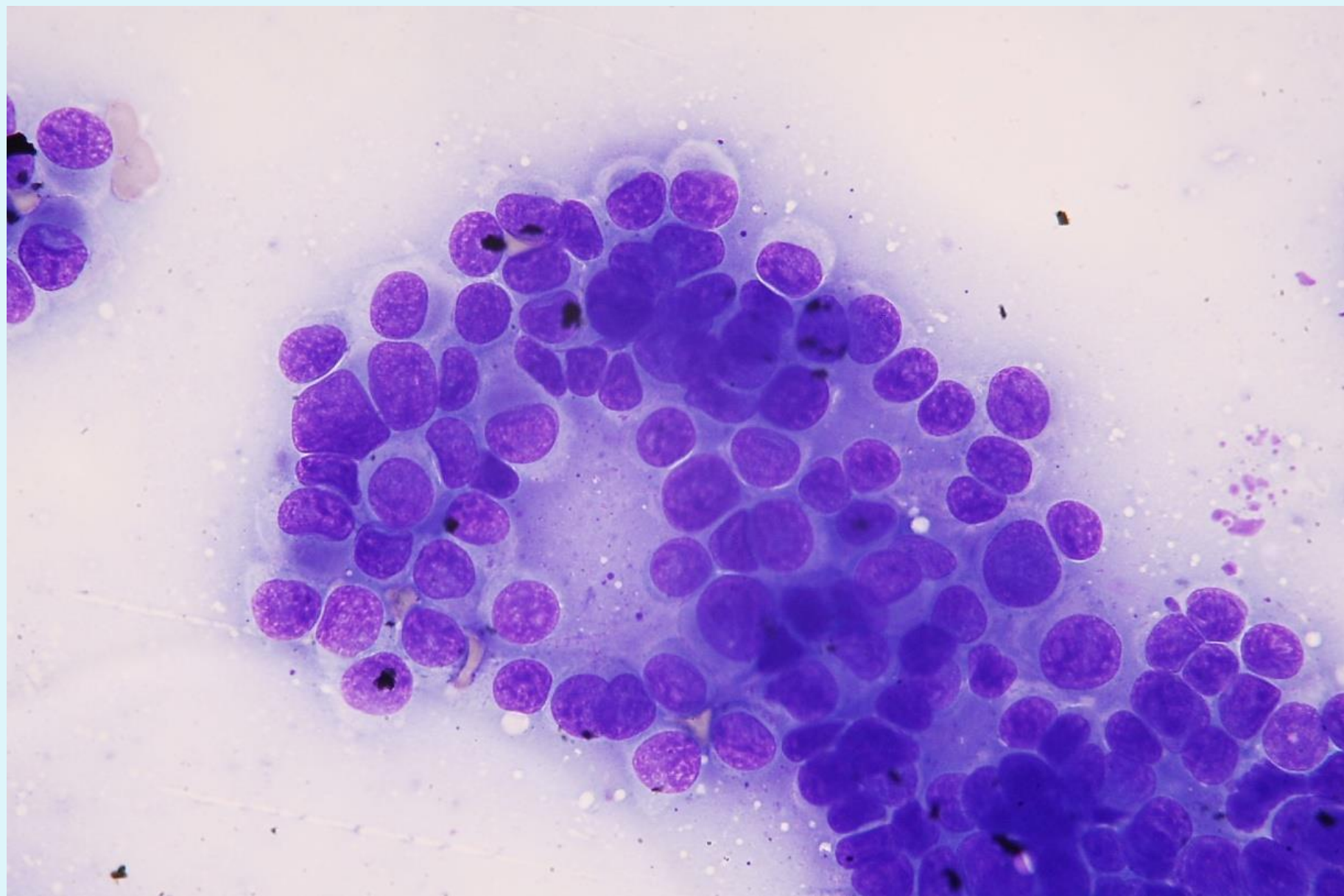
- Dog, mongrel, female, 11-years-old
- Multiple nodule on the skin
- SAMPLE: FNCS of a nodule

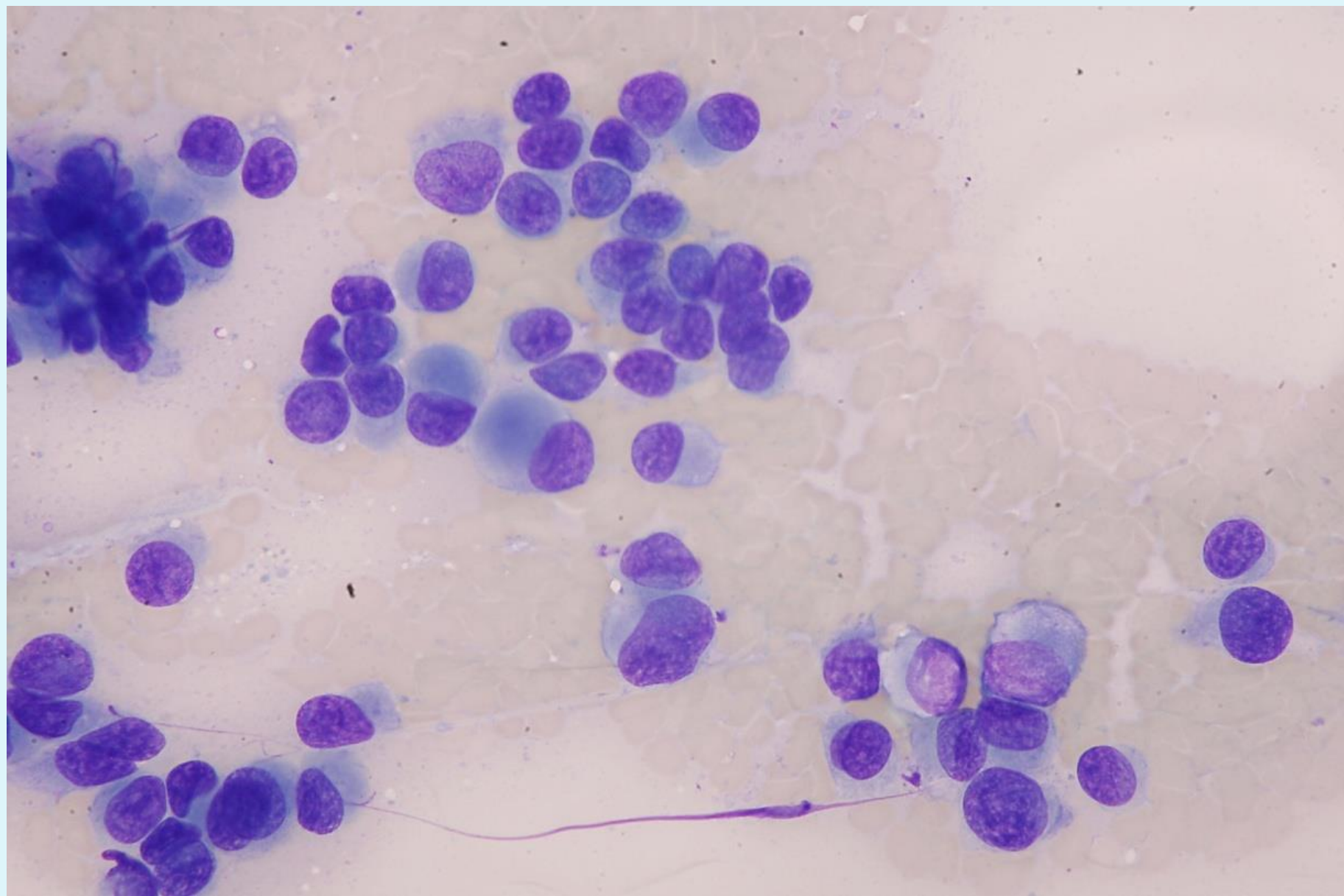


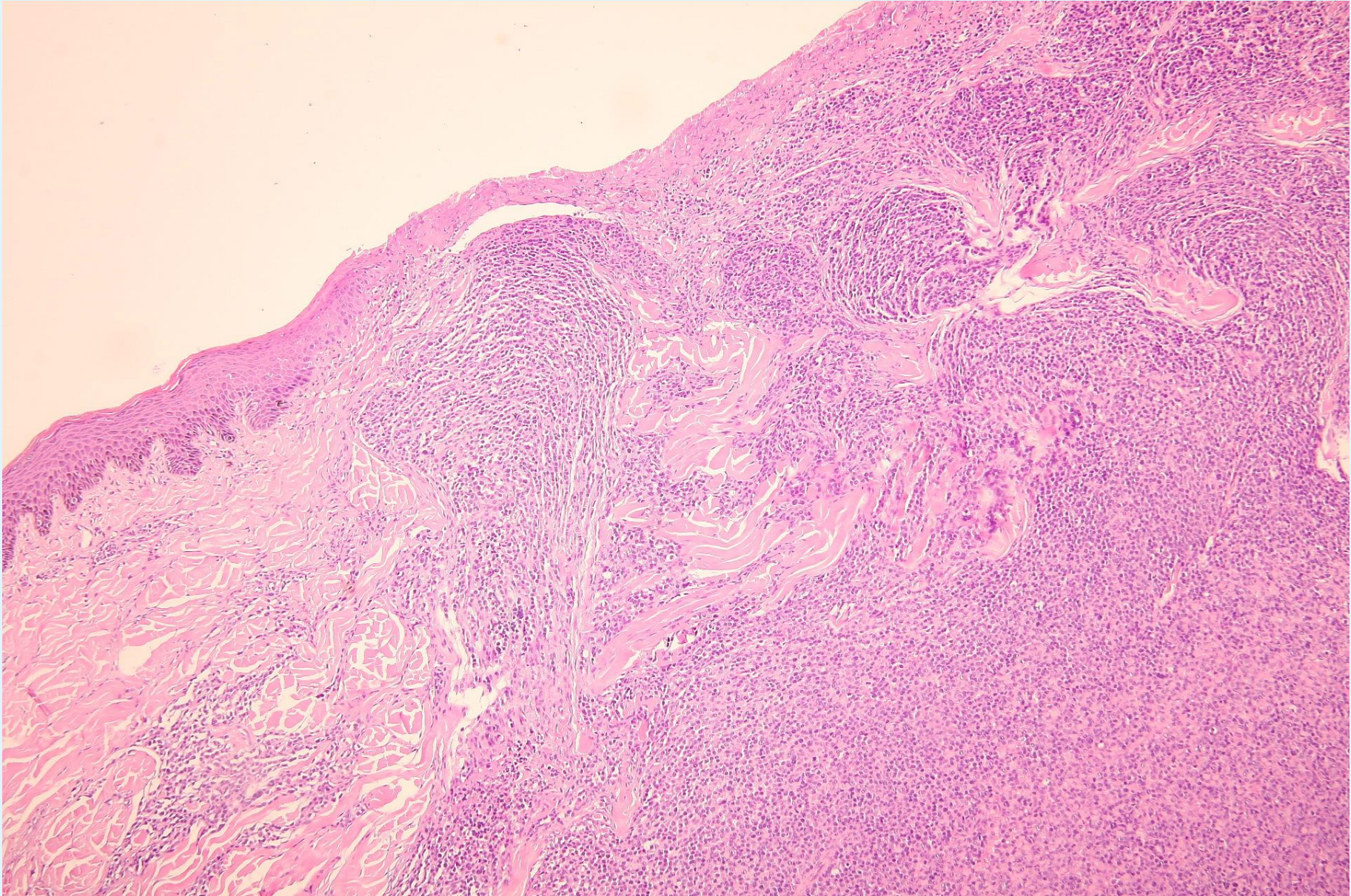


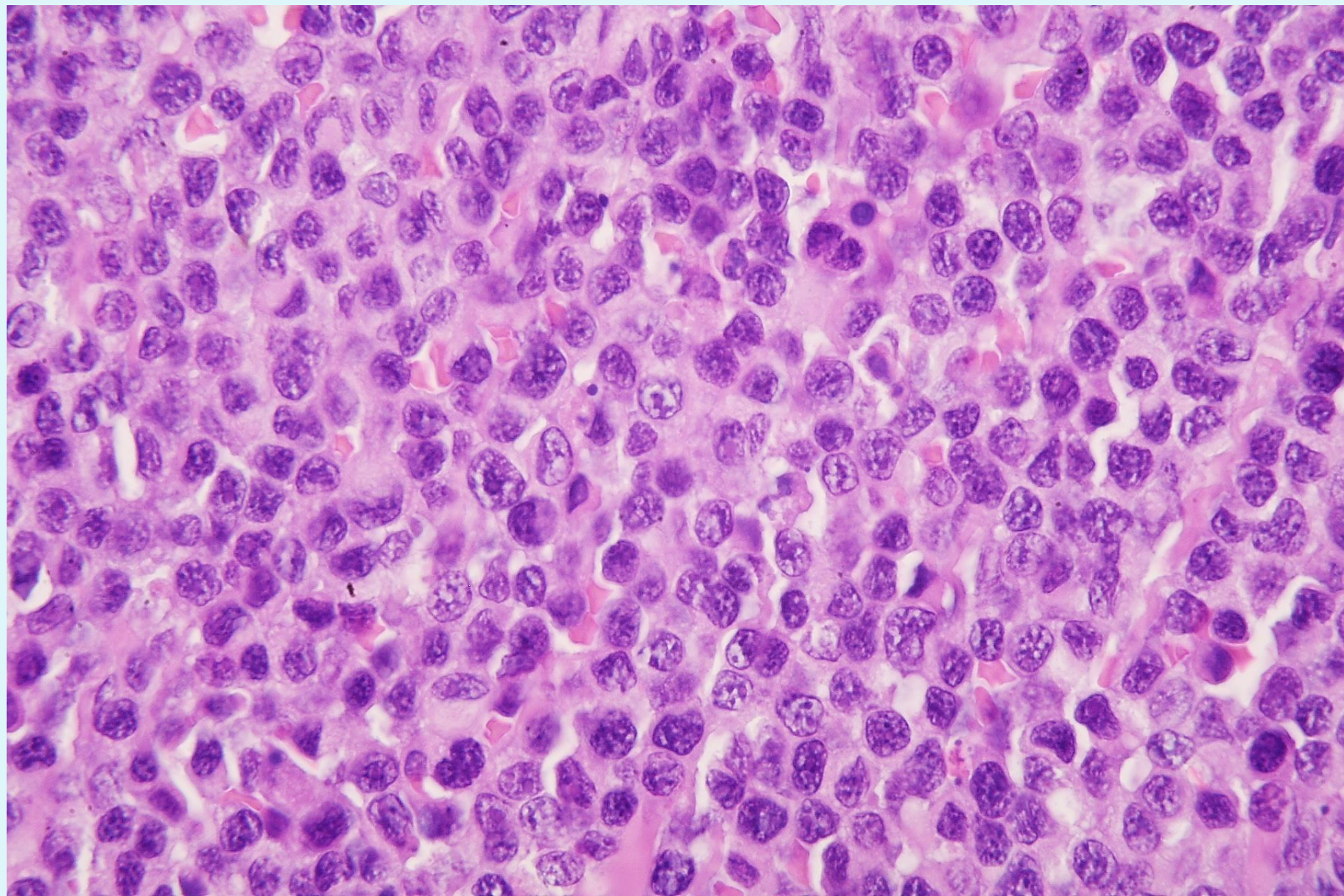


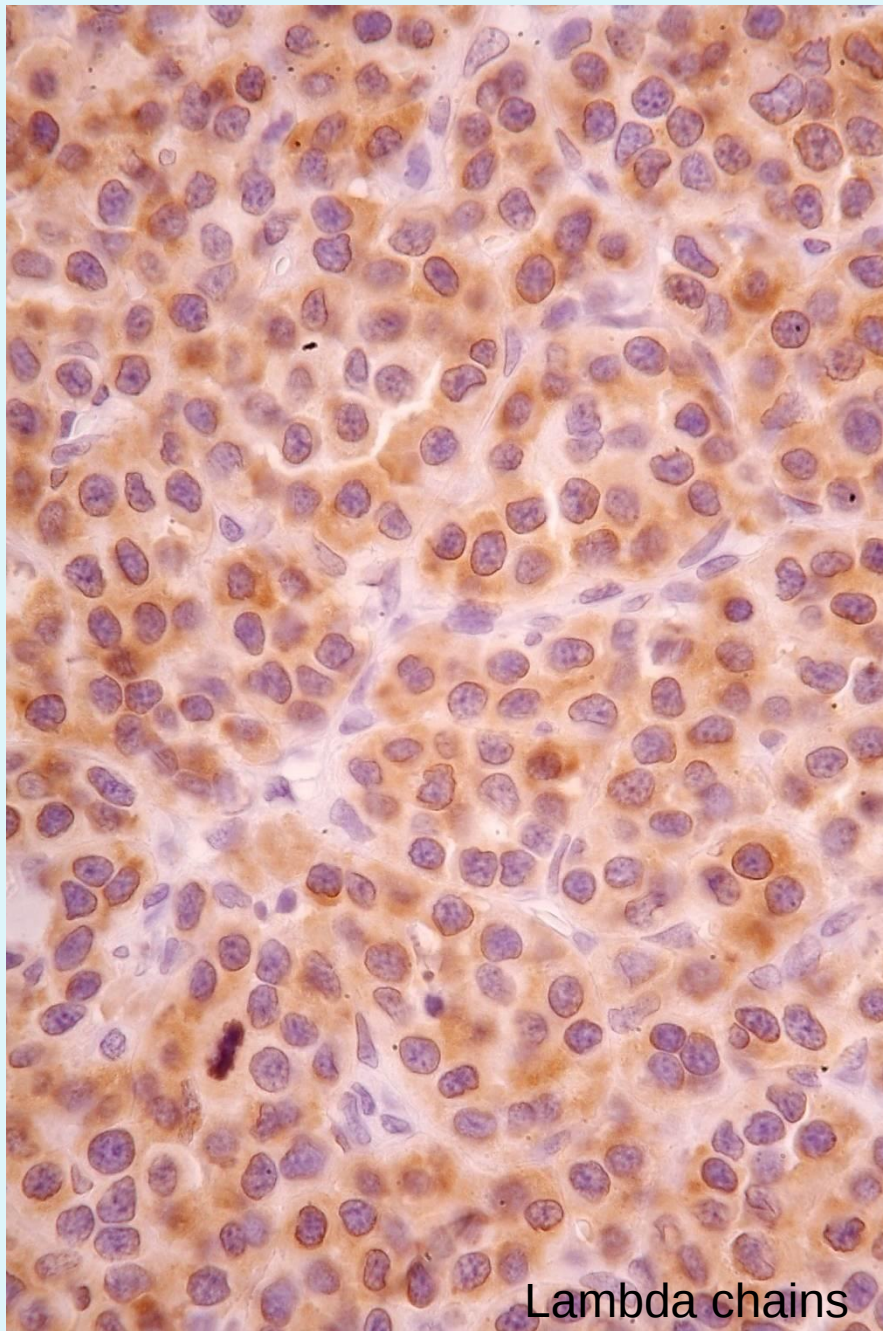












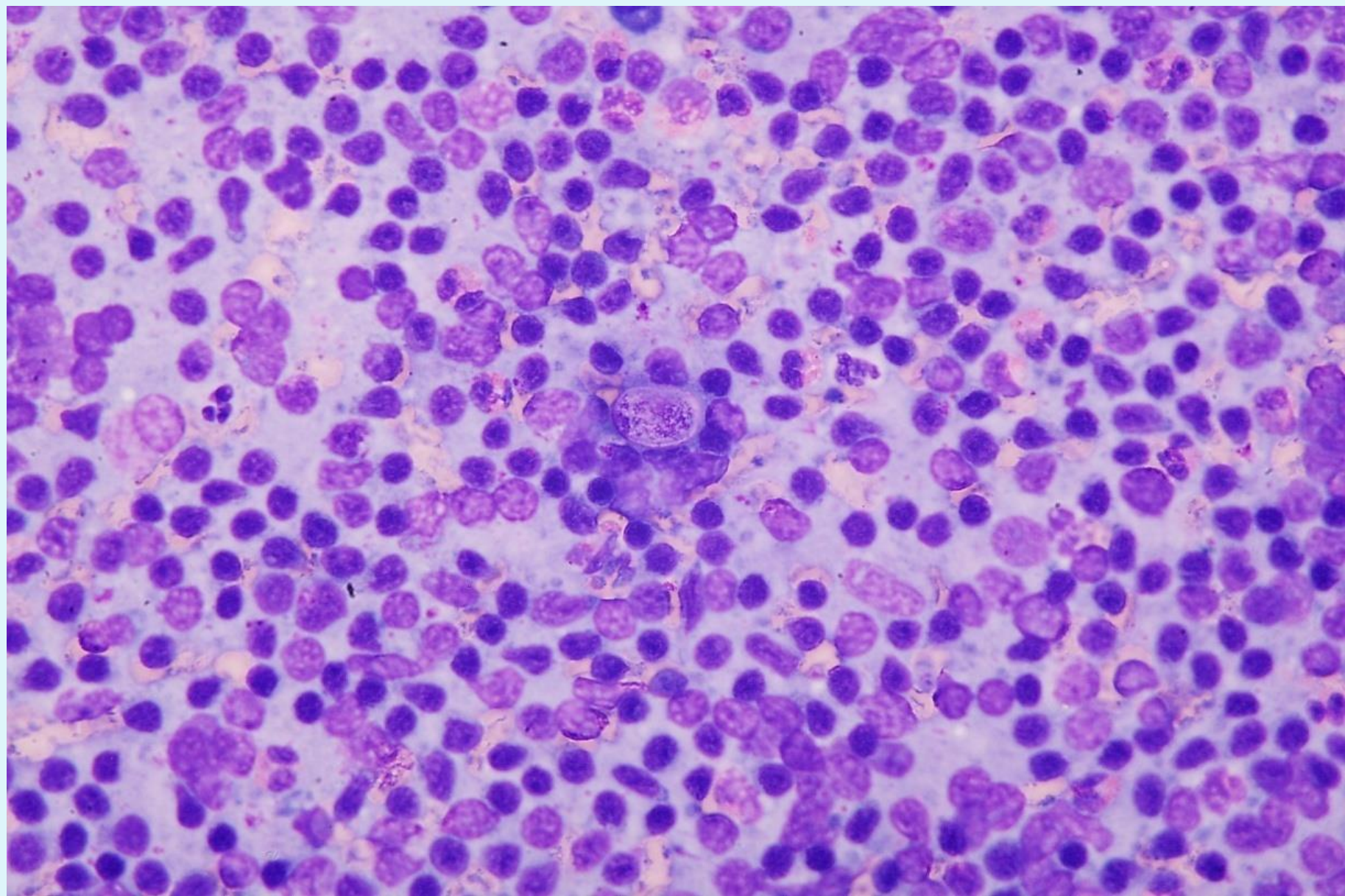
- CD3: rare scattered lymphocytes positive
- CD20: neoplastic cells irregularly positive
- CD18: rare scattered neoplastic cells positive
- Lambda chains: neoplastic cells diffusely positive

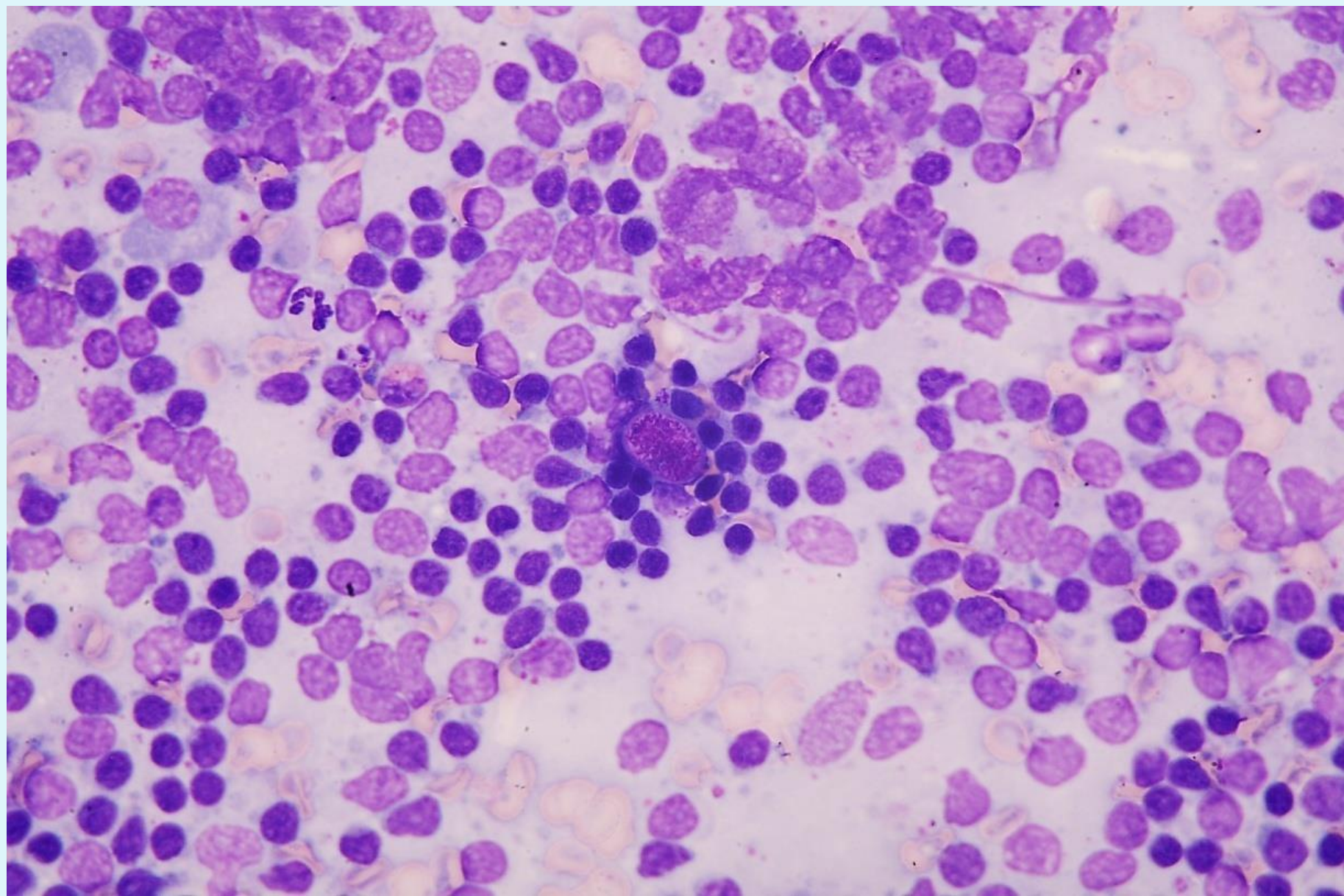
DIAGNOSIS

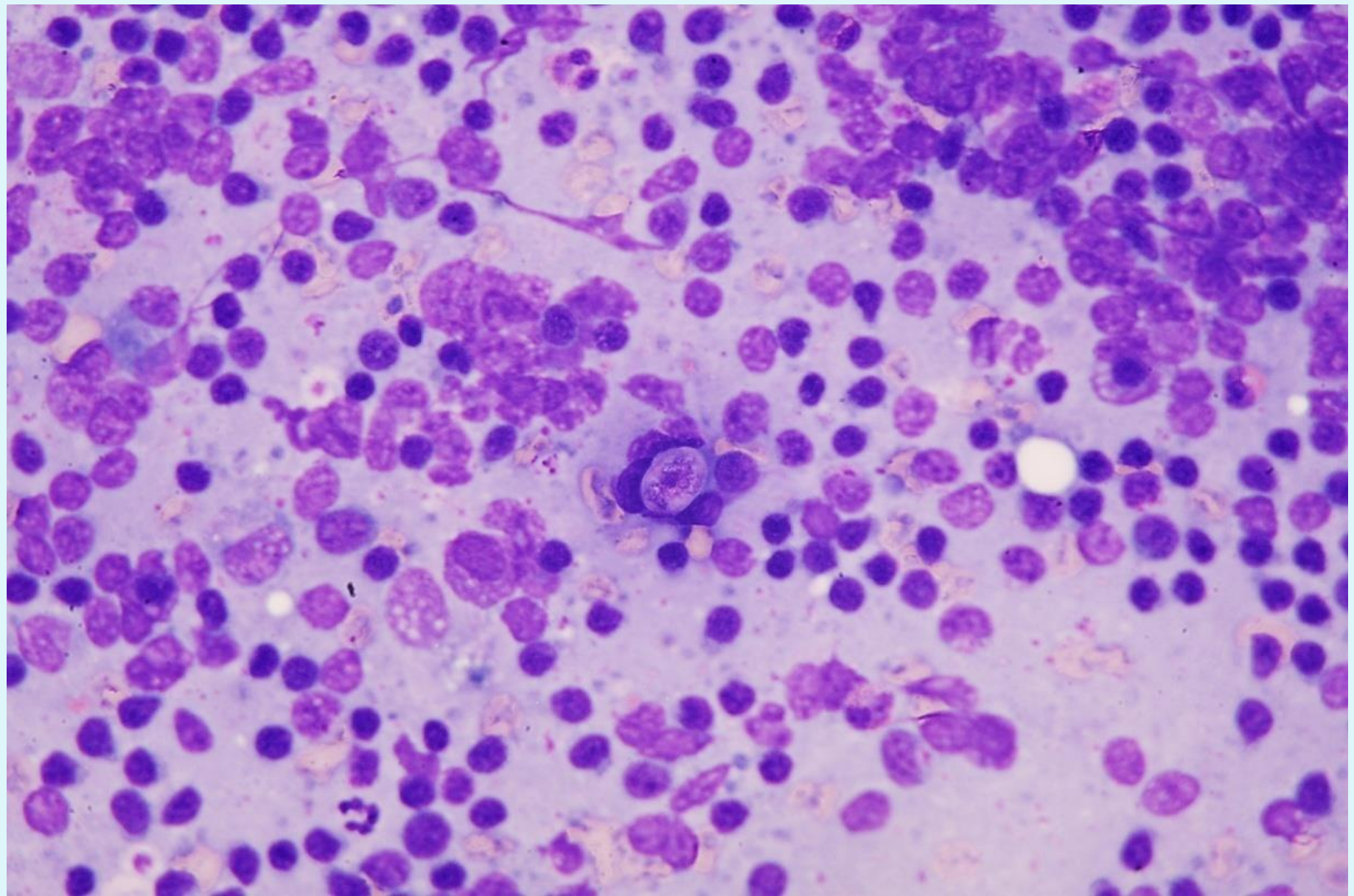
- Cytologic diagnosis: malignant round cell neoplasia, suggestive of plasmacytic origin
- Histologic diagnosis: malignant plasmocytoma

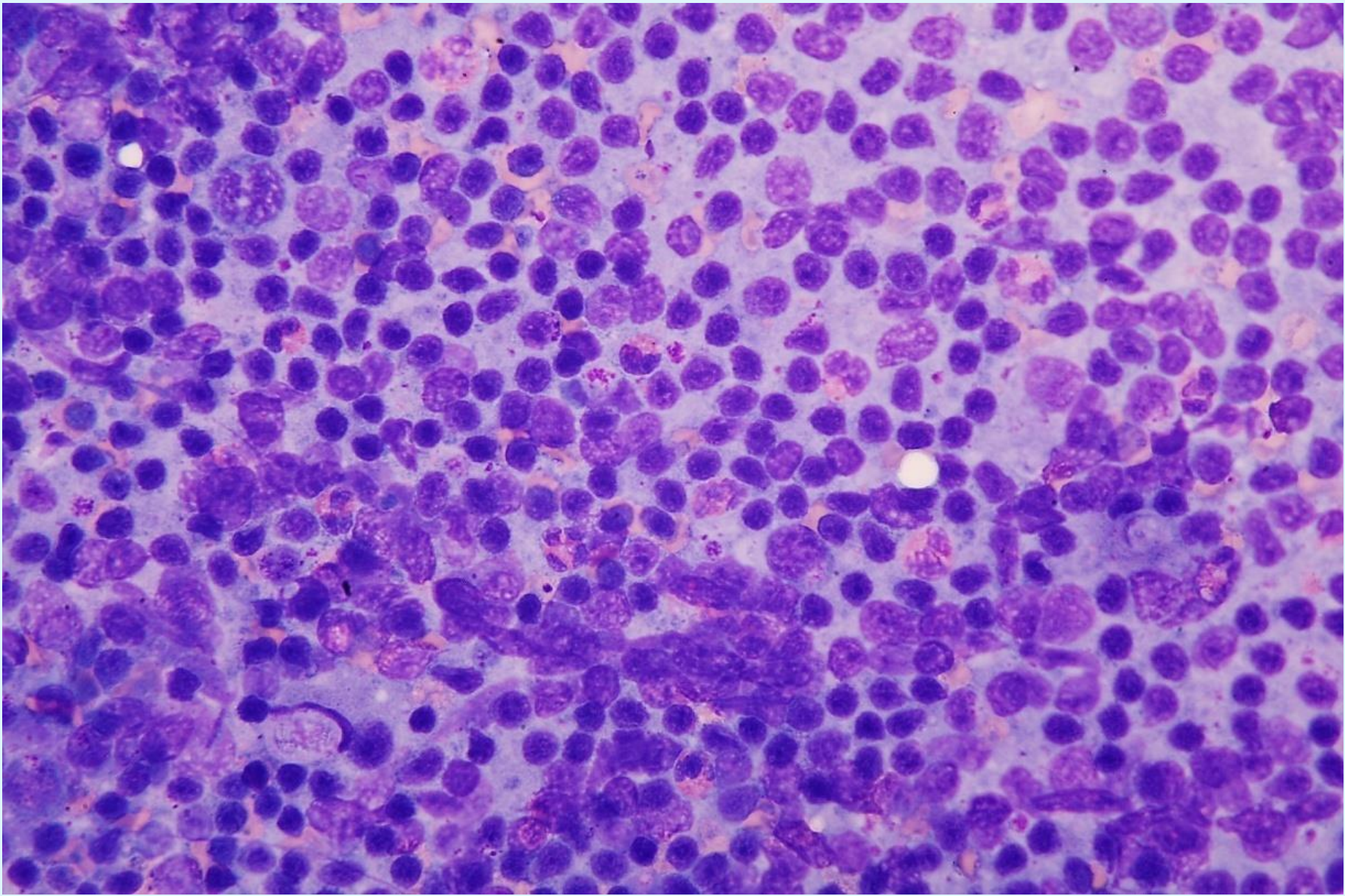
Case #6

- Dog, Setter, male, 2-years-old
- Diarroea in the last 3 months
- Hemorrhagic uveitis
- Lymphoadenomegaly
- SAMPLE: FNCS of lymphnode







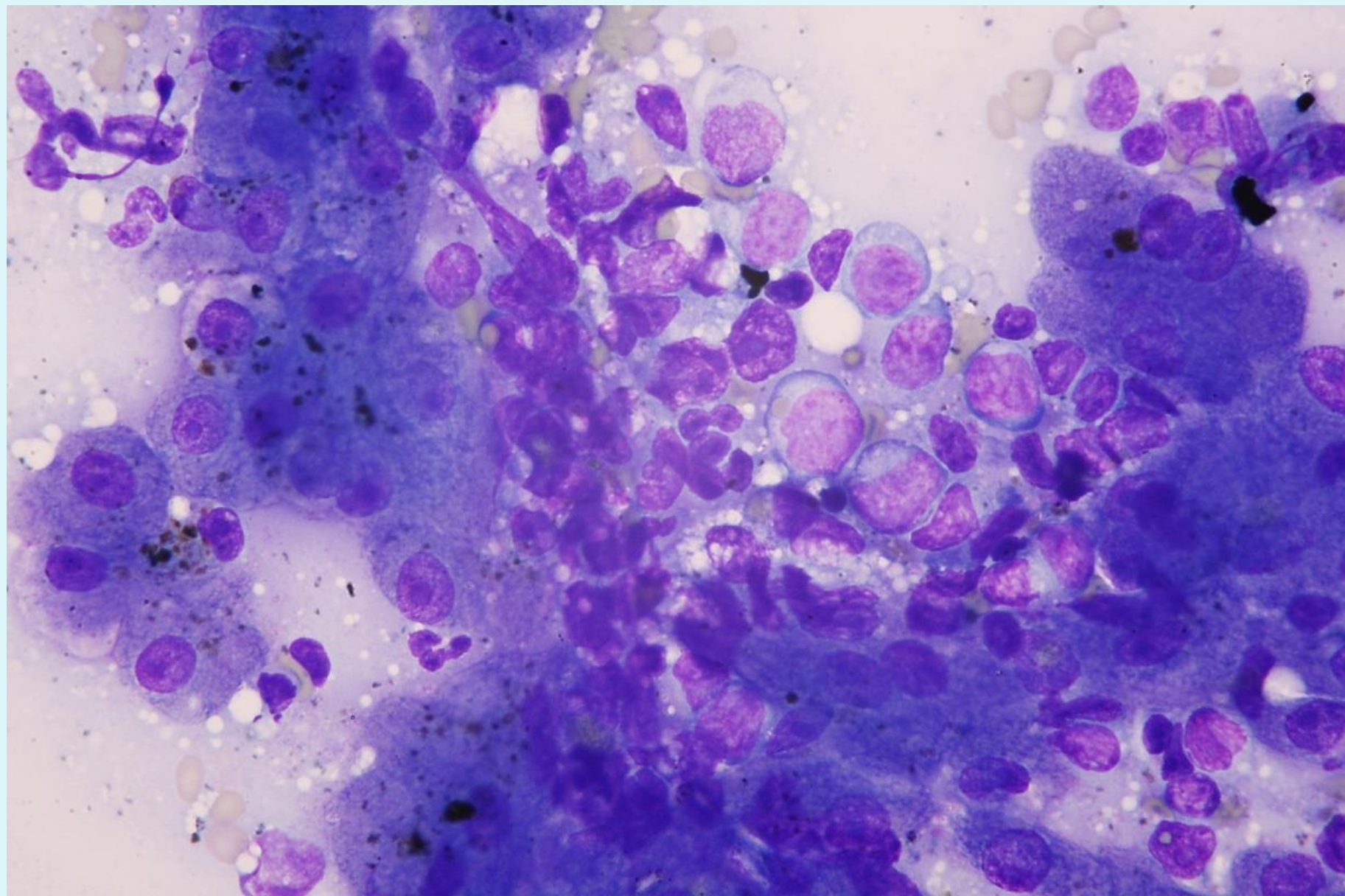


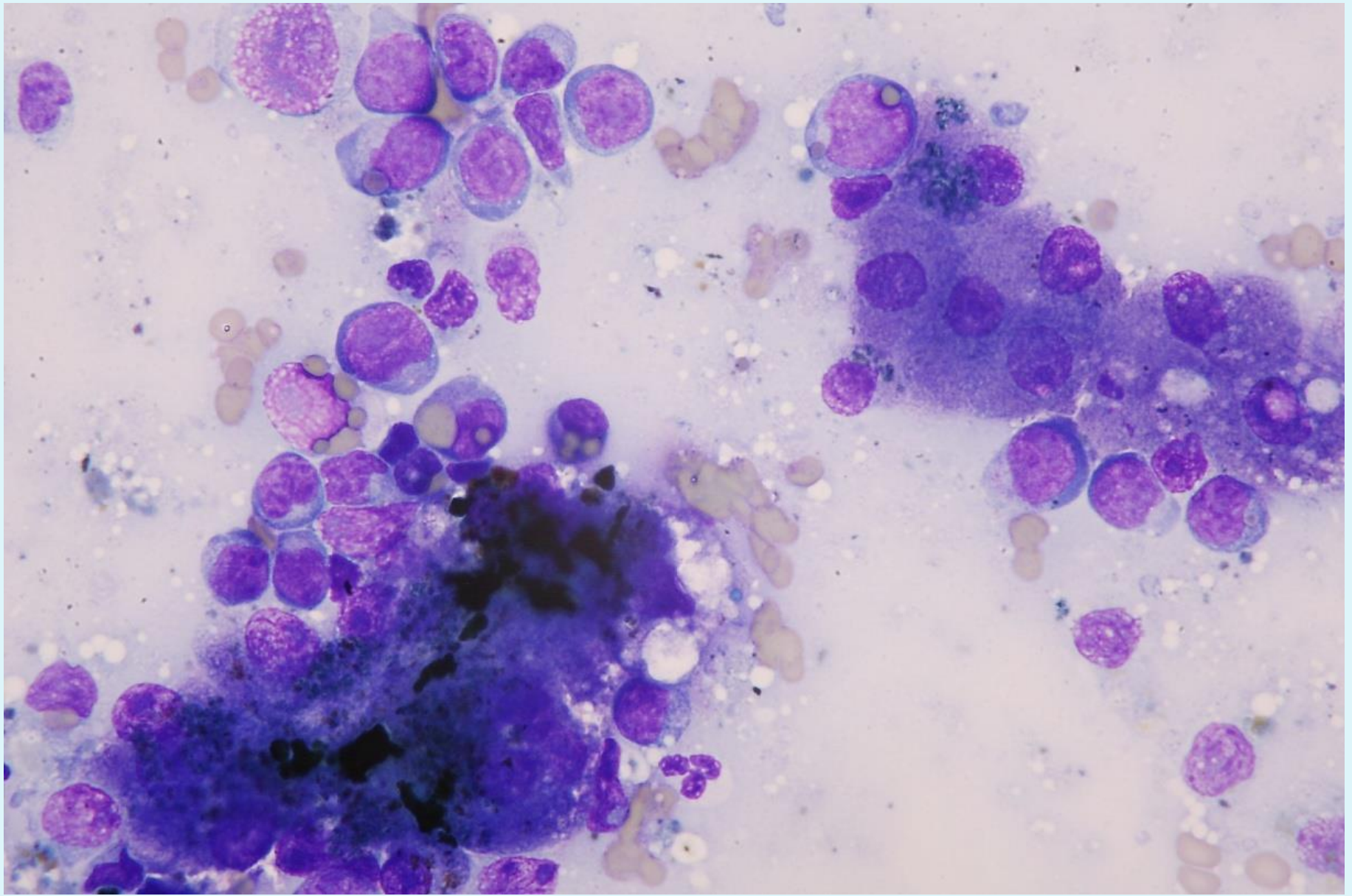
DIAGNOSIS

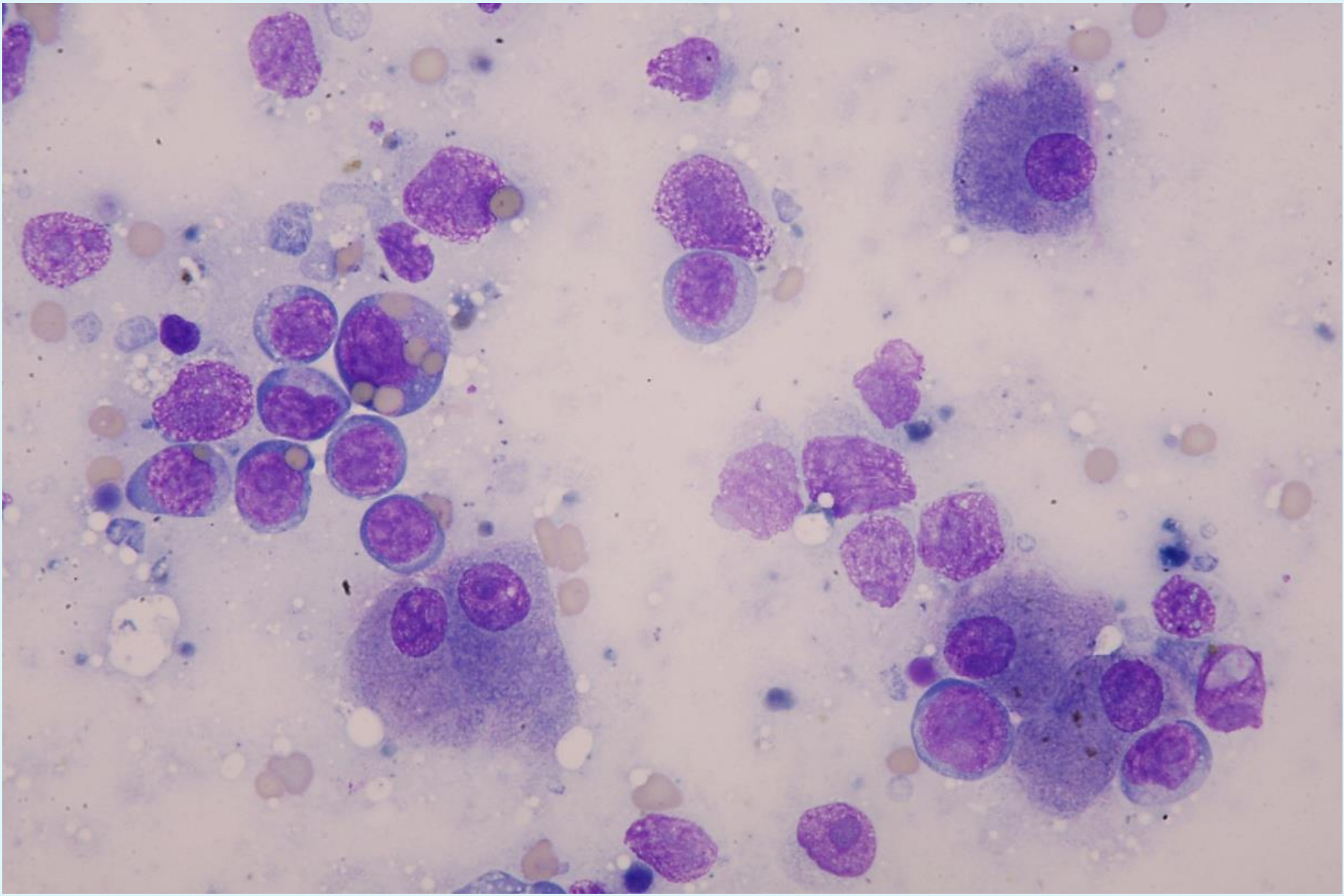
- Cytologic diagnosis: reactive lymphadenopathy; prothotecosis
- PCR: Prototheca zopfii genotype II

Case #7

- Cat, European short-hair, castrated male, 18-years-old
- Anorexia, jaundice
 - Ultrasonographic evaluation: hepatic mass
- **SAMPLE: FNCS of hepatic mass**







CASE REPORT

Erythrophagocytic low-grade extranodal T-cell lymphoma in a cat

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Key Words

Cat, erythrophagocytosis, hepatosplenic, lymphoma, PARR

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DOI:10.1111/j.1939-165X.2008.00073.x

Abstract: A 13-year-old male castrated domestic shorthair cat was presented to the referring veterinarian with a 2-month history of weight loss and lethargy. Splenomegaly, hepatomegaly, nonregenerative anemia, neutropenia, and hyperbilirubinemia were noted. Results of testing for feline immunodeficiency virus, feline leukemia virus, *Toxoplasma gondii*, and *Mycoplasma* sp. were negative. On cytologic examination of aspirates from the enlarged spleen and liver, a population of erythrophagocytic round cells was observed. Splenectomy and a liver biopsy were done which revealed a population of CD3+/CD79a- erythrophagocytic mononuclear round cells localized in the hepatic and splenic sinusoids. T-cell PARR (PCR for antigen receptor gene rearrangements) analysis of bone marrow and spleen demonstrated a single band indicative of a clonal proliferation of T-cells. Based on the marked splenomegaly, sinusoidal infiltration, lack of lymphadenopathy, and results of cytology, PARR, and immunophenotyping, a diagnosis of low-grade extranodal T-cell lymphoma was made. The cat was treated with chlorambucil and prednisolone; clinical and laboratory abnormalities resolved and the cat has remained clinically normal for 2.5 years. To our knowledge, this report documents the first case of an erythrophagocytic T-cell lymphoma in a cat. The clinicopathologic findings were suggestive of hepatosplenic T-cell lymphoma, a neoplasm described previously only in humans and dogs.

Case Presentation

A 13-year-old male castrated domestic shorthair cat was presented to the North Carolina State University Veterinary Teaching Hospital (NCSU-VTH) Internal Medicine Service with a 2-month history of weight loss and lethargy. Anemia (hemoglobin [HGB] 7.4 g/dL, reference interval 9.0–15.1 g/dL), neutropenia (1550/μL, reference interval 2500–12,500/μL), and hyperbilirubinemia (1.5 mg/dL, reference interval 0.1–0.4 mg/dL) were noted by the referring veterinarian (LaserCyte, IDEXX Laboratories, Atlanta, GA, USA). The results of tests for feline immunodeficiency virus (FIV) antibody, feline leukemia virus (FeLV) antigen, *Mycoplasma* antibody, FIV western blot (Antech Diagnostics, Charlotte, NC, USA), and IgG and IgM antibodies to *Toxoplasma gondii* (Antech Diagnostics) were negative. Thoracic and abdominal radiographic findings were also normal. The cat was prescribed prednisone (5 mg PO SID), amoxicillin (5 mg PO SID), and

enrofloxacin (22.7 mg PO SID). After 2 weeks of treatment, the weight loss and anemia continued and the cat was referred for further diagnostics.

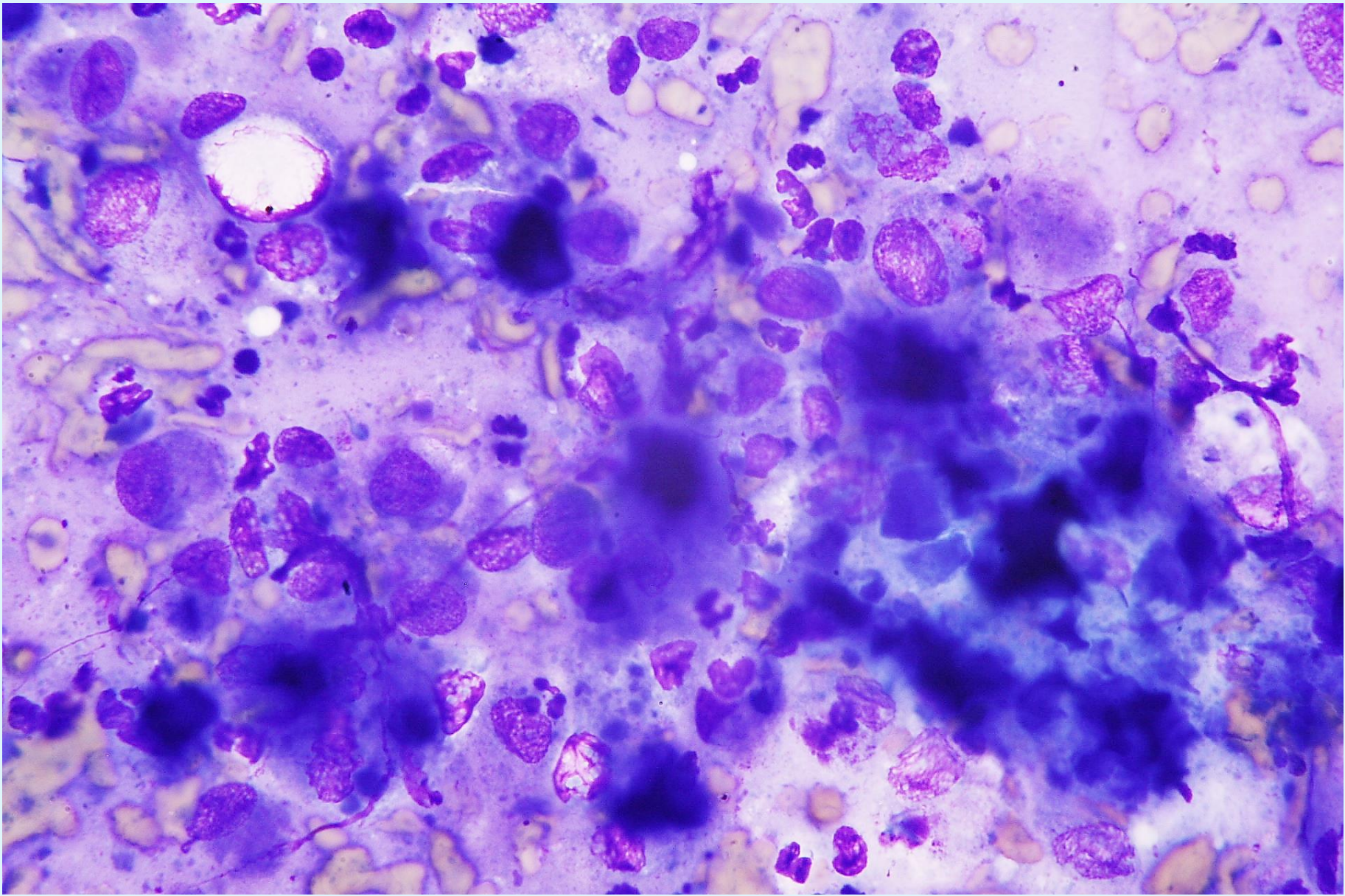
Upon presentation to the NCSU-VTH, 1 month after initial presentation to the referring veterinarian, the cat was bright, alert, and hydrated. Physical examination findings were unremarkable, except for cranial organomegaly on abdominal palpation. Results of a CBC (ADVIA 120, Siemens, Tarrytown, NY, USA) indicated nonregenerative, macrocytic anemia (HCT 19.8%, reference interval 32.8–49.8%; RBC $3.47 \times 10^6/\mu\text{L}$, reference interval $6.91\text{--}10.49 \times 10^6/\mu\text{L}$; HGB 6.0 g/dL, reference interval 10.9–16.0 g/dL; MCV 57.3 fL, reference interval 40.7–53.8 fL); the reticulocyte count was 27,760/μL (manual count using a Miller disc, reference interval < 60,000/μL). Total and differential WBC count, platelet count, and plasma protein concentration were within reference intervals. On blood smears, mild polychromasia was noted. Results of serum chemistry analysis (Roche/Hitachi 912,

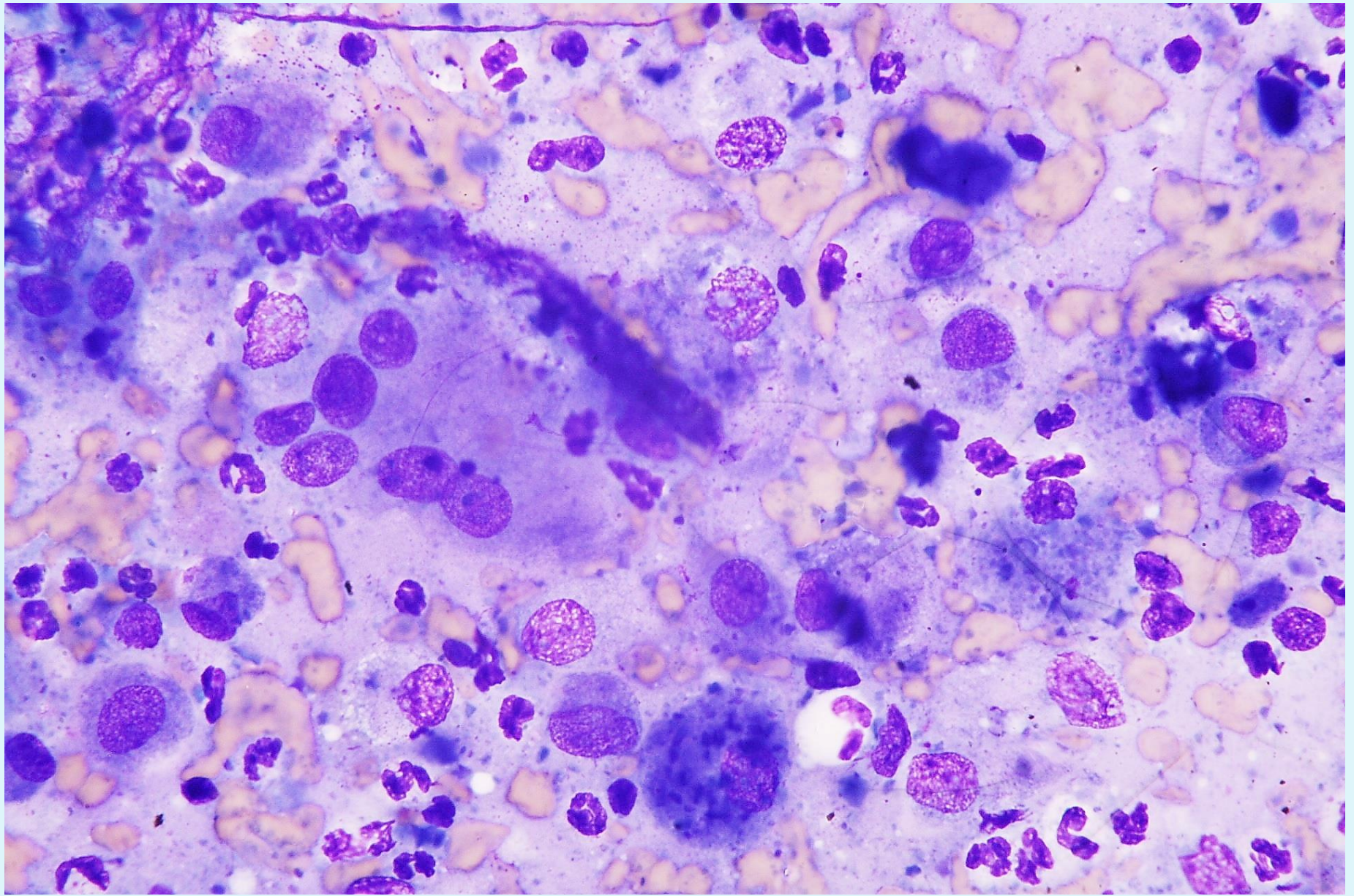
DIAGNOSIS

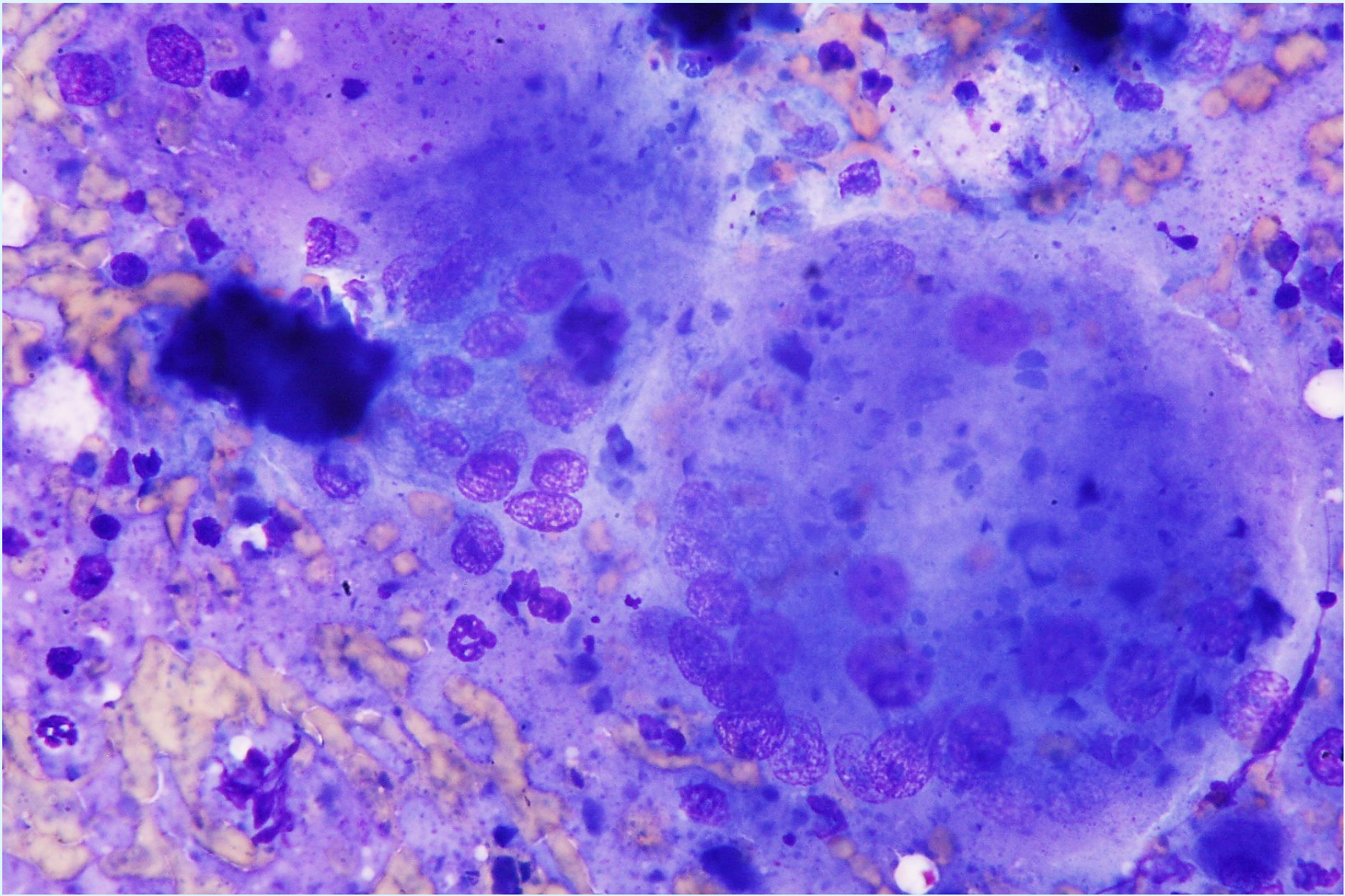
- Cytologic diagnosis: high-grade lymphoma with erithrophagocytic activity

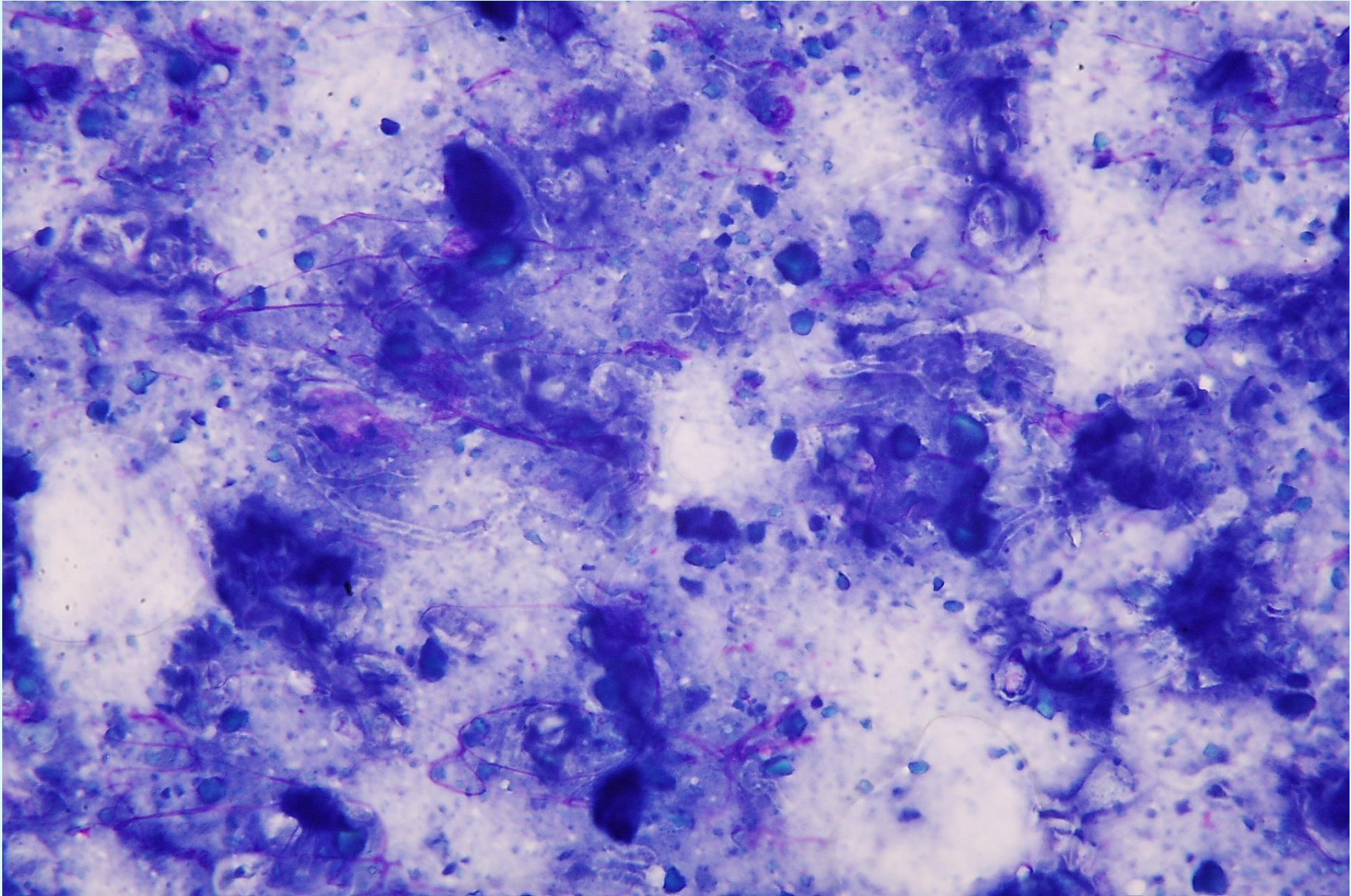
Case #8

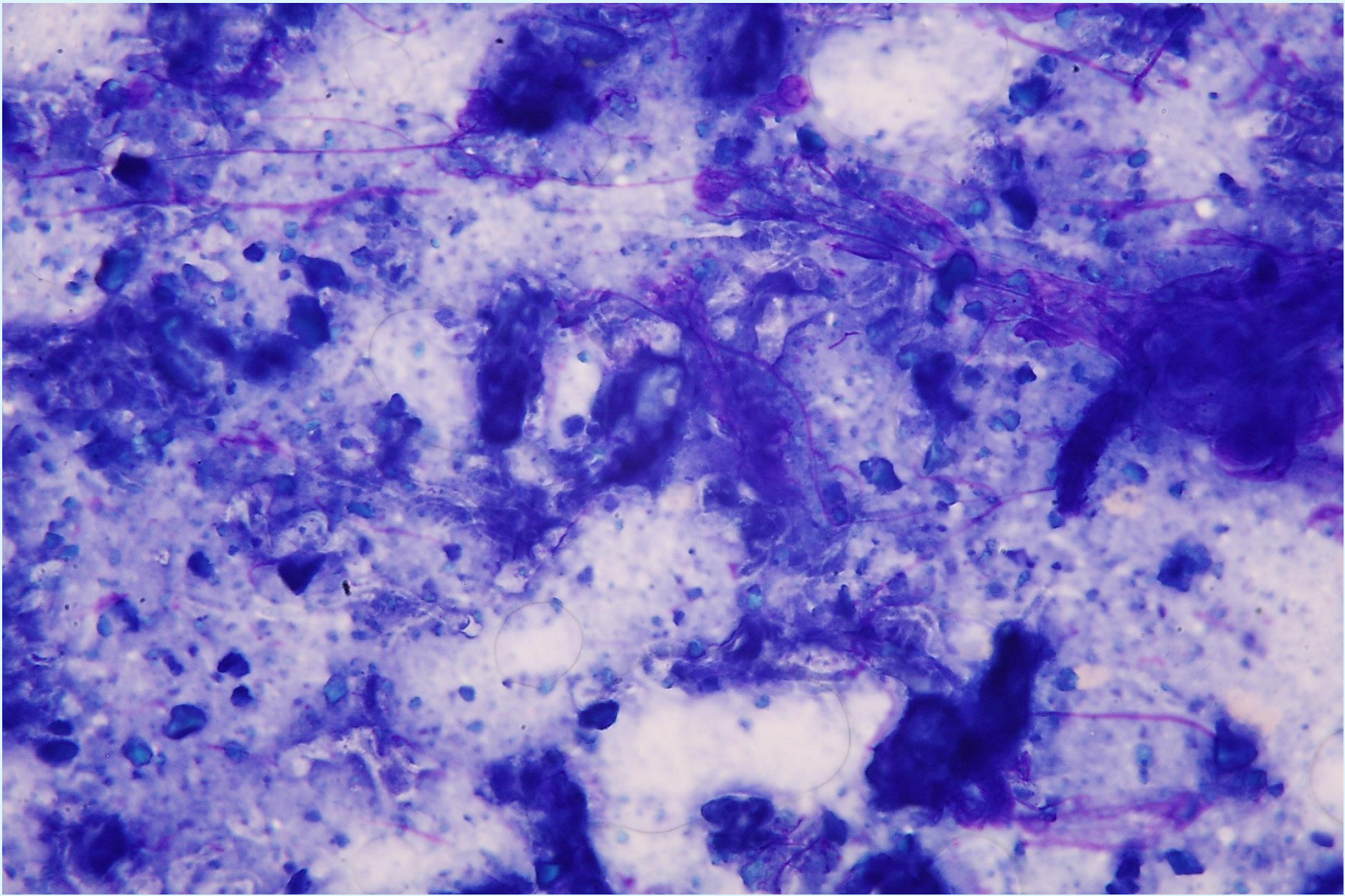
- Cat, Persian, female, 8-years-old
- Cutaneous and subcutaneous mass on abdomen
- SAMPLE: FNCS of the mass

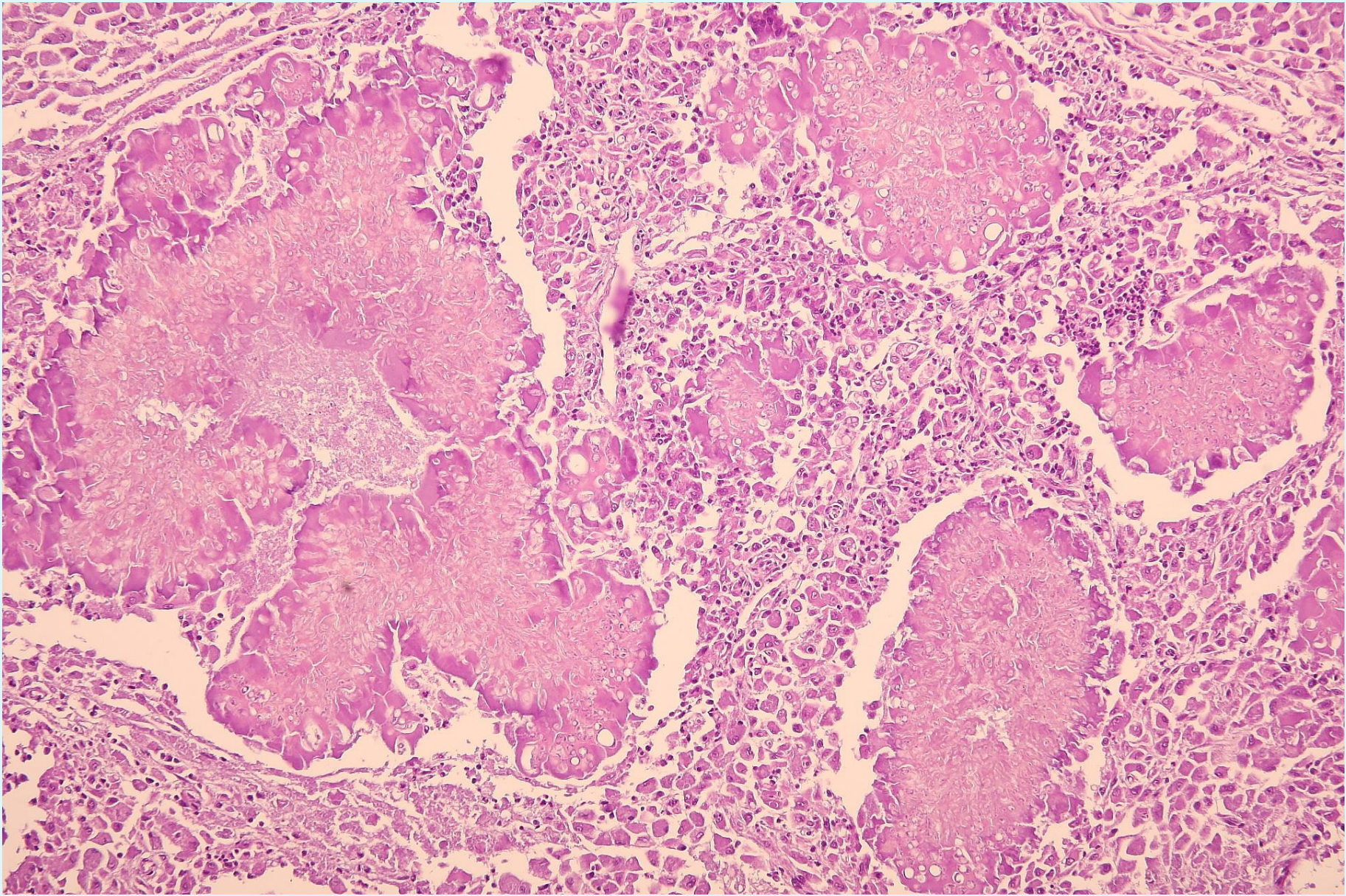


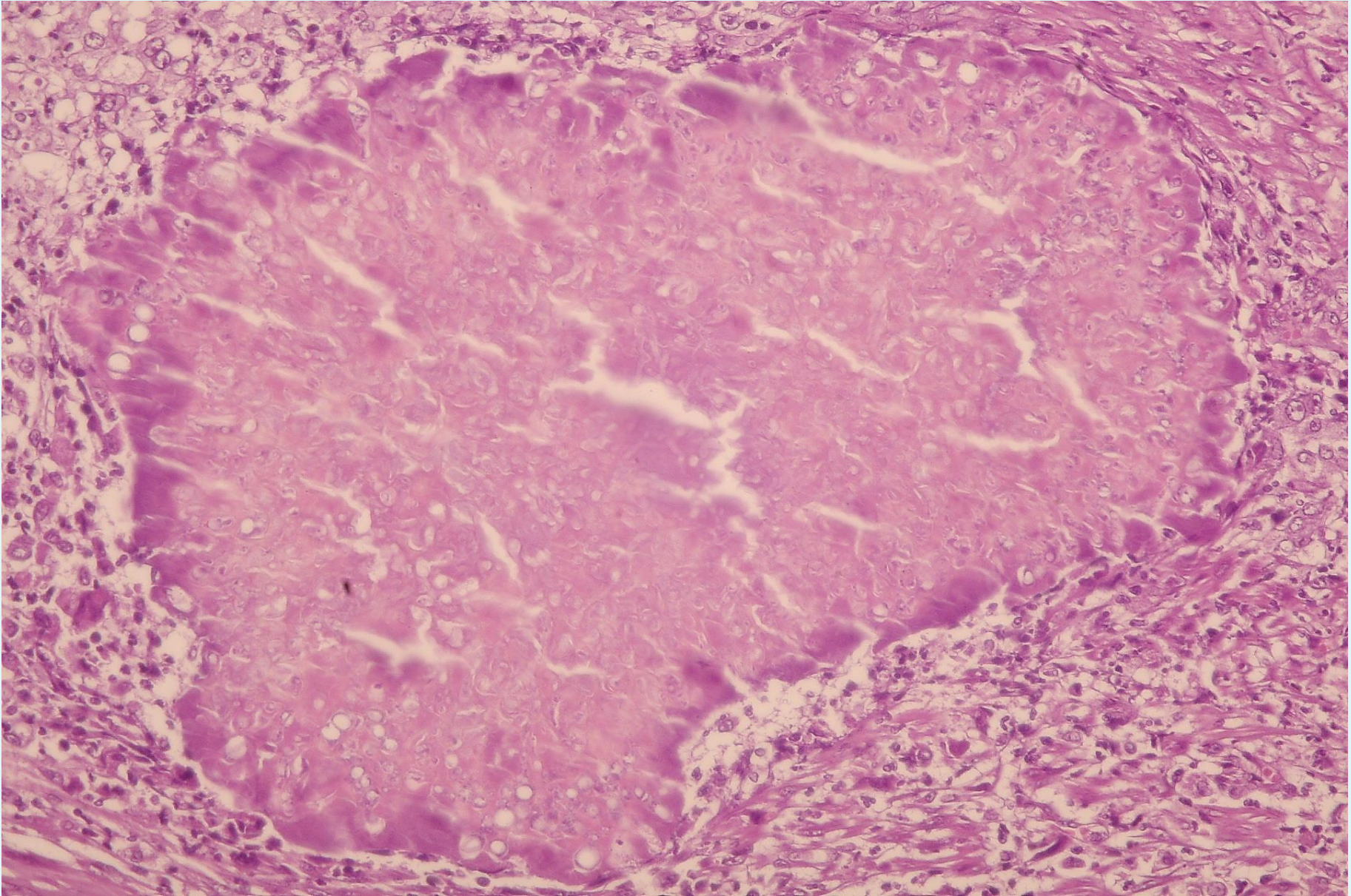


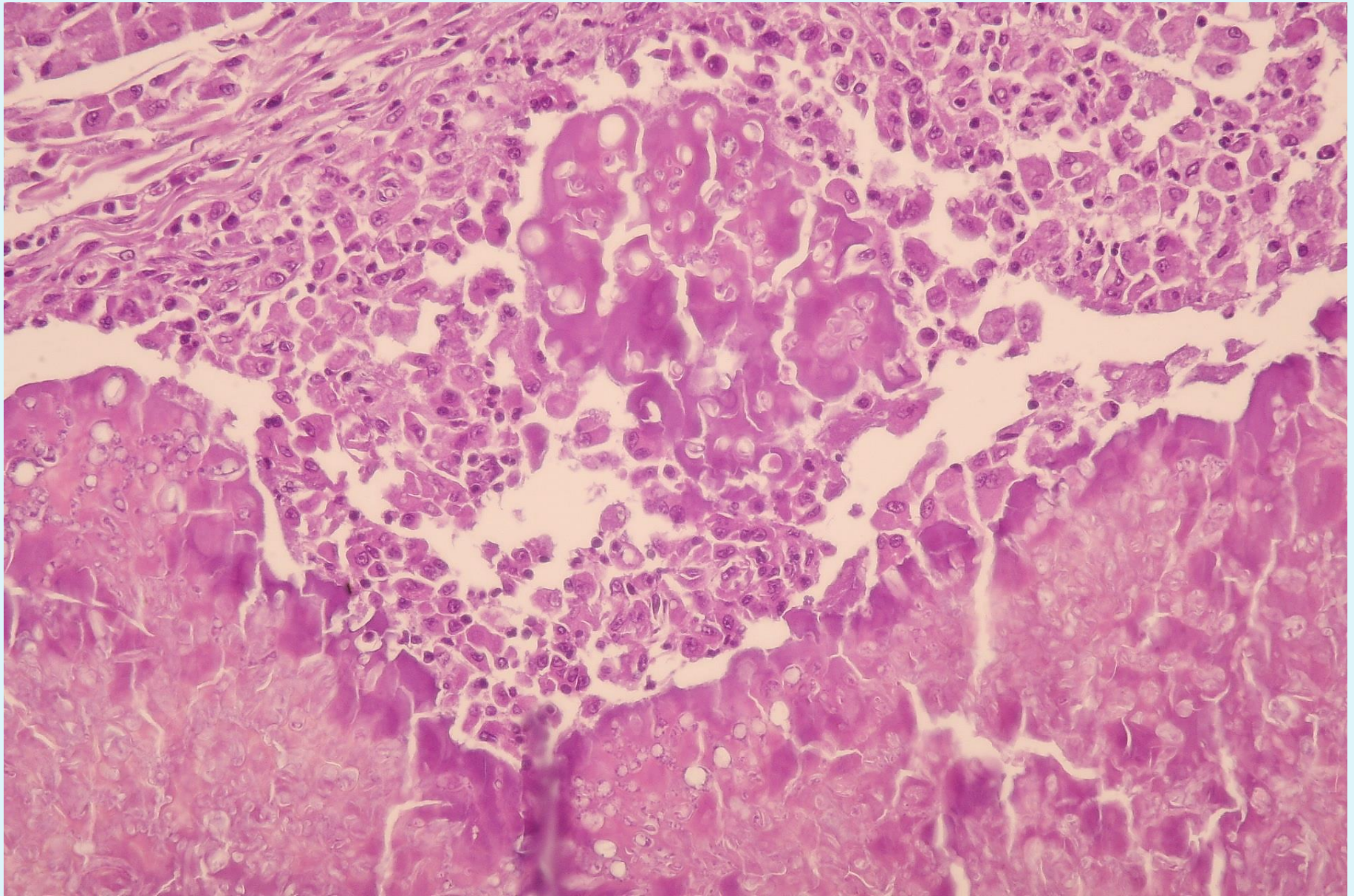


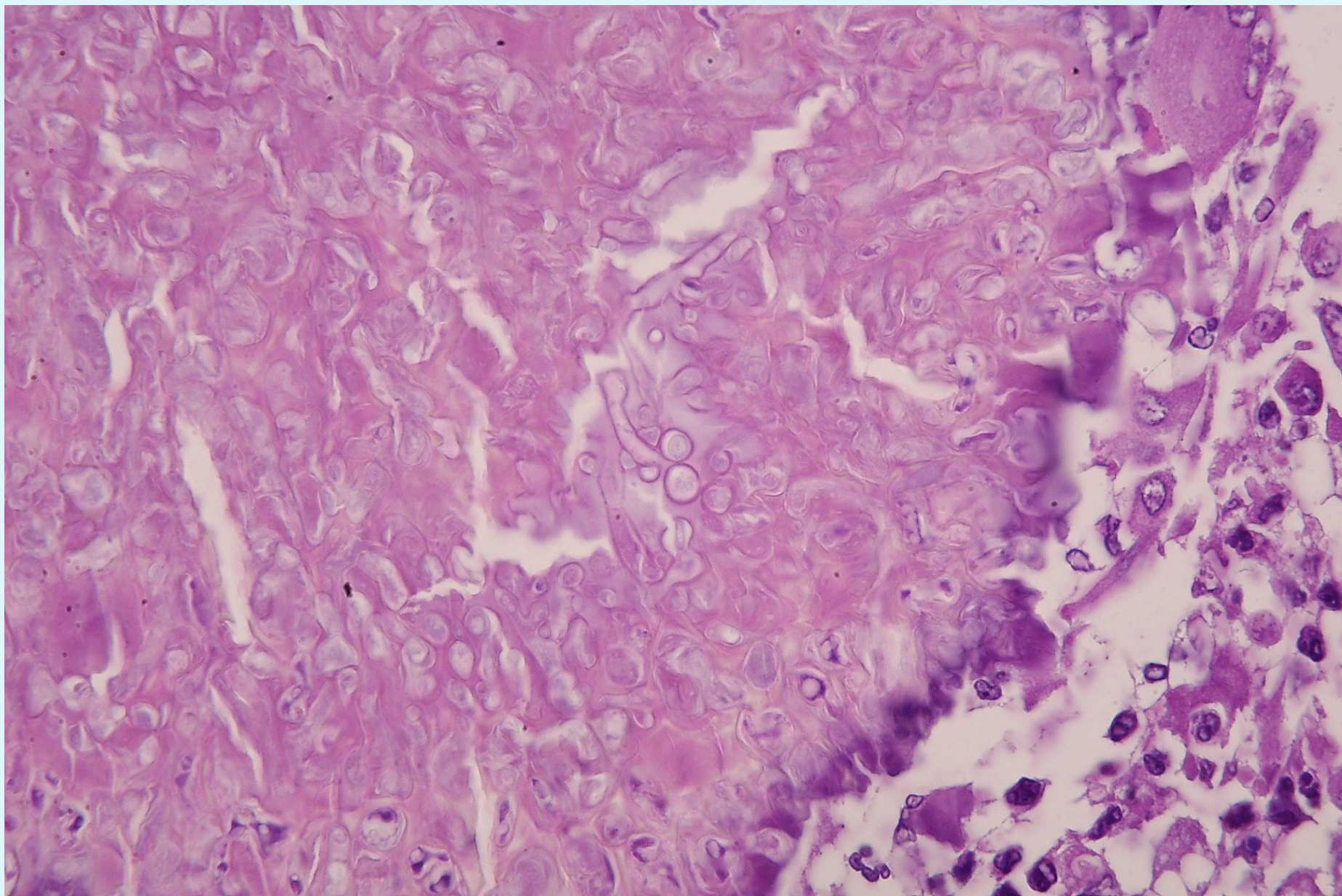












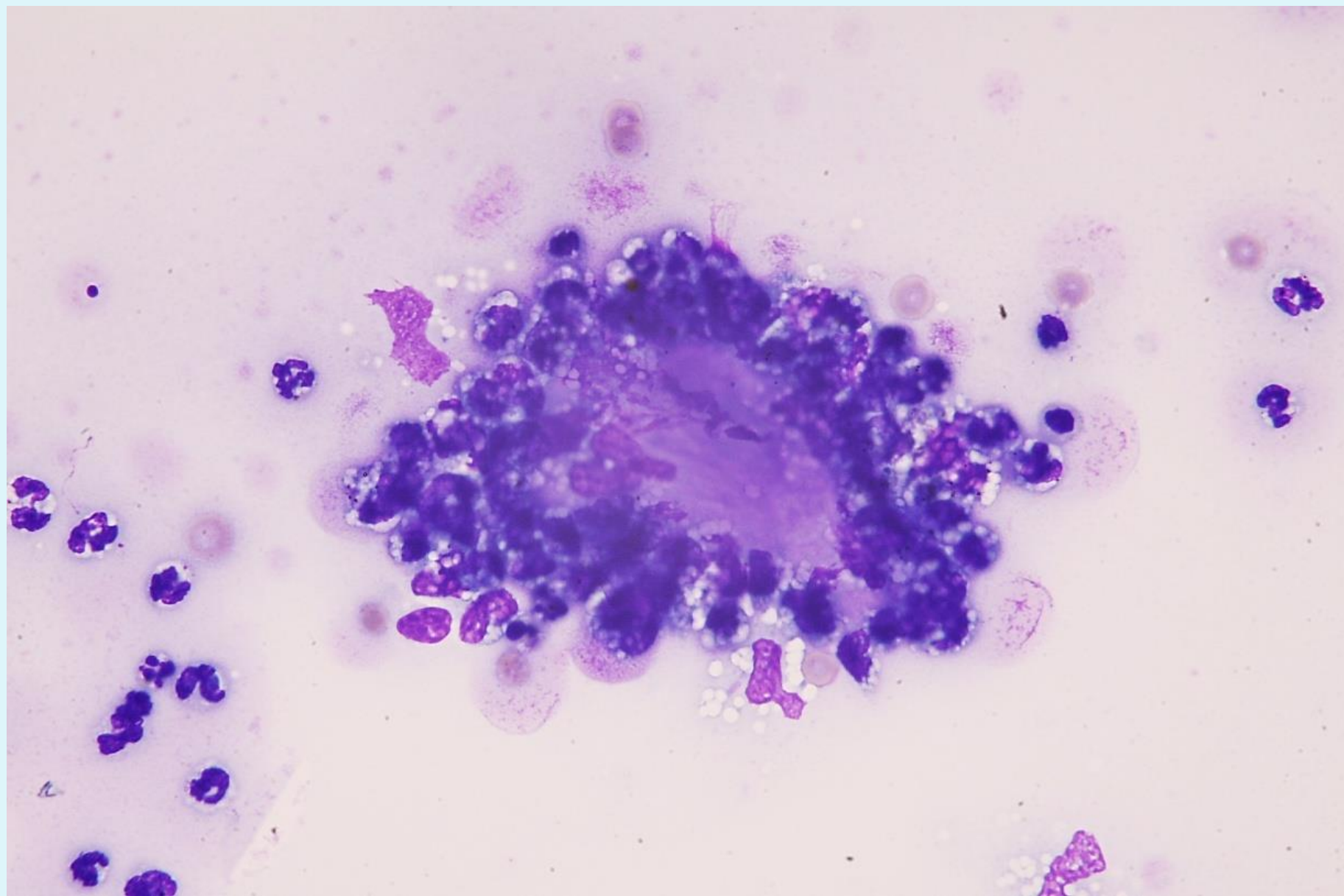
DIAGNOSIS

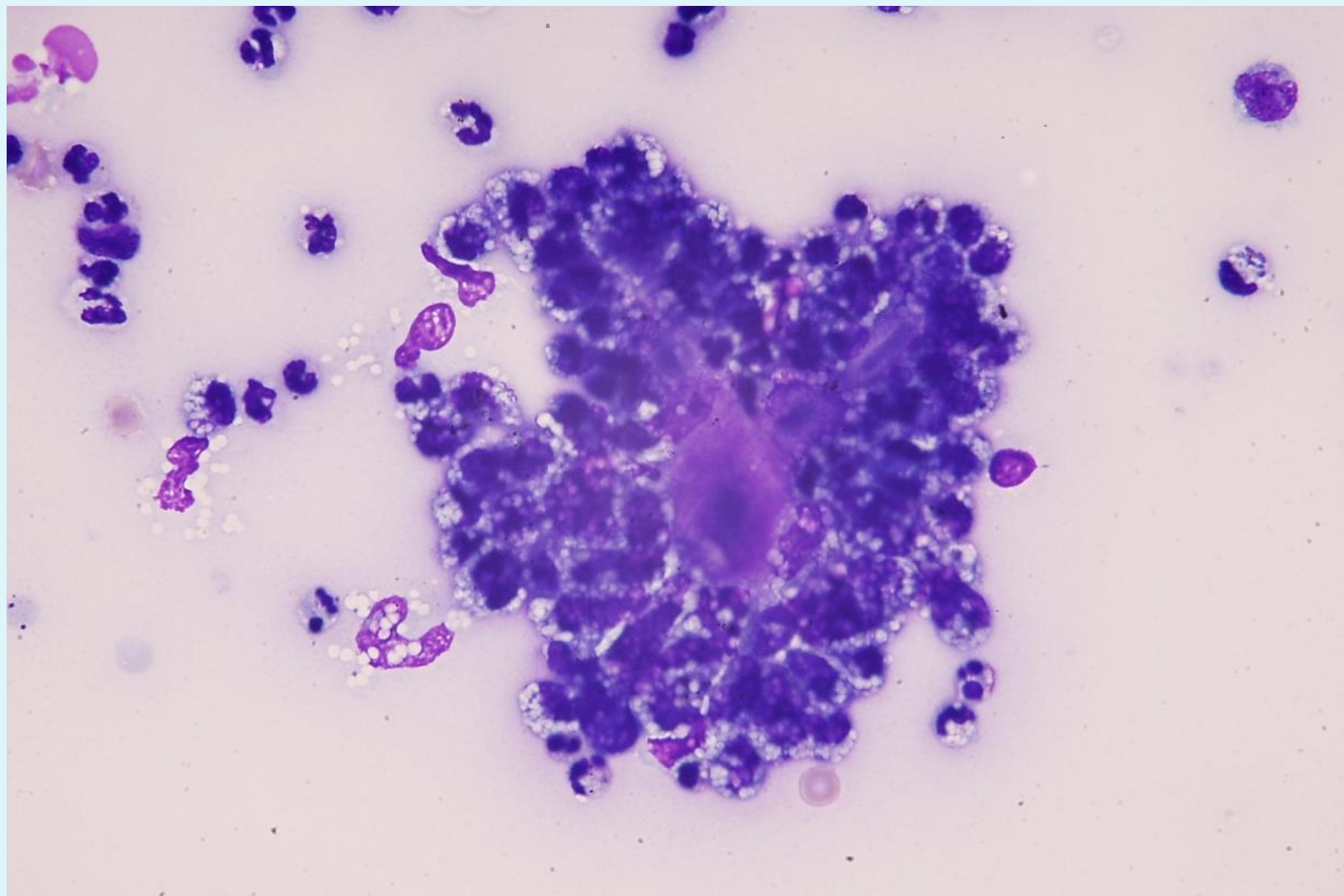
- Cytologic diagnosis: pyogranulomatous inflammation secondary to deep fungine infection
- Histologic diagnosis: pseudomycetoma
- Pseudomycetoma: pyogranulomatous inflammation around large aggregates of fungi (or bacteria)

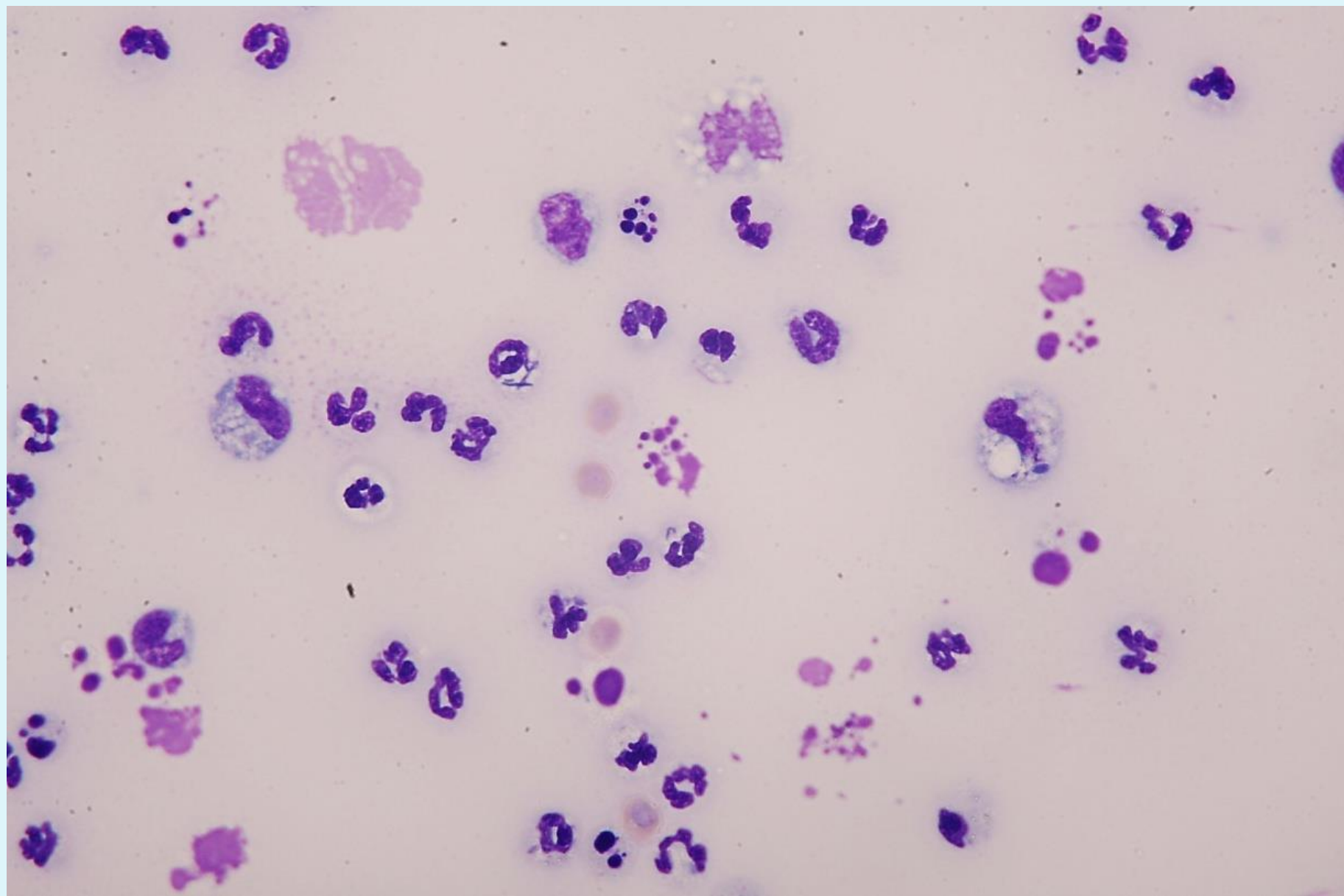
Case #9

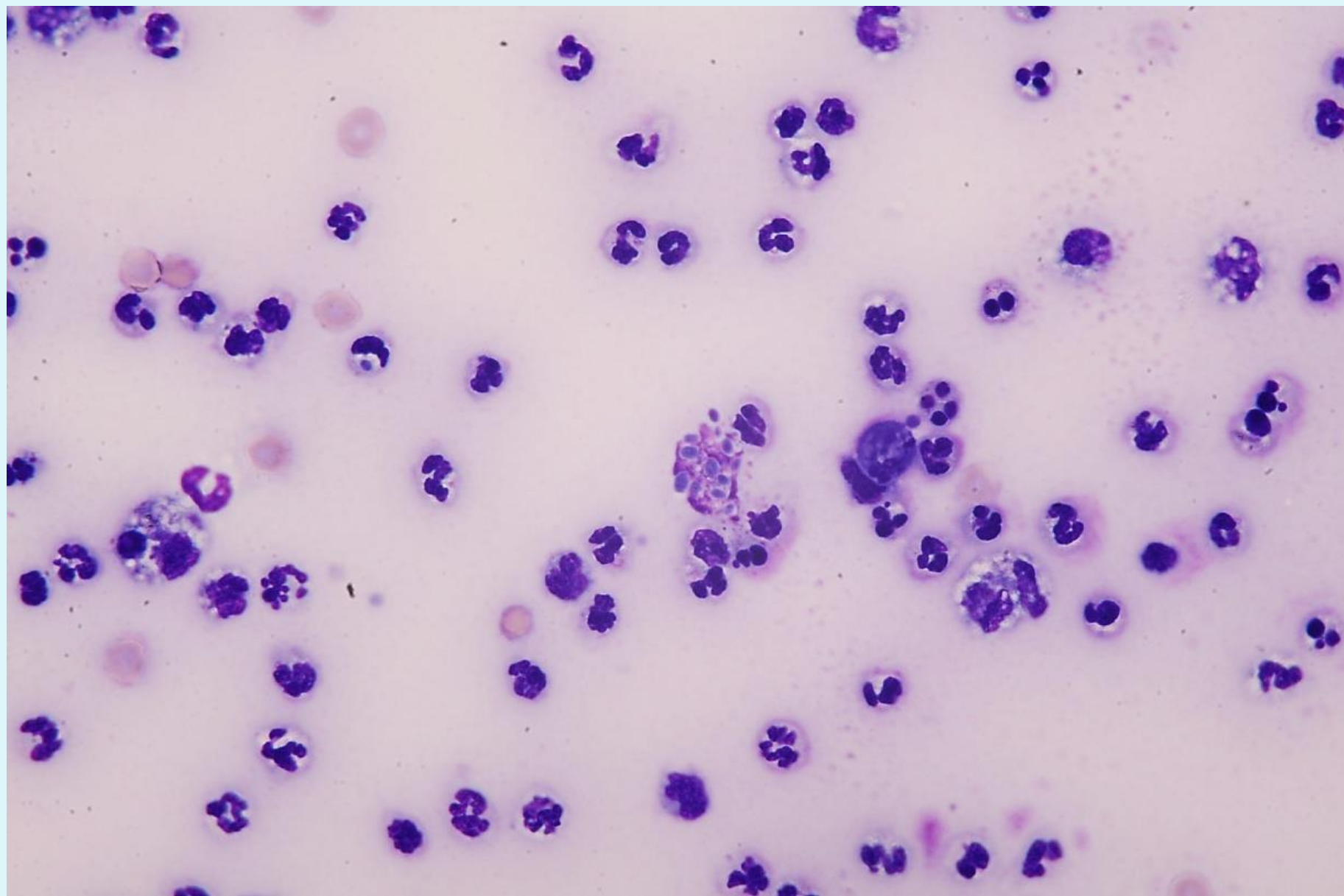
- Dog, German shepherd, male, 6-years-old
- Depression and anorexia
- Peritoneal effusion
 - Color: brown

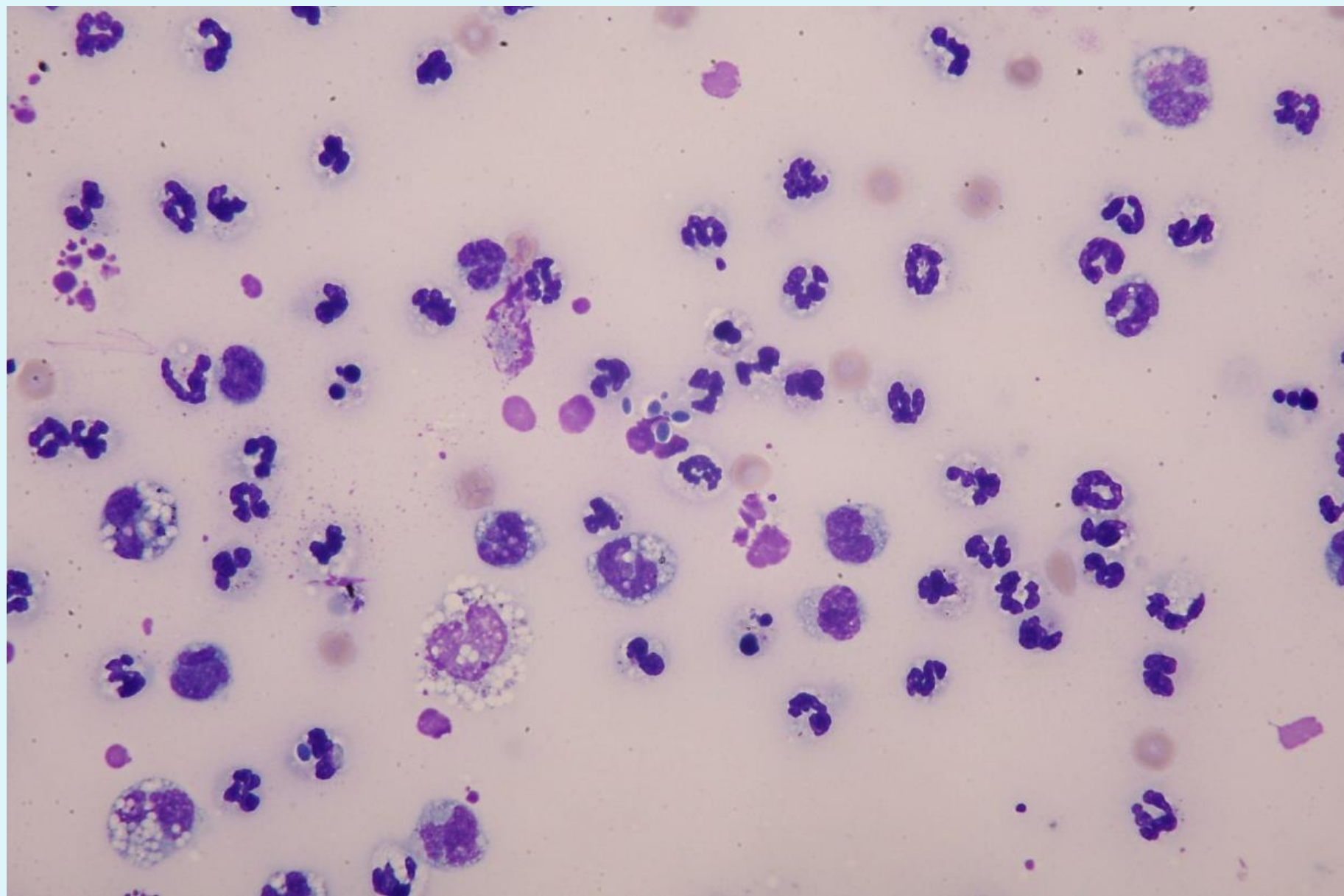
Test	Risultato	U.M.
Specific gravity	1030	
Total protein	5.1	g/dL
Total nucleated cells	267.46	$10^3 / \mu\text{L}$
RBC	0.35	$10^6 / \mu\text{L}$
Hgb	2.6	g/dL
Hct	3.5	%

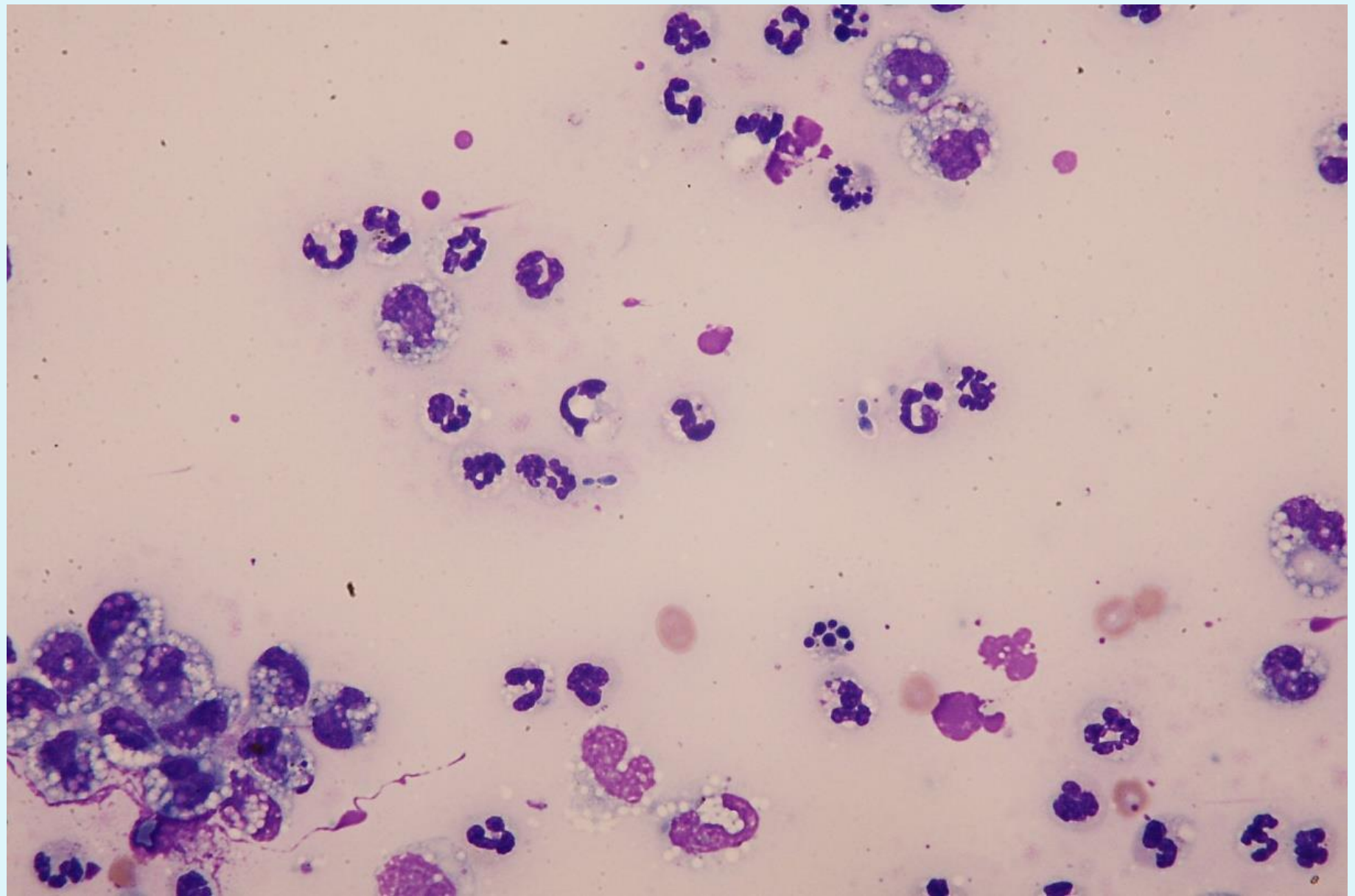


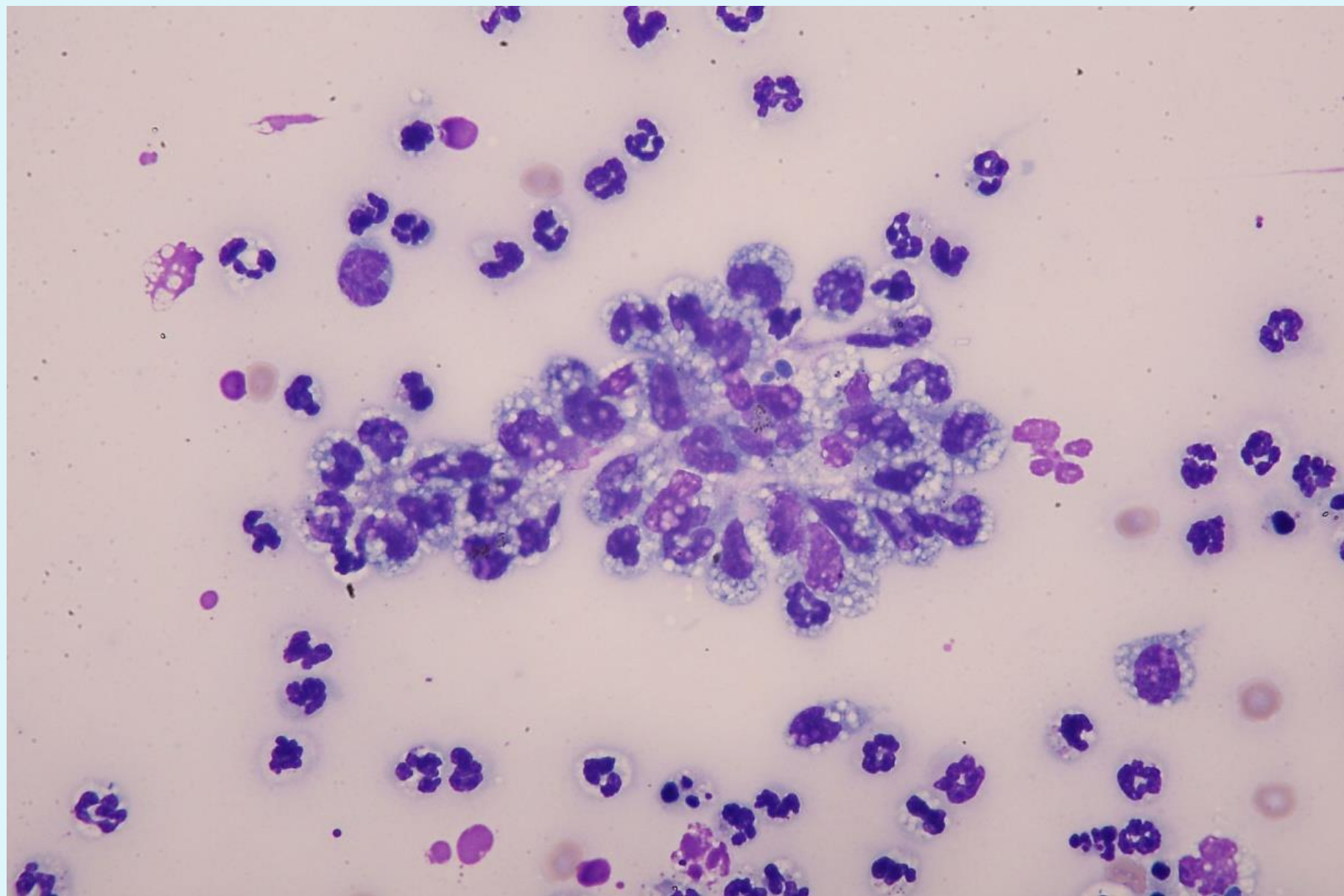












DIAGNOSIS

- Cytologic diagnosis: exudative effusion with pyogranulomatous inflammation secondary to bacterial and fungal peritoneal infection
- Culture:
 - Escherichia Coli
 - Candida albicans

CASE REPORT

Candida peritonitis in dogs: report of 5 casesKaty Bradford¹, Jim Melnick¹, Keki McKelmen², Brenda Love¹Departments of ¹Veterinary Pathobiology and ²Veterinary Clinical Sciences, Center for Veterinary Health Sciences, Oklahoma State University, Stillwater, OK, USA**Key Words**

Abdominal fluid, abdominal surgery, cytology, fungal infection, gall bladder rupture

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Abstract: *Candida* peritonitis is reported in people and is associated with significant morbidity and mortality compared with sterile or bacterial peritonitis. Recognized predisposing risk factors include peritoneal dialysis, hollow viscous organ perforation, abdominal surgery, inflamed intestinal mucosa, antimicrobial administration, and immunosuppression. In this report, we describe 5 cases of dogs with peritonitis complicated by *Candida* spp.: 3 dogs with *C. albicans*, one dog with *C. albicans* and *C. glabrata*, and one dog with *C. glabrata* only. The 3 dogs with *C. albicans* peritonitis presented with duodenal perforation due to NSAID therapy, intestinal resection and anastomosis following post-surgery dehiscence, and intestinal foreign body removal. The 2 dogs with *C. glabrata* peritonitis had undergone cholecystectomy due to gall bladder rupture and dehiscence of intestinal biopsy removal sites following exploratory laparotomy. In all cases, initial diagnosis of fungal peritonitis was made via cytologic examination of peritoneal effusions, which revealed marked pyogranulomatous inflammation with numerous 3–8 µm oval, deeply basophilic yeast organisms with thin clear capsules noted within phagocytes and extracellularly. In addition, germ tube formation, hyphae, and pseudohyphae were rarely seen in some of the cases with pure *C. albicans*. Identity of the organisms was determined by culture in all cases and confirmed by PCR in 3 cases. *Candida* spp. are commensals normally inhabiting the alimentary, the upper respiratory, and the lower urogenital tracts of mammals. They are opportunistic pathogens that can invade and colonize tissue when a patient is immune-compromised or there is disruption of the mucosal barrier. *Candida* peritonitis should be considered in patients with peritoneal contamination with gastrointestinal or biliary contents.

Candida peritonitis is reported frequently in people and is associated with significantly increased mortality rates compared with either sterile peritonitis or intra-abdominal sepsis due to bacterial alone.^{1–4} *Candida* spp. are the most common cause of invasive mycoses, including fungal peritonitis in people.^{2,4} In contrast to the numerous publications in human medicine, there is a dearth of information on *Candida* peritonitis in the veterinary literature. Only 2 previous cases involving dogs have been reported, one following enterotomy for removal of an intestinal foreign body, and the other one subsequent to intestinal resection and anastomosis for removal of a jejunal mass.^{5,6}

Candida spp. are normal inhabitants of the gastrointestinal (GI) and biliary tracts of people and animals⁷; therefore, peritonitis may develop secondary to overgrowth and extension from these sites in

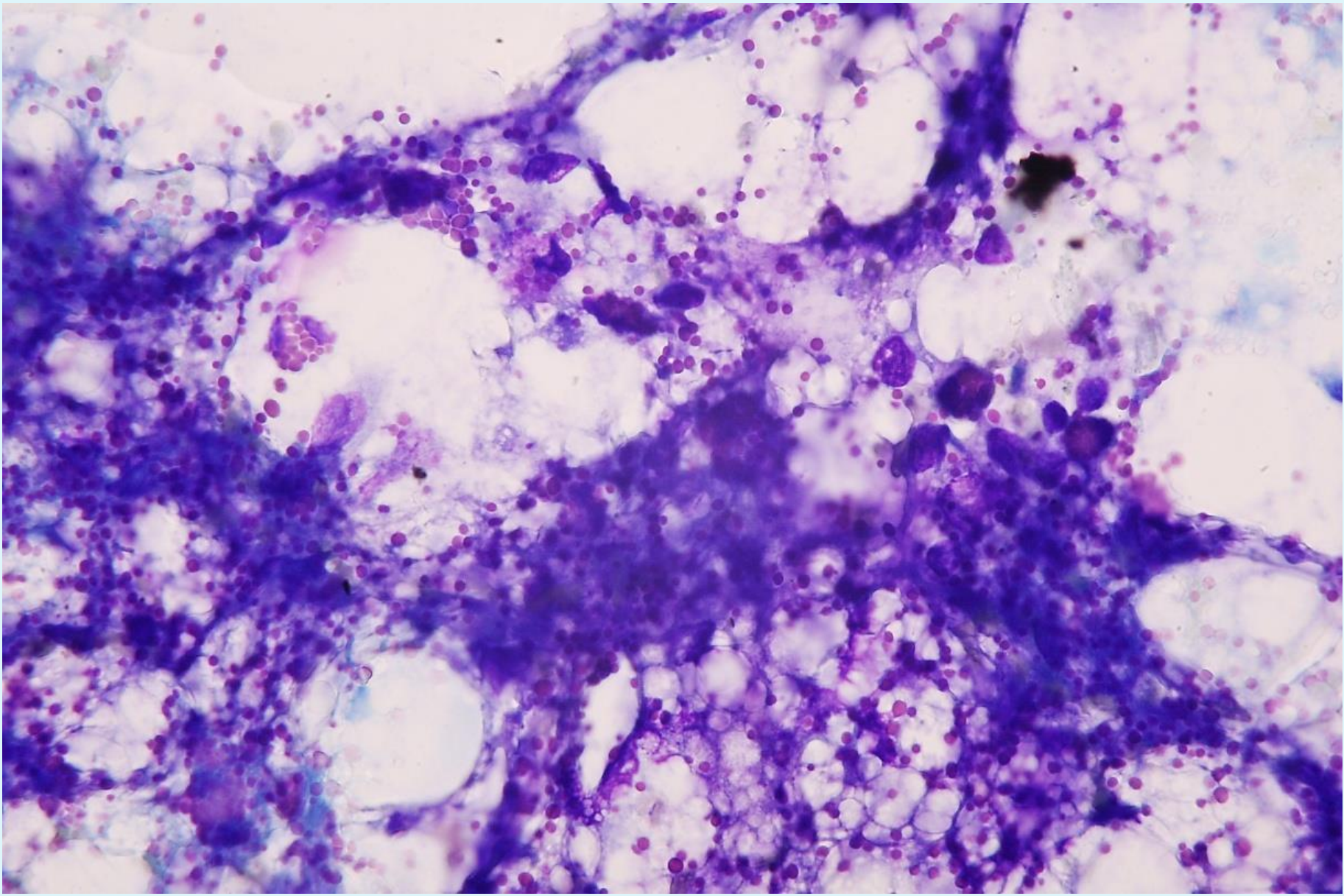
patients with a compromised mucosal barrier. In people, *Candida* peritonitis is seen following peritoneal dialysis, GI surgery with spillage of enteric contents into the peritoneal space, GI ulceration, hollow viscous organ perforation, and mucosal neoplasia. Other less common inciting causes of *Candida* peritonitis in people include pancreatitis, appendicitis, diverticulitis, diabetes mellitus, and penetrating trauma. Most notably, the majority of cases of *Candida* peritonitis were receiving systemic, broad-spectrum antimicrobial therapy at the time of diagnosis.^{1–4,7–17}

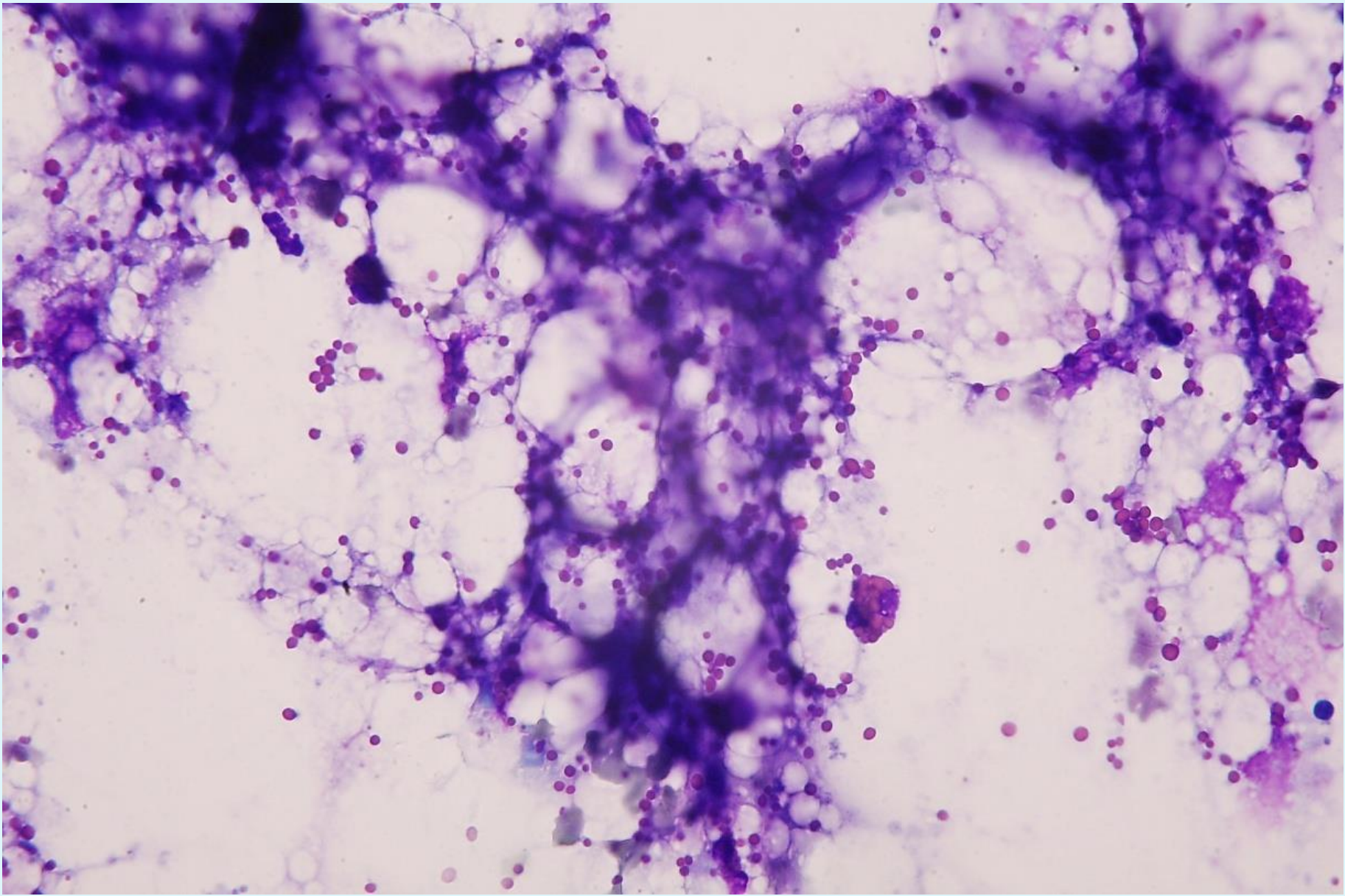
We have recognized 5 cases of *Candida* peritonitis from December 2008 to April 2011, all diagnosed initially on cytology of peritoneal fluid and subsequently confirmed by culture, or culture and PCR in 3 of the cases. The purpose of this study was to describe the clinical parameters associated with septic

- Presence of *Candida* spp. in ascitic fluid: worse prognosis!!

Case #10

- Horse, Arabian, male, 8-years-old
- Multiple cutaneous nodules on the back, neck and shoulder



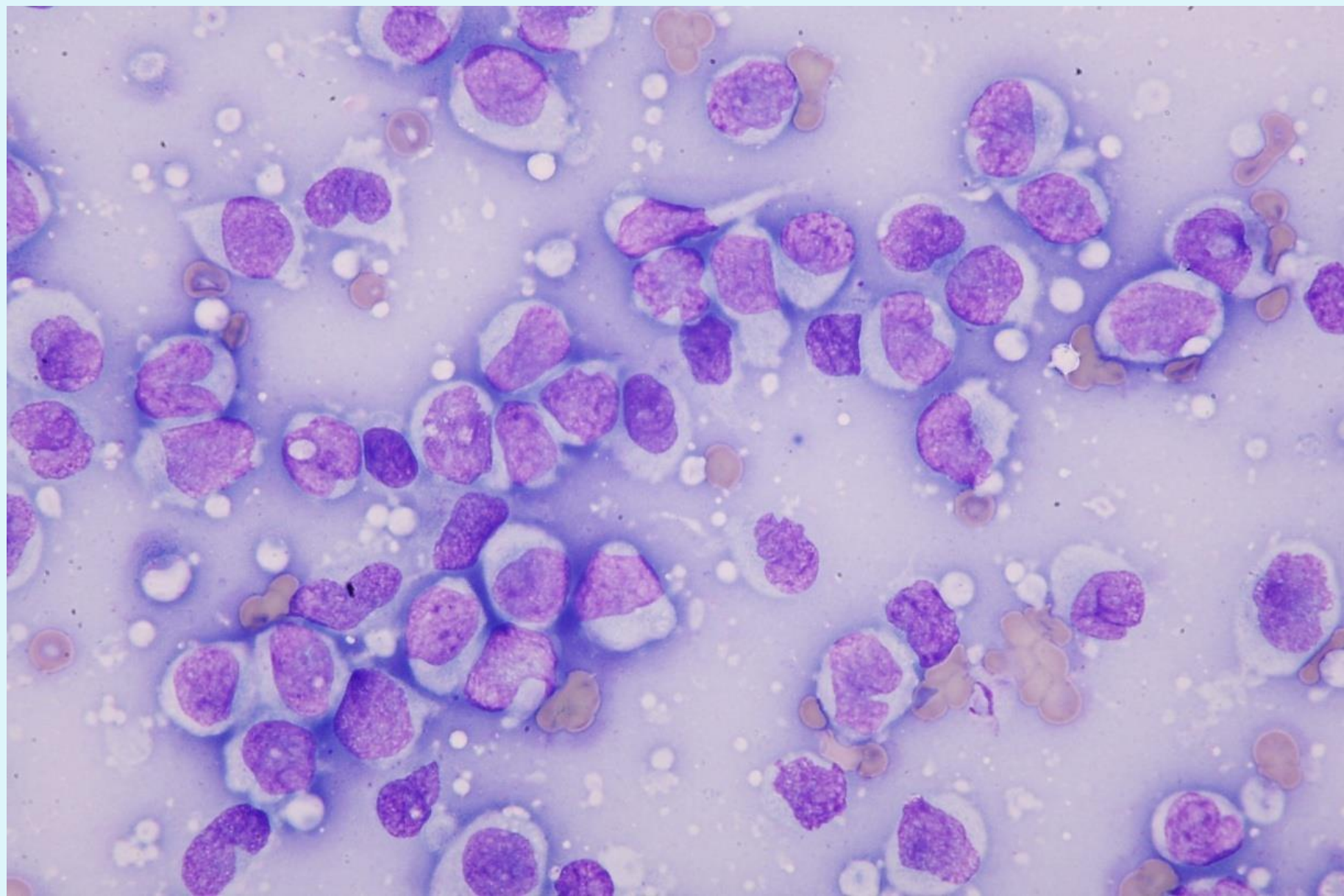


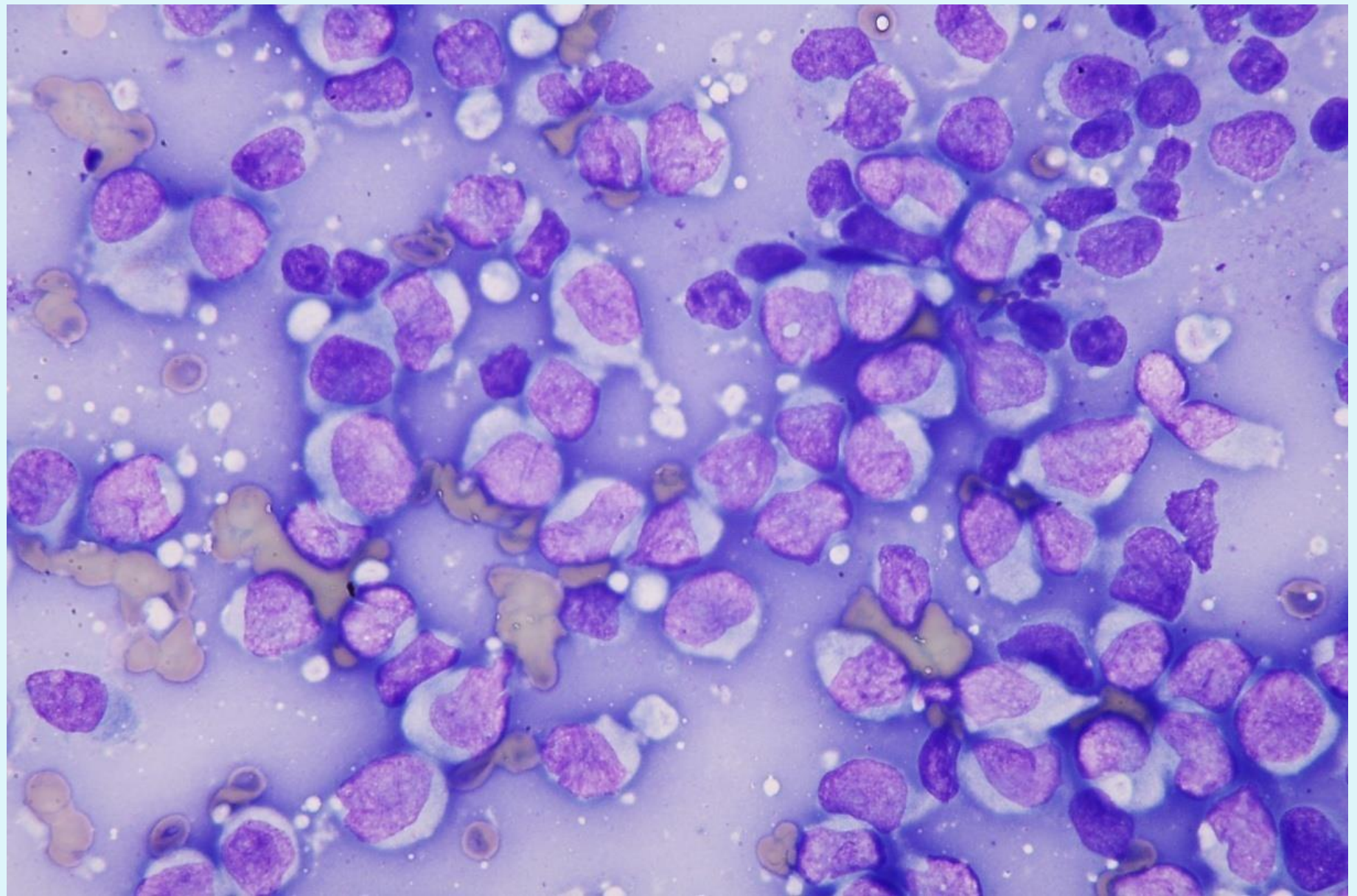
DIAGNOSIS

- Cytologic diagnosis: eosinophilic inflammation with panniculus involvement
- Histologic diagnosis: nodular necrobiosis (equine eosinophilic granuloma)
 - Common nodular reactive disease, secondary to insect bite
 - Differential diagnosis:
 - Others equine eosinophilic nodular diseases
 - Axillary nodular necrosis
 - Unilateral papular dermatosis
 - Mast cell tumor
 - Habronemiasis

BONUS TRACK

- Dog, Dachshund, male, 9-months old
- Cutaneous mass on the head
- SAMPLE: FNCS of the mass





DIAGNOSIS

- Cytologic diagnosis: atypical histiocytoma
- Follow-up: complete recovery after 1 months