
ESVCP-ECVCP Congress 2025
MYSTERY SLIDES SESSION
- Cytology -
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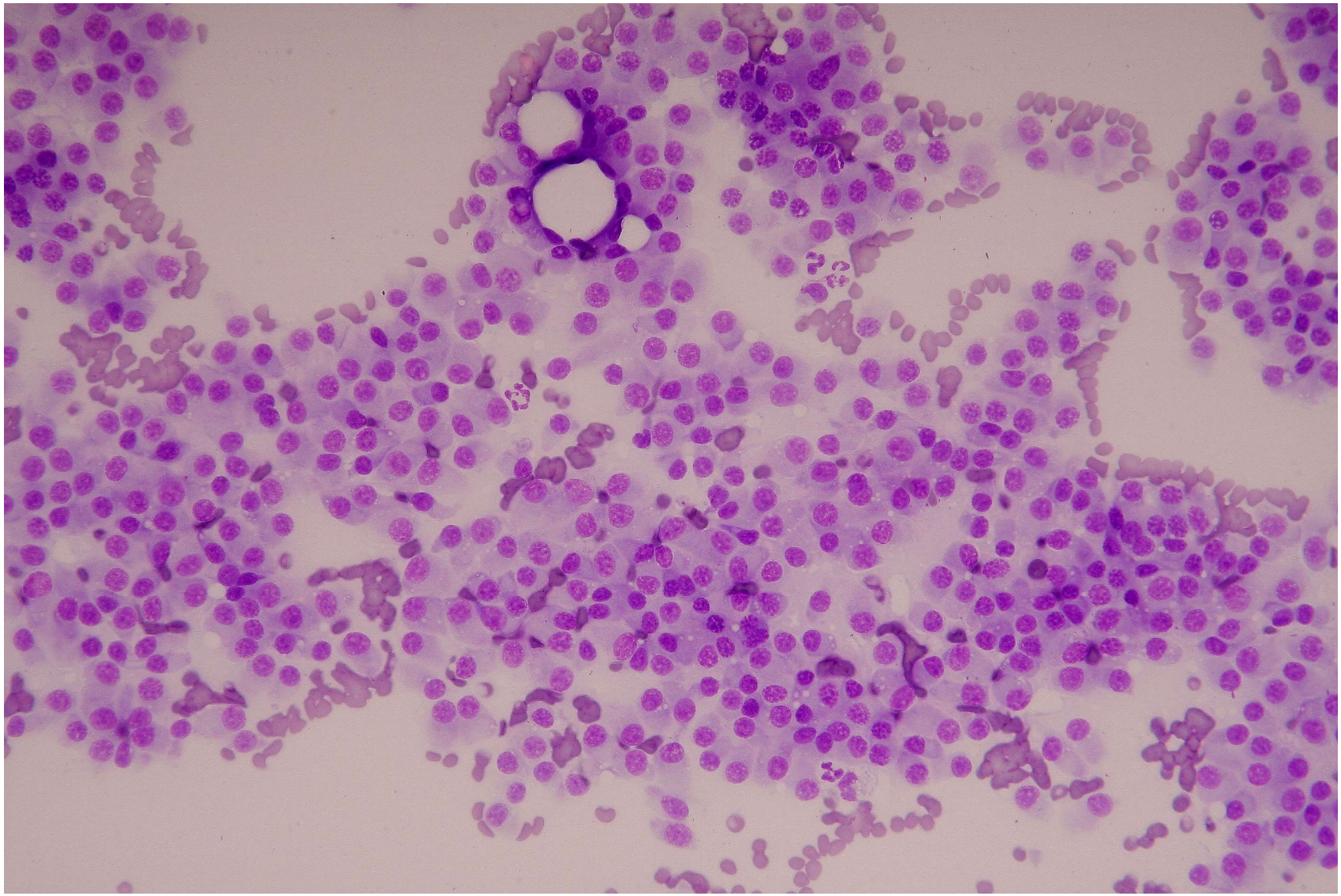
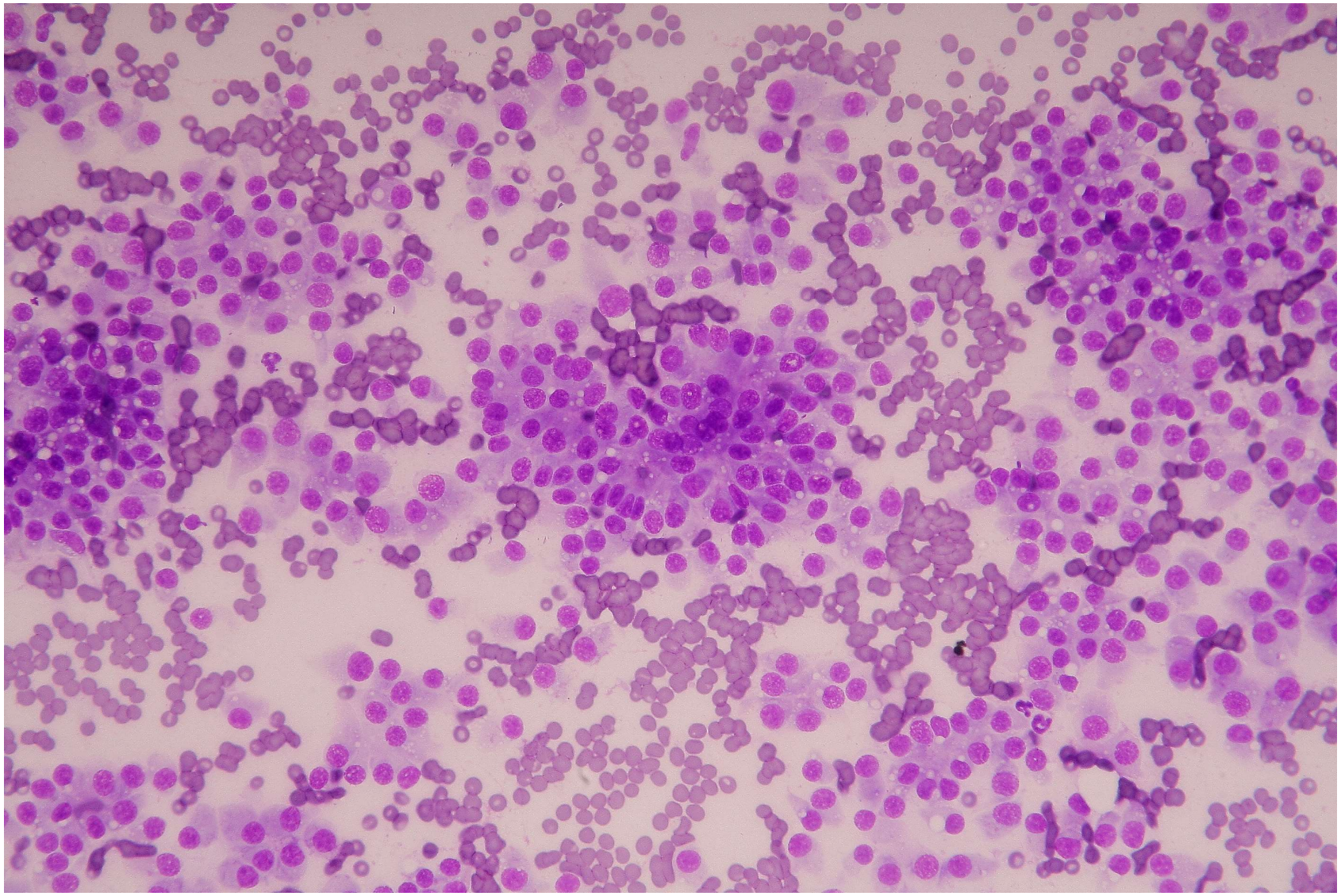
IDEXX
LABORATORIES

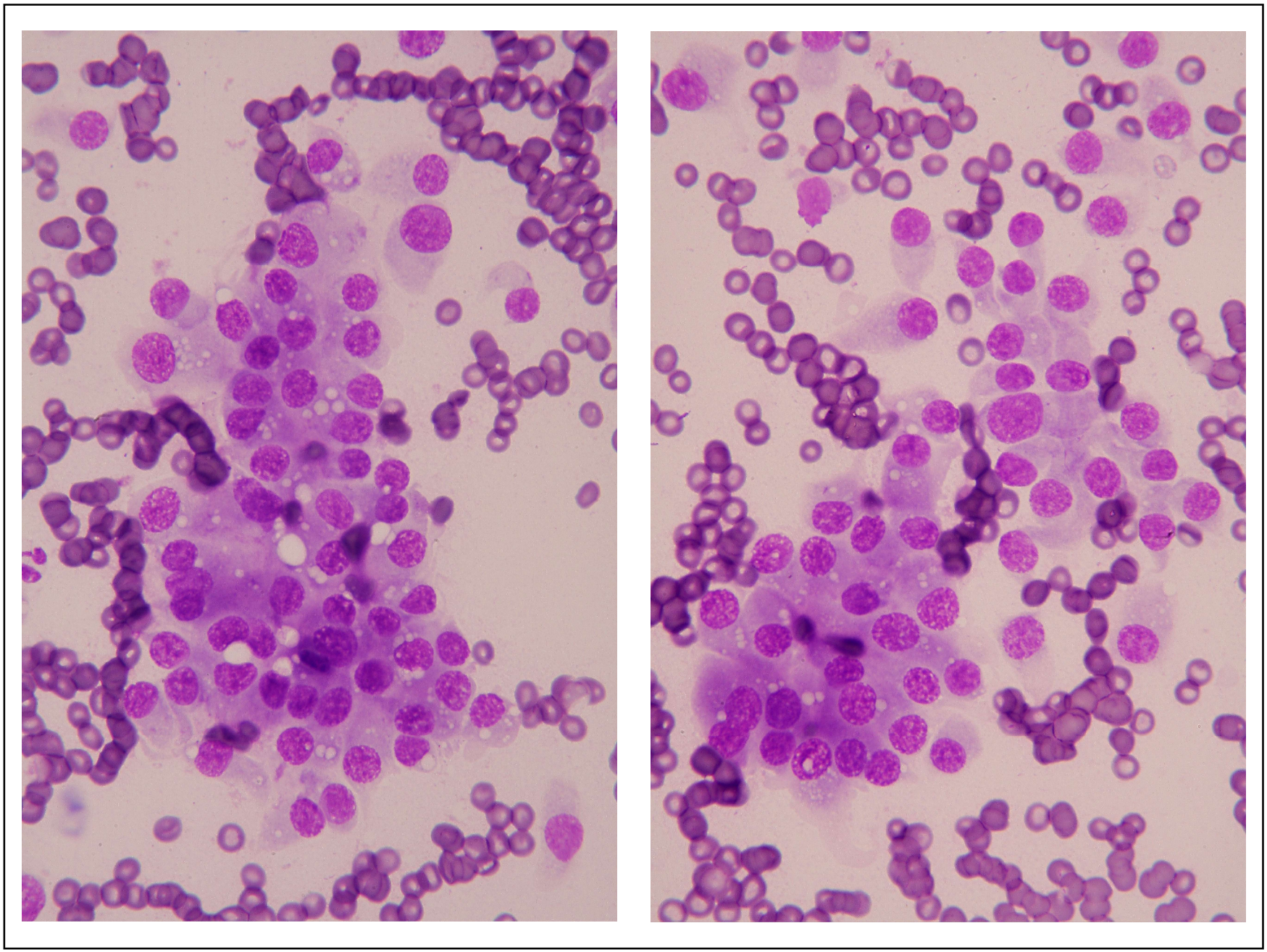
Case #1

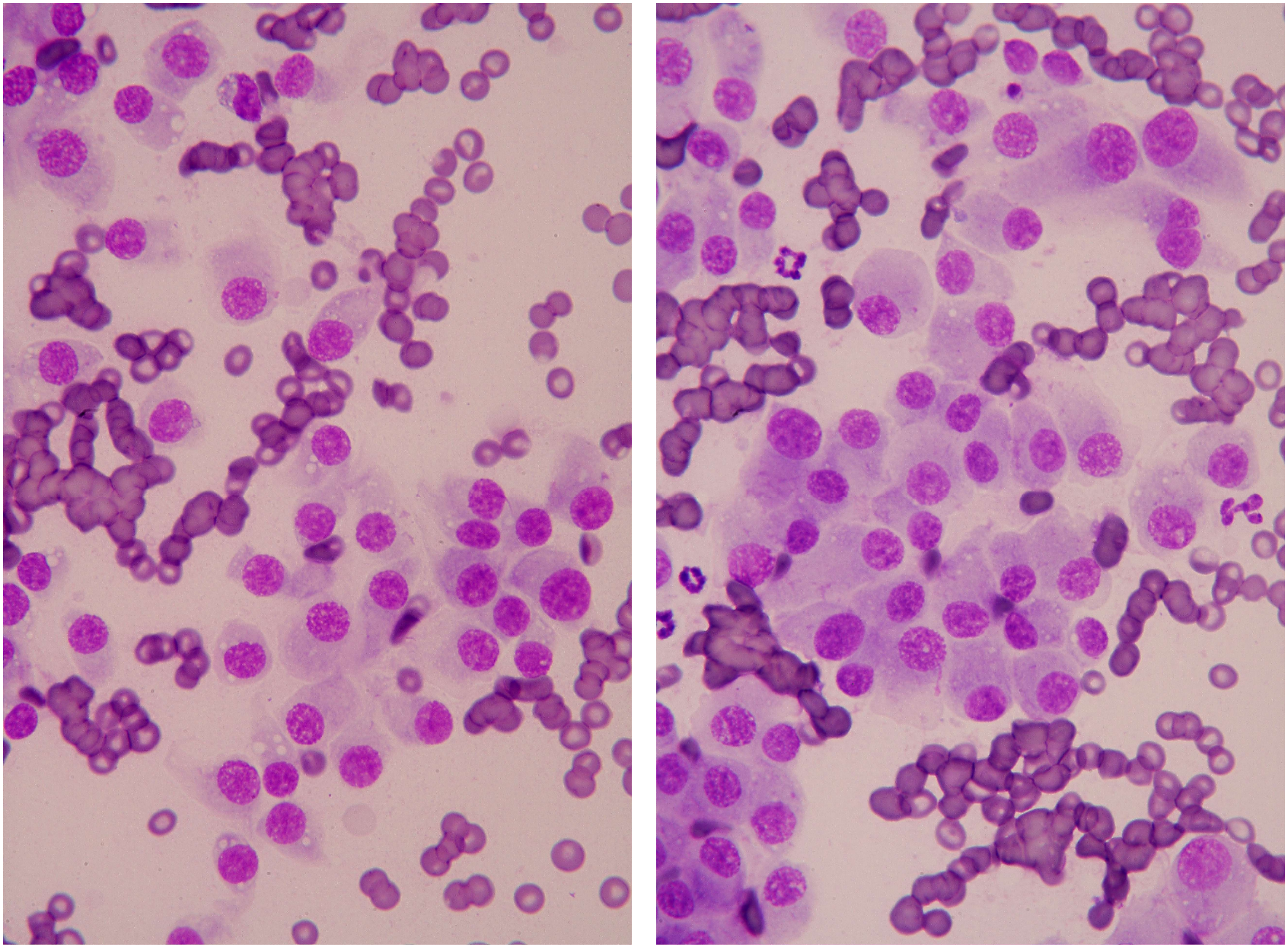
- Dog, Rottweiler, 9-year-old, female
- Thyroid mass (a)
  - Ultrasonographic evidence of a large mass into the right lobe of thyroid; no evidence of lesions in the left lobe of thyroid
- Multiple nodules in the liver (b)
- FNCS of thyroid and liver
- MGG stain

Thyroid lesion

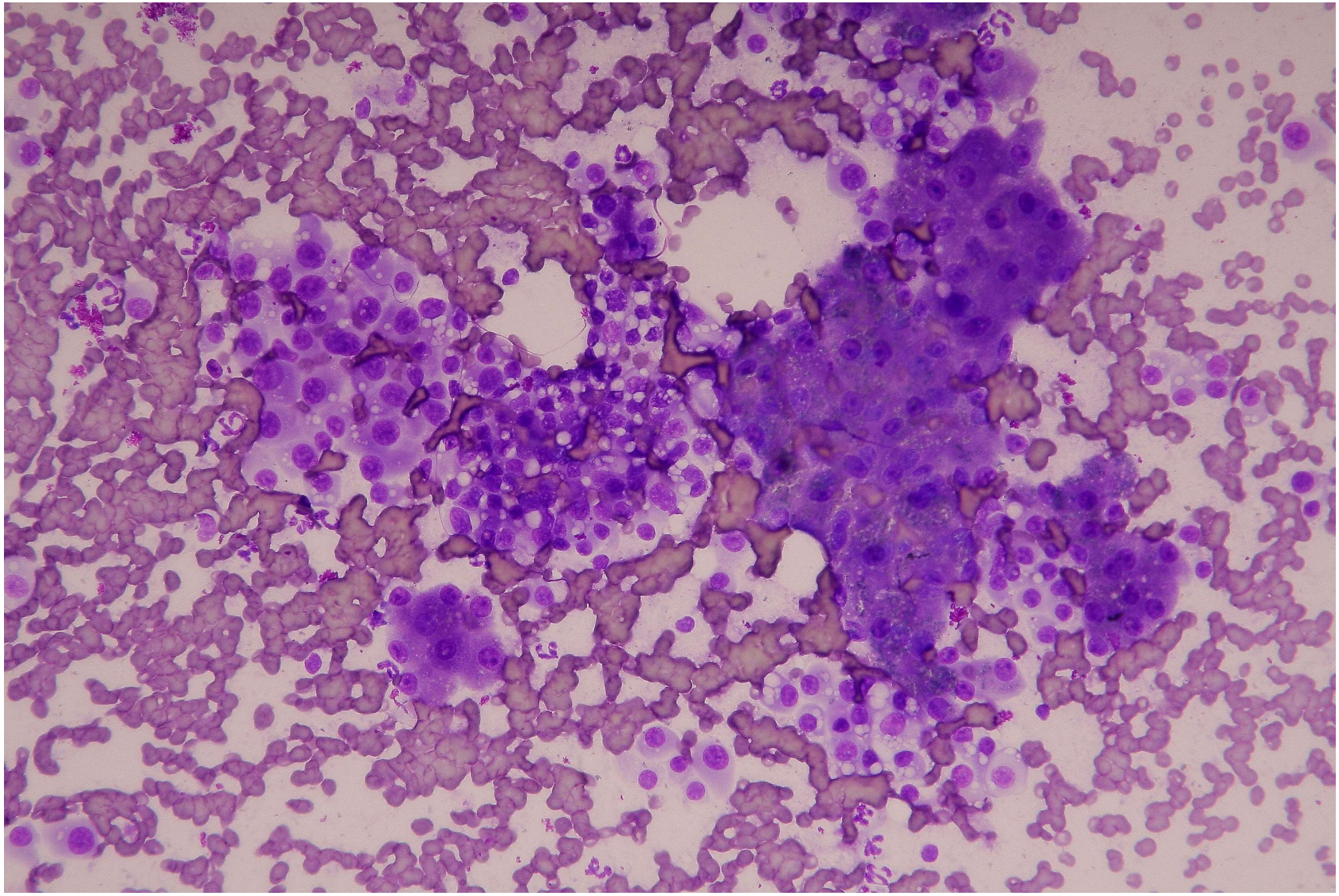


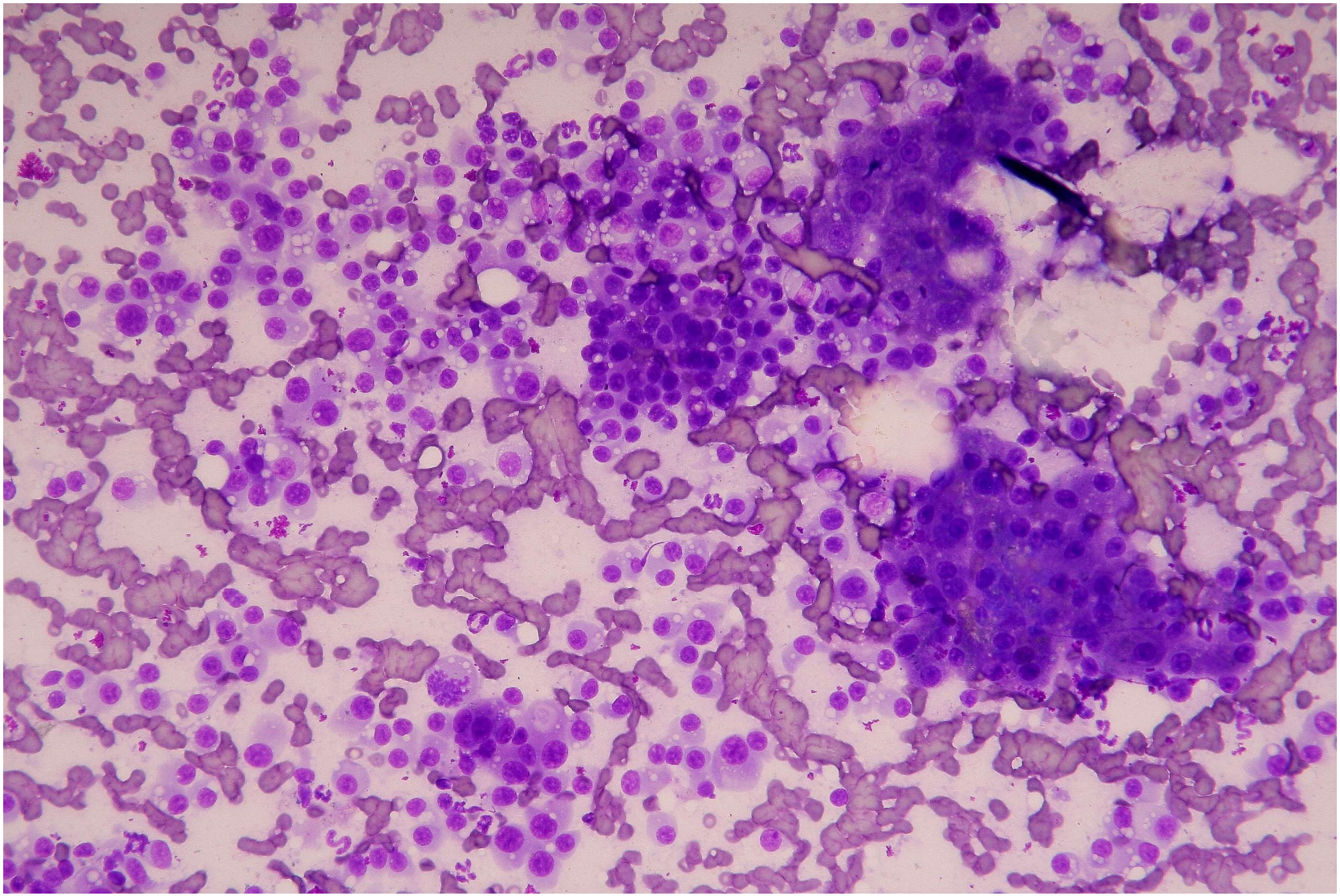


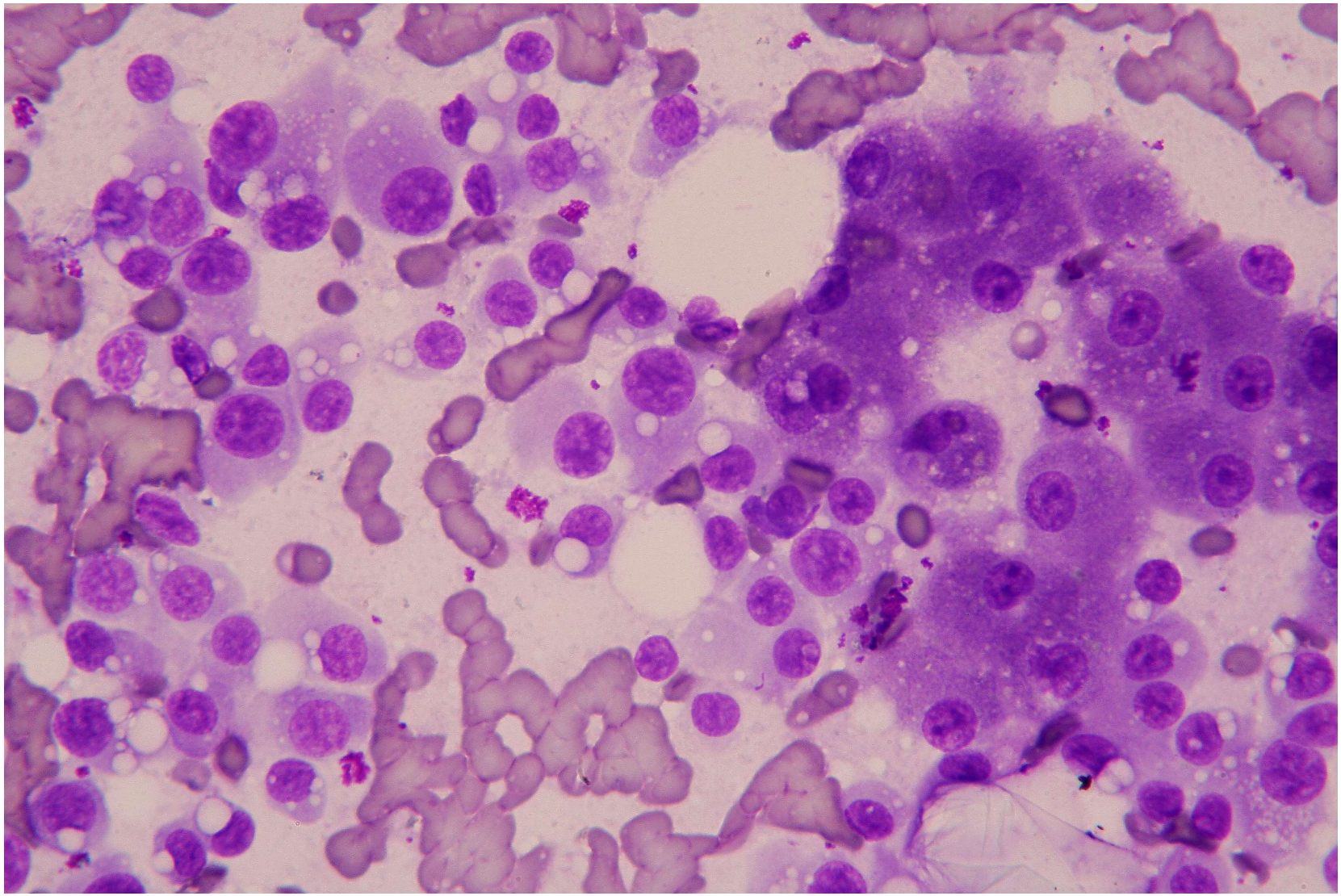


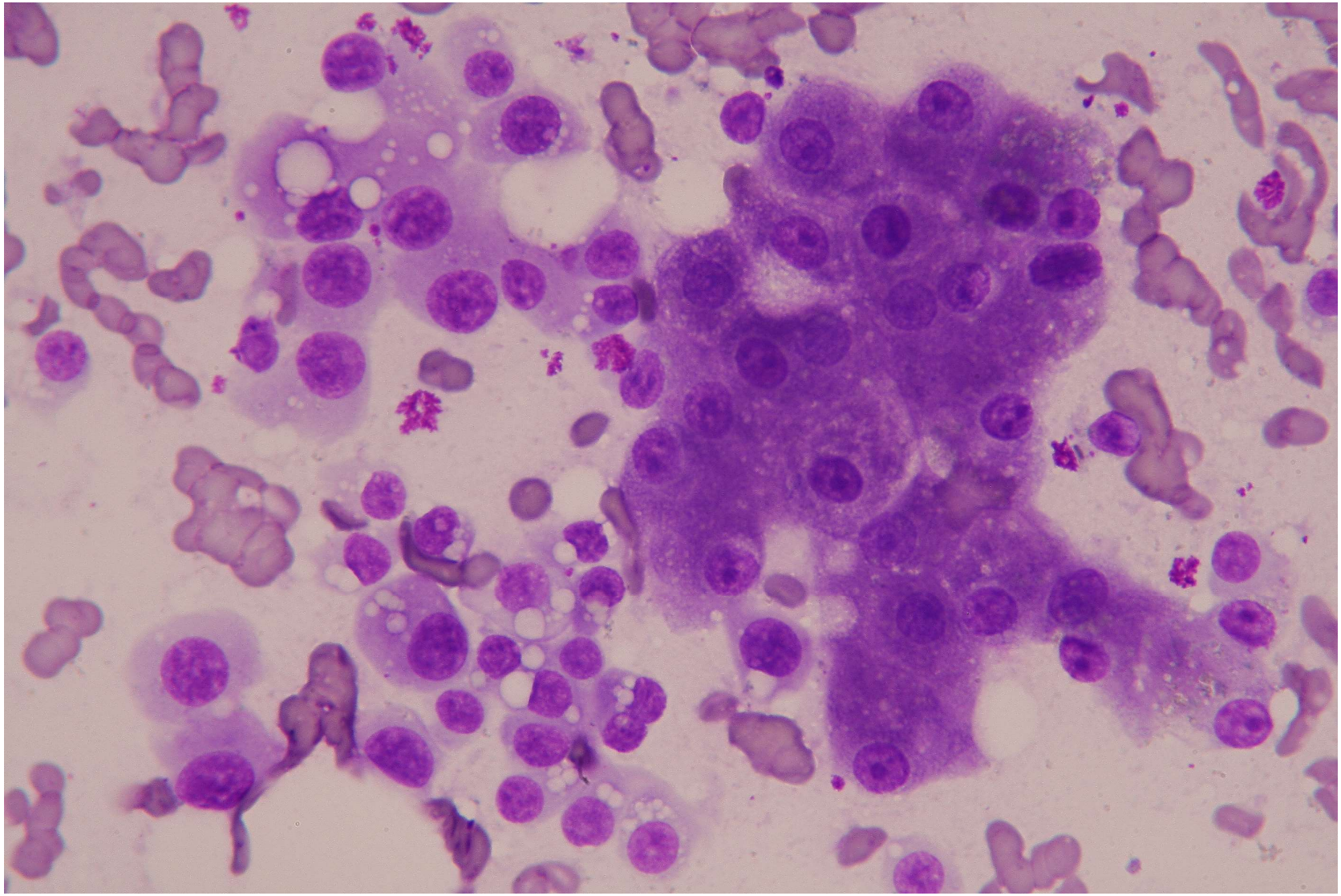


Liver nodule







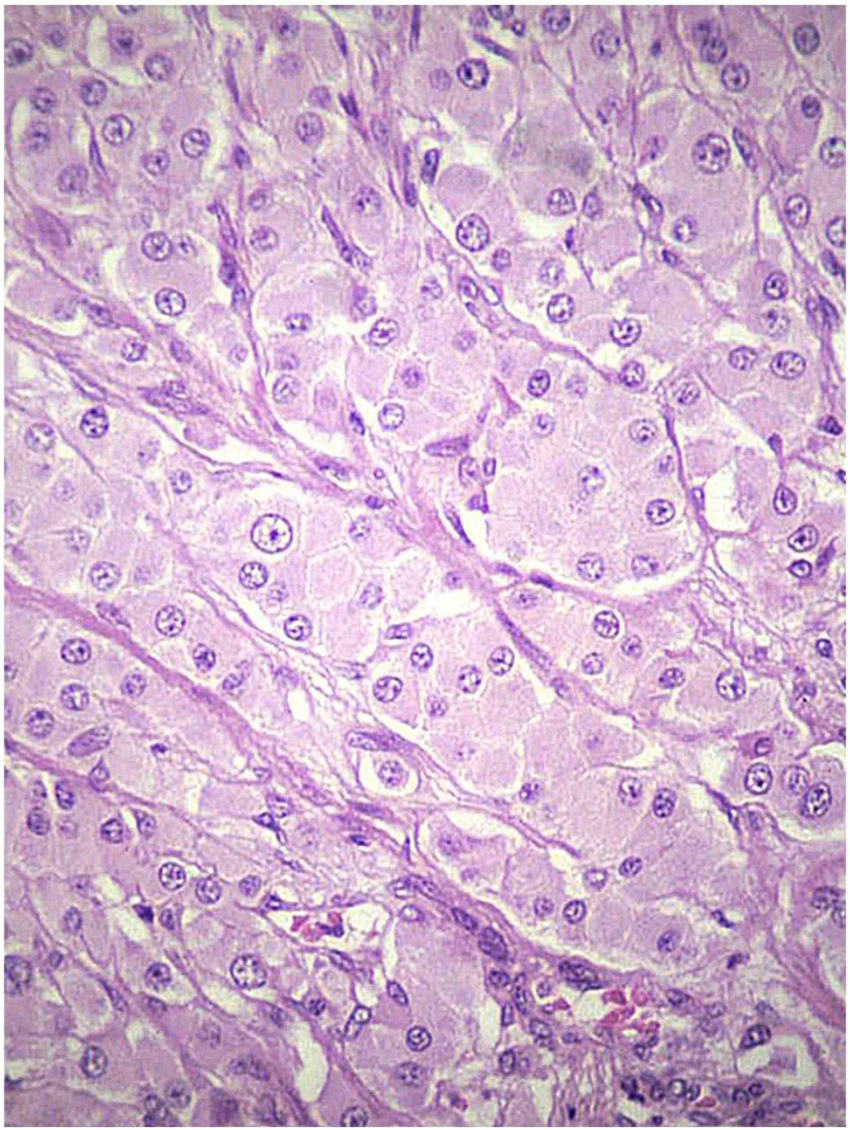


Cytologic findings

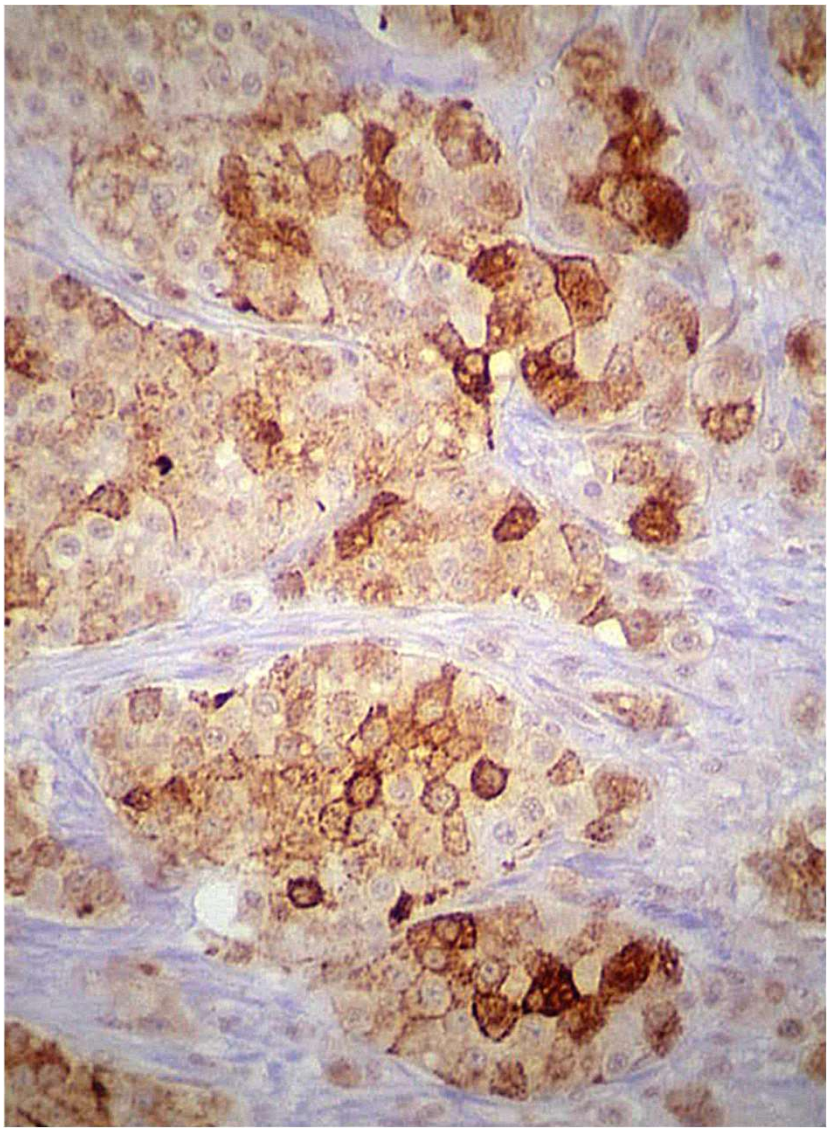
- Thyroid:
  - Discohesive aggregates
  - Sometimes distribution of discrete cells
  - Round to ovoid cytoplasm
  - Very eccentric round to ovoid nucleus
- Liver:
  - Similar cells scattered among clusters of hepatocytes

Diagnosis

- Cytologic diagnosis:
  - **Thyroid C cells (parafollicular cells) carcinoma**
  - **Liver metastasis of C cells carcinoma**
- Histologic diagnosis (after surgical removal of the mainly involved thyroid lobe)
  - **Thyroid C cells carcinoma**



HE, 40X



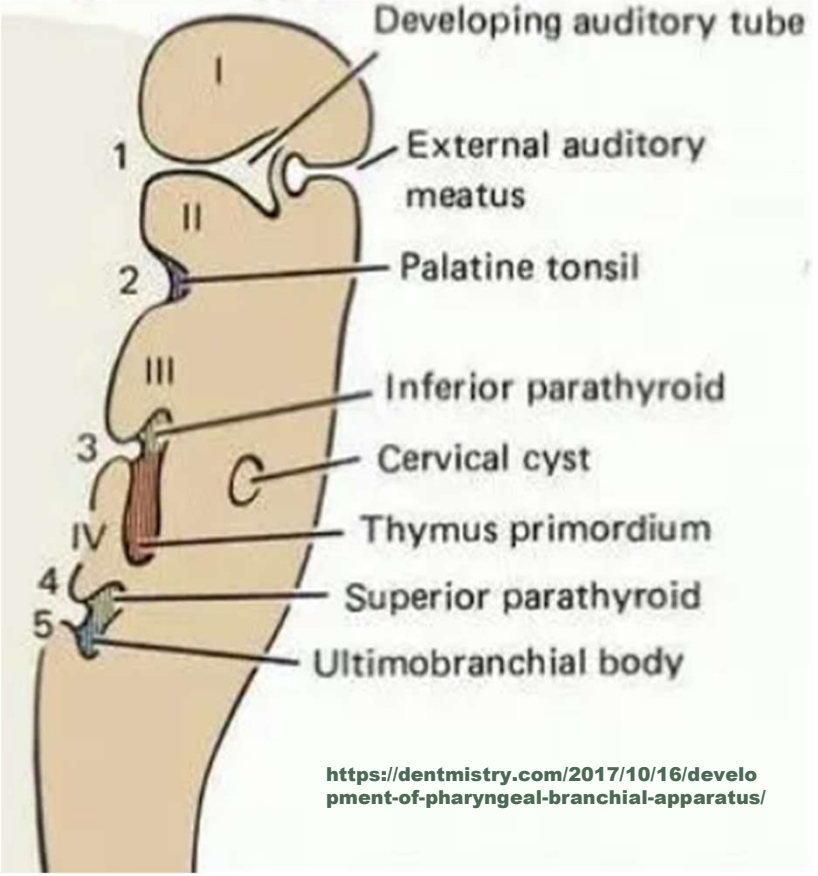
IHC: calcitonin

Follow-up

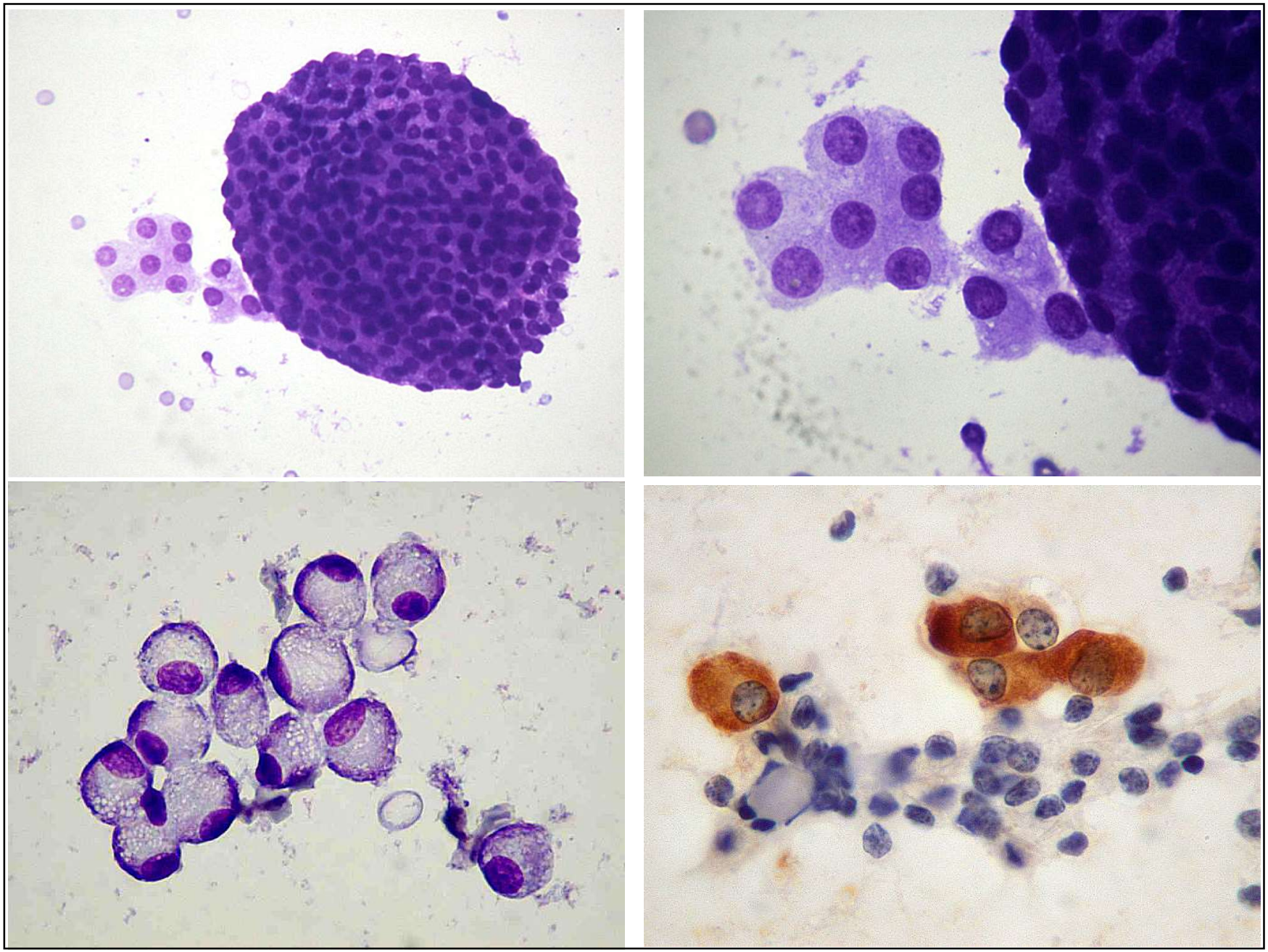
- Plasma concentration of Ca
  - 9,8 mg/dl (RI: 7,1 – 11,9)
- The dog developed depression and anorexia
- Widespread distribution of nodular lesions
- Euthanasia

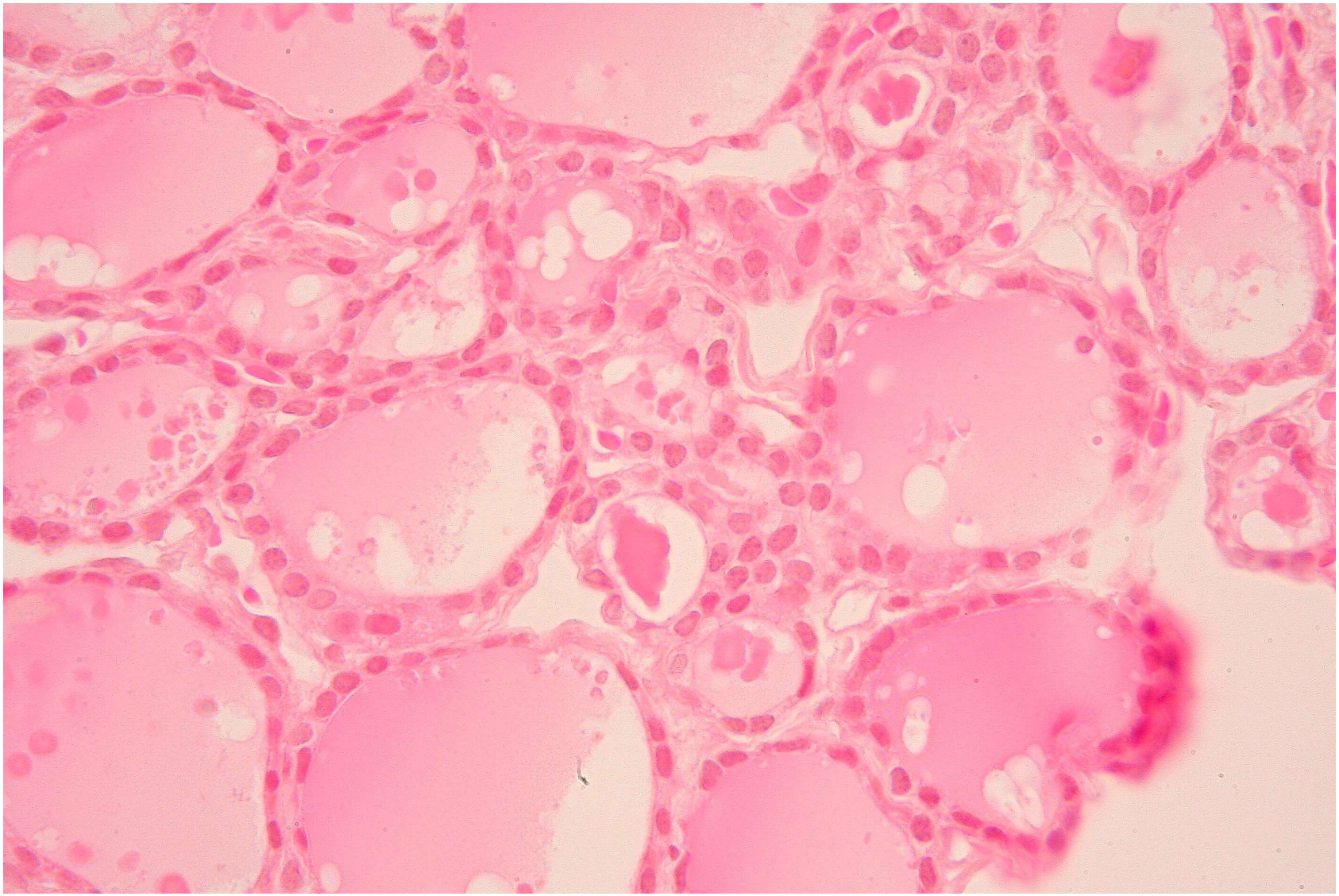
Discussion

- C cell thyroid
  - Also called “parafollicular cells”
  - Located within the thyroid, in the interstitium between follicles, generally in parafollicular position
  - They produce calcitonin, a hormone that regulates the blood calcium levels by inhibitin calcium release form the bone
  - C cells originate from the ultimobranchial body, a structure derived from the last pharyngeal pouch



https://dentmistry.com/2017/10/16/development-of-pharyngeal-branchial-apparatus/





Discussion

- C cell thyroid tumors
  - Hyperplasia and adenoma
    - Transition point is subjective
    - When the C-cell proliferation exceeds several thyroid follicles, the lesion is classified as adenoma
  - Carcinoma:
    - More highly cellular
    - Tumor cells are pleomorphic
    - Histologic evidence of intrathyroidal or extracapsular invasion
    - Metastases to distant sites

What Is Your Diagnosis?

Paratracheal Cervical Mass in a Dog

Walter Bertazzolo, Chiara Giudice, Marta Dell'Orco, Mario Caniatti

Case Presentation

A 14-year-old female Welsh Terrier was presented for evaluation of multiple skin masses. The dog had been vaccinated routinely and given monthly heartworm prophylactic treatments and had no history of disease prior to presentation. The owner had noted the masses incidentally the previous day during bathing and clipping. On presentation the dog was in good body condition and alert. Results of clinical examination were unremarkable except for the presence of 2 cutaneous masses and 1 subcutaneous mass. Results of a CBC and serum biochemical profile were within reference intervals. Thoracic radiography was unremarkable.

One cutaneous mass was located on the dorsum and was diagnosed cytologically and histologically as a follicular (epidermal) cyst. The second cutaneous mass was located in the parotid gland region and was diagnosed cytologically and histologically as a sebaceous epithelioma. The subcutaneous mass was located in the cervical region. It was smooth, 2×3 cm (oval), well circumscribed, and loosely attached to the soft tissue adjacent to the left ventrolateral aspect of the cranial trachea.

A sample for cytologic examination of the cervical mass was obtained by fine-needle capillary sampling, in which a 25-ga 1-inch needle was inserted multiple times into the mass without aspiration. Smears were routinely prepared and stained with a quick Romanowsky-type stain (Hemacolor; Merck, Darmstadt, Germany) (Figure 1A and B).

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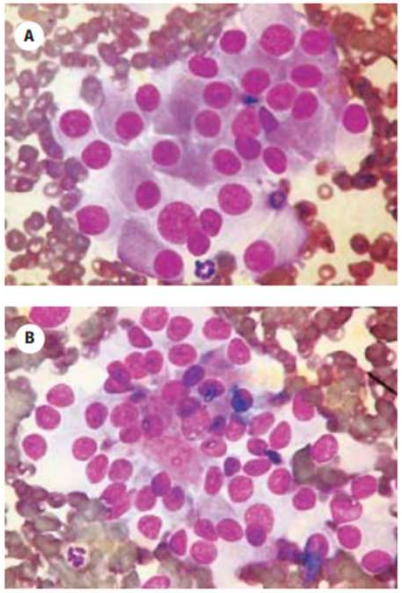
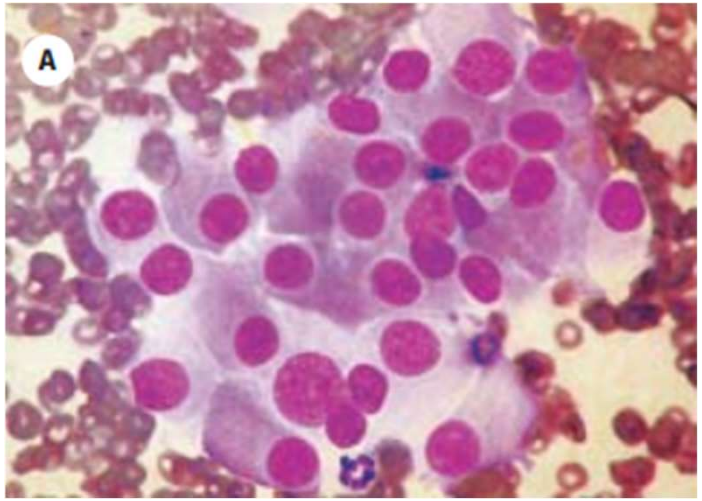


Figure 1. Fine-needle capillary sample from a paratracheal cervical mass in a dog (**A**,**B**). Hemacolor, ×100 objective.

From the Pronto Soccorso Veterinario, Lodi, Italy (Bertazzolo, Dell'Orco) and the Dipartimento di Patologia Animale, Igiene e Sanità Pubblica Veterinaria, Sezione di Anatomia Patologica e Patologia Aviare, Università degli Studi di Milano, Milano, Italy (Giudice, Caniatti). Corresponding author: Walter Bertazzolo, via Emilia, 1-27045 Casteggio (PV), Italy (bertwalter@libero.it).



Cytologic Interpretation

The sample was moderately cellular and contaminated with blood. A single cell population was arranged in numerous clusters of variable sizes. Cells forming small clusters were arranged in a monolayer, whereas in larger clusters they were often superimposed. An acinar pattern was sometimes evident. Most cells ranged from 15-30 µm in diameter, but occasionally they were up to 40 µm. Cells were round to polygonal, with distinct cell borders and mild to moderate anisocytosis. Nuclei were round to oval and eccentric, with reticular to coarse chromatin and prominent nucleoli. Anisokaryosis was moderate to marked. Rare binucleated and multinucleated cells were observed. Nuclear pseudoinclusions were rarely seen. Cytoplasm was scarce to abundant, finely granular, and eosinophilic (Figure 1A). Rarely, multiple intracytoplasmic vacuoles were seen in some cells. Extracellular amorphous pink material was occasionally observed in some clusters (Figure 1B).

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CASE REPORT

Veterinary Clinical Pathology
An International Journal of Laboratory Medicine
WILEY

Multiorgan metastases with massive bone involvement of a medullary thyroid carcinoma in a dog

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Abstract

A 10-year-old mixed-breed male dog was referred for a subcutaneous mass on the ventral neck. Based on total-body computed tomography (TBCT), the mass was located in the left thyroid lobe. Further alterations included enlargement of the ipsilateral mandibular and prescapular lymph nodes (LNs). Surgical excision of the mass and enlarged LNs was performed. Histopathology and immunohistochemistry were consistent with a medullary (C-cell) thyroid carcinoma, with no evidence of nodal metastases. Surgery was considered curative, and no medical treatment was provided. Periodic follow-up rechecks were unremarkable. After 18 months, the dog exhibited lethargy, vomiting, anorexia, and hind leg stiffness. TBCT revealed polyostotic osteopathy, and cytology suggested a metastatic endocrine carcinoma. Due to the dog's poor clinical condition and prognosis, the owner elected euthanasia, and a necropsy was performed. Based on gross pathology, histopathology, and immunohistochemistry, multiple metastases of the previous thyroid carcinoma were diagnosed, involving the occipital bone, multiple vertebrae, left sacral wing, fourth right rib, left scapula, left humerus, intrathoracic LNs, lung, spleen, and adrenal glands. This report describes a case of medullary thyroid carcinoma with distant multiorgan metastases and massive bone involvement after a disease-free interval of 18 months.

KEYWORDS
canine, C-cell, endocrine, metastasis, osteolytic lesion, skeletal

1 | CASE PRESENTATION

A 10-year-old mixed-breed male dog was referred to the Oncology Unit of the Department of Veterinary Medical Sciences (University of Bologna) for the evaluation of a unilateral, mobile mass in the ventral neck region, which had been noticed 3 months earlier. Left mandibular and prescapular lymph nodes (LNs) were mildly enlarged at palpation. Physical examination was otherwise unremarkable. Ultrasound examination of the neck revealed a heterogeneously hypoechoic mass of 6 × 5 × 4 cm in size, with multiple hyperechoic foci of intraparenchymal mineralization located on the projection area of the left thyroid lobe with no apparent invasion of surrounding structures. Routine blood analysis (complete blood count, serum biochemistry, and clotting profile) was unremarkable. A total body computed tomography (TBCT) scan revealed a 7.3 × 4.6 × 4.4 cm left thyroid mass in close proximity to the trachea, left carotid artery, left jugular vein, and neck muscles without any apparent infiltration of those structures. Left mandibular and prescapular LNs appeared mildly enlarged. No distant metastases were identified. Due to the bleeding risk associated with the procedure, cytology was not performed.

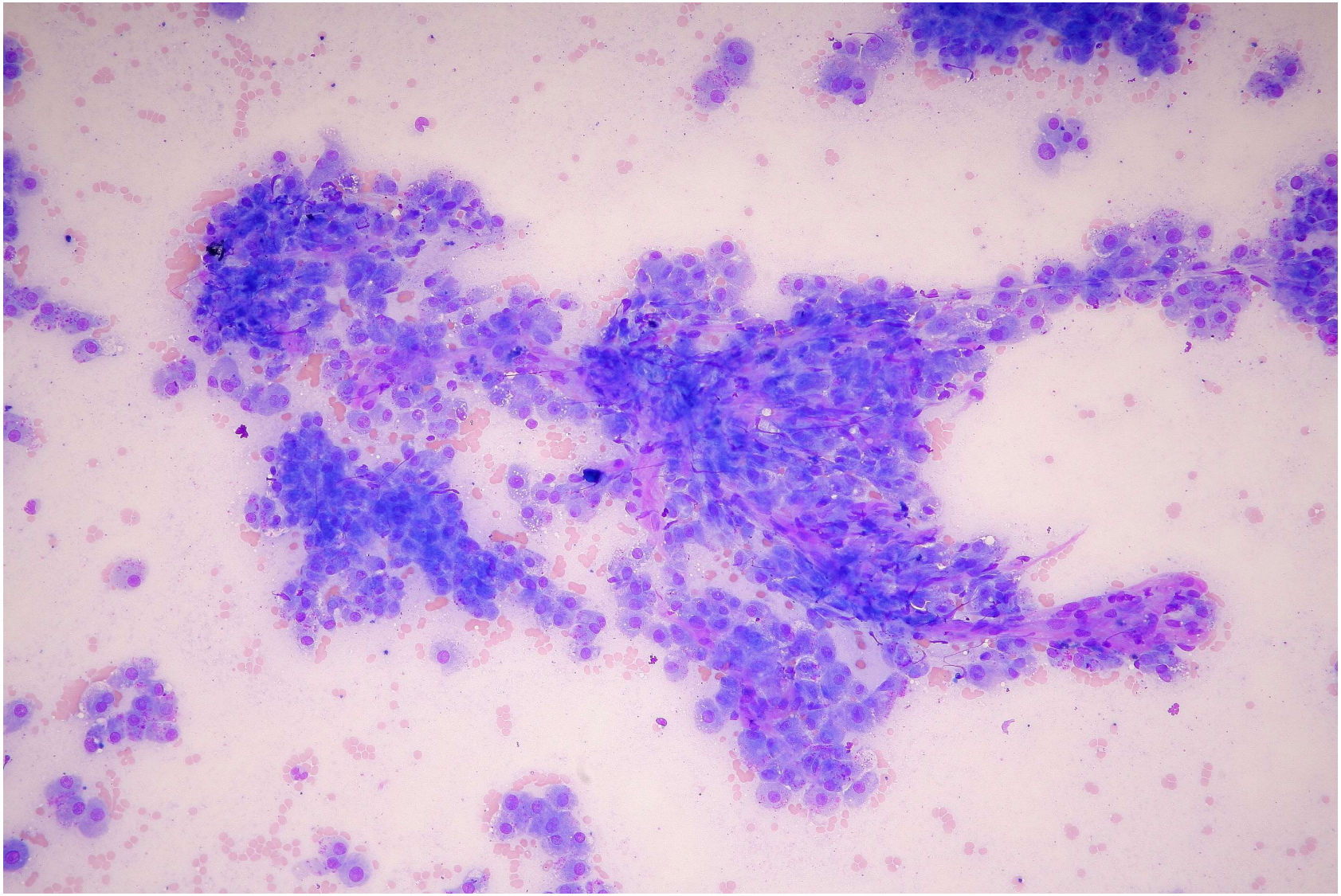
The histopathologic differentiation between follicular and medullary carcinomas can be challenging, as both can occur with a solid pattern. Moreover, medullary carcinomas can entrap residual thyroid follicles, leading to a misdiagnosis of solid follicular carcinoma. In these cases, immunohistochemistry is required for a definitive diagnosis, and the most useful markers are thyroglobulin to confirm follicular origin and calcitonin for medullary origin.[5,6] Although it has

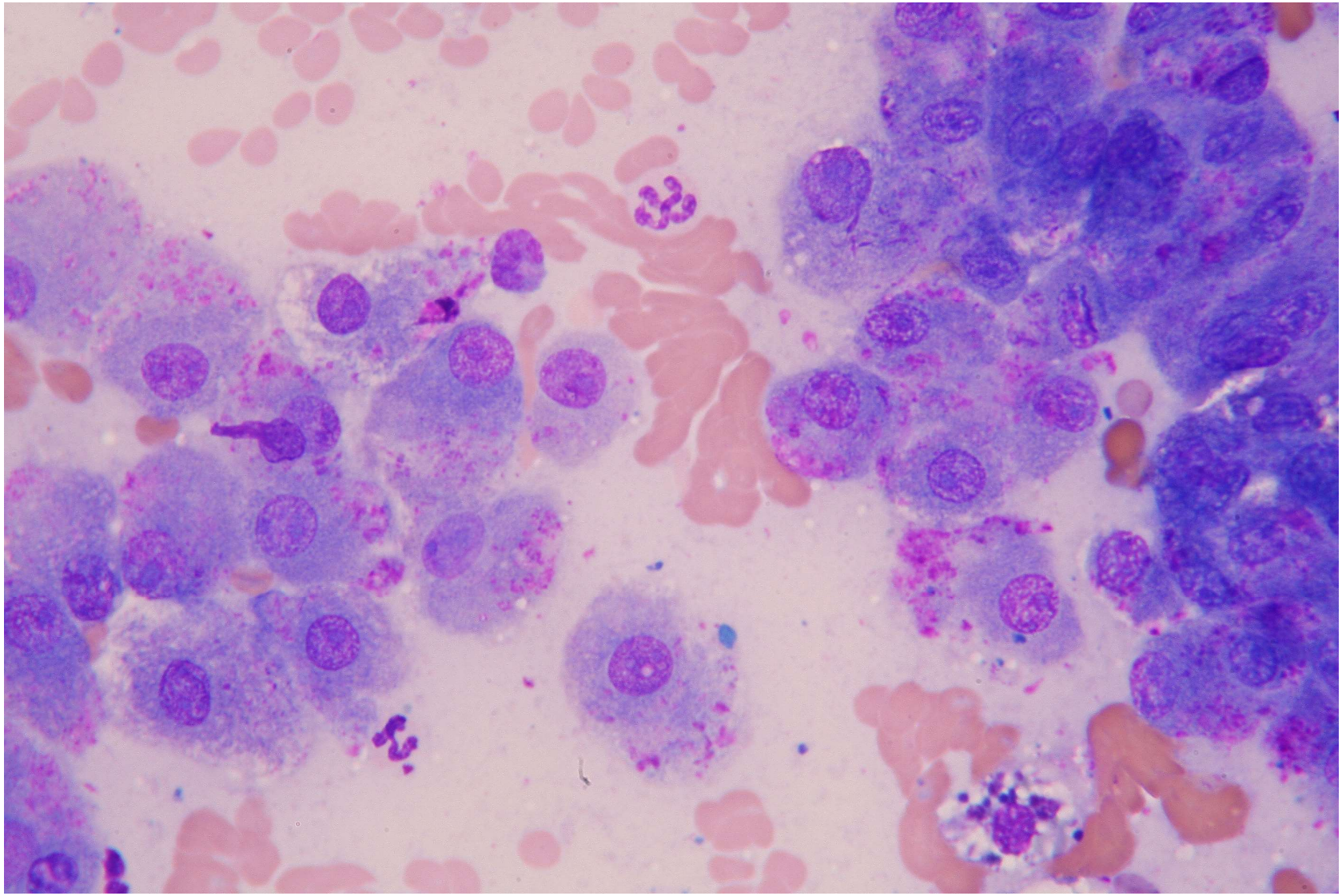
This report describes a case of canine medullary thyroid carcinoma, which developed metastatic disease after 18 months from thyroidectomy and lymphadenectomy. The biological niche for residual

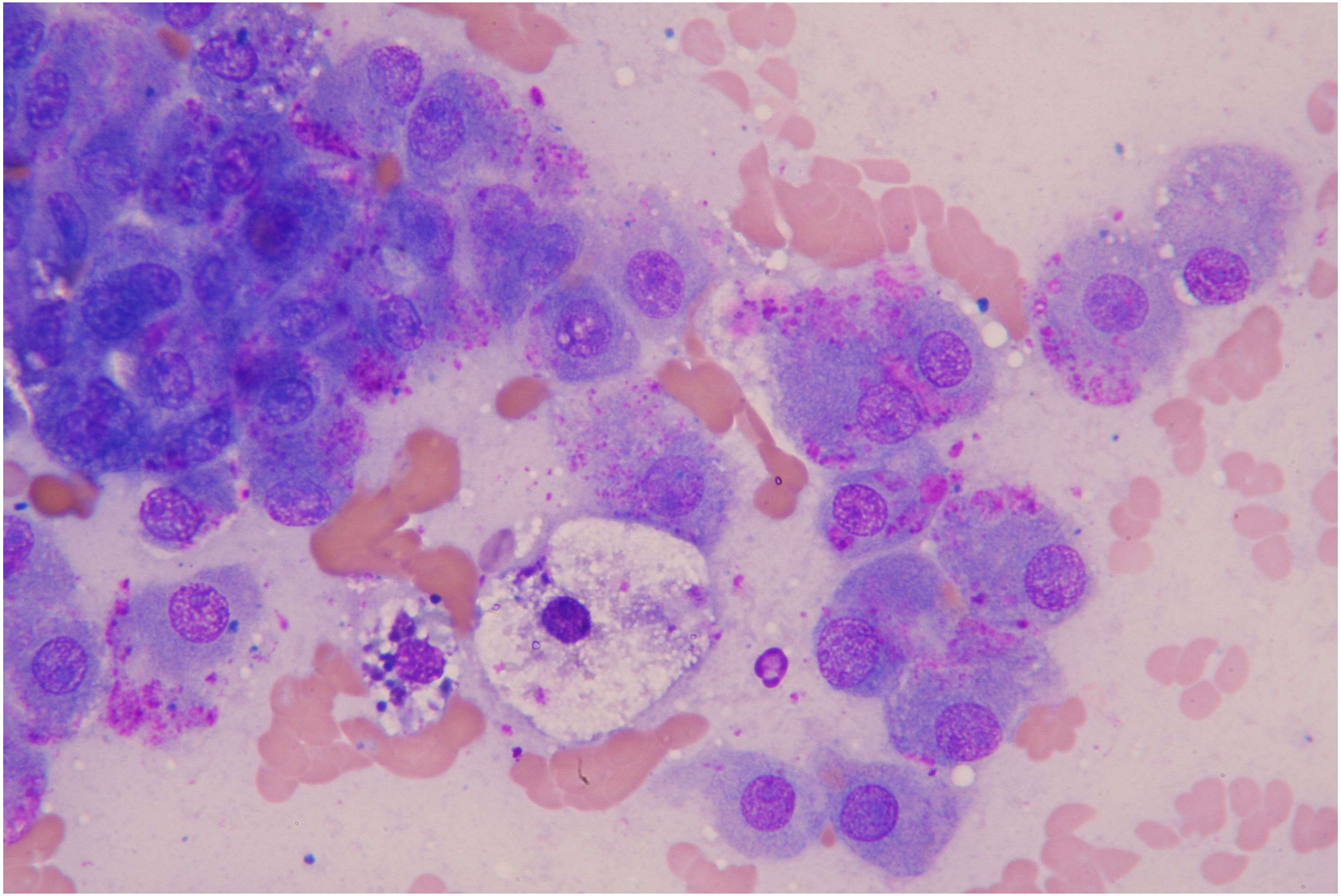
potential. At the time of diagnosis, metastases are reported in 16%–38% of dogs, while at necropsy they have been documented in up to 80% of cases.[6-10] The lung is the most common site of metastases, followed by draining LNs and, less frequently, brain, heart, liver, spleen, kidney, and bone.[7,11-13] Several potential prognostic factors

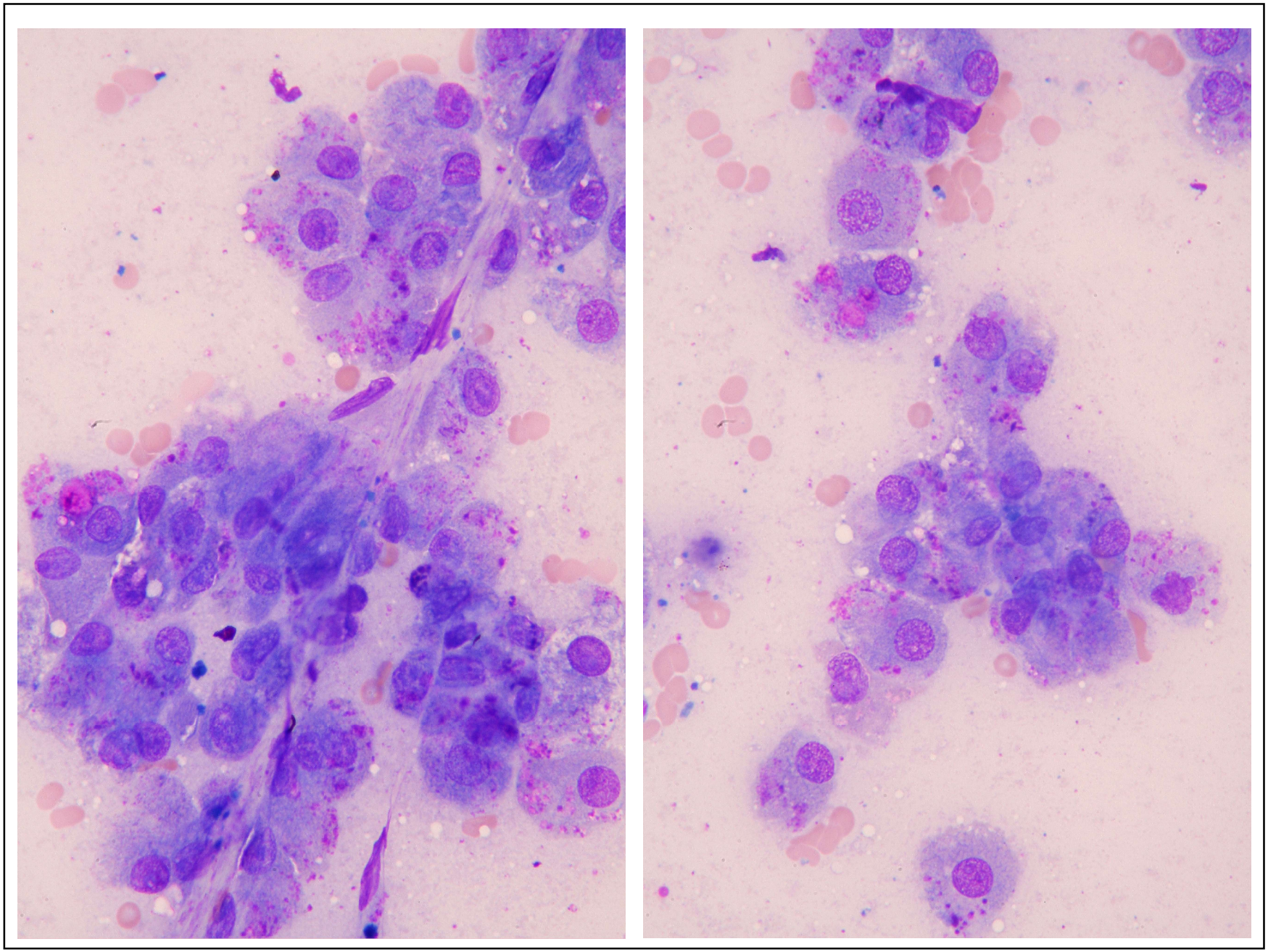
Case #2

- Dog, mongrel, 14-year-old, male
-
- Diffuse hepatic changes.
- Ultrasonography: irregularly hyperechoic liver parenchyma
-
- FNCS of the liver
- MGG stain









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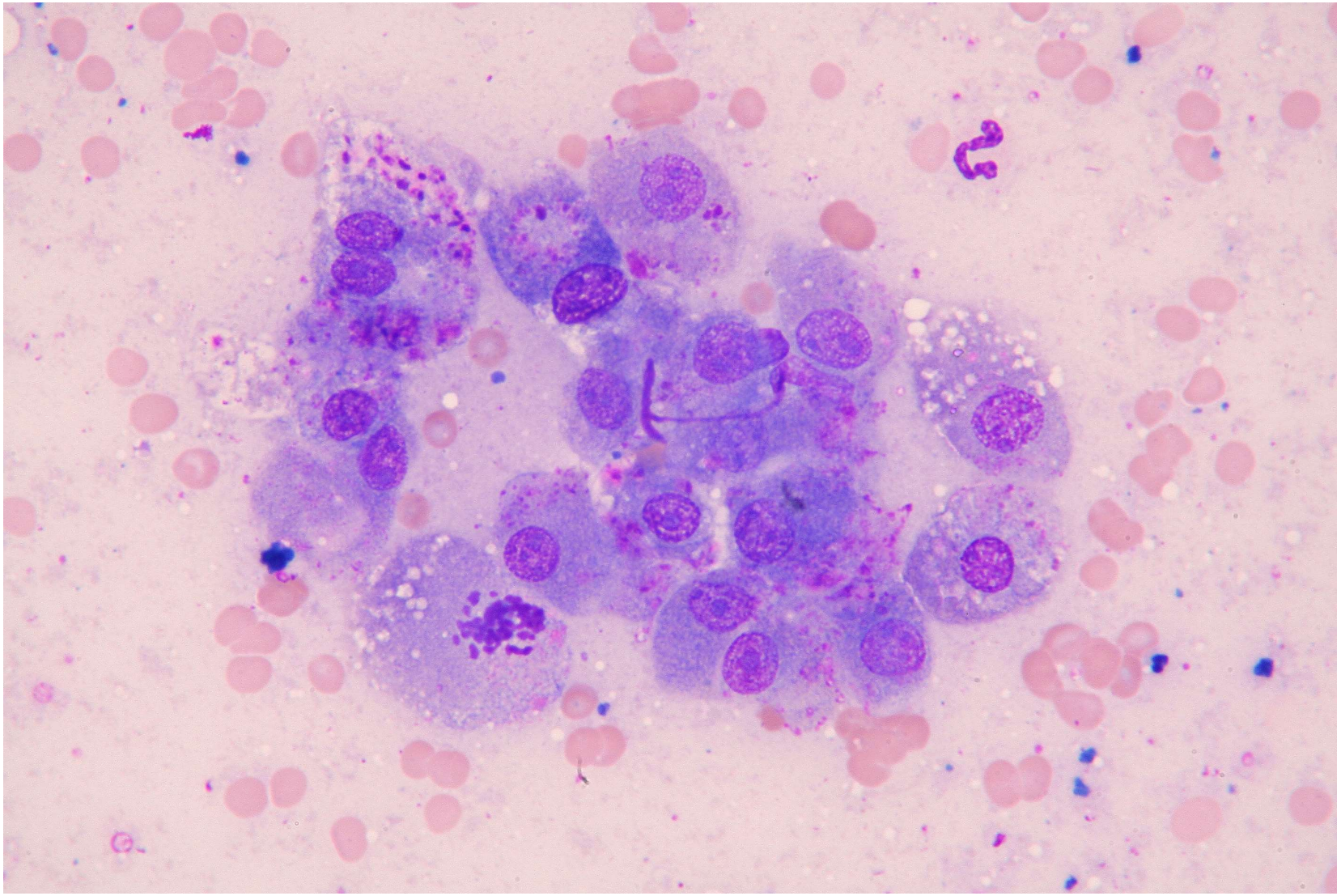
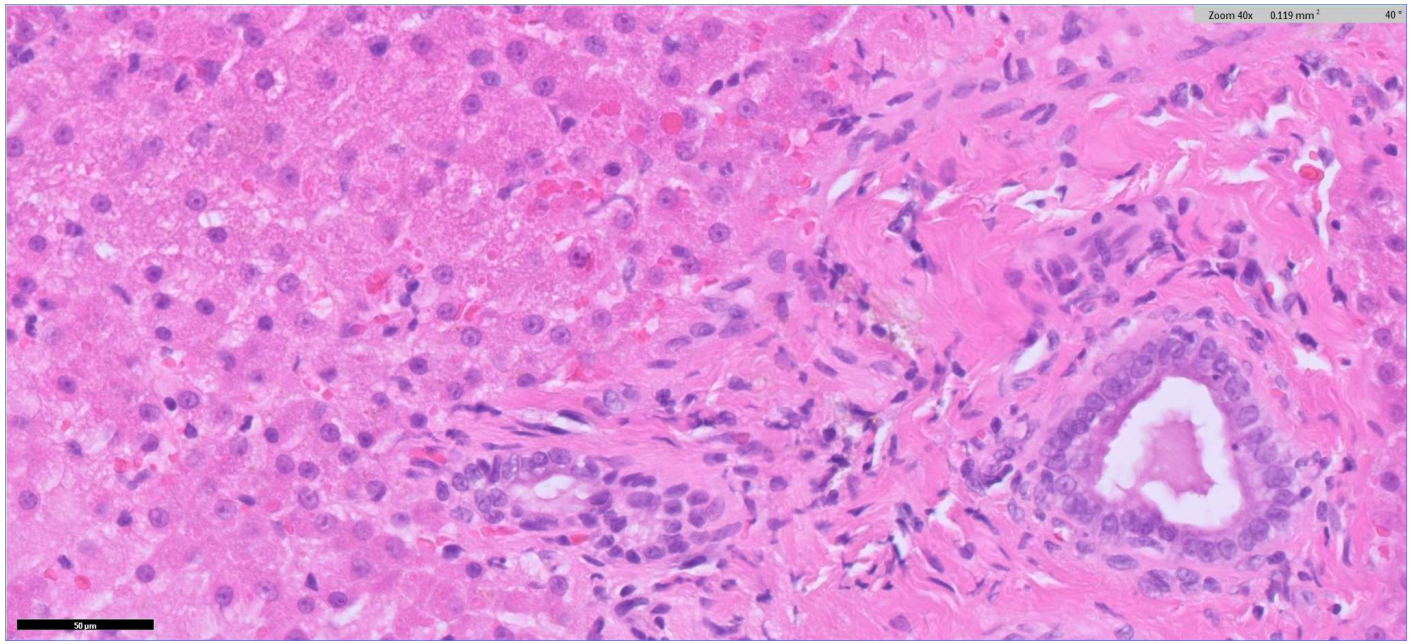


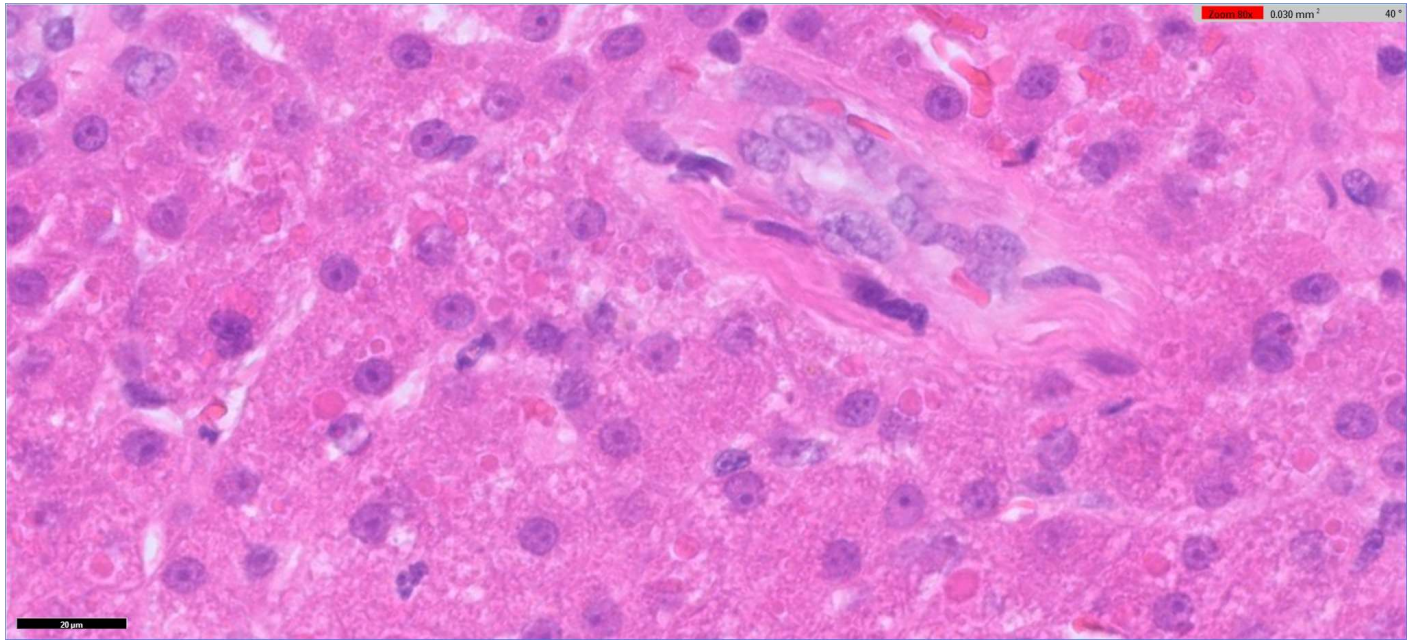
Cytologic findings

- High number of pink/purple intracytoplasmic granules in otherwise normal hepatocytes
- Cytologic features of regeneration
  - Mild anisokarioys
  - Mitoses
- Cytologic features of mild hepatic fibrosis
  - Bundles of collagen among hepatocytes

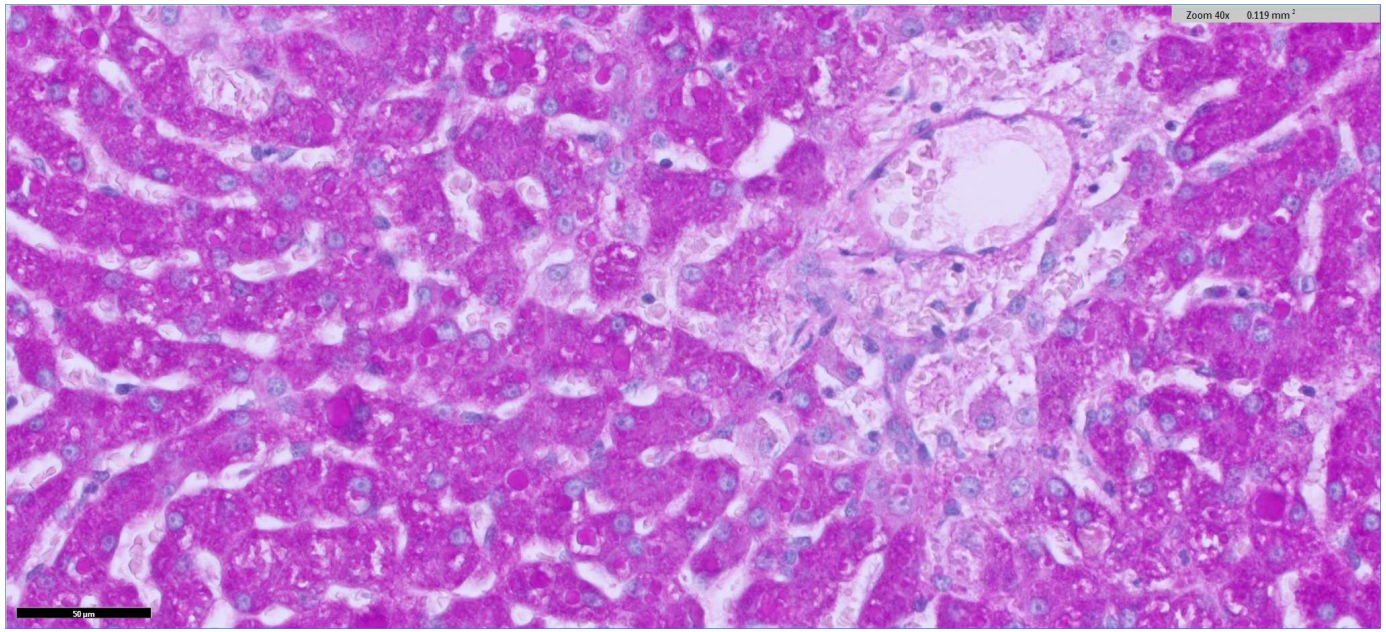
Diagnosis

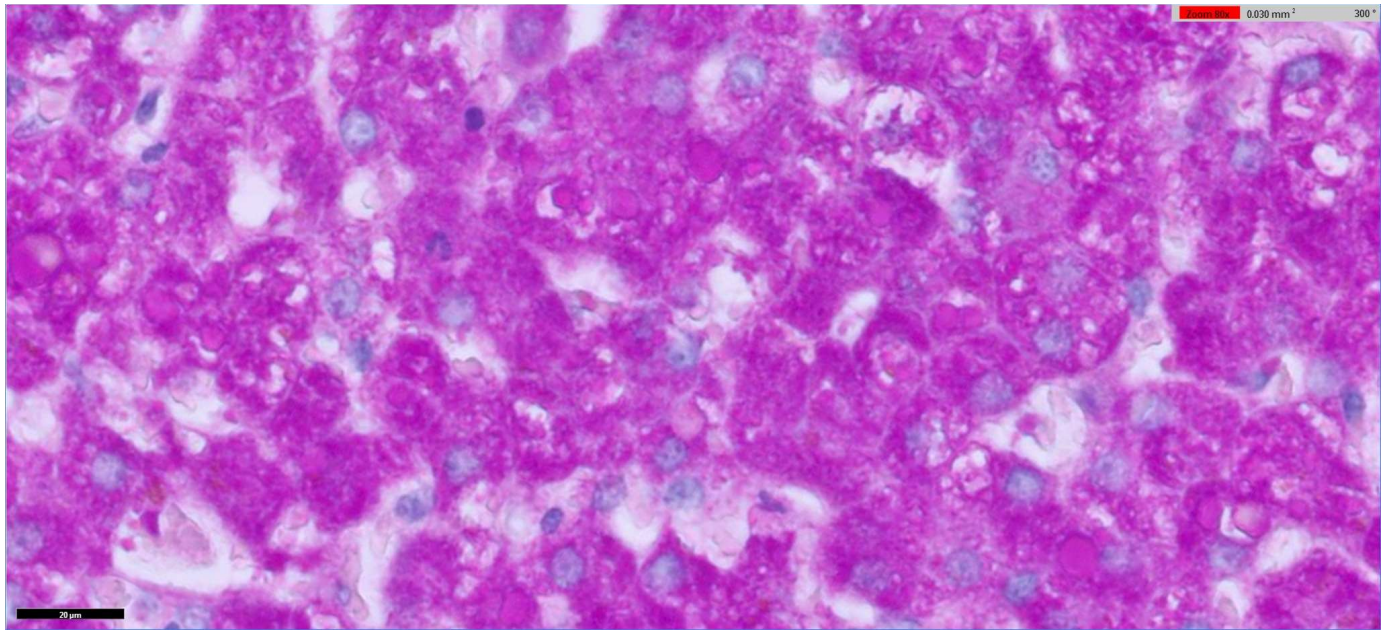
- Cytologic diagnosis
  - **Liver fibrosis**
  - **Accumulation of cytoplasmic eosinophilic granules of unknow significance**
- Histologic diagnosis (laparotomic biopsies)
  - **Chronic hepatitis**





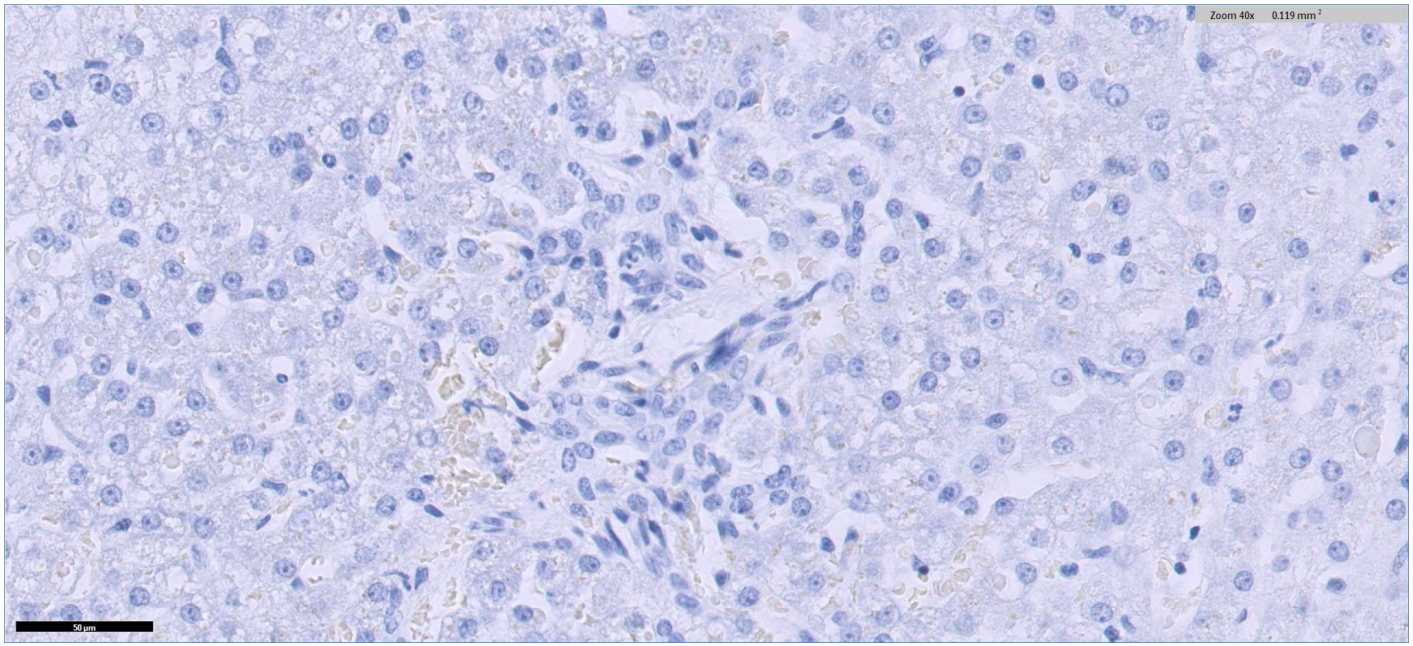
HE



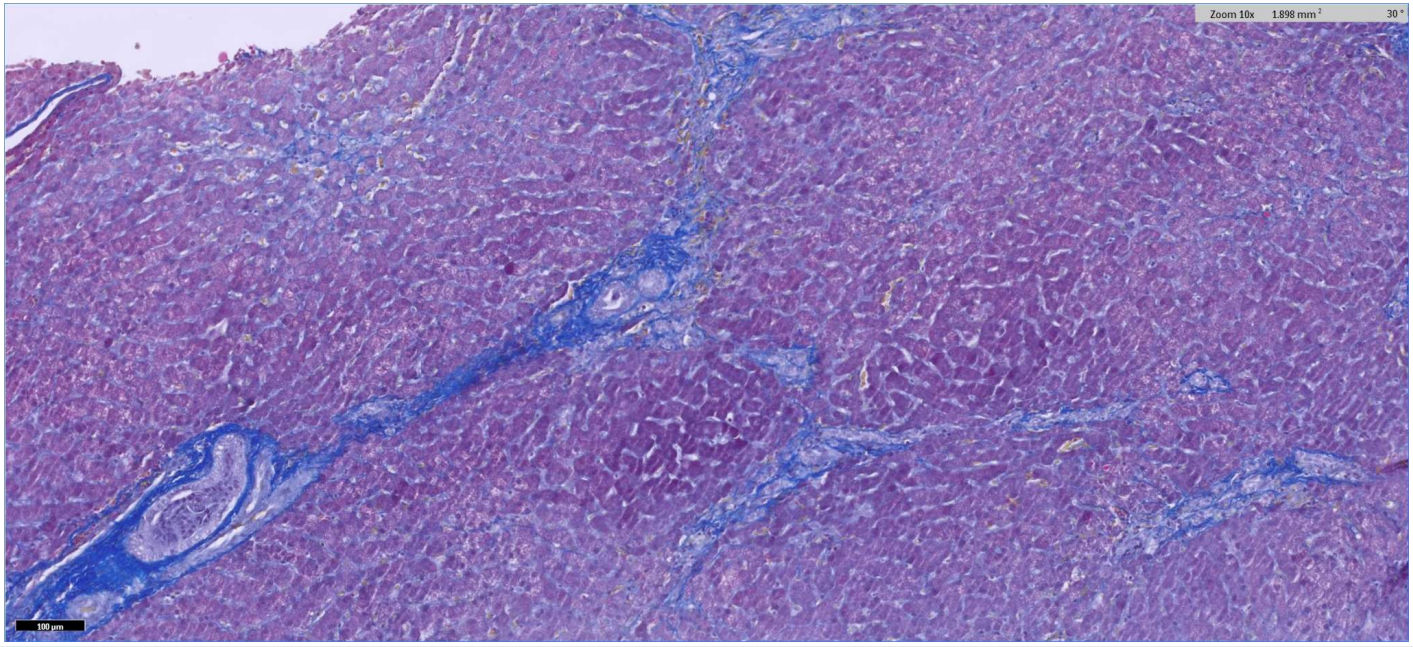


PAS

Rodanine



Trichromic



Discussion

- The presence of globular eosinophilic cytoplasmic inclusion in liver of dog is unusual
- The meaning of this finding is unknow
- Some of the possible cause are represented by accumulation of:
  - Alpha-1-antitrypsine
  - Alpha-fetoprotein
  - Haptoglobin
  - Alpha-macroglobulin

Journal of Comparative Pathology
Volume 111, Issue 4, November 1994, Pages 401-412

Hepatic accumulation of alpha-1-antitrypsin in chronic liver disease in the dog

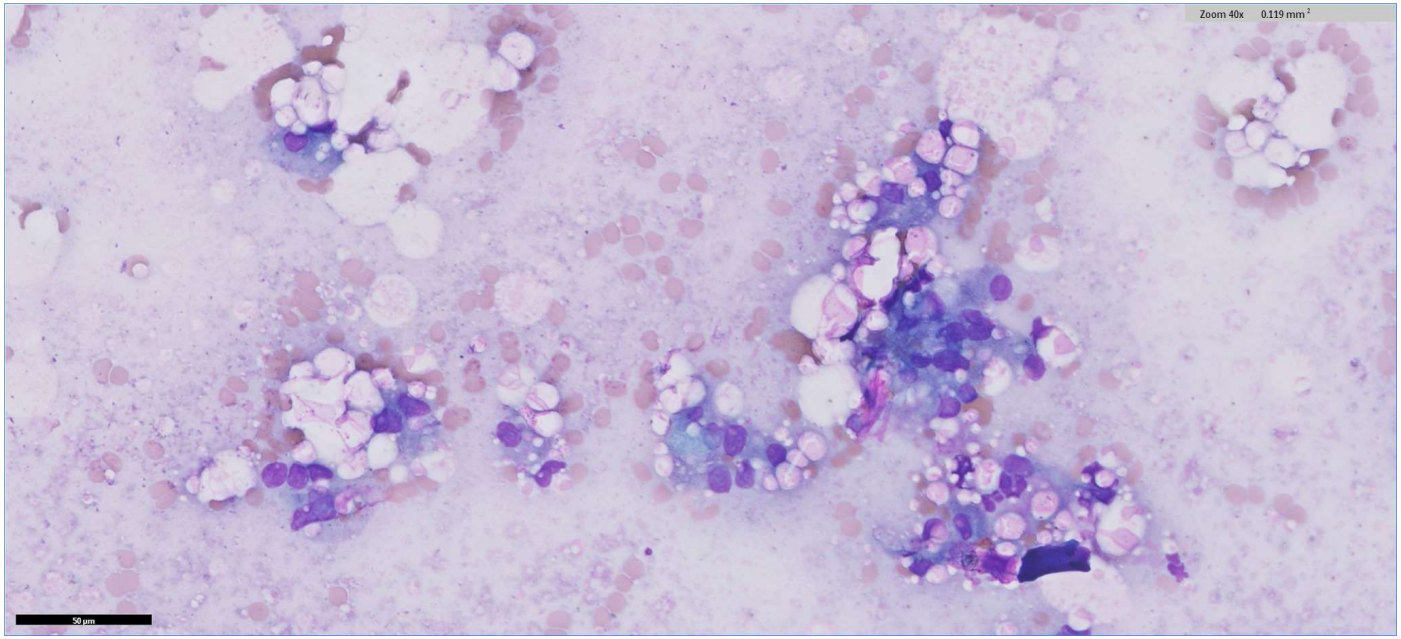
E. Sevelius [a], M. Andersson [a], L. Jönsson [*]

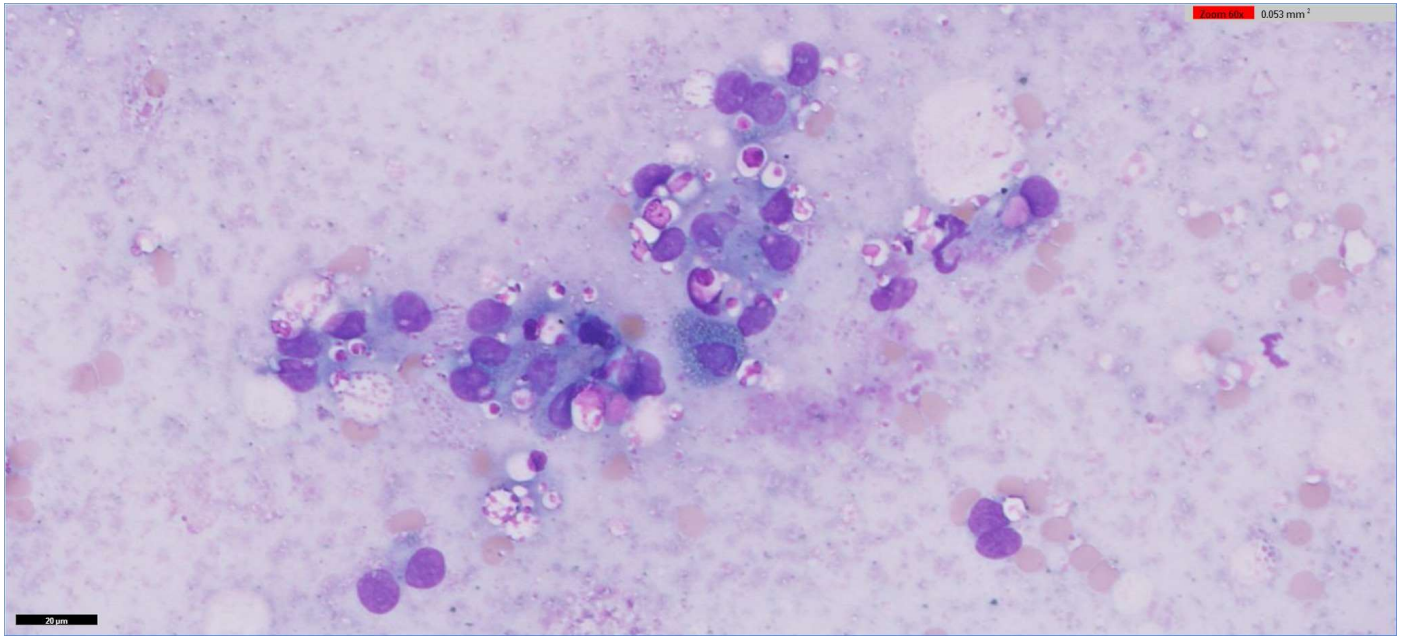
- Alpha-1-antitrypsin deficiency has long been known to cause liver cirrhosis in man, but whether it does so in the dog is uncertain.
- To investigate this point 57 dogs with clinically and histopathologically diagnosed chronic liver disease were examined.
- Immunostaining for alpha-1 antitrypsin revealed that 37 diseased dogs had alpha-1 antitrypsin in the cytoplasm of their hepatocytes.
- As alpha-1 antitrypsin aggregation is lethal to hepatocytes and as cell death attracts mononuclear blood cells whose cytokines induce continued alpha-1 antitrypsin synthesis with subsequent risk of further alpha-1 antitrypsin accumulation, liver disease may thus be maintained.
- Whether alpha-1 antitrypsin aggregates actually initiates liver disease in dogs, as in man, remains to be elucidated by further biochemical investigation of the three canine alpha-1 antitrypsin types found.

Discussion

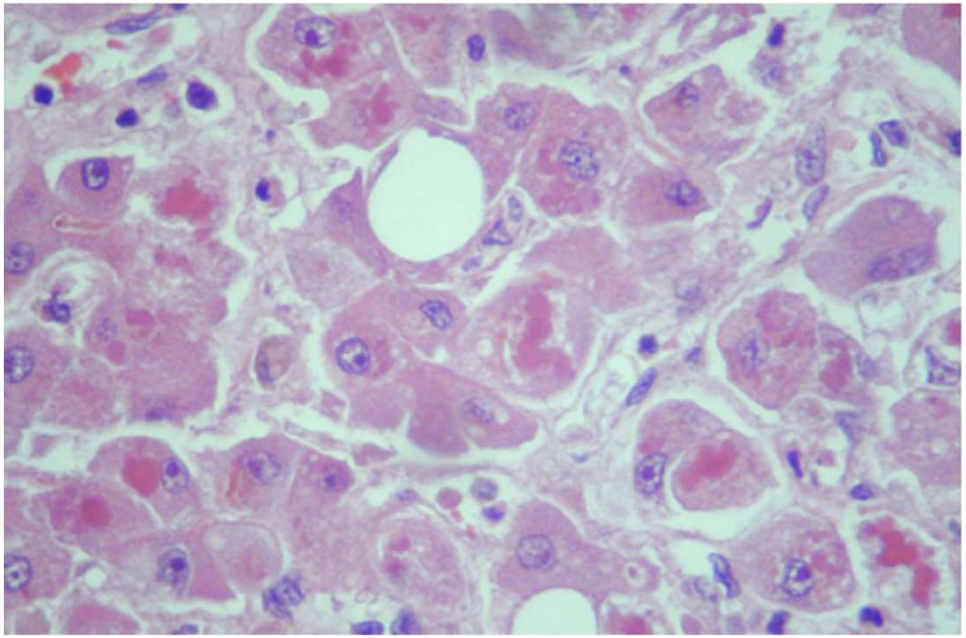
- Not sure what this material does represent!!!
  - Any imput is welcome
- There are no conclusive evidence that correlate this finding to primary causes
- The most important correlation of this finding is the association with chronic liver disease
- Need for further investigation:
  - Definitive recognition of this material
  - Association with primary diseases
  - Clinical relevance of the finding

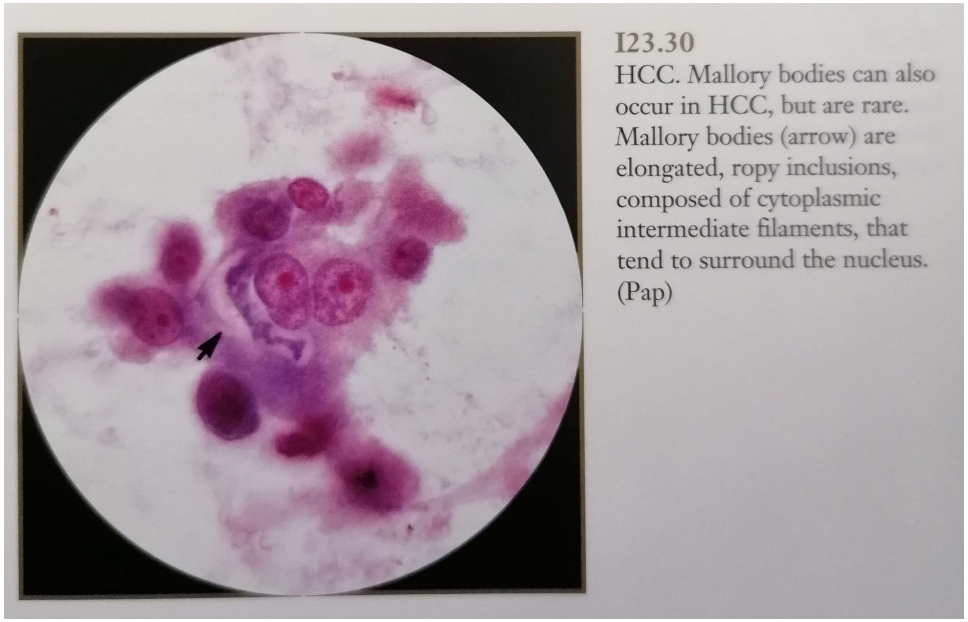
- **Do not confuse eosinophilic accumulation with presence of oxidized lipidic material**





- **<u>Do not confuse this granules with Mallory-Denk bodies, represented by aggregates of cytokeratin</u>**





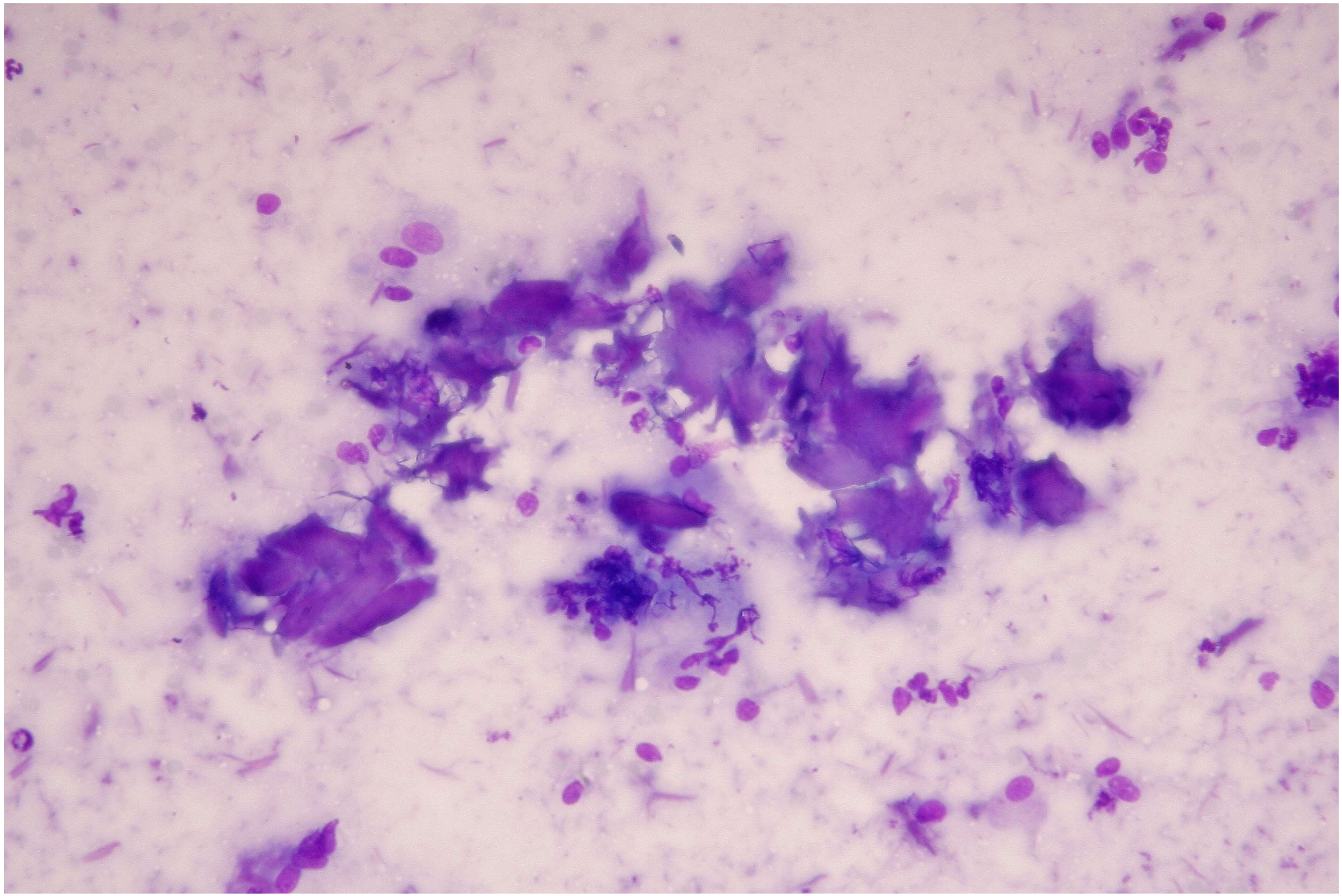
I23.30
HCC. Mallory bodies can also occur in HCC, but are rare. Mallory bodies (arrow) are elongated, ropy inclusions, composed of cytoplasmic intermediate filaments, that tend to surround the nucleus. (Pap)

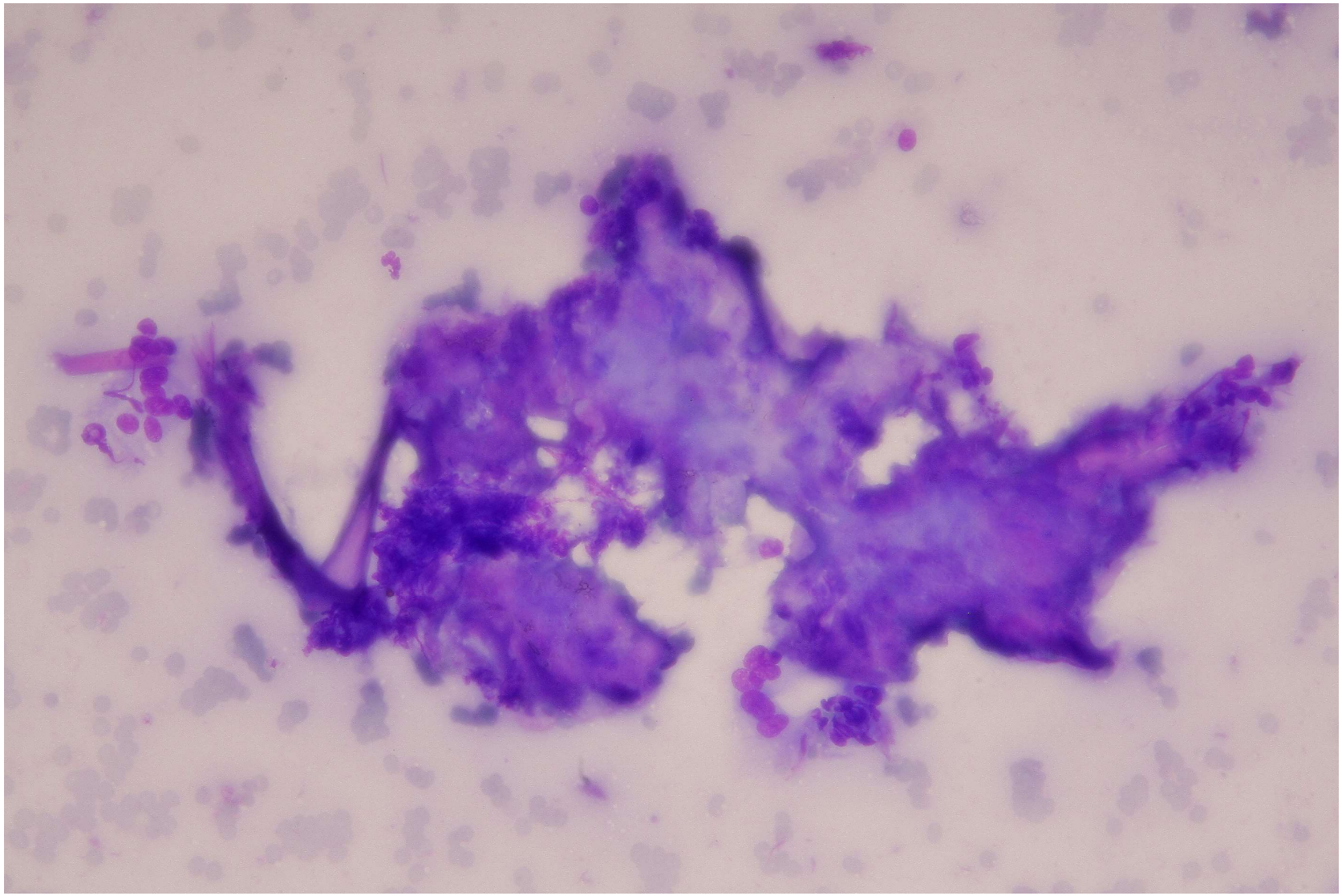
From R.DeMay, The Art and Science of Cytopathology, ASCP, 1996

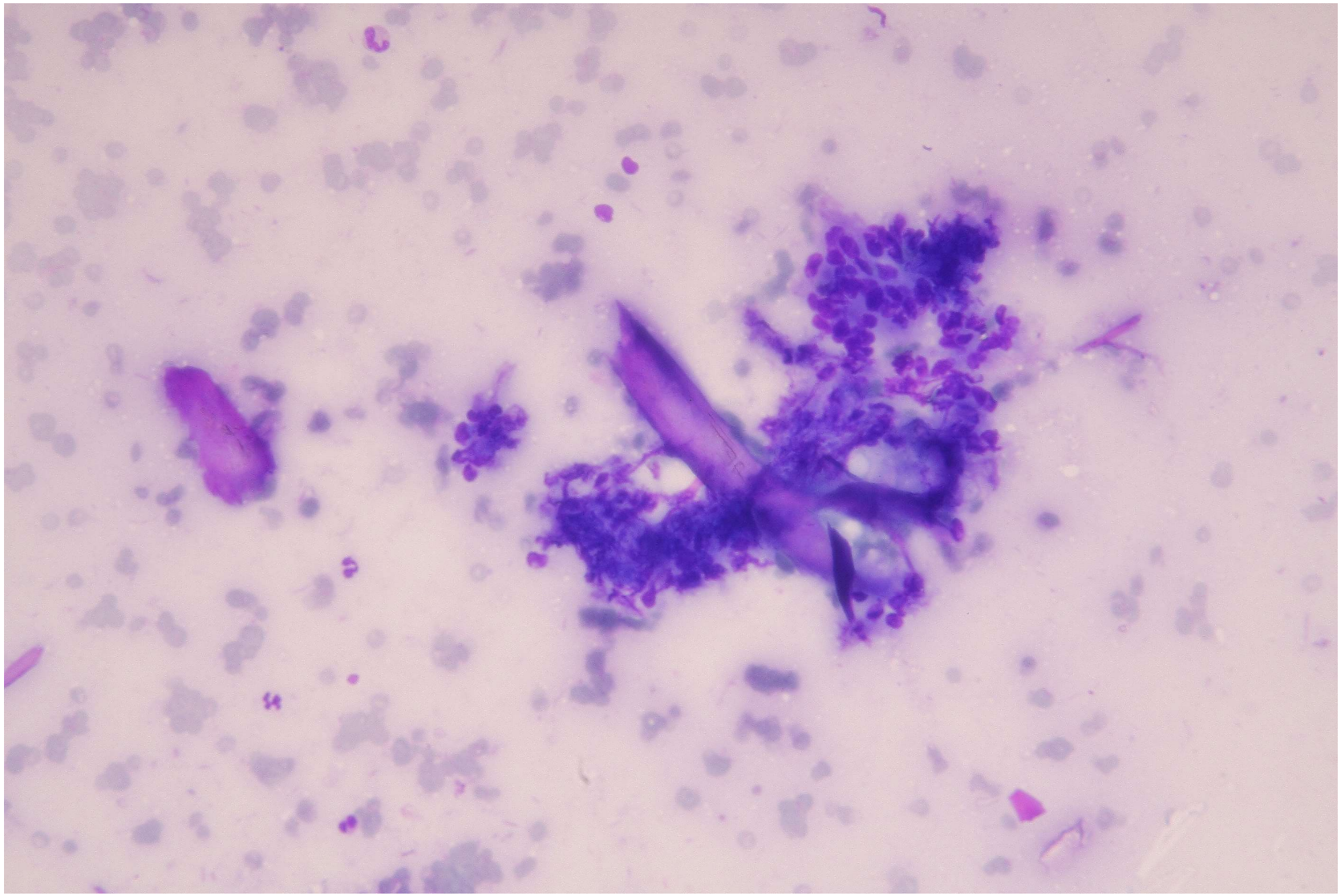
Case #3

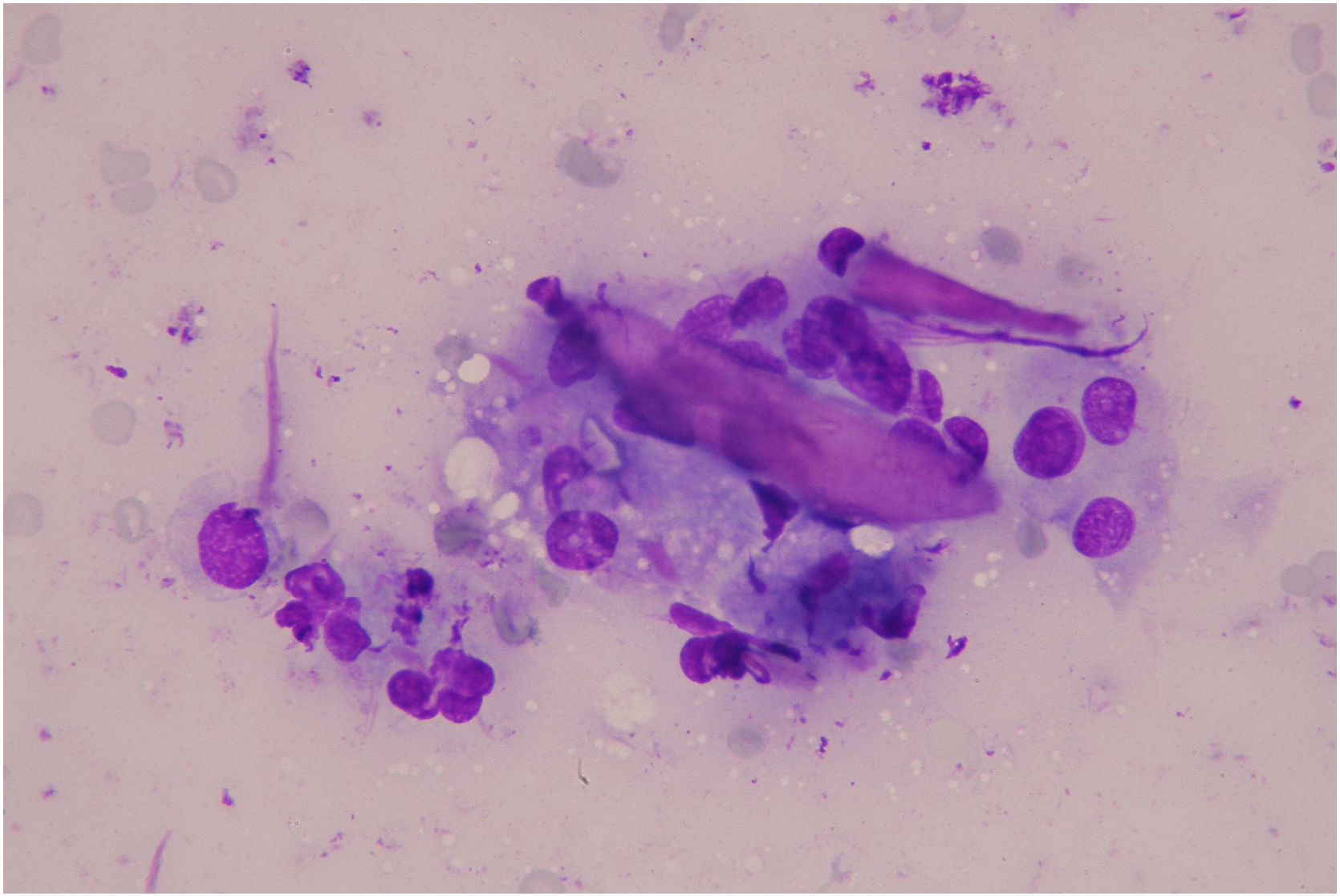
- Dog, Bulldog, 2-years-old, neutered female
-
- Ovariohysterectomy 1 year ago
- Mass in the abdomen

- FNCS of the mass
- MGG stain









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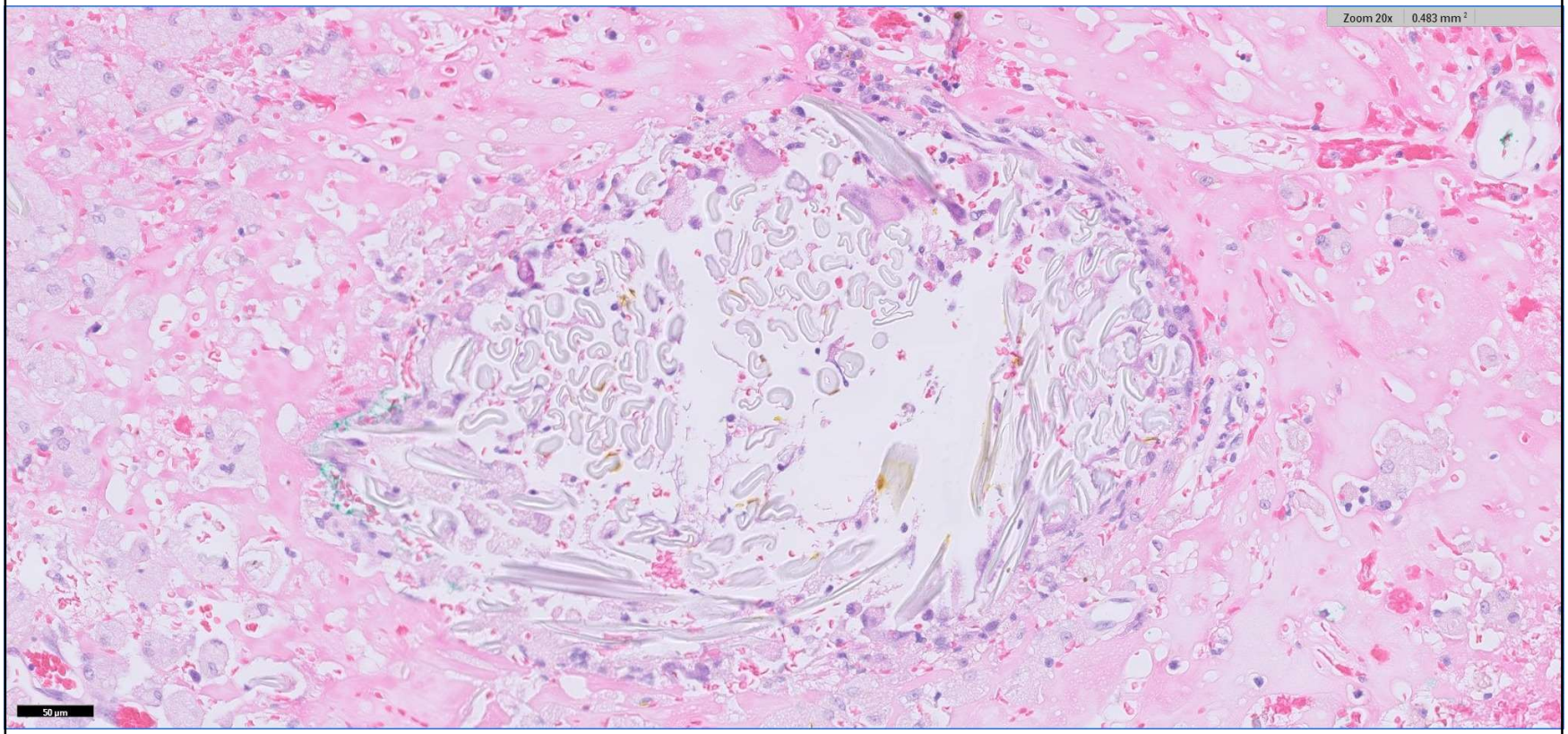
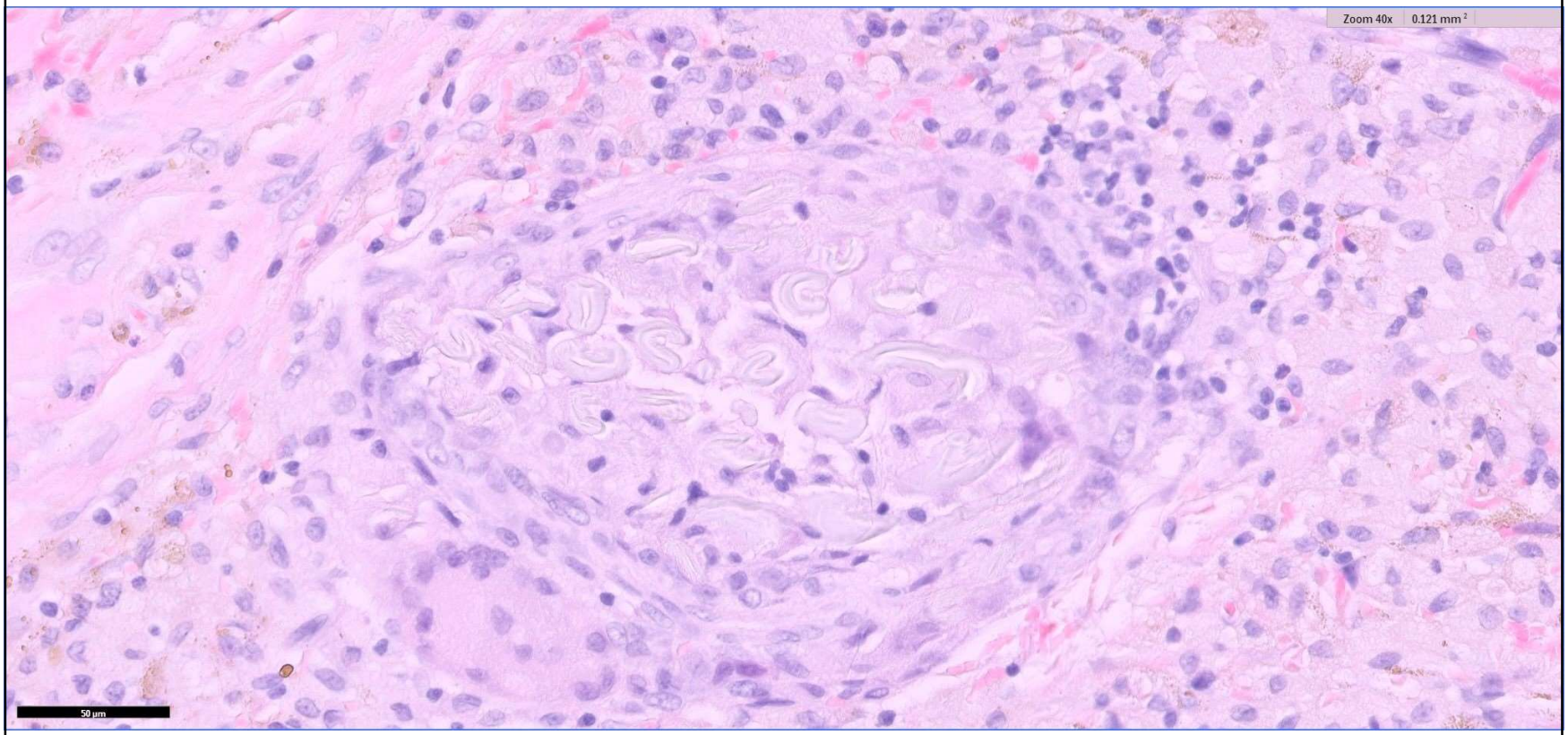
Cytologic findings

- Poor cellularity
- Eosinophilic «foreign» material
- Histiocytic/macrophagic cells
  - Epithelioid aggregates

Diagnosis

- Cytologic diagnosis
  - **Granulomatous inflammation due to foreign bodies in the abdomen**
- Histologic diagnosis (after surgical removal of a foreign body – cotton matrix or sponge – from the abdomen)
  - **Gossipiboma**


Zoom 20x
0.483 mm²
50 µm


Zoom 40x
0.121 mm²
50 µm

Discussion

- Gossypiboma
  - Also called textiloma or cottonoid
  - The term gossypiboma is derived from the Latin word "**gossypium**", which means cotton, and the Swahili word "**boma**", which means place of concealment, thus referring to a retained sponge in the surgical bed.

The Swahili term 'Boma' is traditionally known as an enclosure or fence used to protect livestock like cows, sheep, goats and other animals from predators

https://www.gondwanatoursandsafaris.com/what-is-an-african-boma/

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What is your diagnosis? Intra-abdominal mass aspirate from a spayed dog with abdominal pain

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Case Presentation

An 8-year-old, spayed female Labrador Retriever was presented to a first-opinion veterinary practice for investigation of unwillingness to exercise. The bitch had been spayed 7 years previously and had been treated medically for a postoperative infection at the incision site but had not required subsequent surgical treatment. The only abnormality on physical examination was a tense abdomen. Results of a serum biochemistry profile and CBC were unremarkable, with mild increases in alkaline phosphatase (33 U/L, reference interval 0–25 U/L) and alanine aminotransferase (34 U/L, reference interval 0–25 U/L) activities. The dog's condition deteriorated overnight and abdominal palpation elicited more severe pain the following day. The dog was unwilling to stand and had an abnormal gait, crossing its hind limbs when walking. Abnormalities were not found on a neurologic examination and orthopedic pain was not elicited. Examination of abdominal radiographs showed a midabdominal mass, cranial to the bladder. A fine-needle aspirate of the mass was obtained with ultrasound guidance and was submitted for cytologic examination (Figure 1).

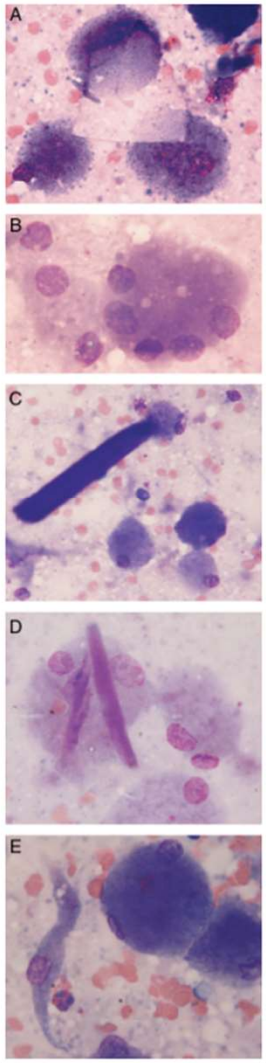

Figure 1. Fine-needle aspirate of a midabdominal mass from a dog. Modified Wright's, (**A, B, D, E**) × 100 objective, (**C**) × 40 objective.

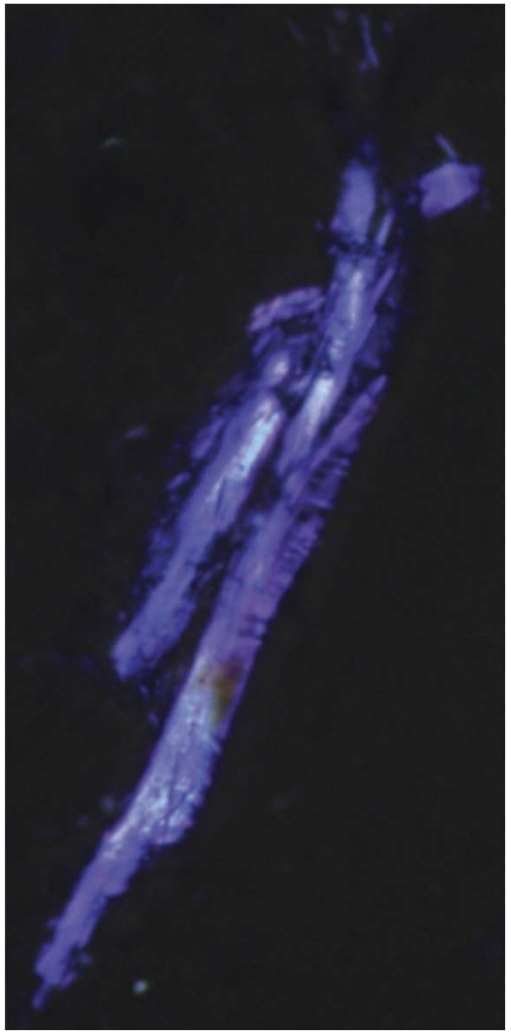

Figure 2. The fine-needle aspirate as seen under polarized light. The fibers are birefringent. Modified Wright's, × 40 objective.

Journal of the American Veterinary Medical Association

Issue: 01 Jul 2019

Pathology in Practice

Lisa J. Schlein DVM, MS, MBA, Sara L. Connolly DVM, MS, Clara Moran DVM, and Daniel J. Duffy BVM&S, MS

- Two types of gossypibomas are reported in the human medical literature:
  - **acute or exudative type**
    - an exudative reaction develops rapidly, often over a period of days, and may lead to serious sequelae, including sepsis, intestinal obstruction, formation of fistulas to the skin or into surrounding viscera, and even death
  - **aseptic, chronic type**
    - a fibrinous reaction results in encapsulation of the foreign material and formation of a granuloma

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Pathology in Practice

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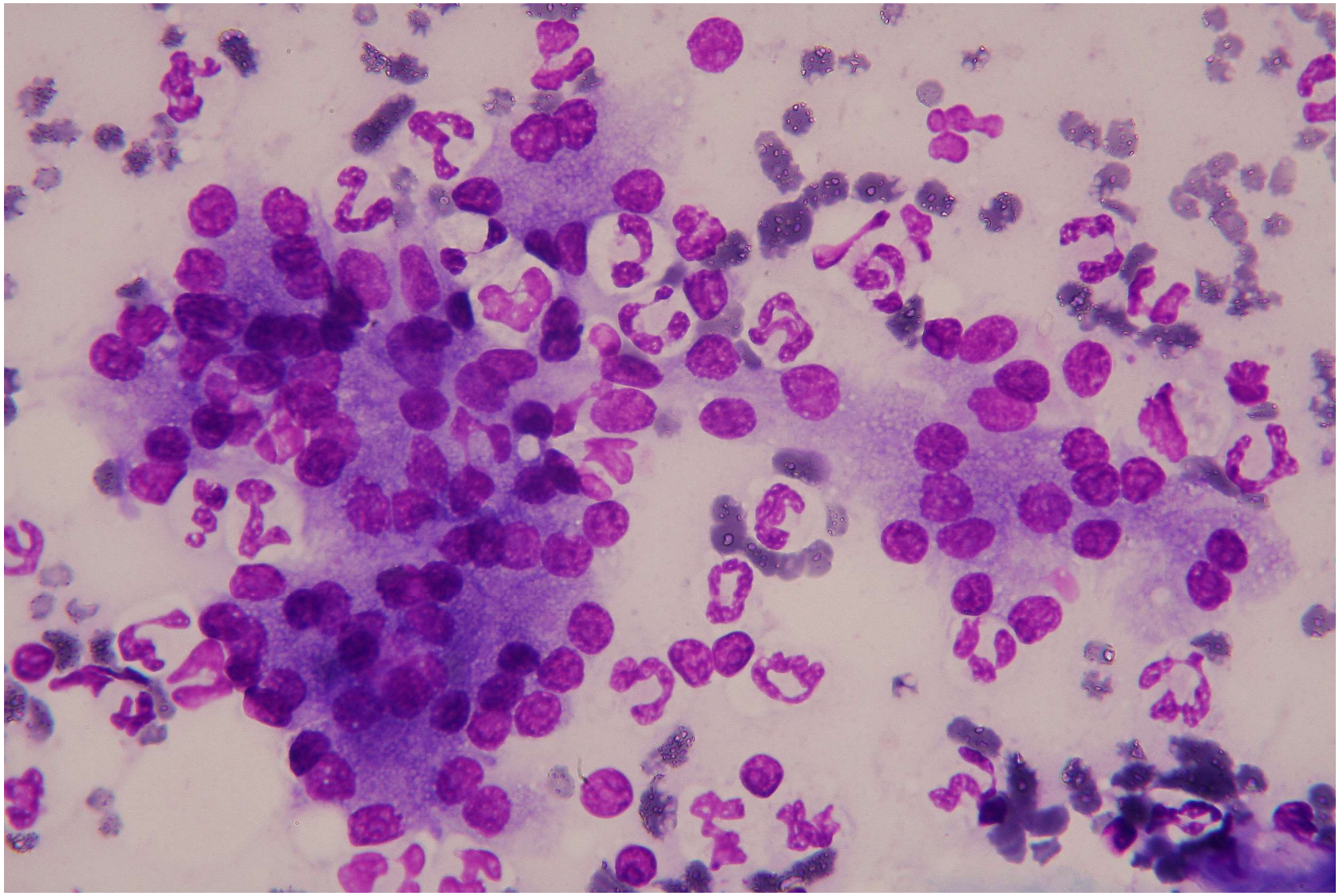
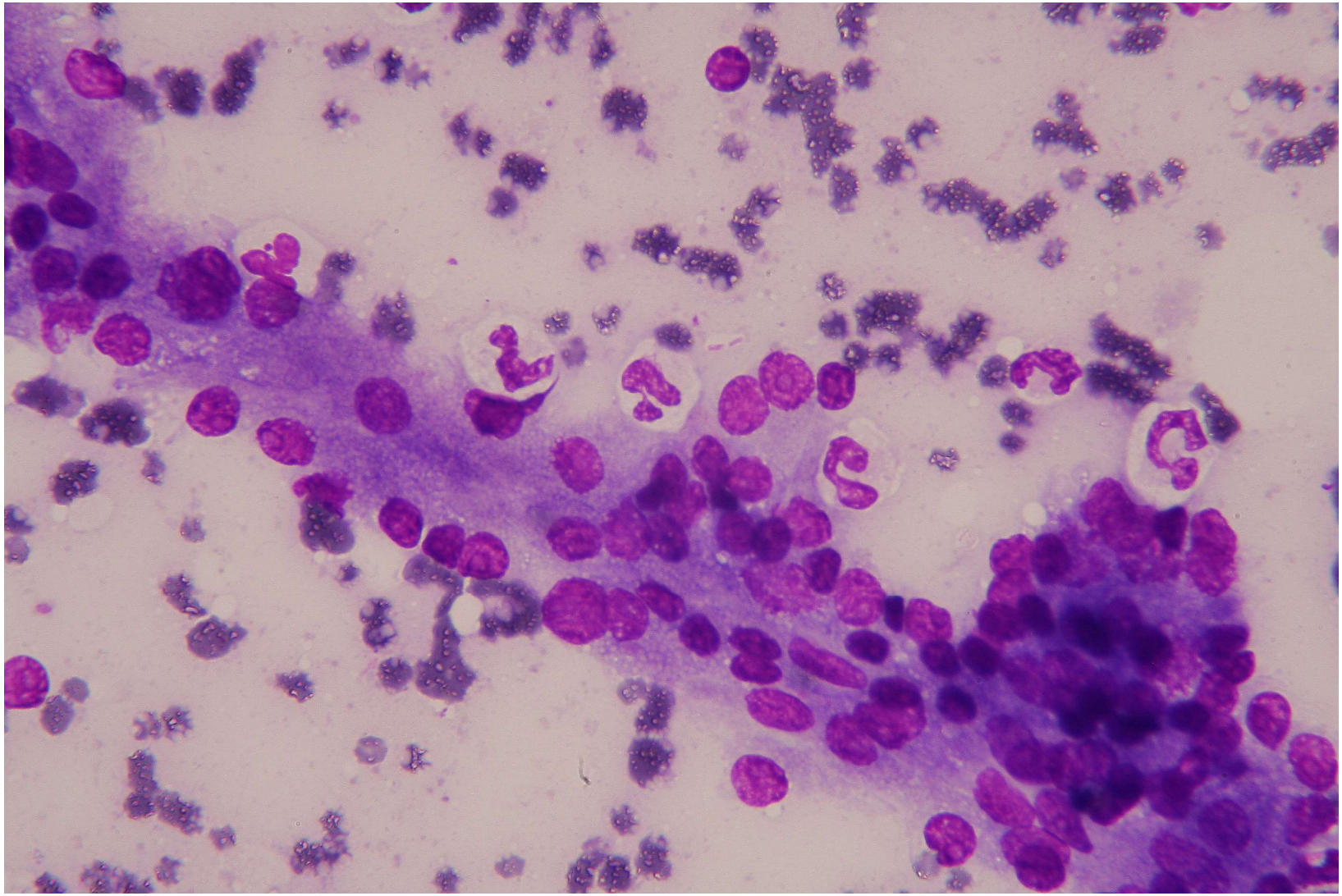
- Complications of gossypiboma have included osteomyelitis, visceral infiltration, and malignant transformation of surrounding tissues
- Interestingly, there are several case reports of extraskeletal osteosarcomas associated with retained surgical sponges in dogs. These are rare malignant neoplasms that originate from the viscera or soft tissues and are characterized by production of osteoid without bone involvement
- The veterinary medical literature suggests that niduses of chronic inflammation may contribute to sarcoma development

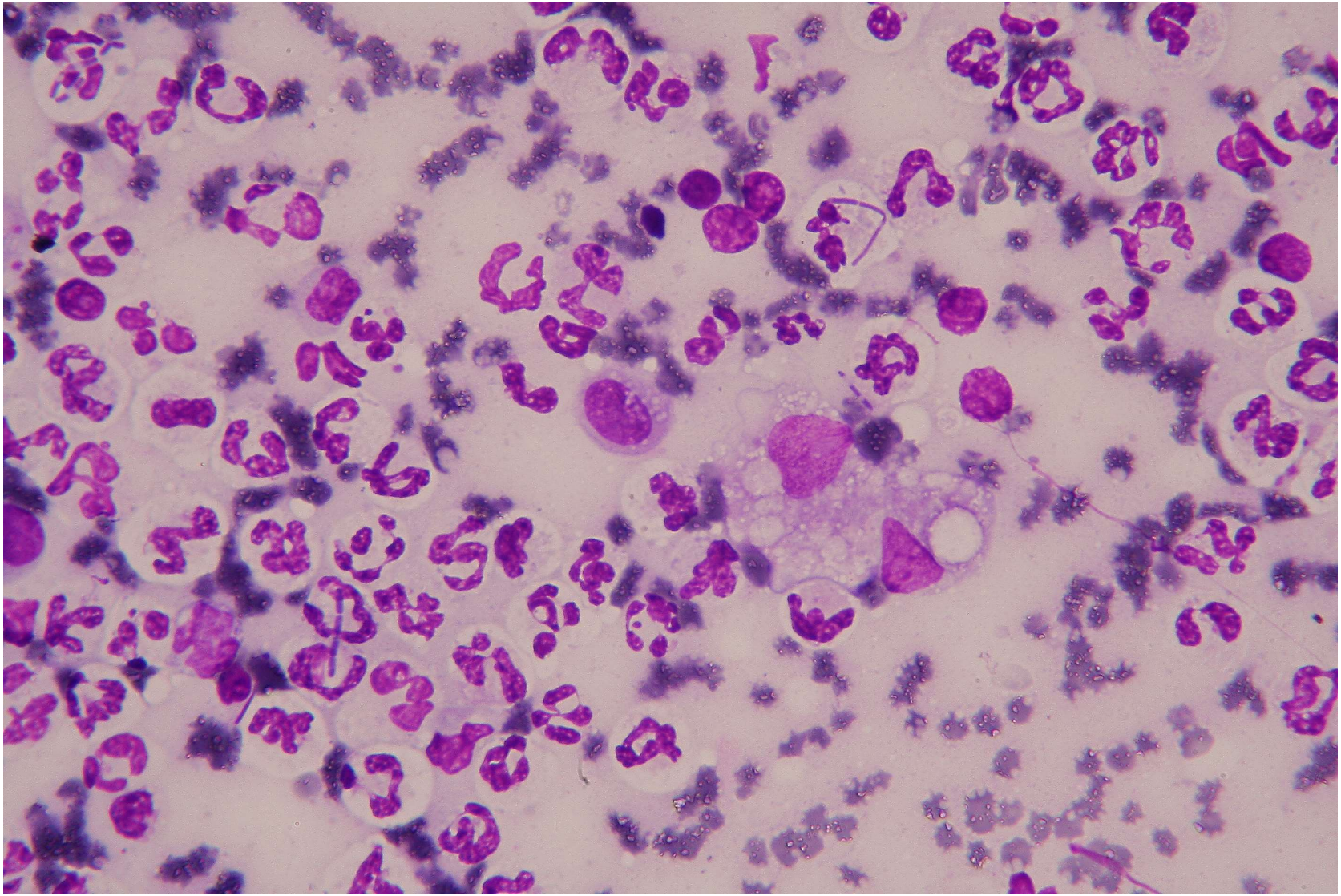
Case #4

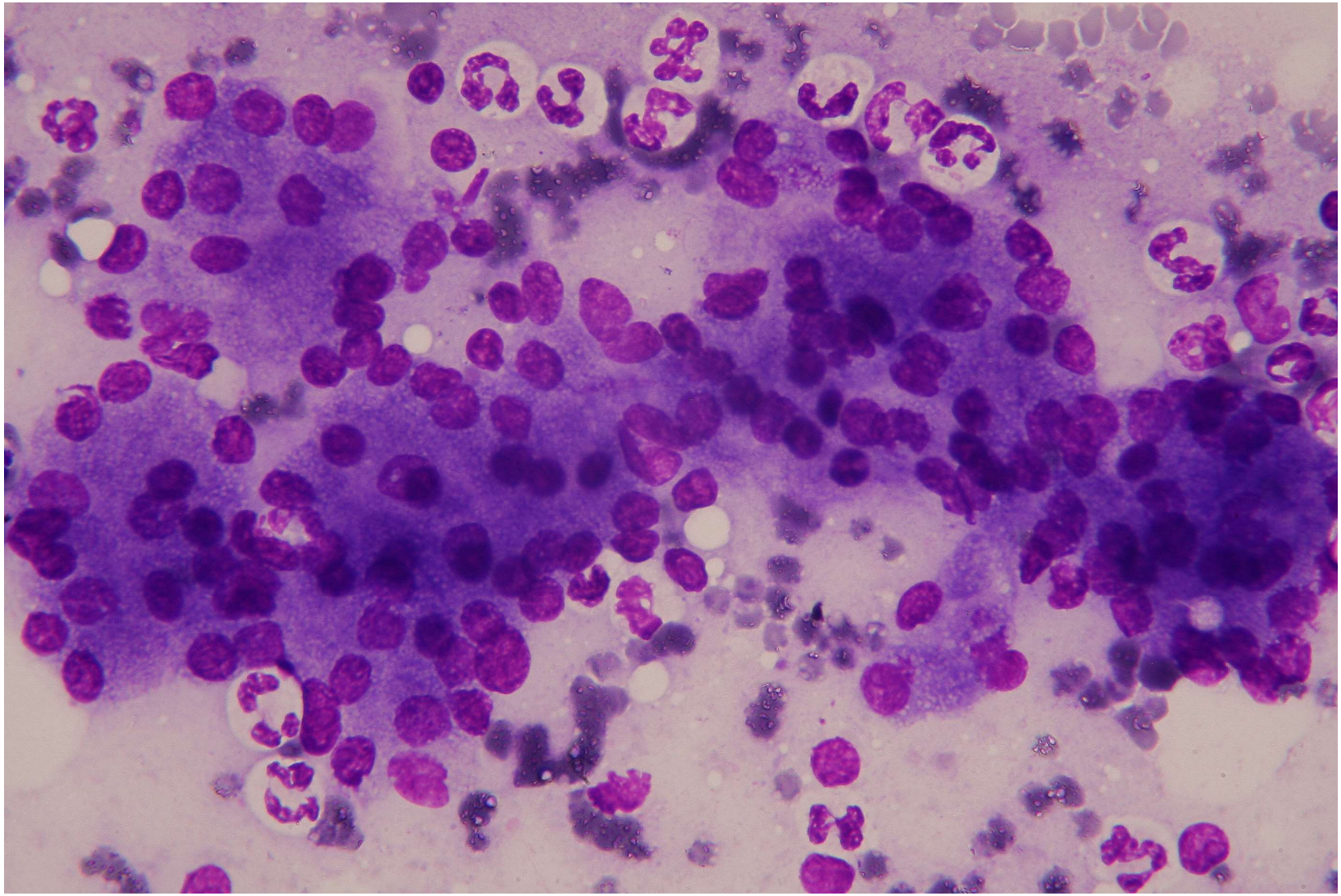
- Cat, DSH, 18-year-old, neutered female
-
- Leukocytosis
- Increase of pancreatic and hepatic enzymes concentration
- Enlargement of the pancreas

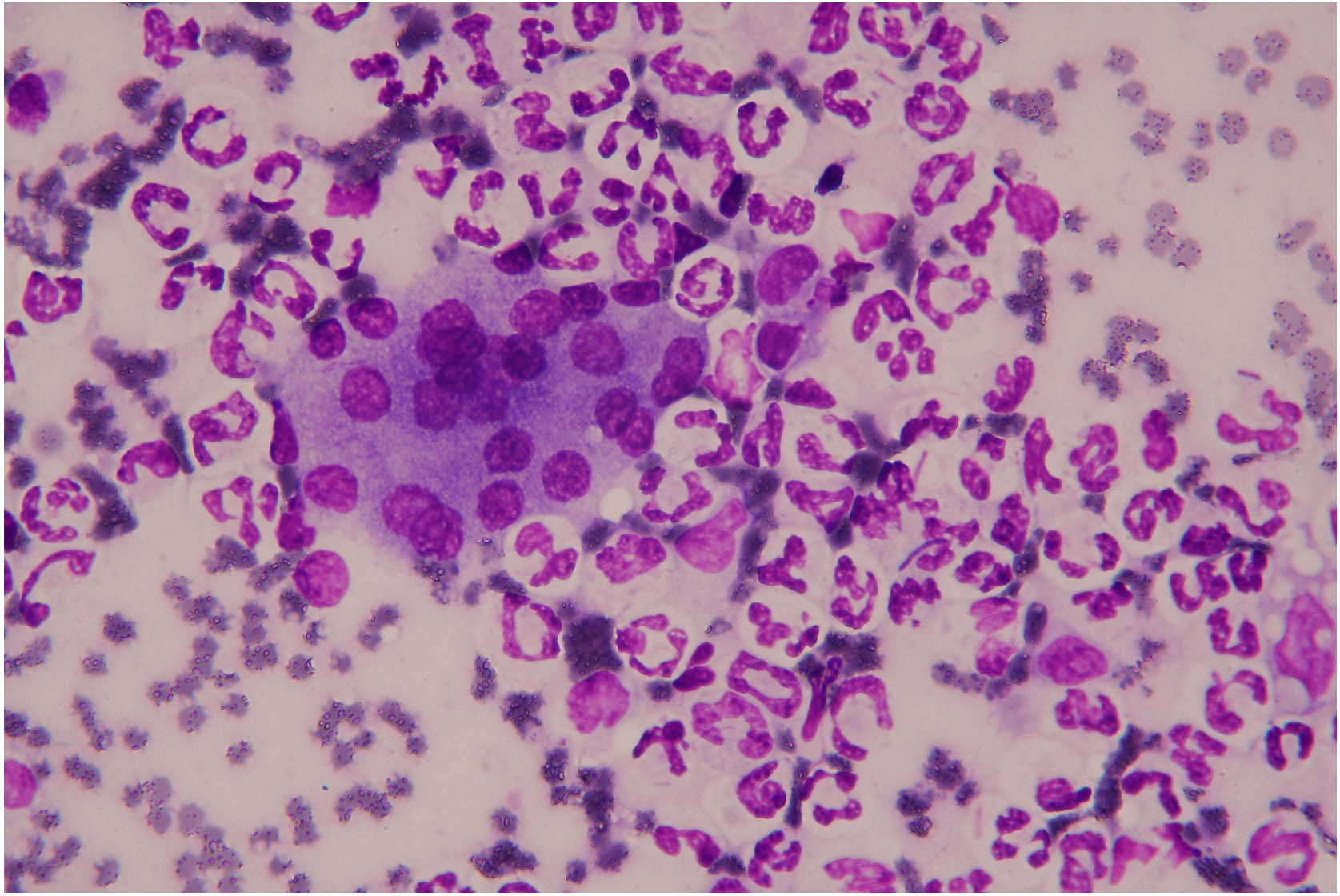
- FNCS of the pancreas
- MGG stain











Cytological findings

- Epithelial cells in bi-tridimensional clusters
  - Exocrine pancreas origin
  - Round to indistinct cytoplasm, containing pink granular material
  - Round nuclei
- High number of neutrophilic granulocytes
  - Degenerate to non-degenerate neutrophils
  - Rod shaped bacteria phagocytosis

Diagnosis

- Cytologic diagnosis
  - Septic neutrophilic pancreatitis

Discussion

- There are no large-scale definitive studies on the cytologic diagnosis of pancreatitis
- Pancreatic aspirates are more likely to be performed when neoplasia is a differential diagnosis
- Anecdotally, pancreatitis in small animals is described cytologically as consisting of
  - Inflammatory cells (most often degenerate or non-degenerate neutrophils, lymphocytes occasionally in cats)
  - Debris
  - Lipid
  - Mineralization
  - Normal to hyperplastic exocrine pancreatic cells

Sharkey LC, Crain S, in Pancreas. Veterinary Cytology, 2021 Wiley Blackwell

Discussion

- Acute pancreatitis appears to be both less common and more difficult to diagnose in the cat (than in dogs)
- Cytology may play a large role in distinguishing between pancreatic inflammation and other pancreatic disorders (especially neoplasia) in feline patients.

Borjesson DL. The pancreas. In Cowell and Tyler Diagnostic Cytology and Hematology of the Dog and Cat, 2014, Elsevier

Discussion

- Aspirates are generally highly cellular and characterized by abundant exocrine epithelial cells and a population of inflammatory cells
- Neutrophils predominate in acute pancreatitis
- The neutrophils are classically non-degenerated
- However, they may appear ragged and mild to moderately degenerate, likely secondary to concurrent necrosis.

Borjesson DL. The pancreas. In Cowell and Tyler Diagnostic Cytology and Hematology of the Dog and Cat, 2014, Elsevier

Meuten DJ, 2017

Discussion

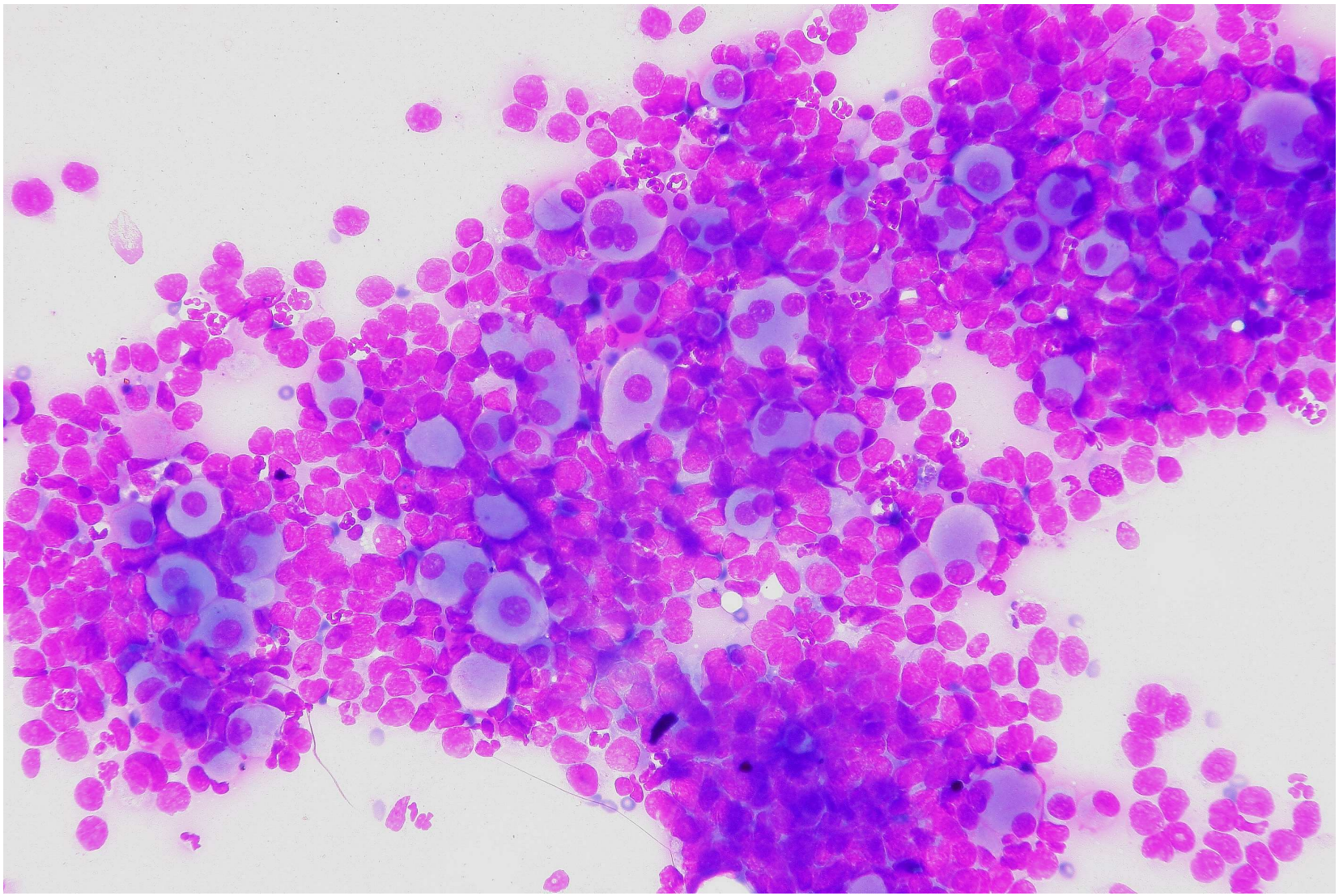
- Bacteria phagocytosis seems to be not a feature in description of acute suppurative pancreatitis
- In our case, the septic suppurative inflammation is likely a consequence of an ascending bacterial infections

- No investigation on the liver has been done
  - To investigate an involvement of biliary tree
- This cat recovered after proper antibiotic therapy
- No relapse as far as I know

Case #5

- Dog, mongrel, 4-year-old, female
-
- Subcutaneous mass on the shoulder

- FNCS of the lump
- MGG stain



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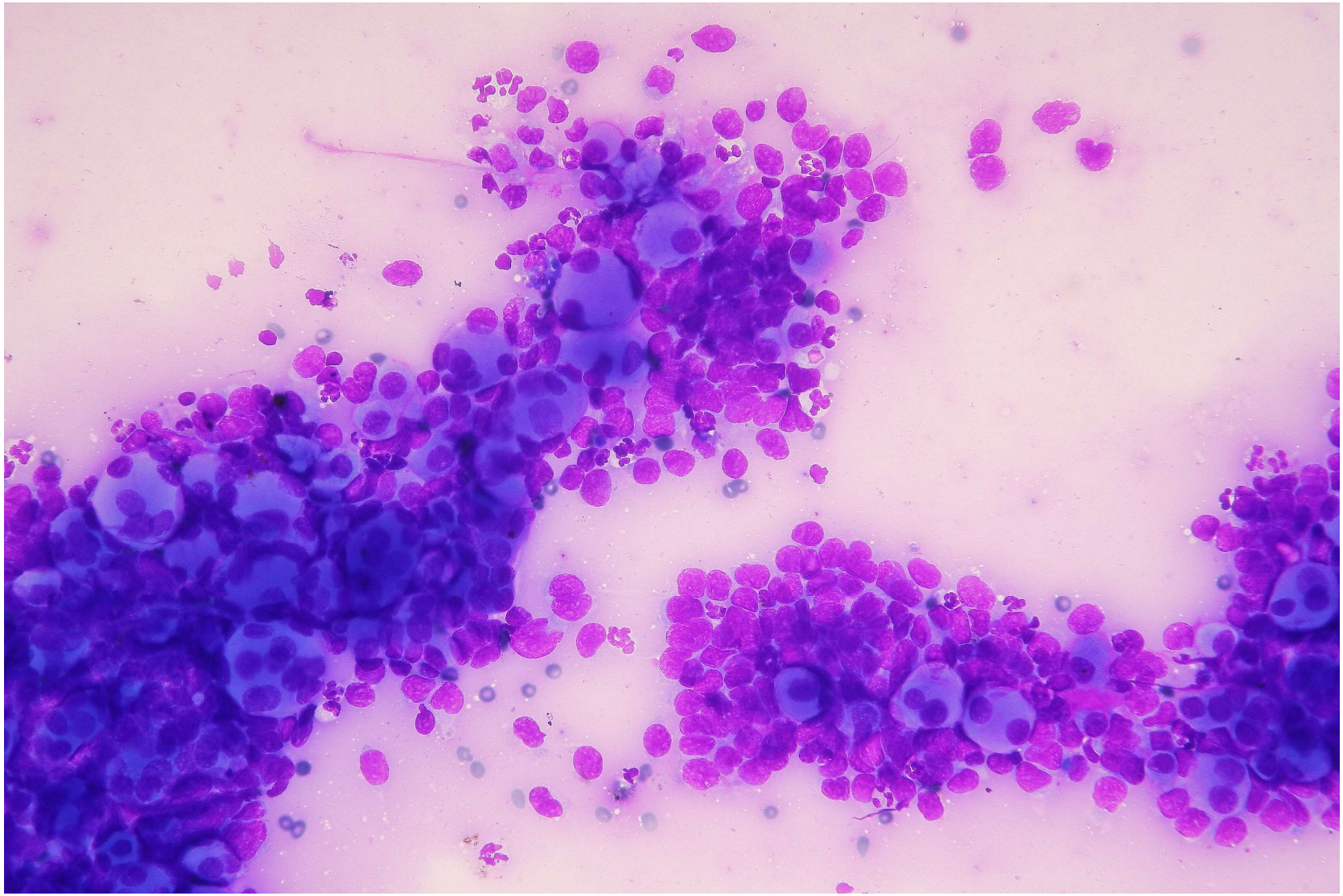
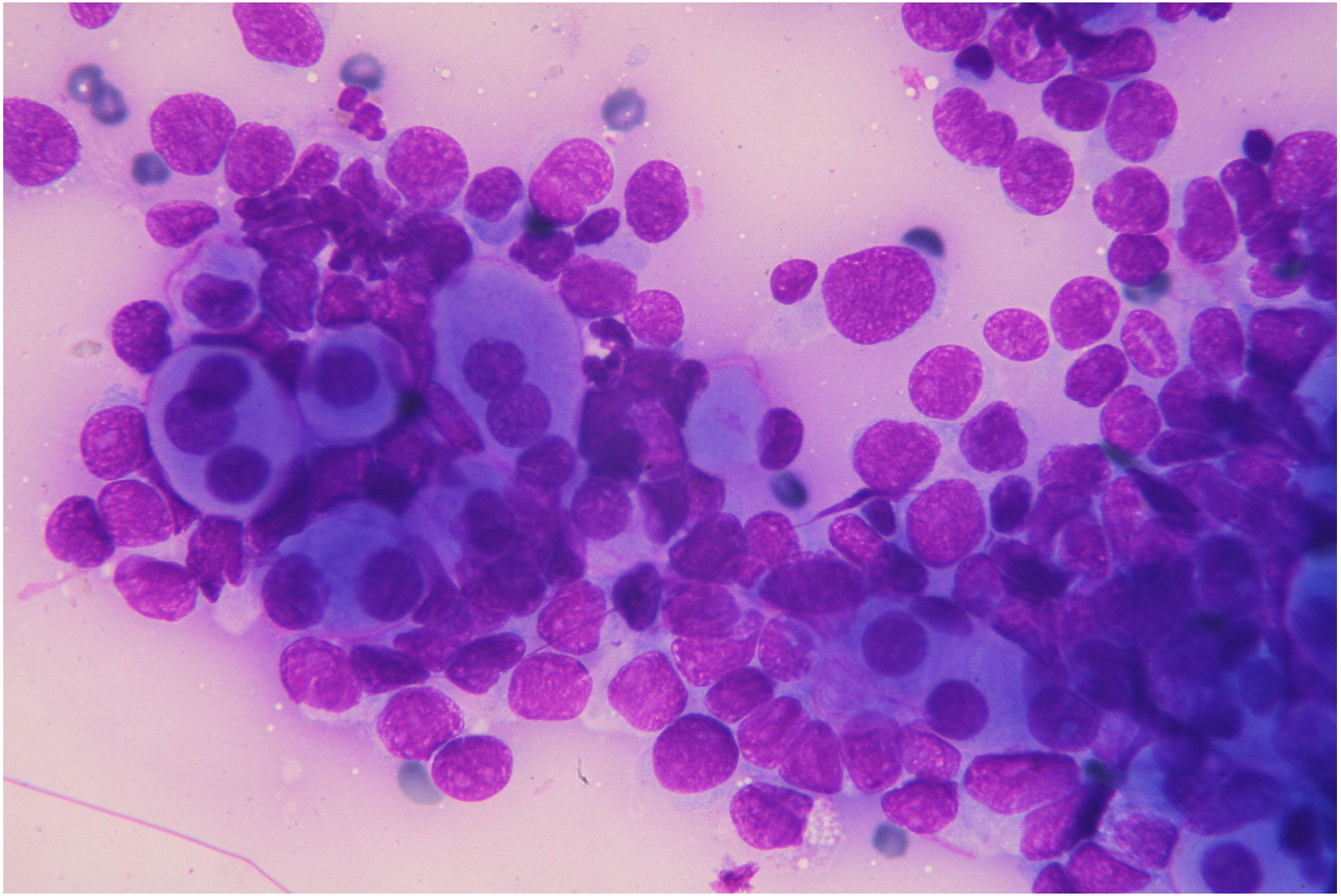
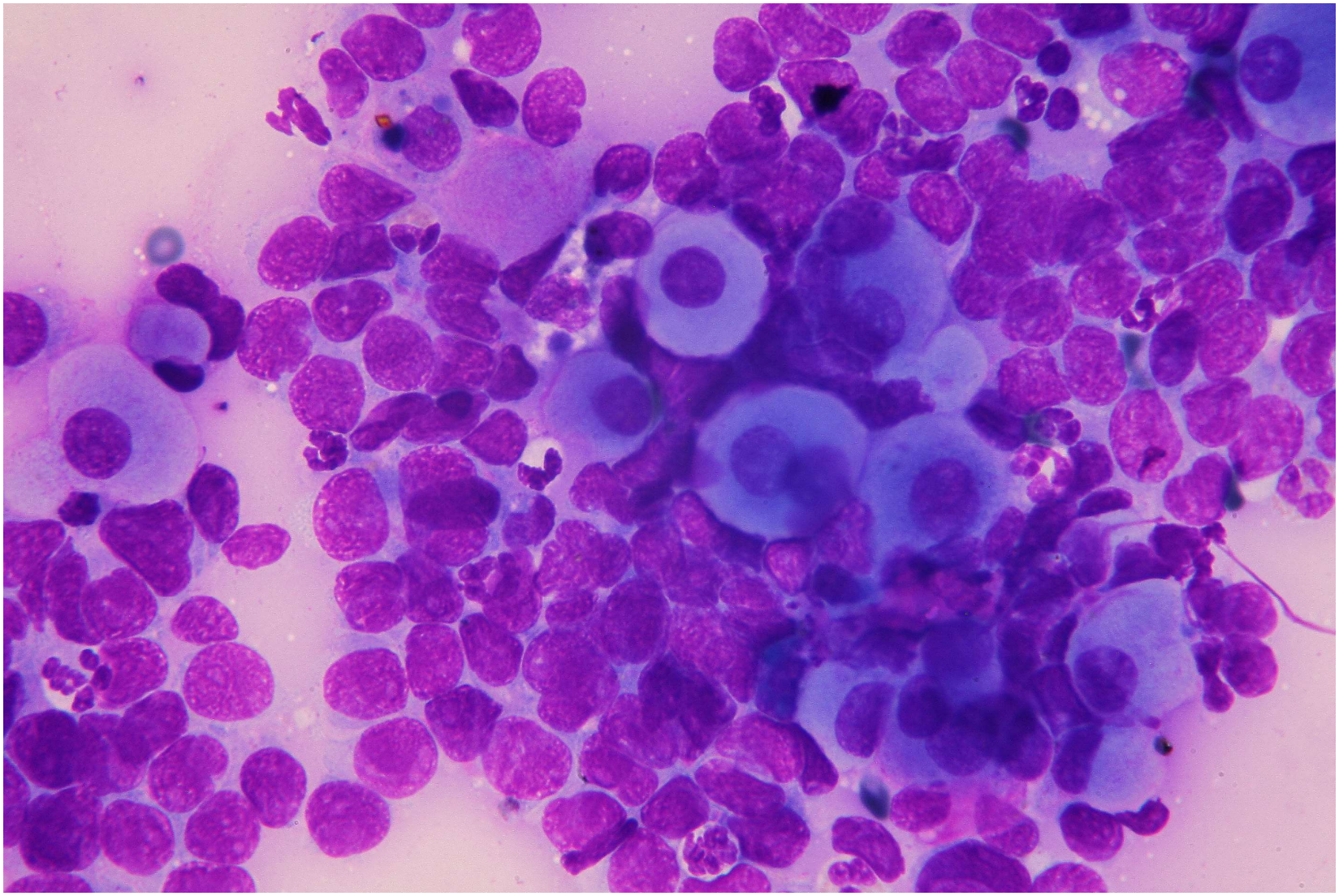
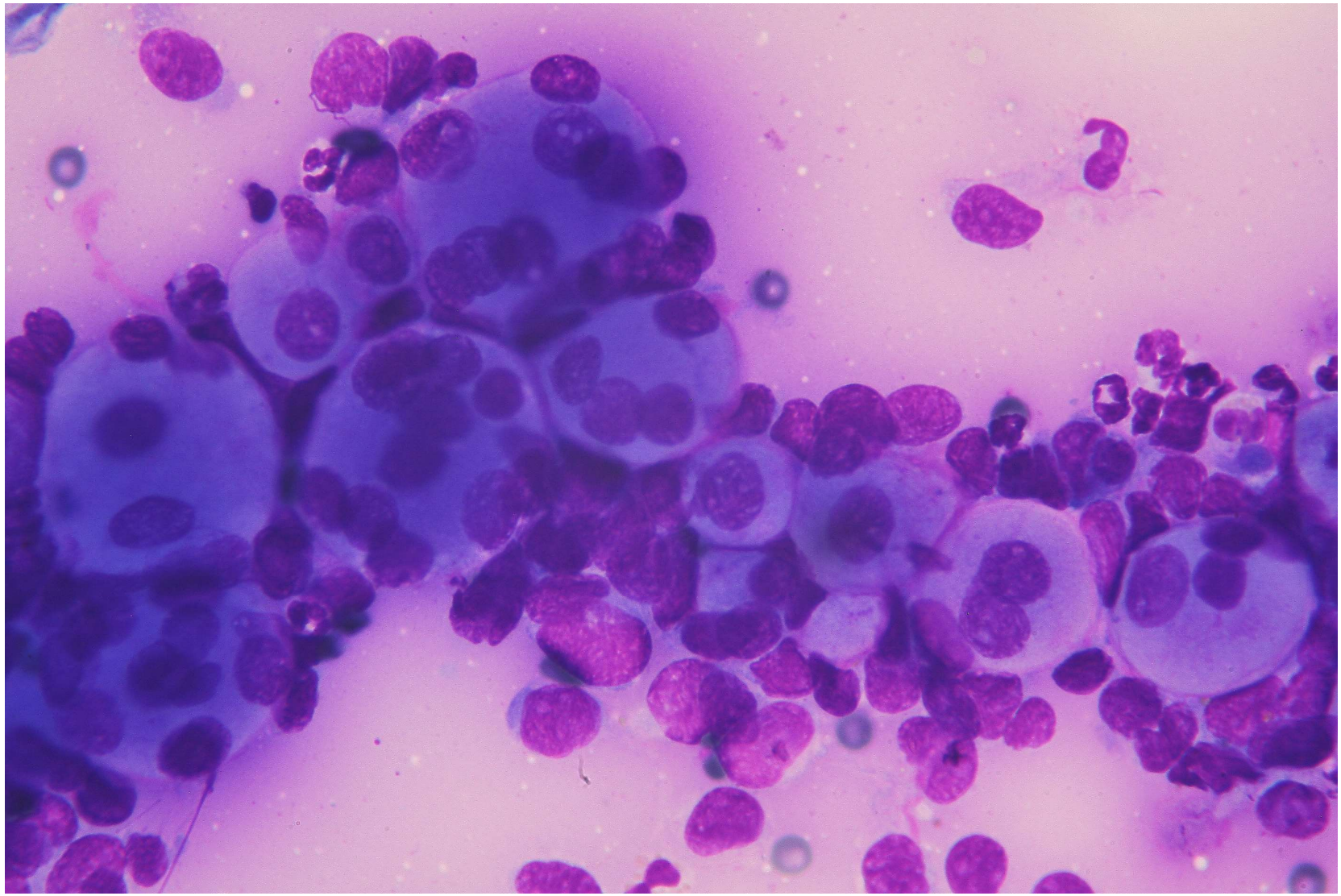
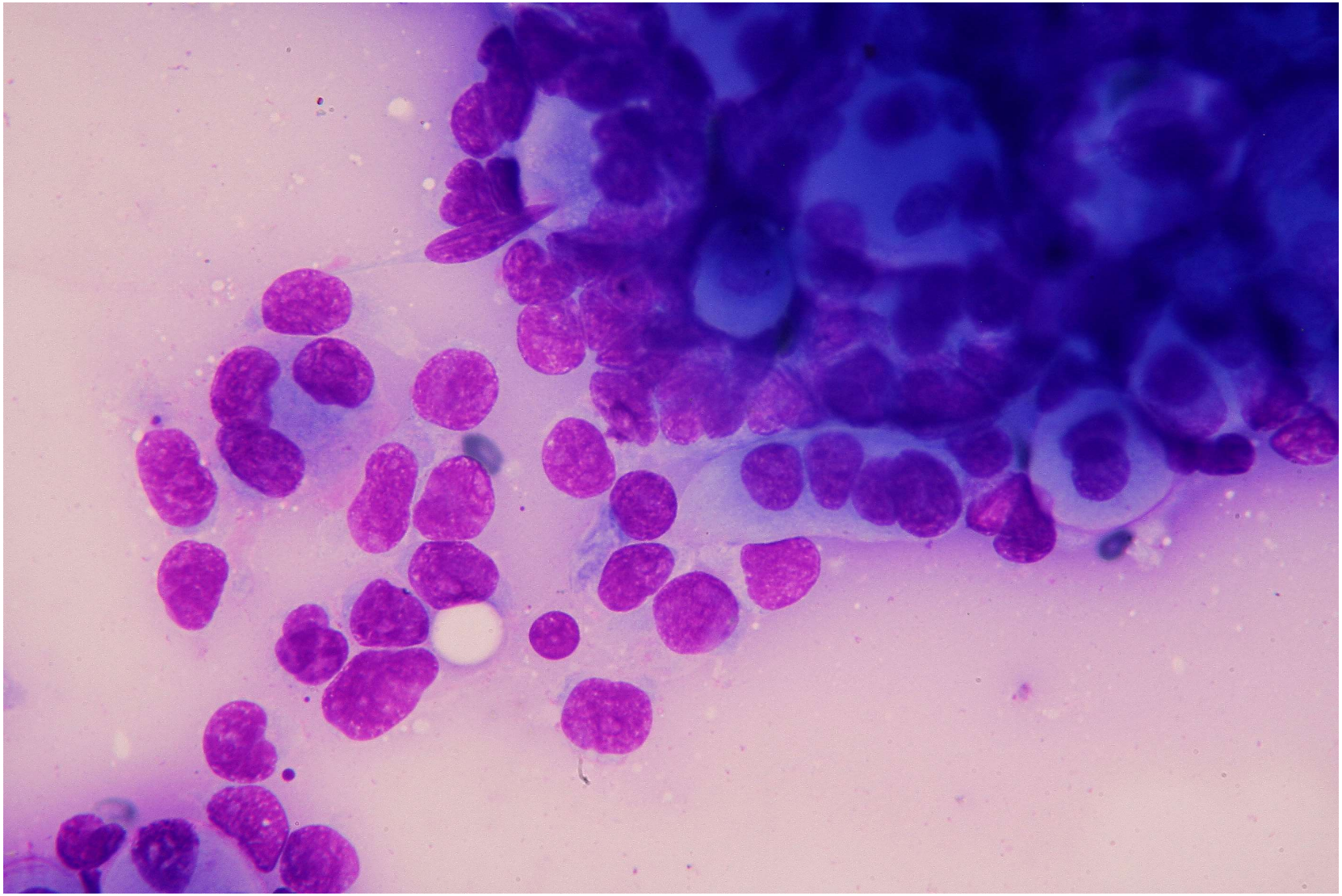








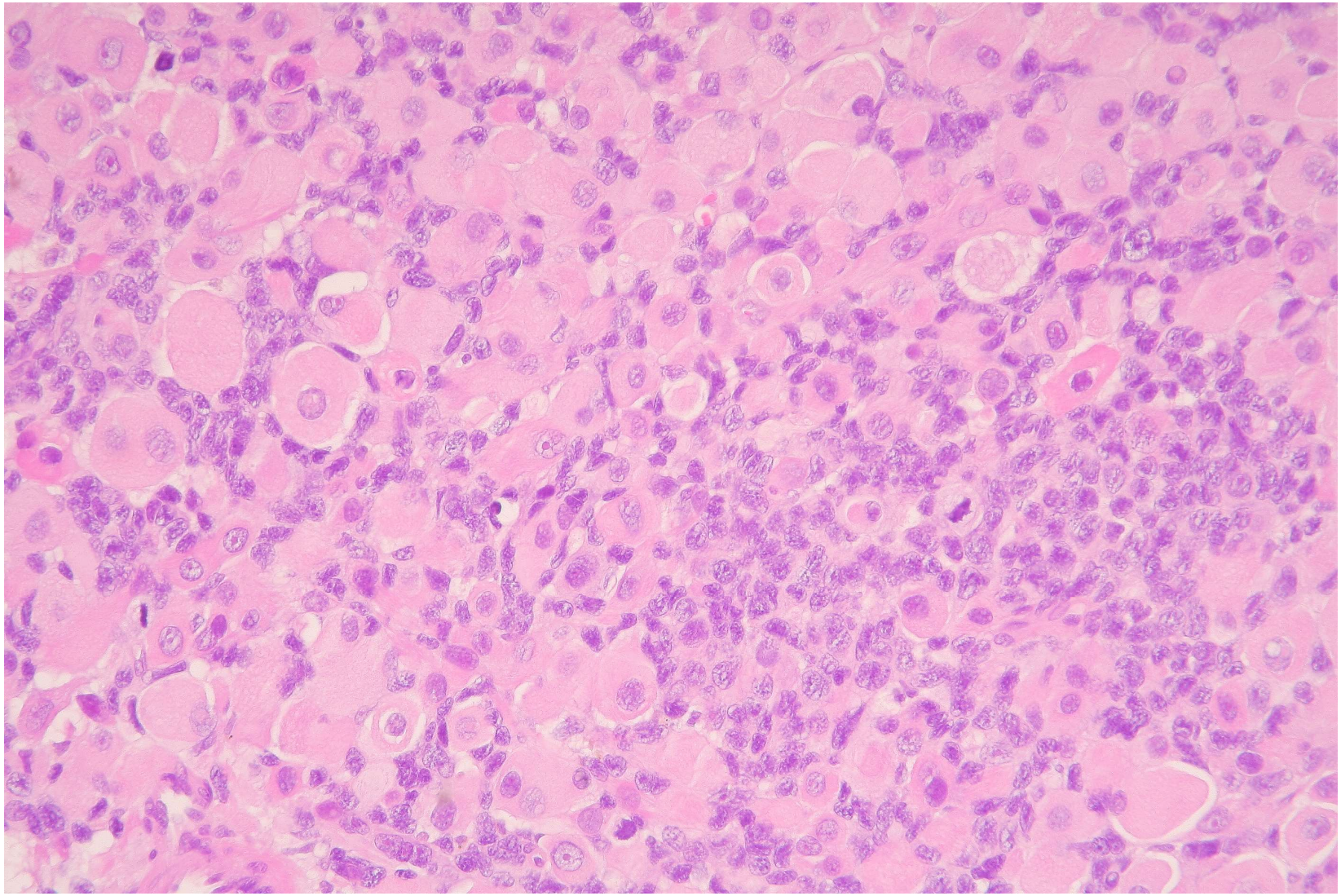


Cytologic findings

- High number of cells with indistinct cytoplasm
  - Sometimes tailed shape
  - Round to ovoid nucleus
  - Anisokariosis and anisocytosis moderate
- Round cells with basophilic cytoplasm
  - One, sometimes two or three round nuclei
  - Anisokariosis and anisocytosis moderate
  - Very rare multinucleated cells consistent with strap-like cells

Diagnosis

- Cytologic diagnosis
  - Spindle cells neoplasia, mostly consistent for rhabomyosarcoma
- Histologic diagnosis (after IHC)
  - Rhabdomyosarcoma



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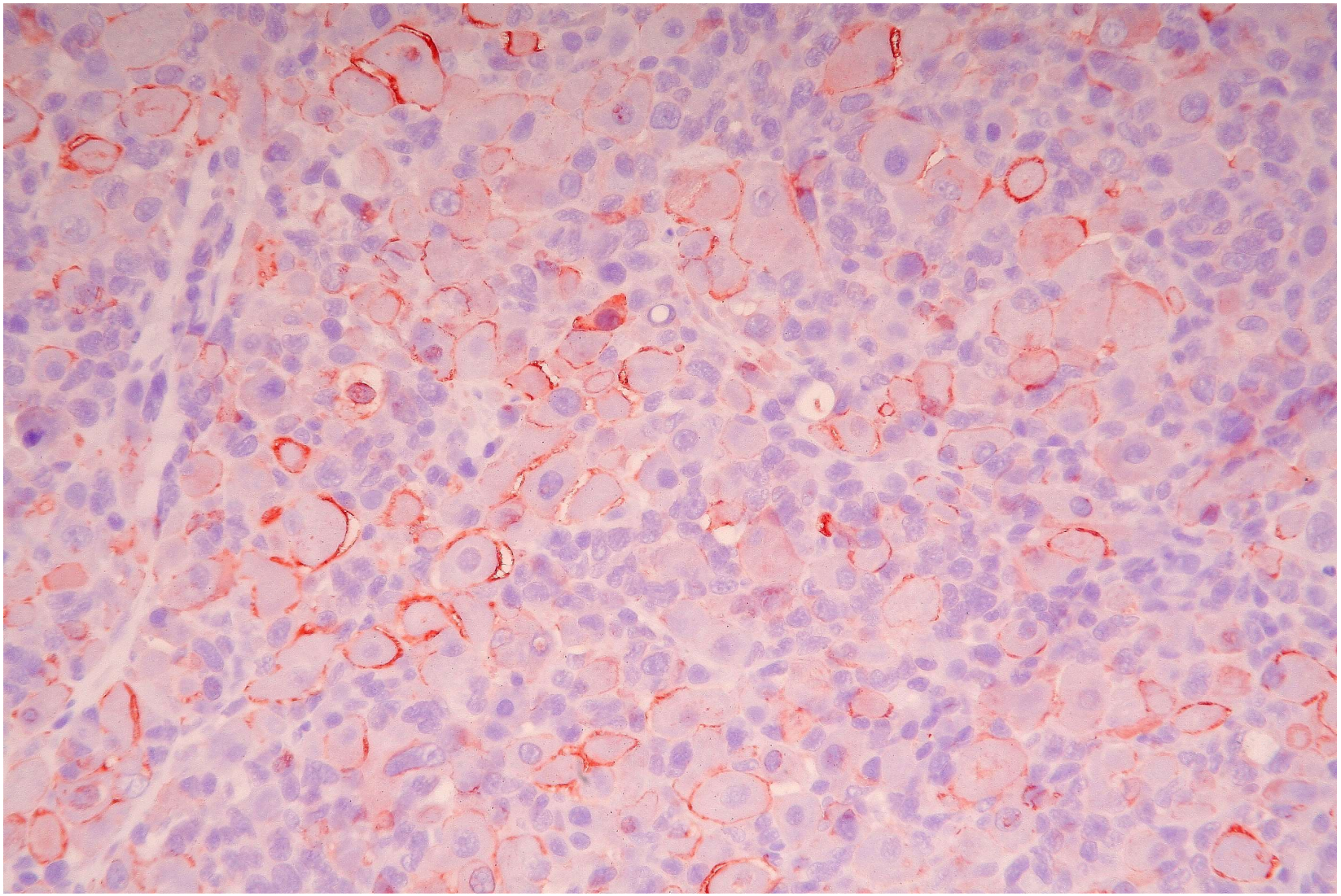
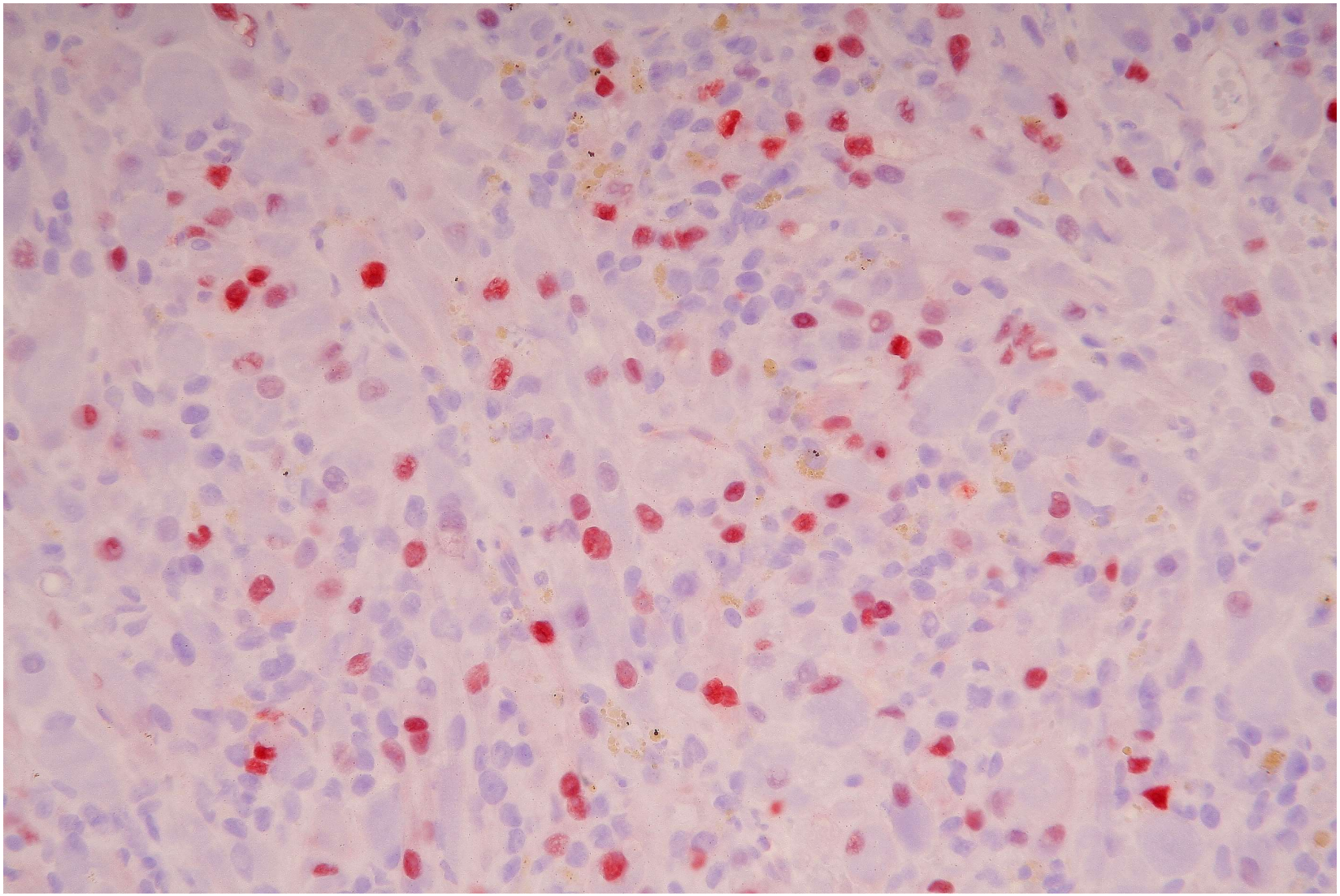


DESMIN



MYOGLOBIN

Discussion

- The rhabdomyosarcoma is **histologically** classified into 4 types:
  - **Embryonal**
    - Round cell type: round to polygonal cells admixed with smaller cells
    - Myotubular type: spindle cells resembling primitive myocytes (myotubes)
  - **Botryoid** (variant of embryonal rhabdomyosarcoma – myotubular type)
    - Most commonly found in the urinary bladder wall of the dog
    - Grape-like or botryoid masses of neoplastic cells
  - **Alveolar** (rare)
    - Round cells with hyperchromatic nuclei organized in structures supported by thick fibrous septa
  - **Pleomorphic** (very rare)
    - Haphazardly arranged plump spindle cells
    - Difficult to be differentiated from the embryonal type

Discussion

- The rhabdomyosarcoma is **cytologically** classified into 3 types:
  - **Embryonal**
    - Round cell type: round to polygonal cells admixed with smaller cells
    - Botryoid type: elongated ribbon-shaped myotubular-like cells with basophilic cytoplasm and **cross striations**
  - **Alveolar** (rare)
    - Round cells with pale blue cytoplasm and hyperchromatic nuclei resembling lymphoid cells
  - **Pleomorphic** (very rare)
    - Irregularly arranged plump, large spindle cells
    - Anisocytosis and anisokaryosis marked
    - Occasional strap-like cells
    - Second population of lymphoid-like neoplastic cells

Discussion

- In human being, the rhabdomyosarcoma is correlated by the International Classification of Rhabdomyosarcoma with the clinical outcome:
  - Botryoid and embryonal - myotubular subtype, have favorable prognoses
  - Embrional – round cells subtype has an intermediate prognosis
  - Alveolar rhabdomyosarcoma has a poor prognosis
  - Pleomorphic rhabdomyosarcoma outcome is unknow due to the rarity if this type
- Clinical correlates lack in veterinary medicine, probably because reports are rare and the subclassification is not always applied

Discussion

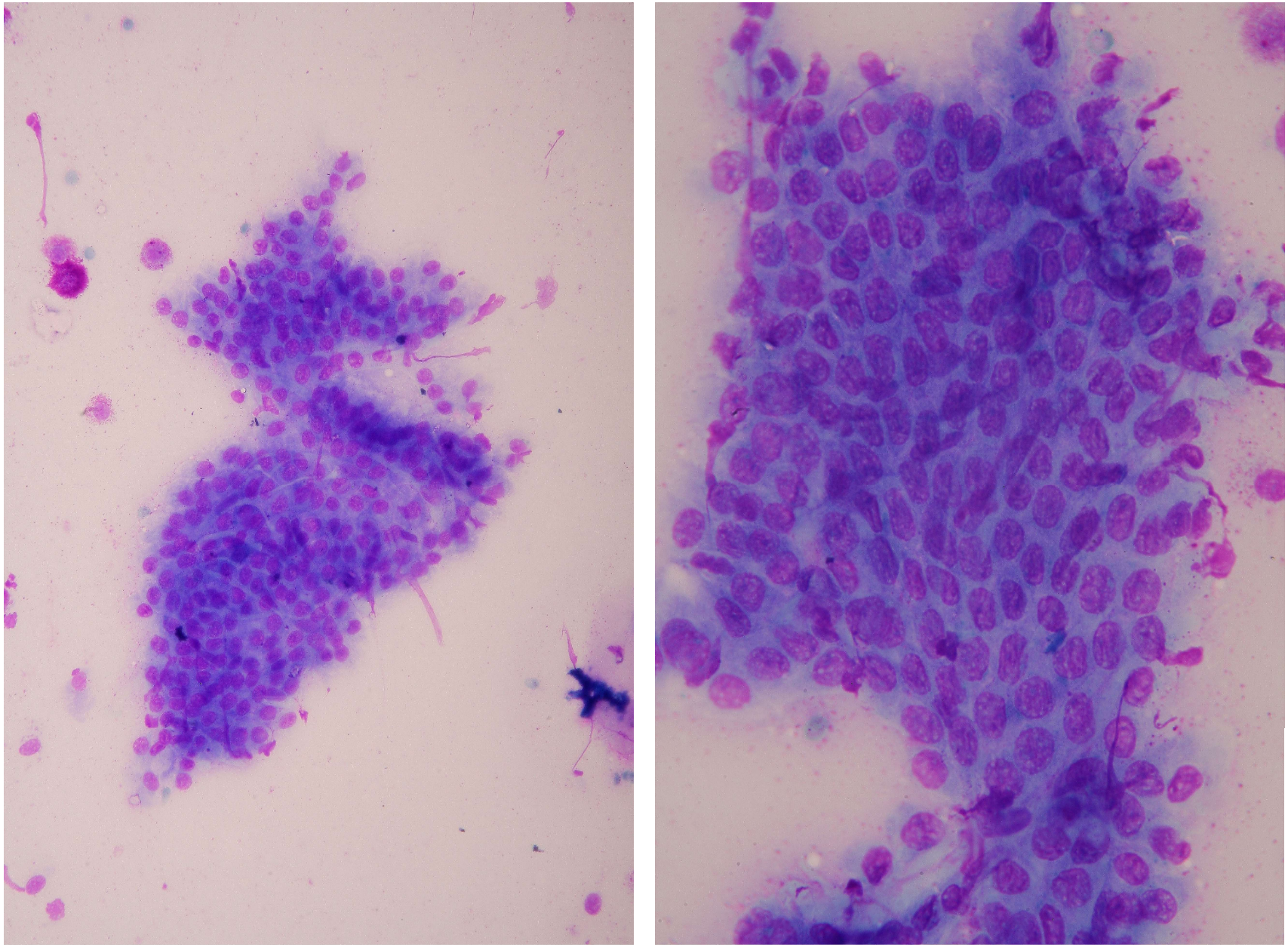
- On the basis of the cytologic classification, our case is most consistent with **embryonal rhabdomyosarcoma – round cell subtype**
- This subtype is also considered to be the most frequent presentation of rhabdomyosarcoma in dog

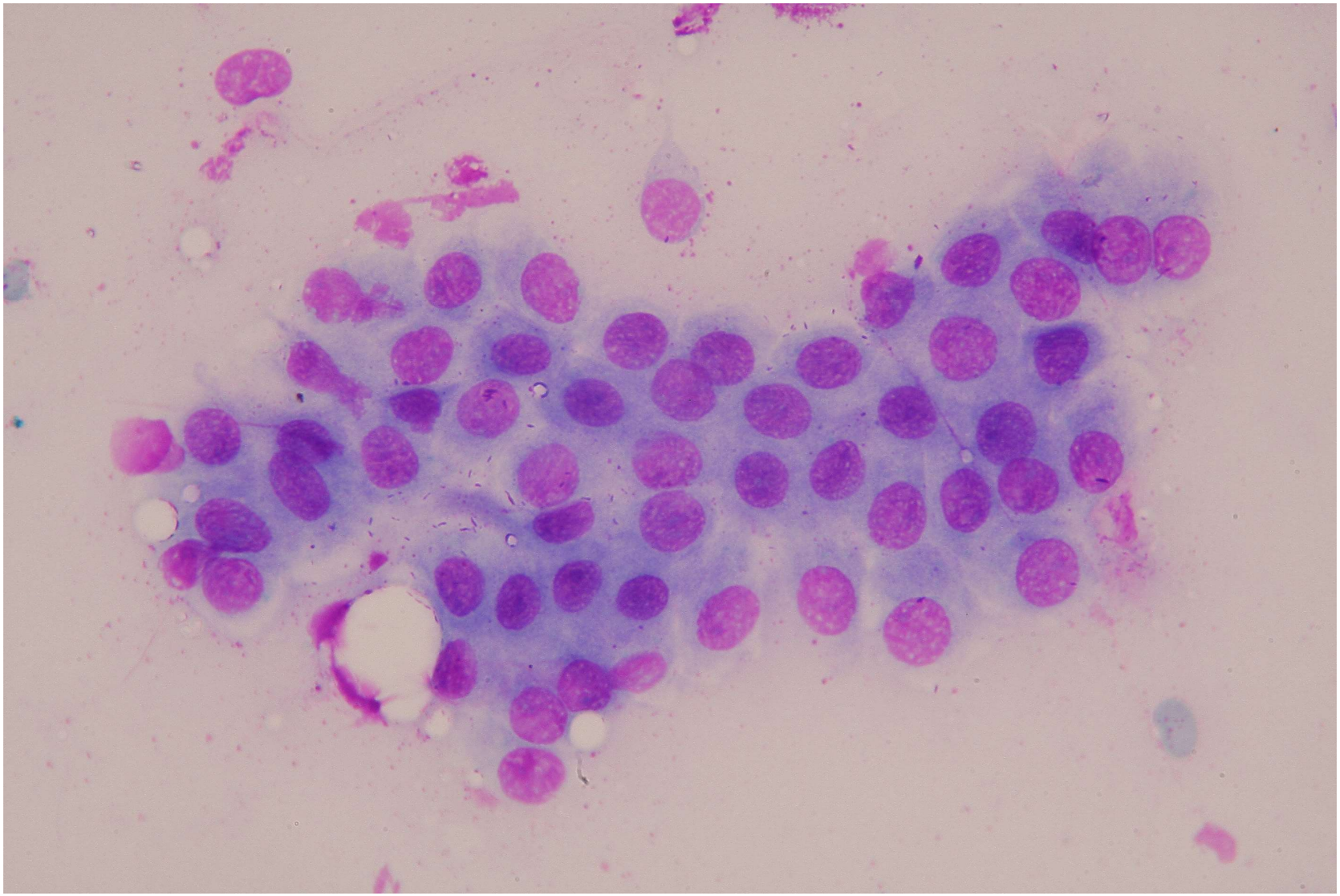
- The dog, after excision of the mass, is going fine
- No relapse yet

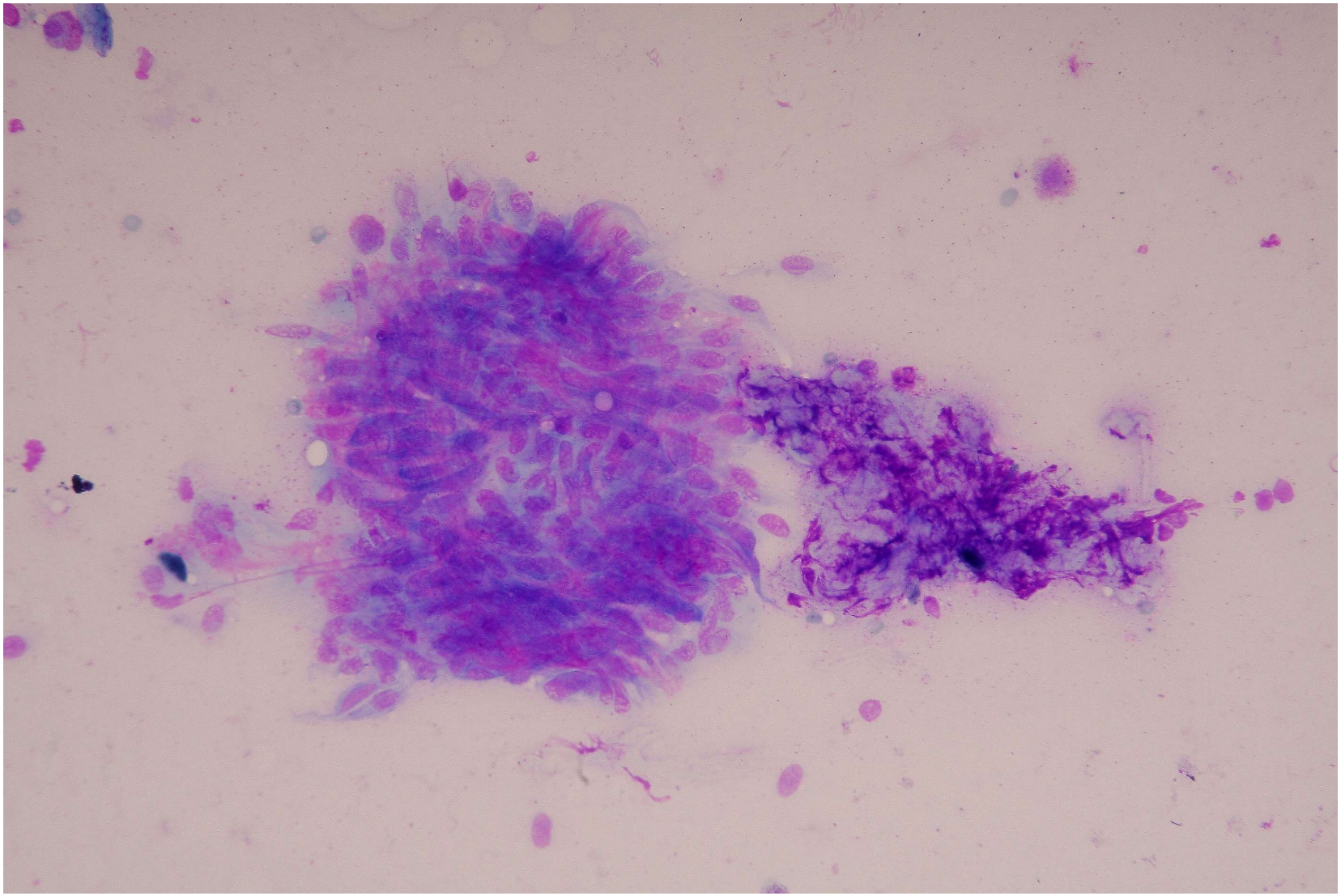
Case #6

- Dog, Labrador, 7-year-old, male
-
- Cutaneous lump on the chest

- FNCS of the lump
- MGG stain







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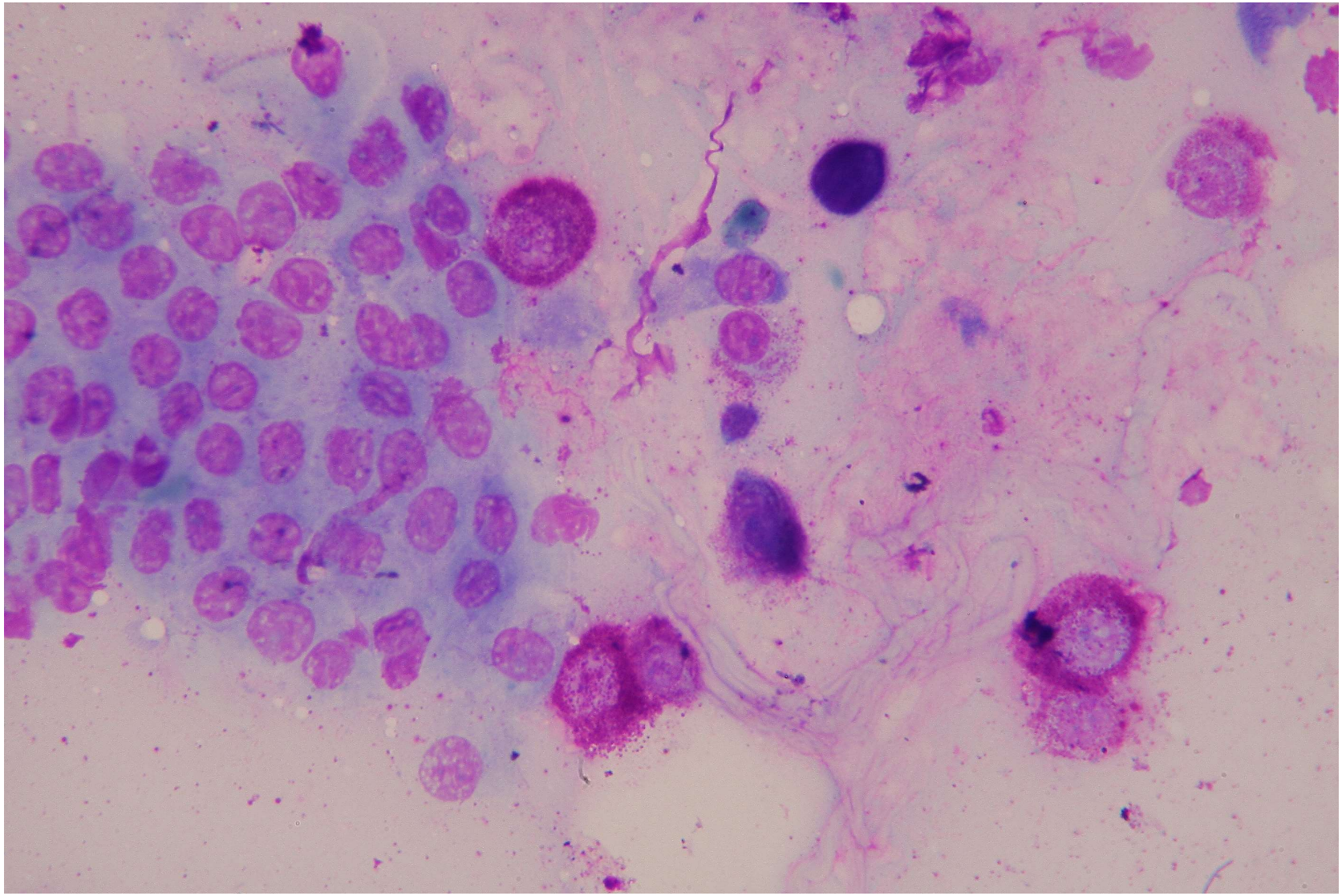
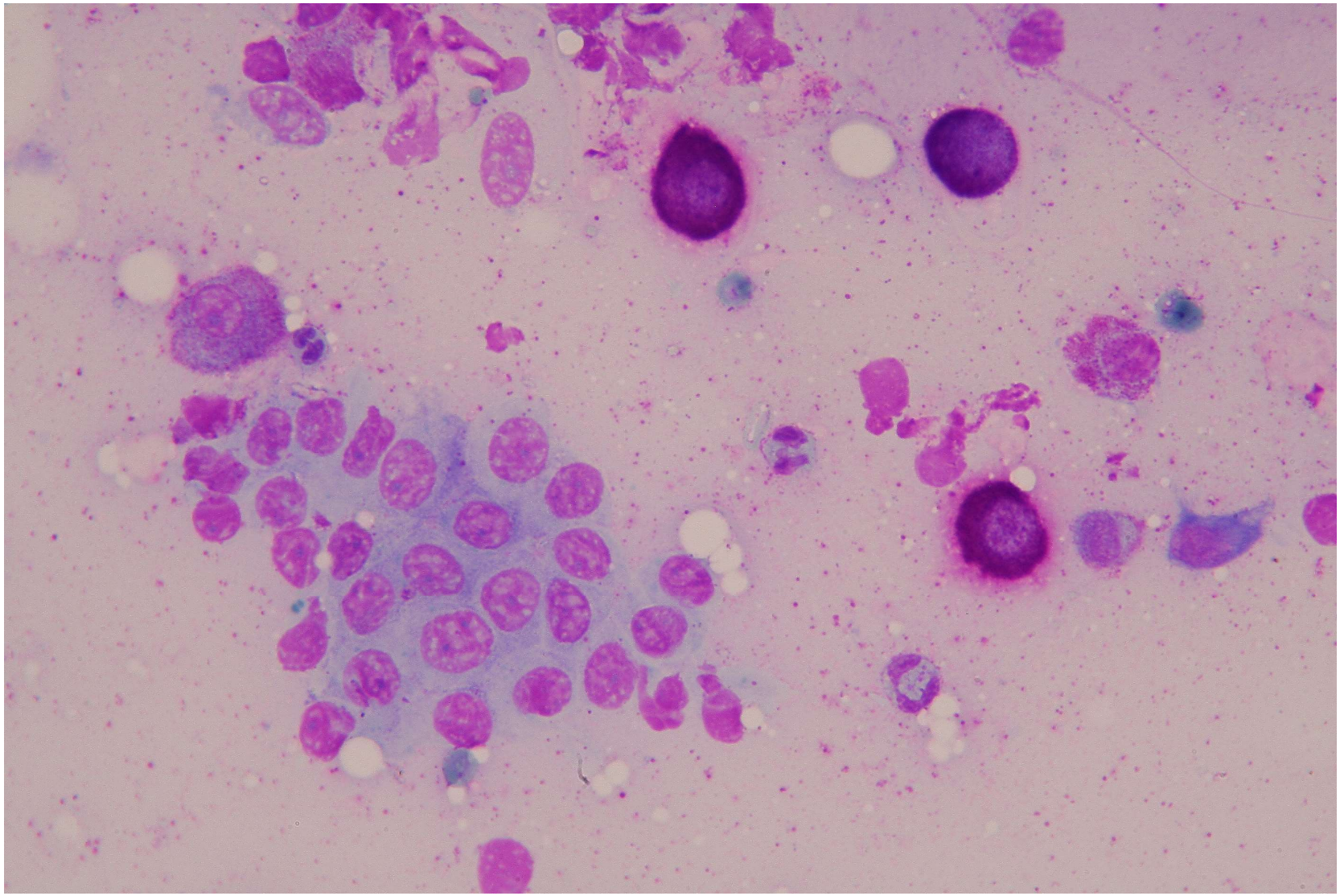
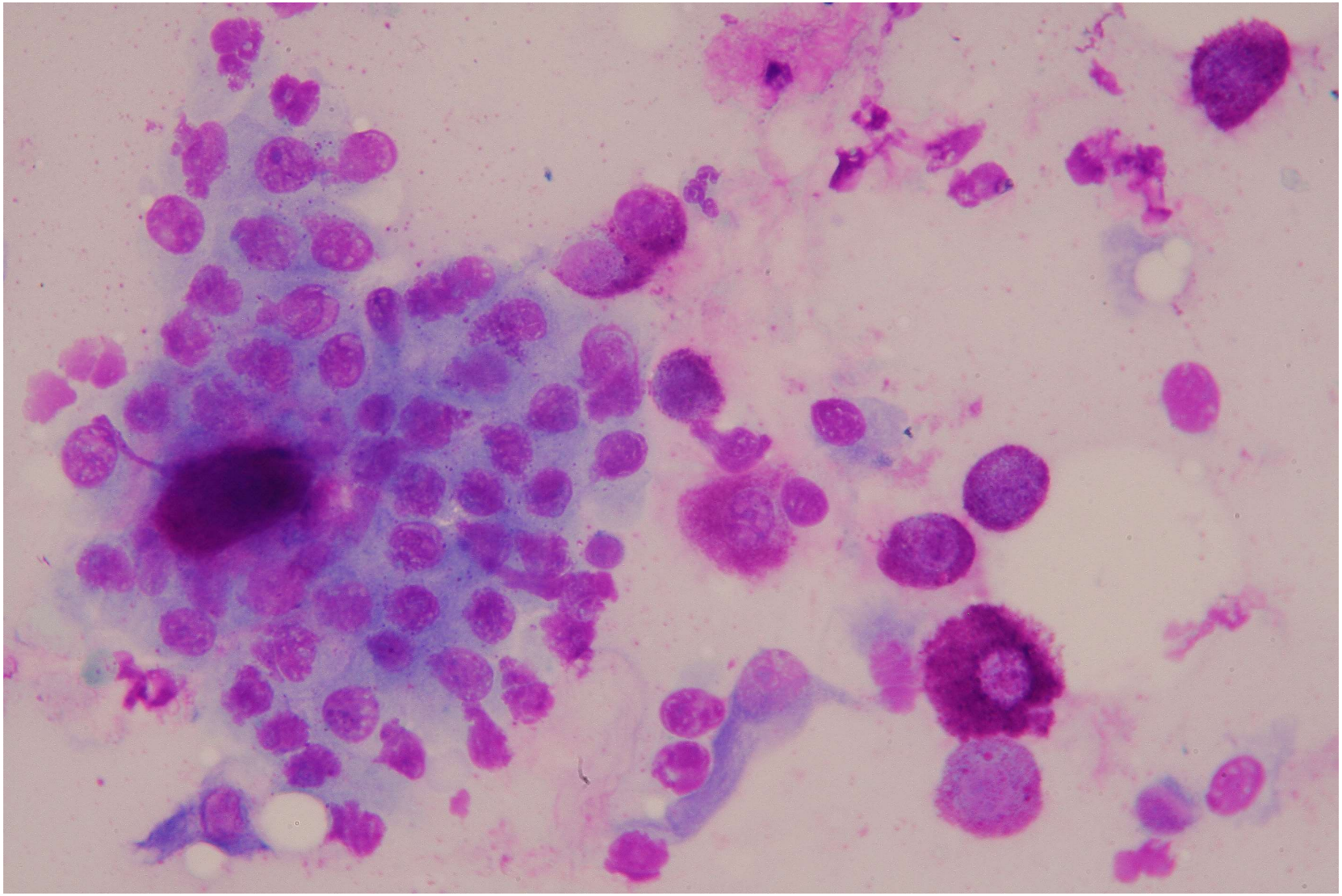
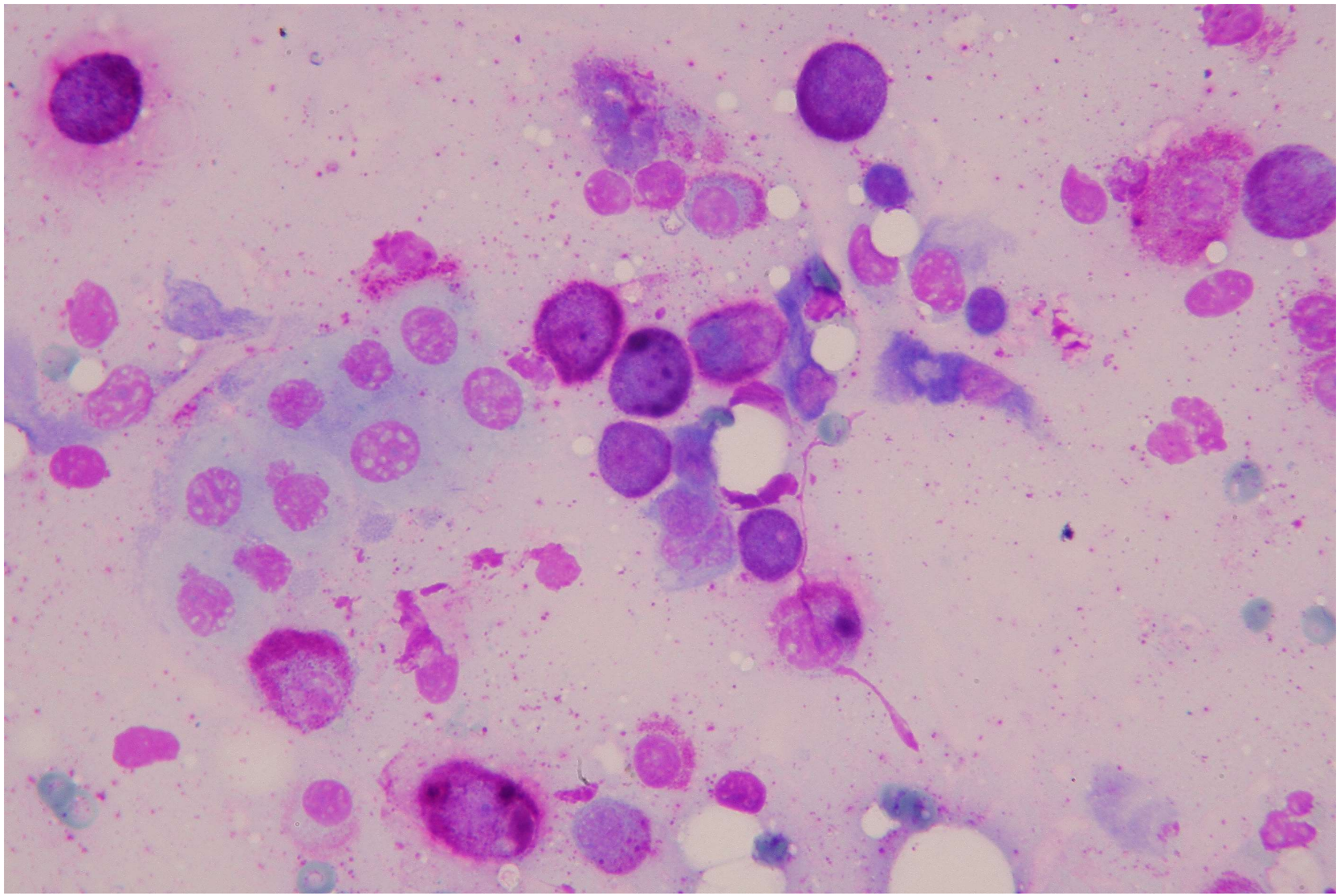






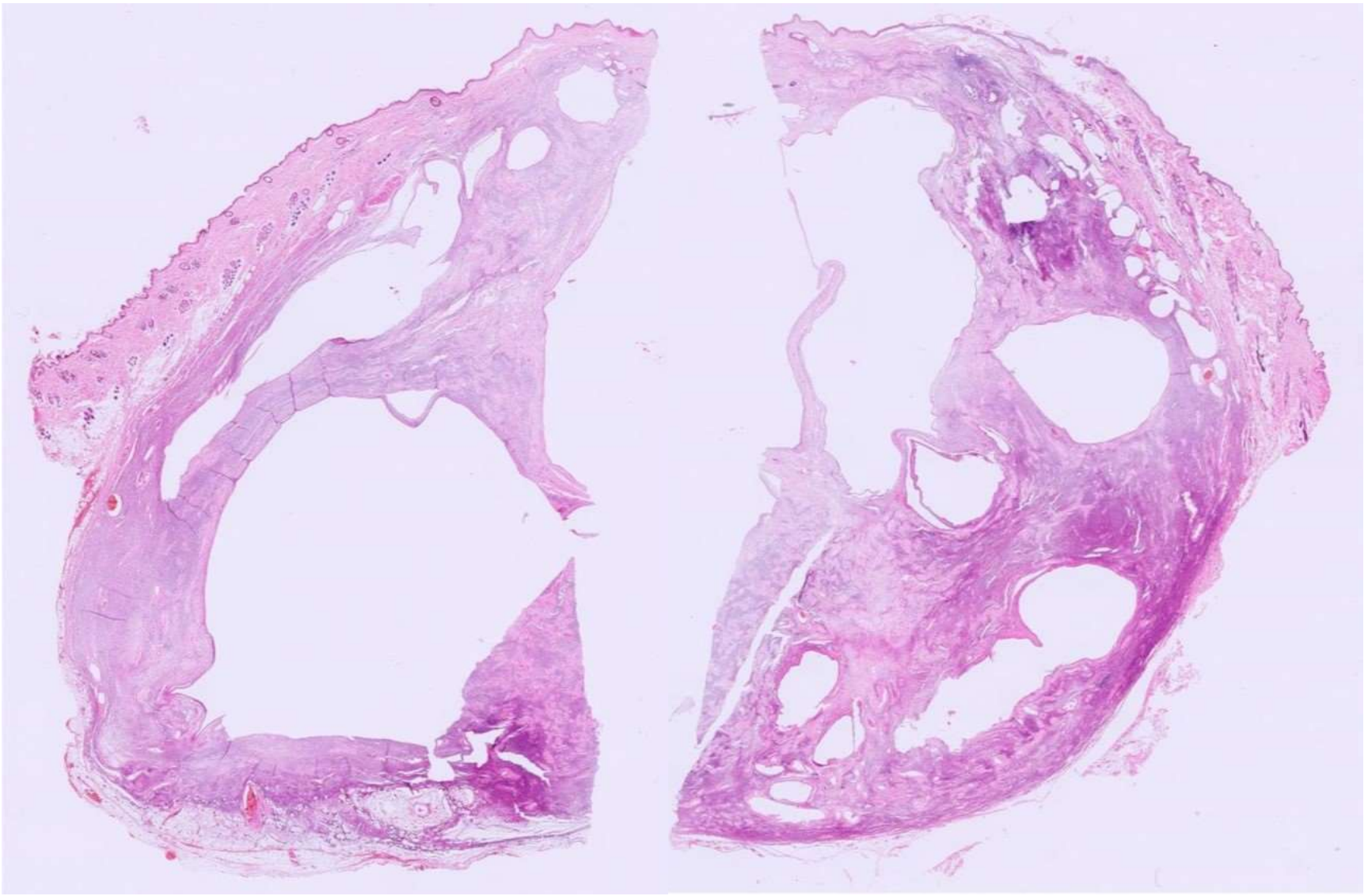


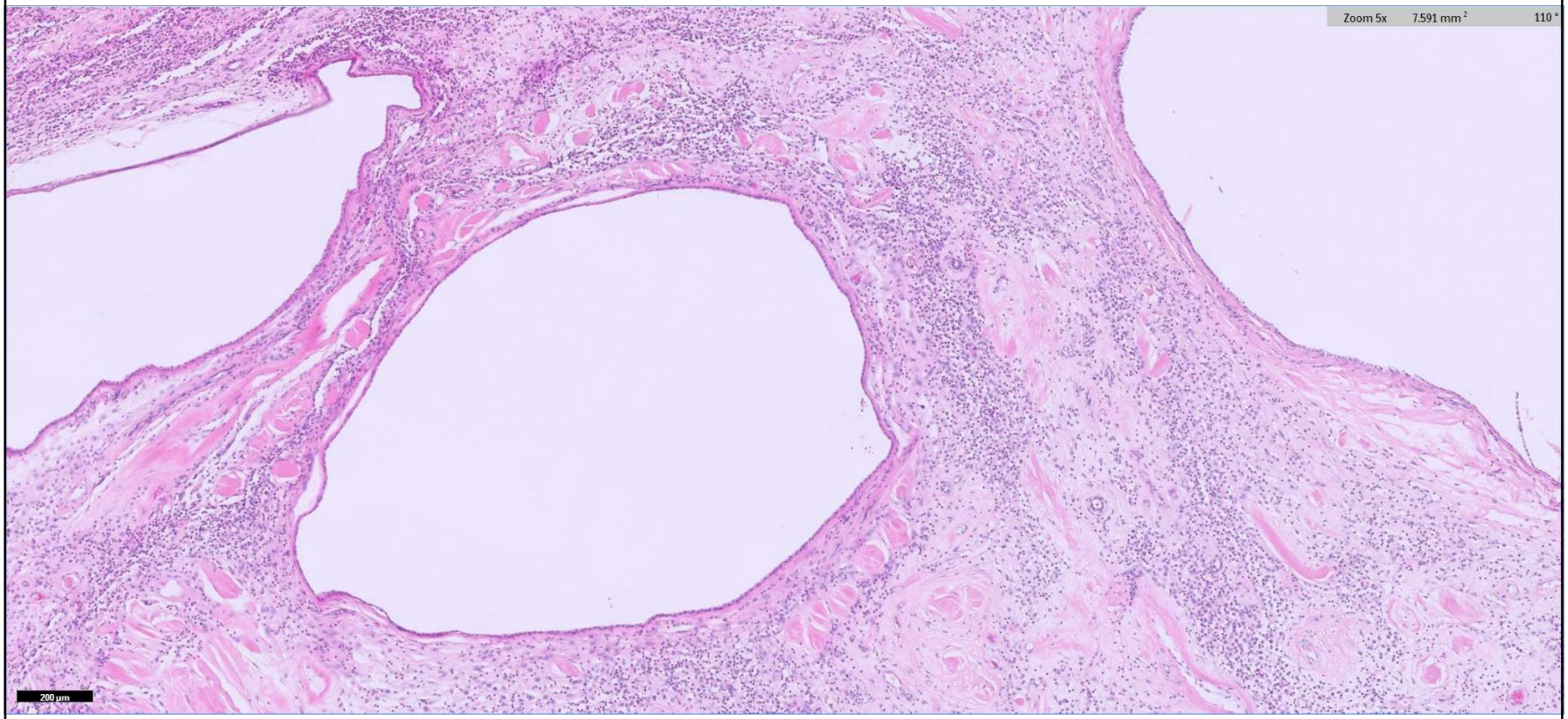
Cytologic findings

- Presence of three distinct populations:
  - Mast cells
    - Scattered on the background
  - Epithelial (apocrine cells)
    - Mostly in cohesive clusters
  - Spindle cells
    - Reactive fibroblast

Diagnosis

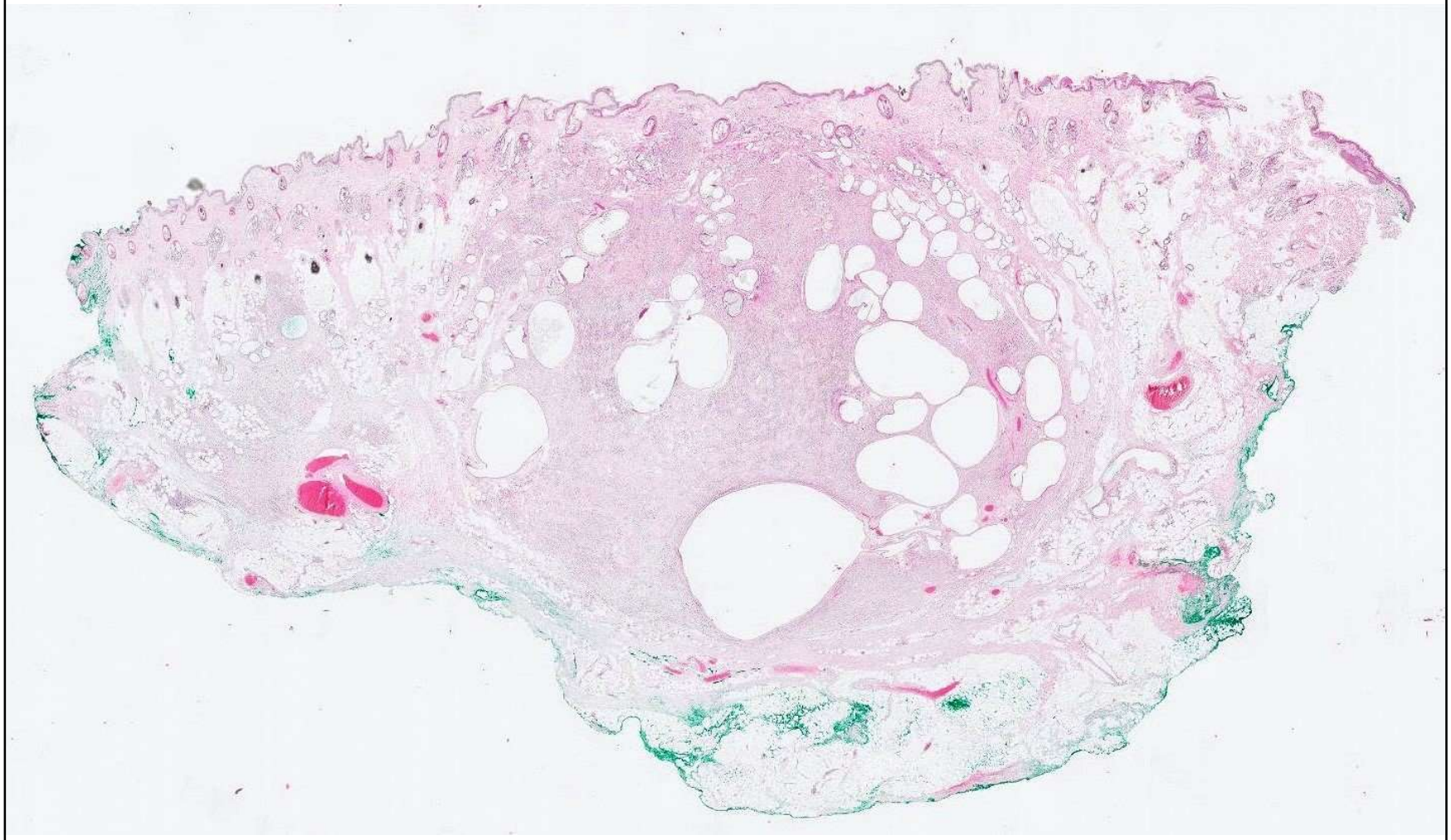
- Cytologic diagnosis
  - Mast cell tumor
- Histologic diagnosis
  - Mast cell tumor
    - Diffuse enlargement of adnexal ductal apocrine component



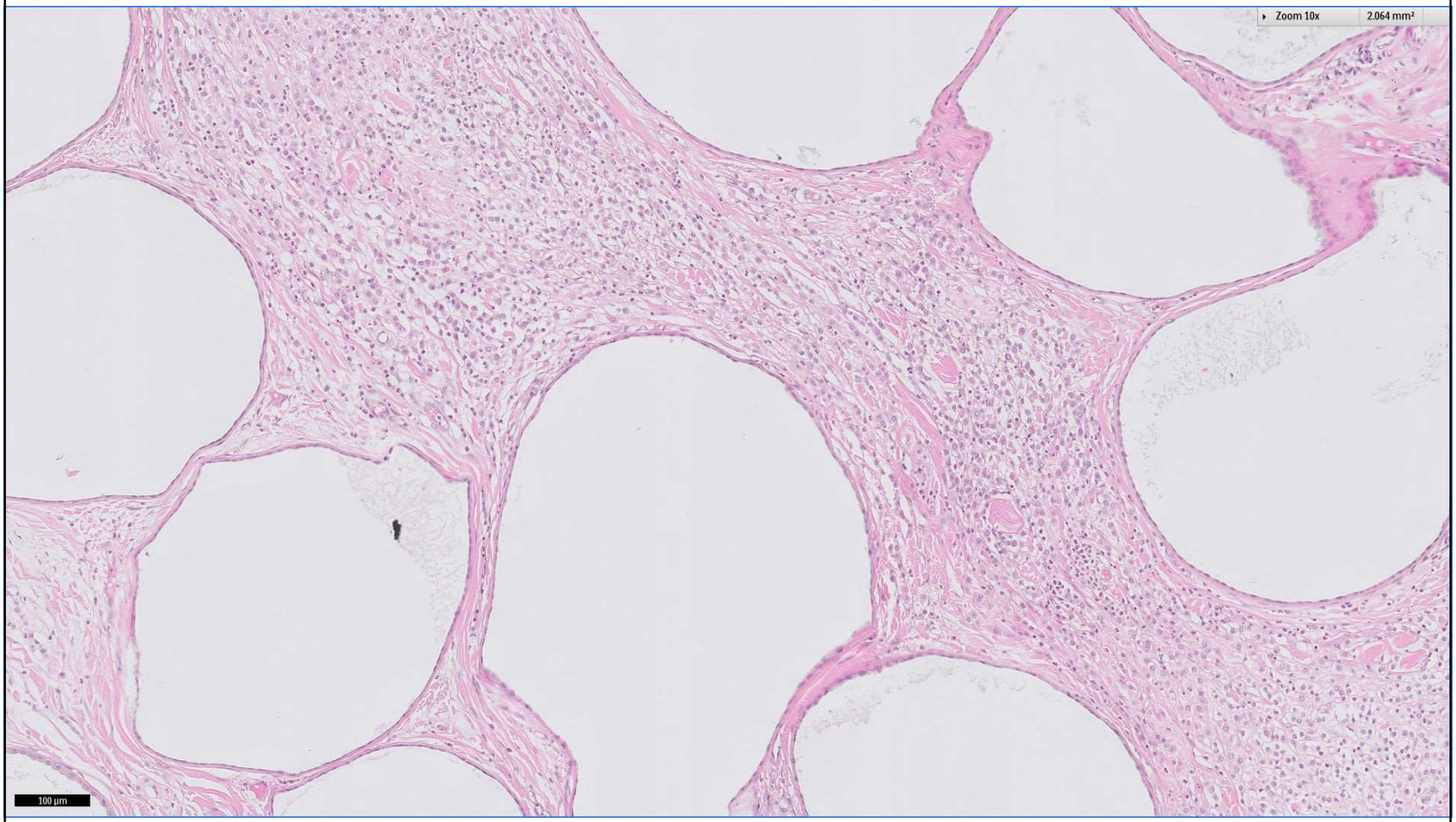

Zoom 5x 7.591 mm ²
110 °
200 µm

Discussion

- Dilatation of apocrine ducts is an inconstant finding in histologic section of mast cell tumor
- Not clear why some mast cell tumor develops a concomitant enlargement of apocrine ducts
- This enlargement is highly variable



Dog, mongrel, 7-year-old, M; mast cell tumor


Zoom 10x
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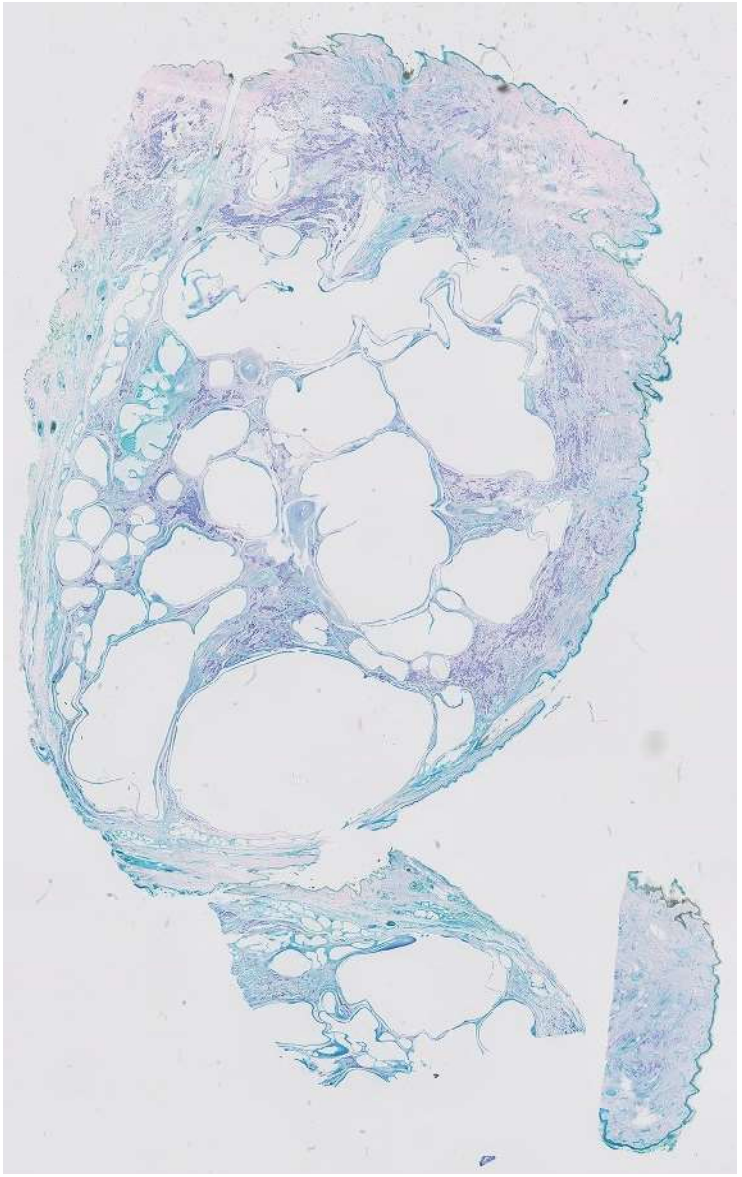


Dog, Poodle, 9-year-old, F; mast cell tumor

Discussion

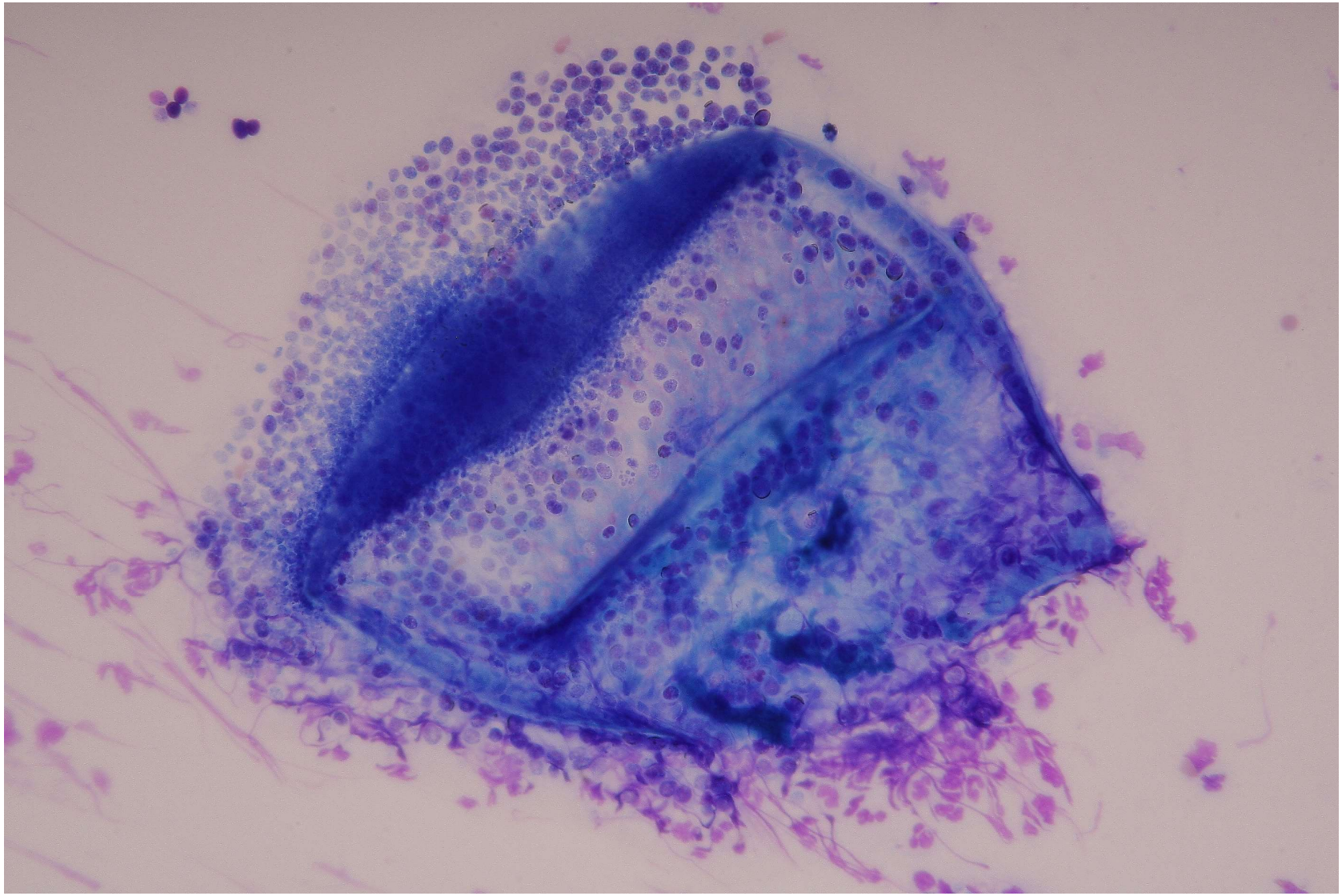
- What is the reason of this enlargement?
  - Reactive fibroplasia or fibrosis induced by tumor factors (TNF-α) elicits the stricture of the superficial tract of the ducts and the accumulation of secrete
  - Direct action of some factor produced only by specific types of neoplastic mast cells
  - Ductal enlargement due to a benign hyperplastic or neoplastic adnexal processes induces neoplastic mast cell proliferation

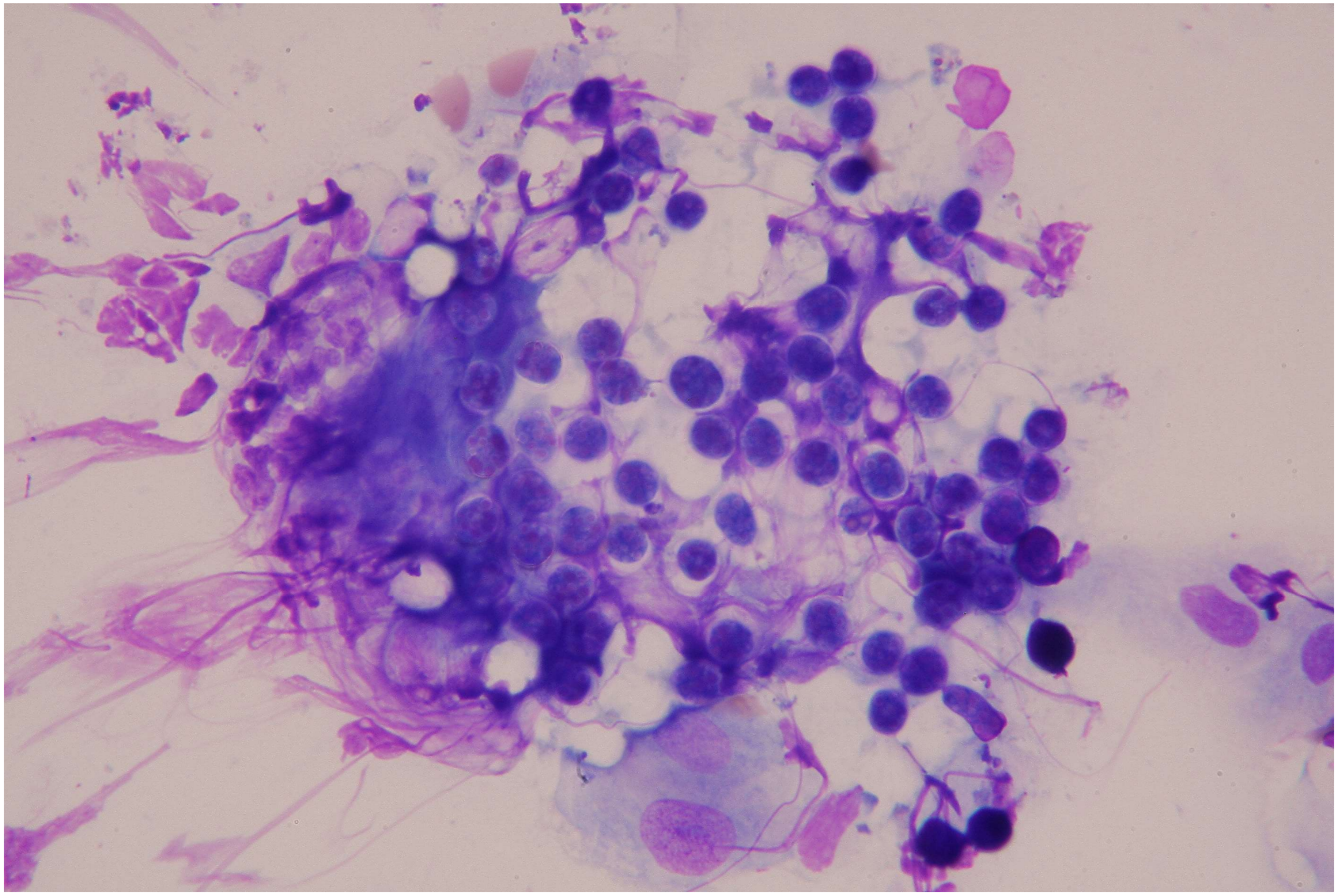
Discussion

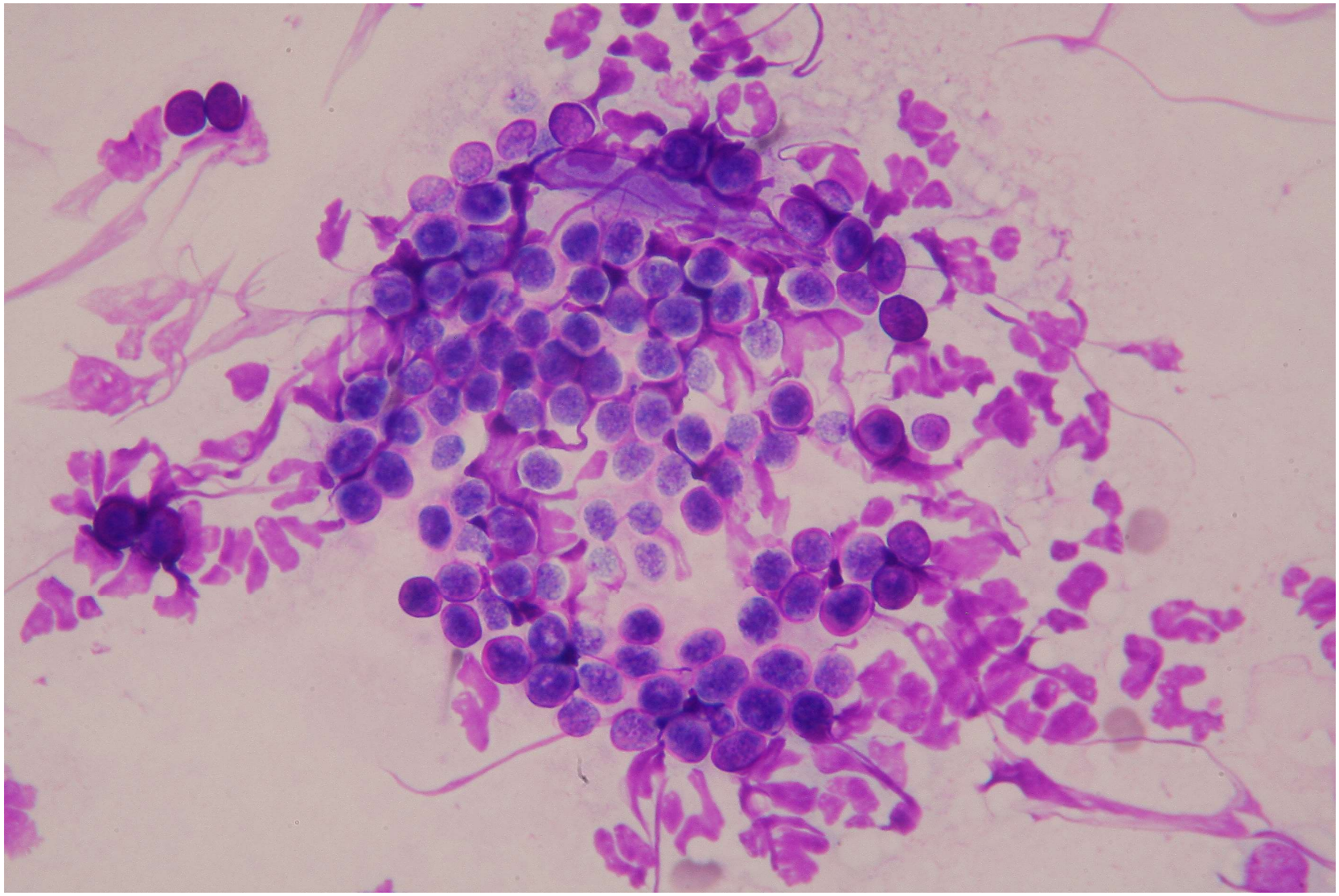
- Currently there are no specific features, both morphologic and immunohistochemical, that provide reliable informations about the mast cell tumor biological behavior
- Should be that the association of mast cells and enlarged apocrine ducts may represent a feature that help in prognosis?
- Need for further studies that correlate this morphological feature with the outcome of the mast cell tumors

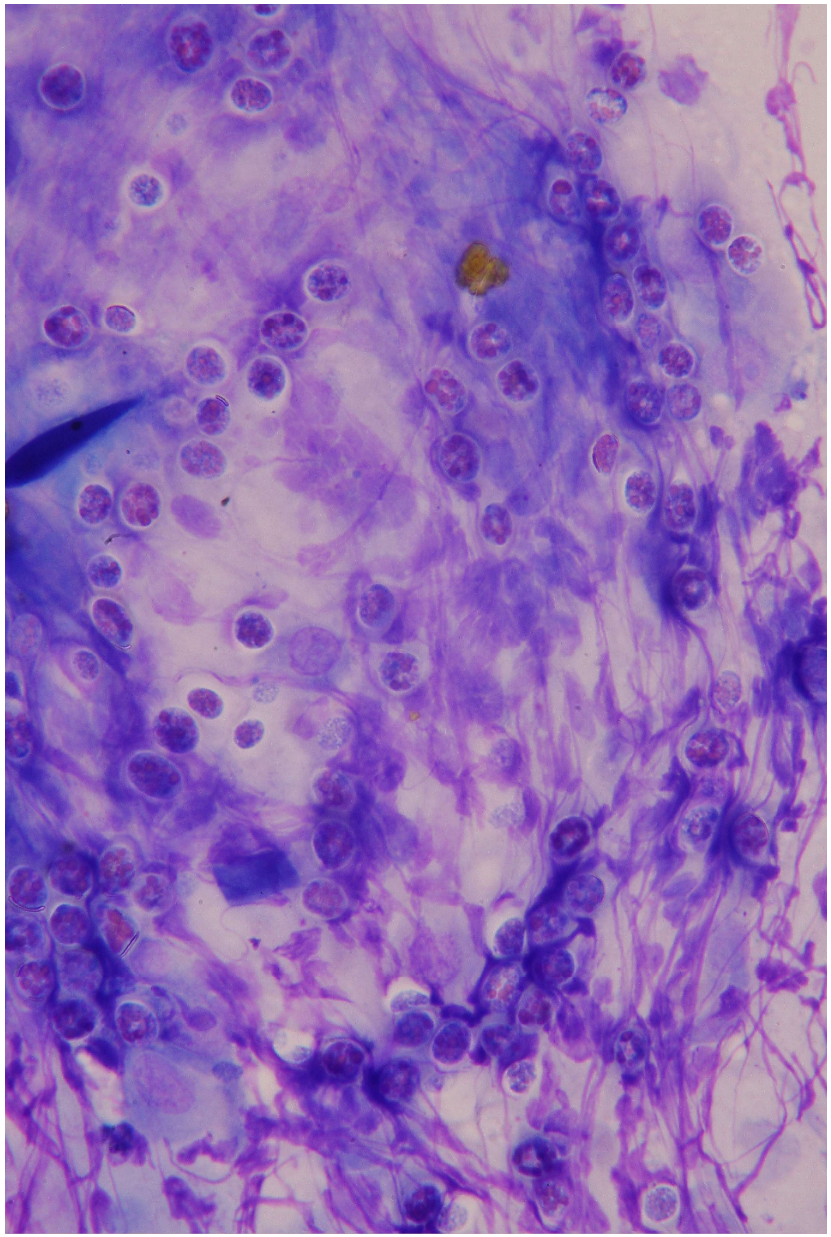
Case #7

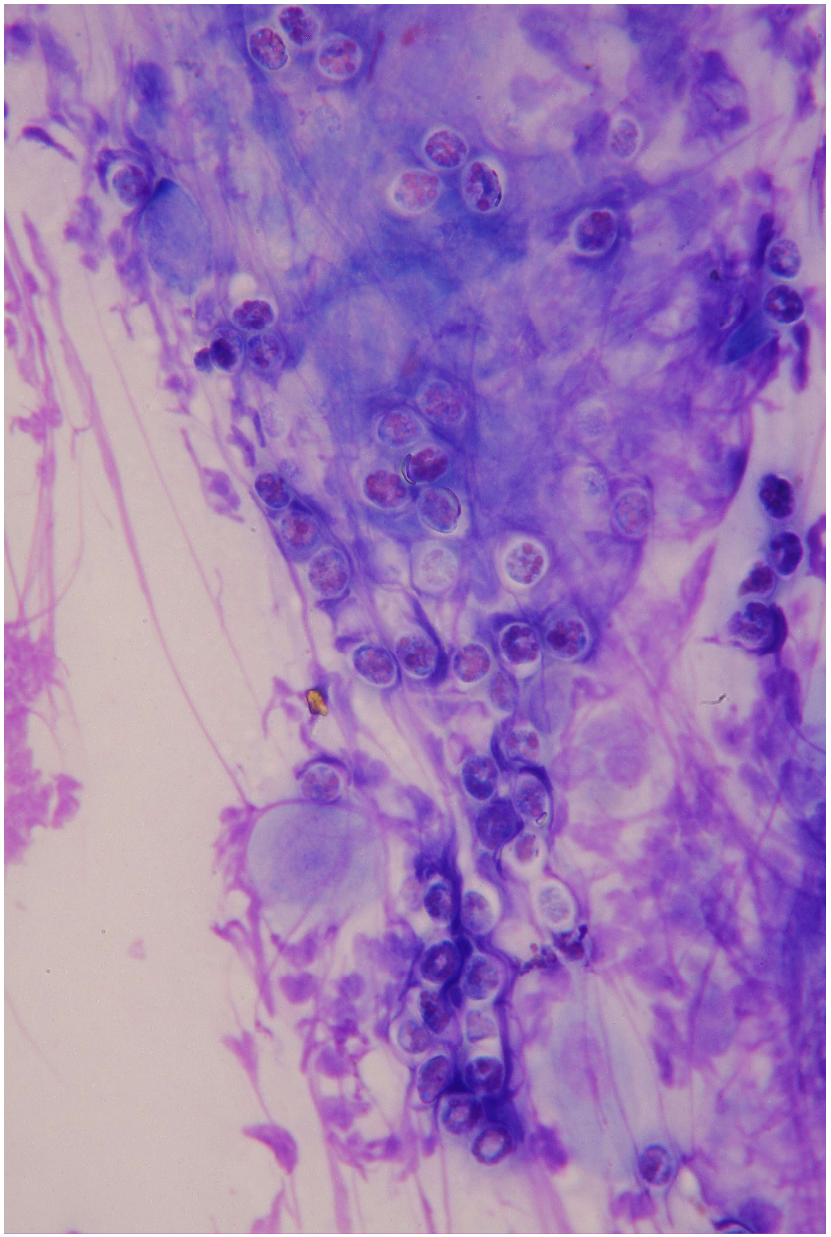
- Dog, Setter, 7-year-old, male
  - Great hunter!!
  - Sneezing episodes and mild hemorrhagic discharge
-
- Nasal mass
  - Red tissue partially protruding from the nose
- FNCS of the mass
- MGG stain

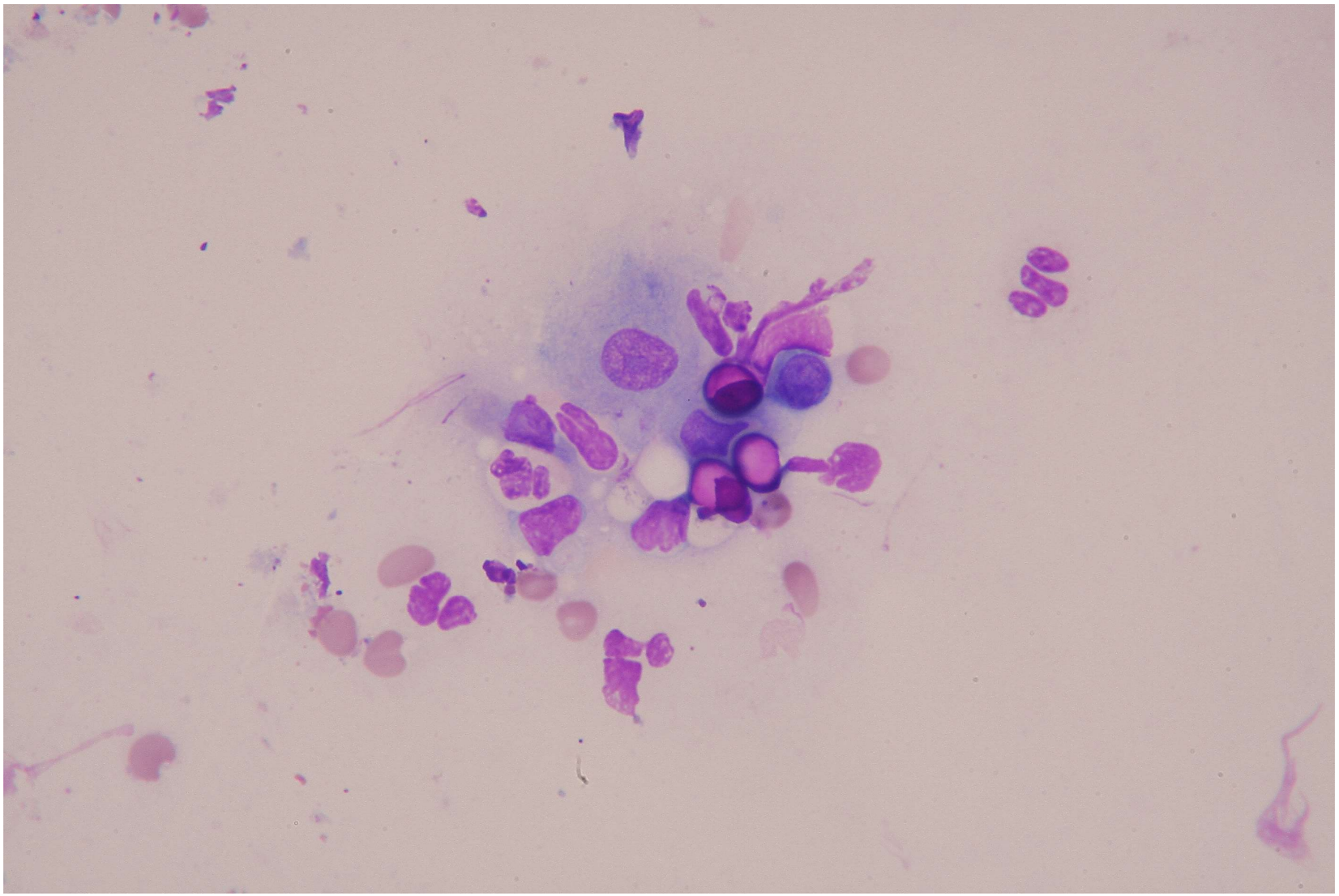












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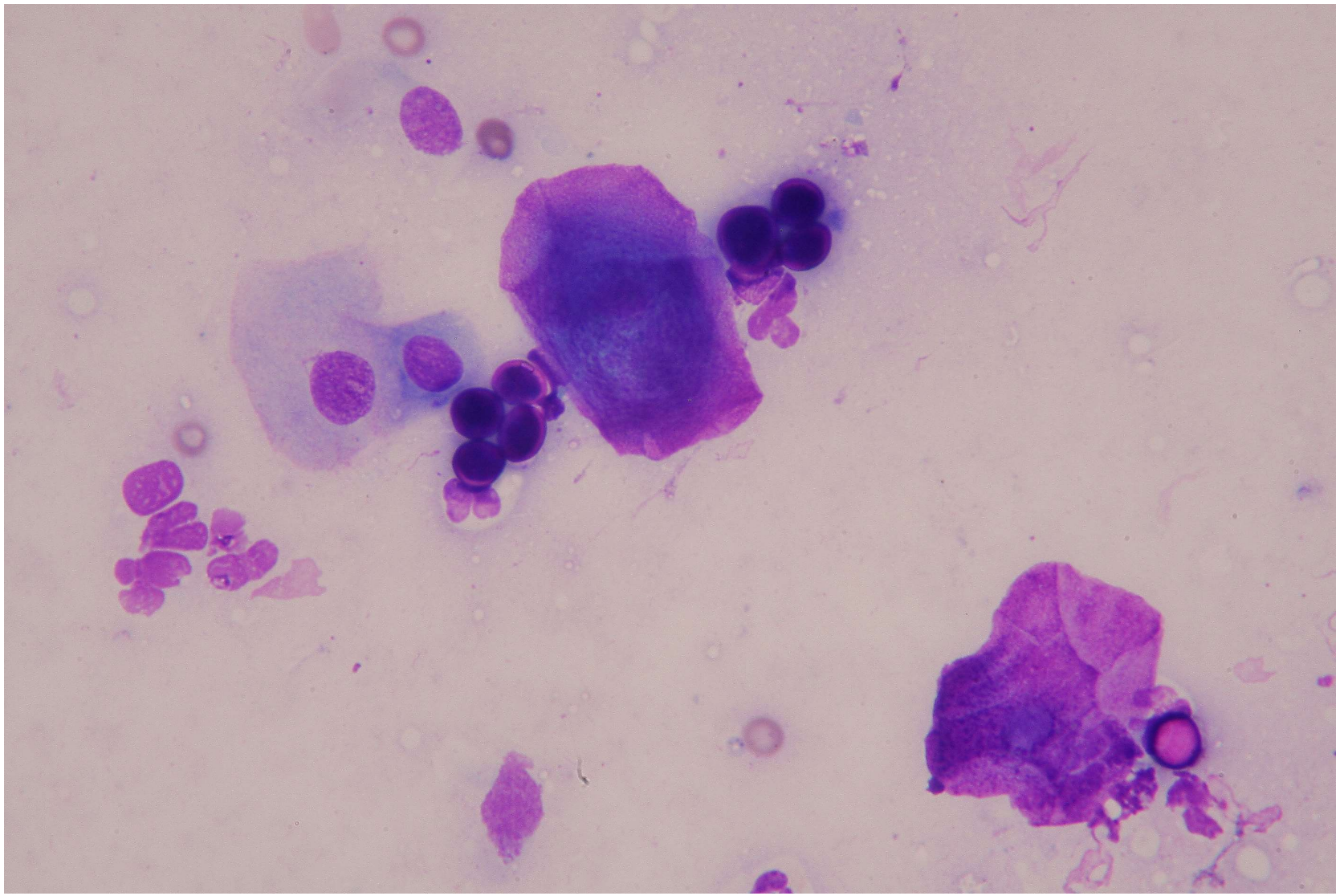

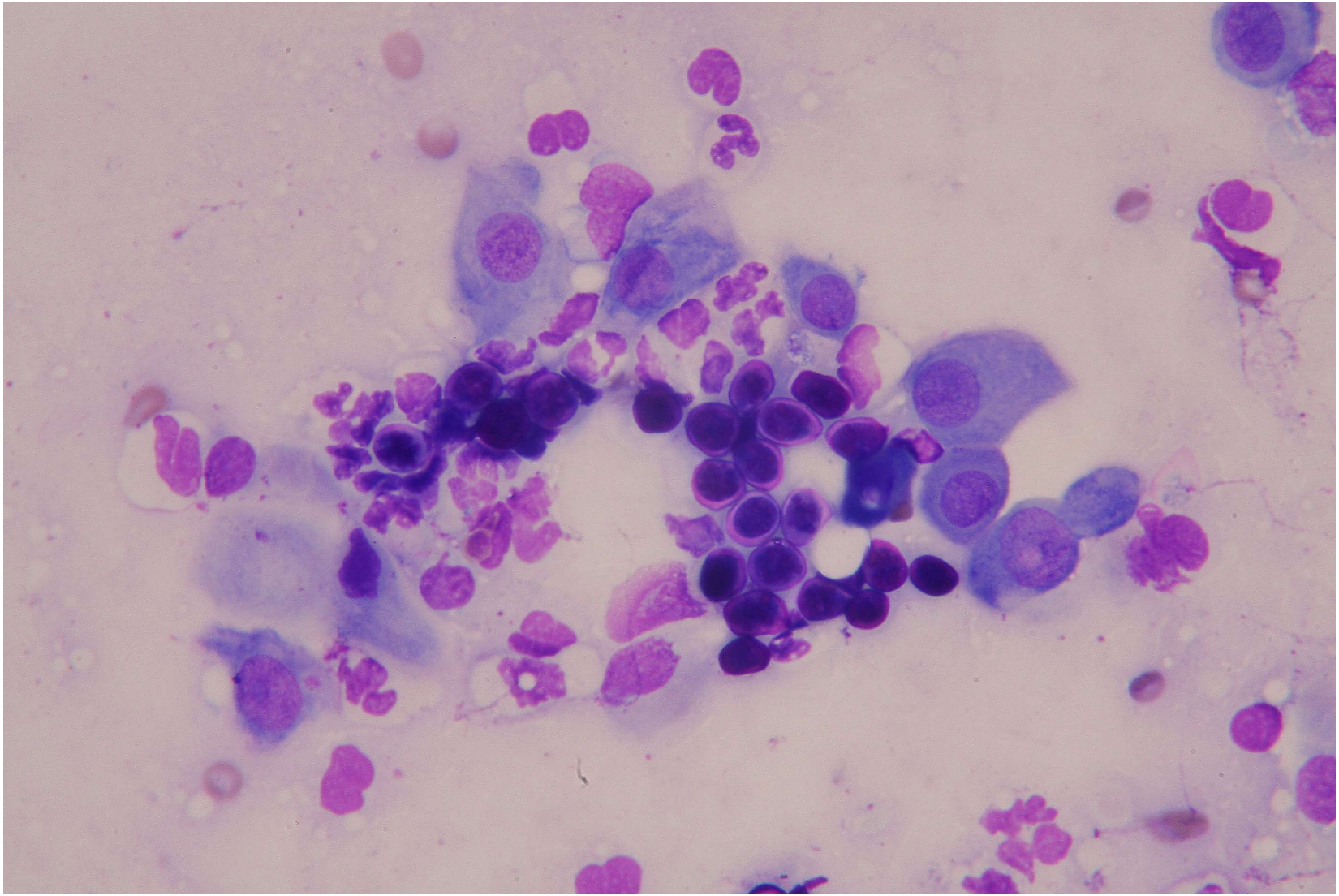

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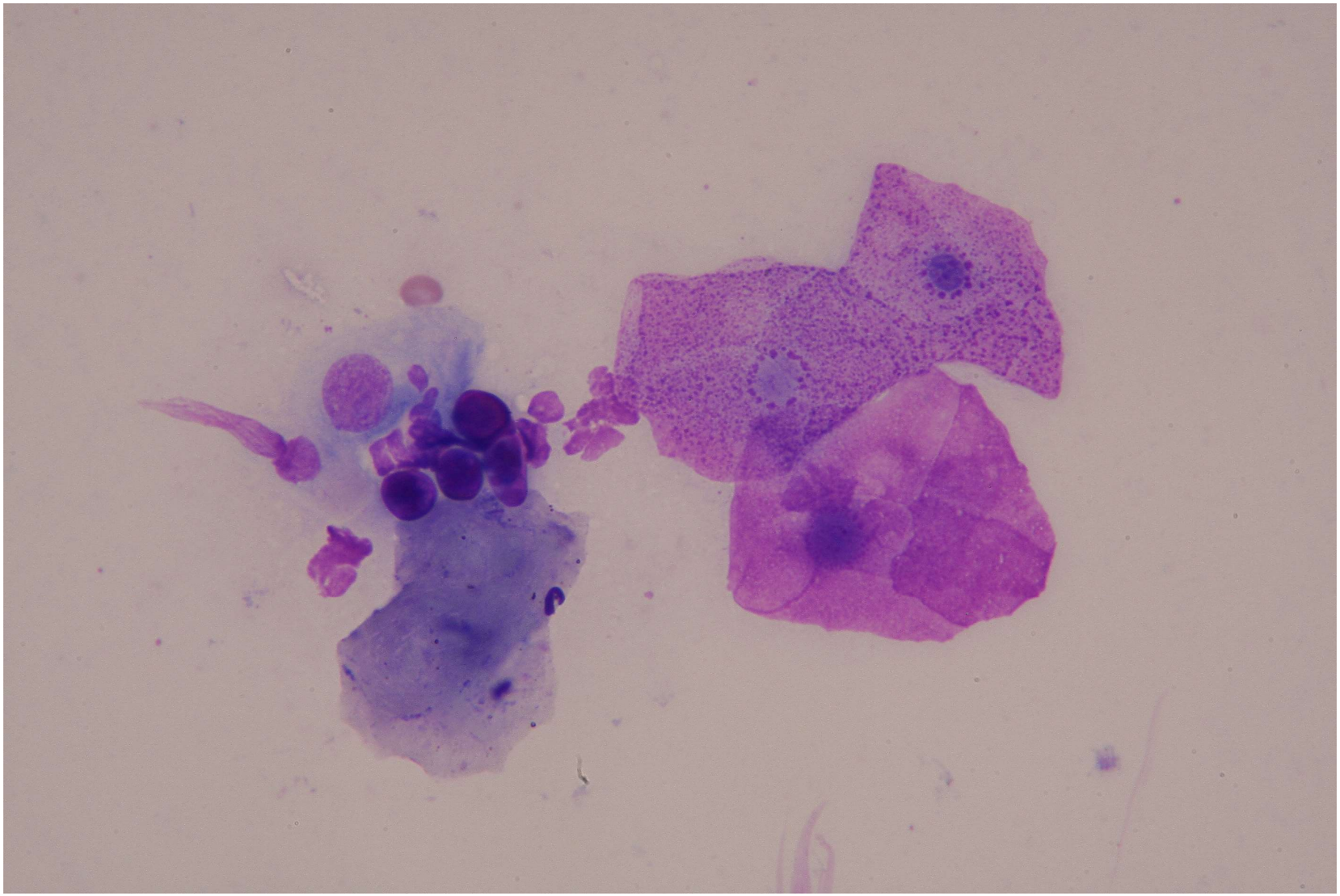

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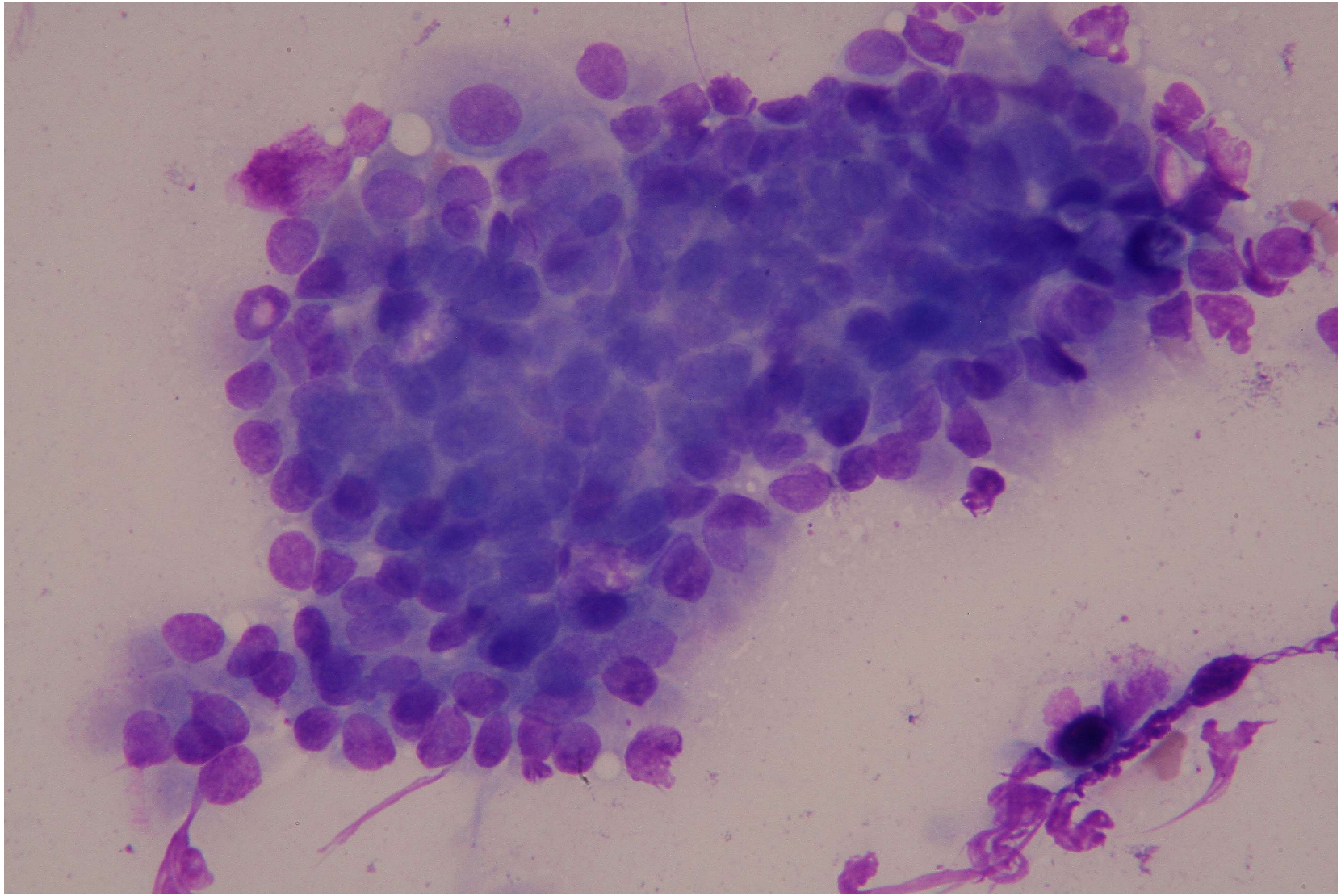

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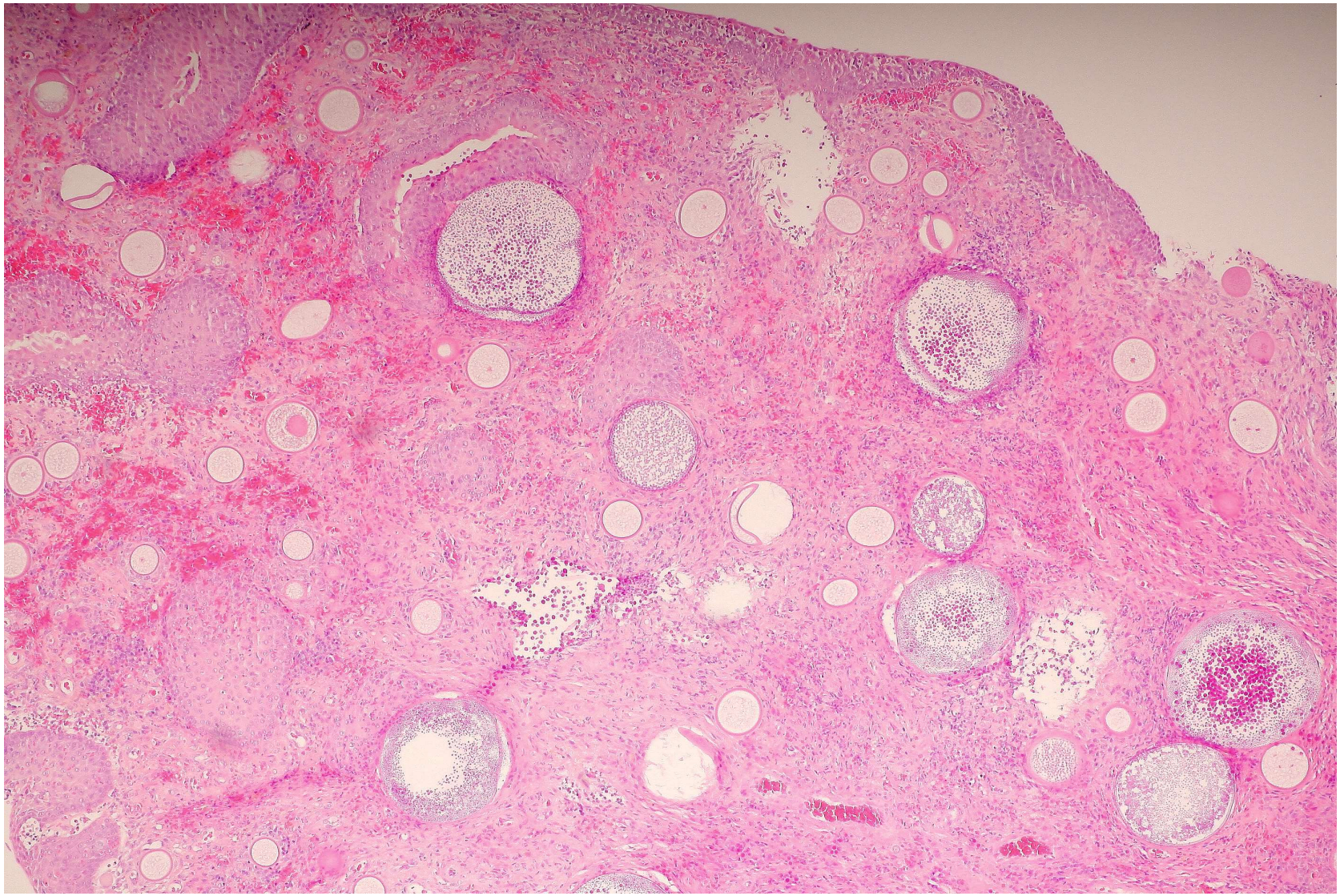
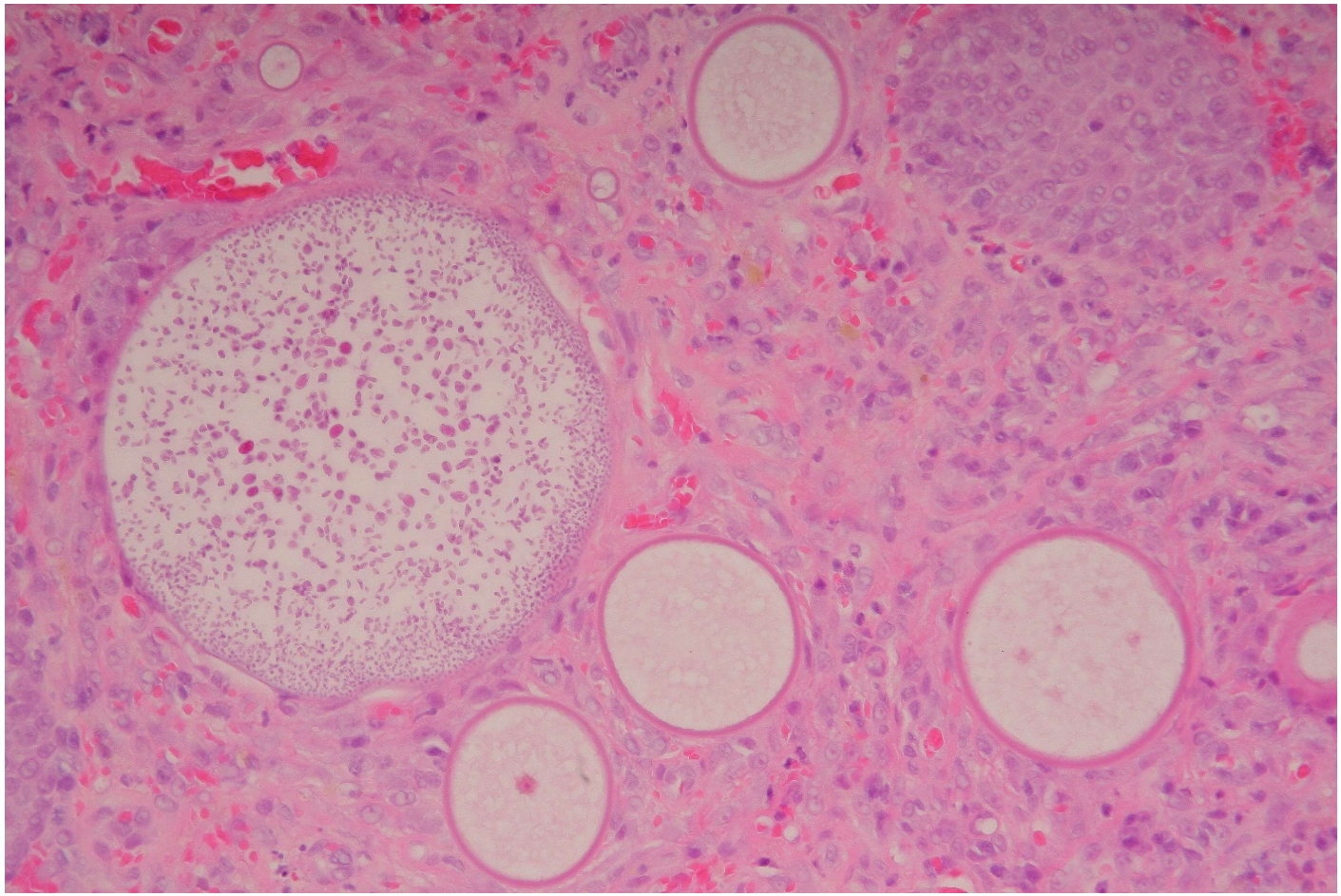
Cytologic findings

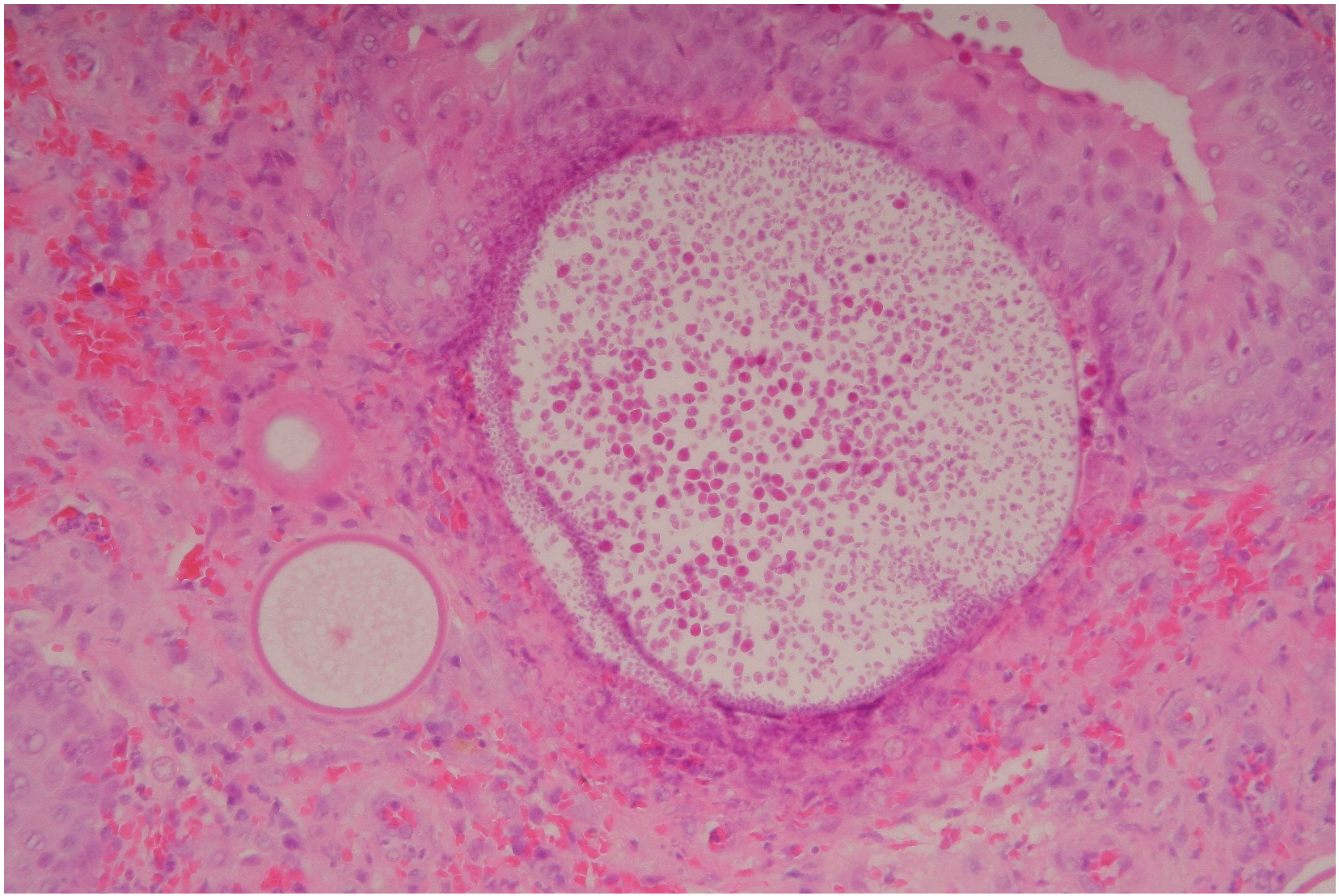
- Free endospores of Rhinosporidium spp
- Single large sporangium containing dozens of endospores
- Mild inflammation
  - Mostly neutrophilic
- Presence of epithelial cells
  - Respiratory ciliated cells
  - Squamous cells

Diagnosis

- Cytological diagnosis
  - Nasal rhinosporidiosis
- Histologic diagnosis
  - Nasal rhinosporidiosis





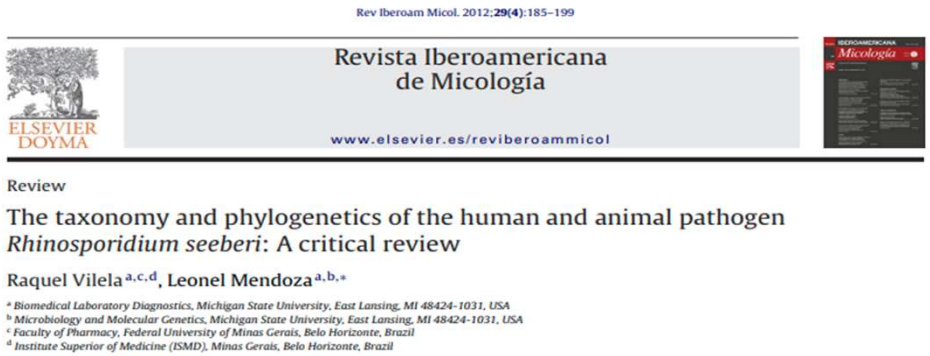


Discussion

- Rhinosporidium seeberi is a mycotic microorganism (??) that causes a disease of mucocutaneous tissues
  - Nasal mucosa and conjunctiva mostly affected
- Stagnant water serves as source of infection
- Local trauma seems to predispose to infection
  - Role of sharp plants in deep implantation
  - The hunter dog that searchs for the pray in swampy location is predisposed

Discussion

- What is Rhinosporidium?
- Current interpretation
  - A cyanobacterium?
  - A eukaryote Mesomycetozoa linked to aquatic fish parasites?
  - A pathogen that belong to the kingdom Fungi?
- According with Vilela and Mendoza, Rhinosporidium, based on DNA and phylogenetic activity is a Mesomycetozoa microbe
- Mesomycetozoa are neither part of fungi nor of animals



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Review

The taxonomy and phylogenetics of the human and animal pathogen *Rhinosporidium seeberi*: A critical review

Raquel Vilela[a,c,d], Leonel Mendoza[a,b,*]

[a] Biomedical Laboratory Diagnostics, Michigan State University, East Lansing, MI 48424-1031, USA
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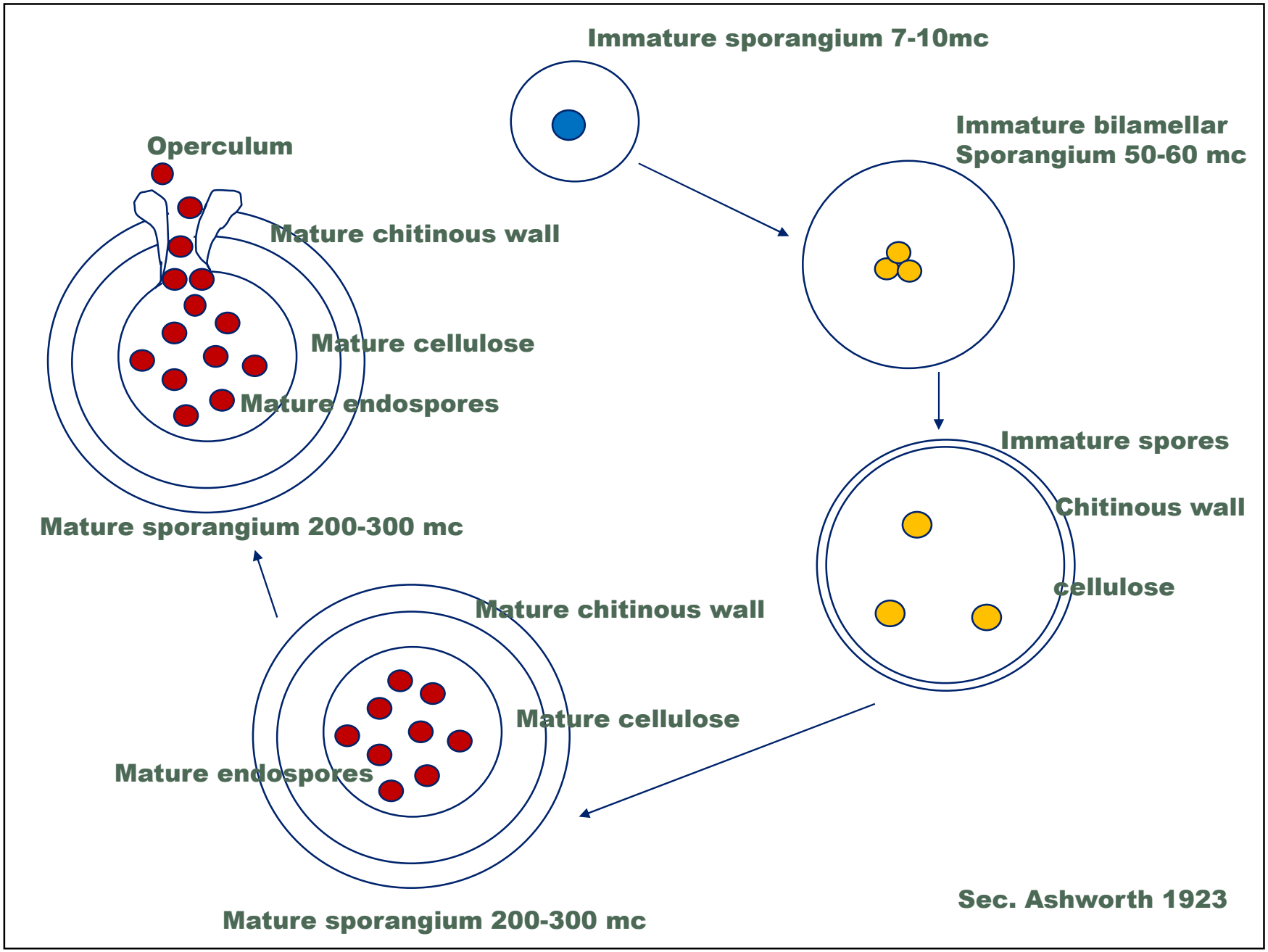
[c] Faculty of Pharmacy, Federal University of Minas Gerais, Belo Horizonte, Brazil
[d] Institute Superior of Medicine (ISMD), Minas Gerais, Belo Horizonte, Brazil


Immature sporangium 7-10mc
Immature bilamellar
Sporangium 50-60 mc
Operculum
Mature chitinous wall
Mature cellulose
Mature endospores
Mature sporangium 200-300 mc
Immature spores
Chitinous wall
cellulose
Mature chitinous wall
Mature cellulose
Mature endospores
Mature sporangium 200-300 mc
Sec. Ashworth 1923

Cytologic identification of immature endospores in a dog with rhinosporidiosis

William A. Meier, James H. Meinkoth, Jill Brunker, Debbie Cunningham, Robert J. Bahr

Abstract: An 8-year-old, intact, male Labrador Retriever was presented to the Boren Veterinary Medical Teaching Hospital at Oklahoma State University with a 2-month history of severe sneezing episodes that resulted in epistaxis and bilateral sanguineous discharge. Rhinoscopy revealed a small polypoid mass, and specimens were obtained for histopathology. Microscopic examination of formalin-fixed tissue specimens revealed organisms consistent with *Rhinosporidium seeberi*. The mass was surgically excised and impression smears were made for cytology examination. Smears revealed high numbers of endospores, typical of those previously described for *R seeberi*. In addition, numerous smaller structures, presumed to be immature endospores, were noted. The immature endospores were morphologically distinct from mature endospores and have not been described previously. Recognition of immature forms of *Rhinosporidium* may help prevent misidentification of the organism or misdiagnosis of a dual infection. (*Vet Clin Pathol.* 2006;35:348–352)

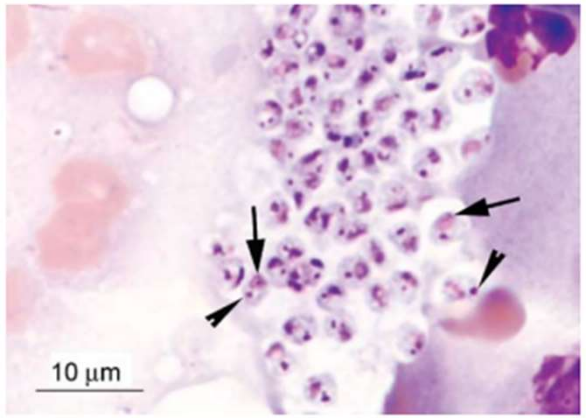


Figure 5. Immature endospores, approximately 2–4 µm in diameter and lightly basophilic, contain a relatively large pink-purple area thought to be nuclear material (arrows) as well as 1–2 smaller, dark-purple structures (arrowheads). Wright's-Giemsa.

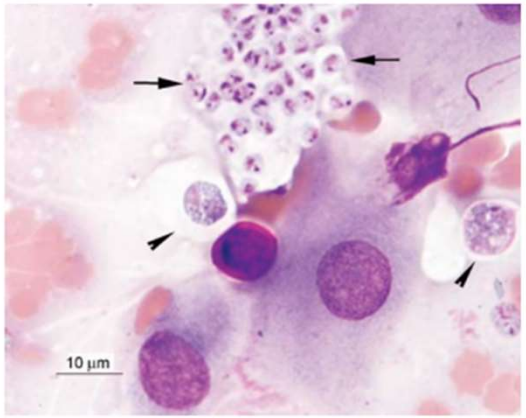


Figure 3. Impression smear from a dog with rhinosporidiosis. Two epithelial cells and 3 stages of developing endospores are shown. A single, mature, eosinophilic endospore is seen in the center. A group of smaller, immature endospores is at the top of the image (arrows). Also seen are 2 intermediate spores (arrowheads). Wright's-Giemsa.

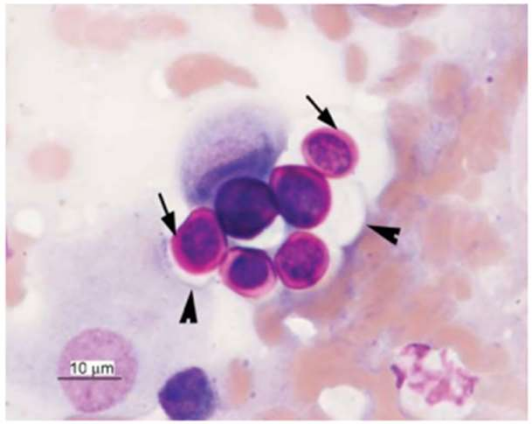
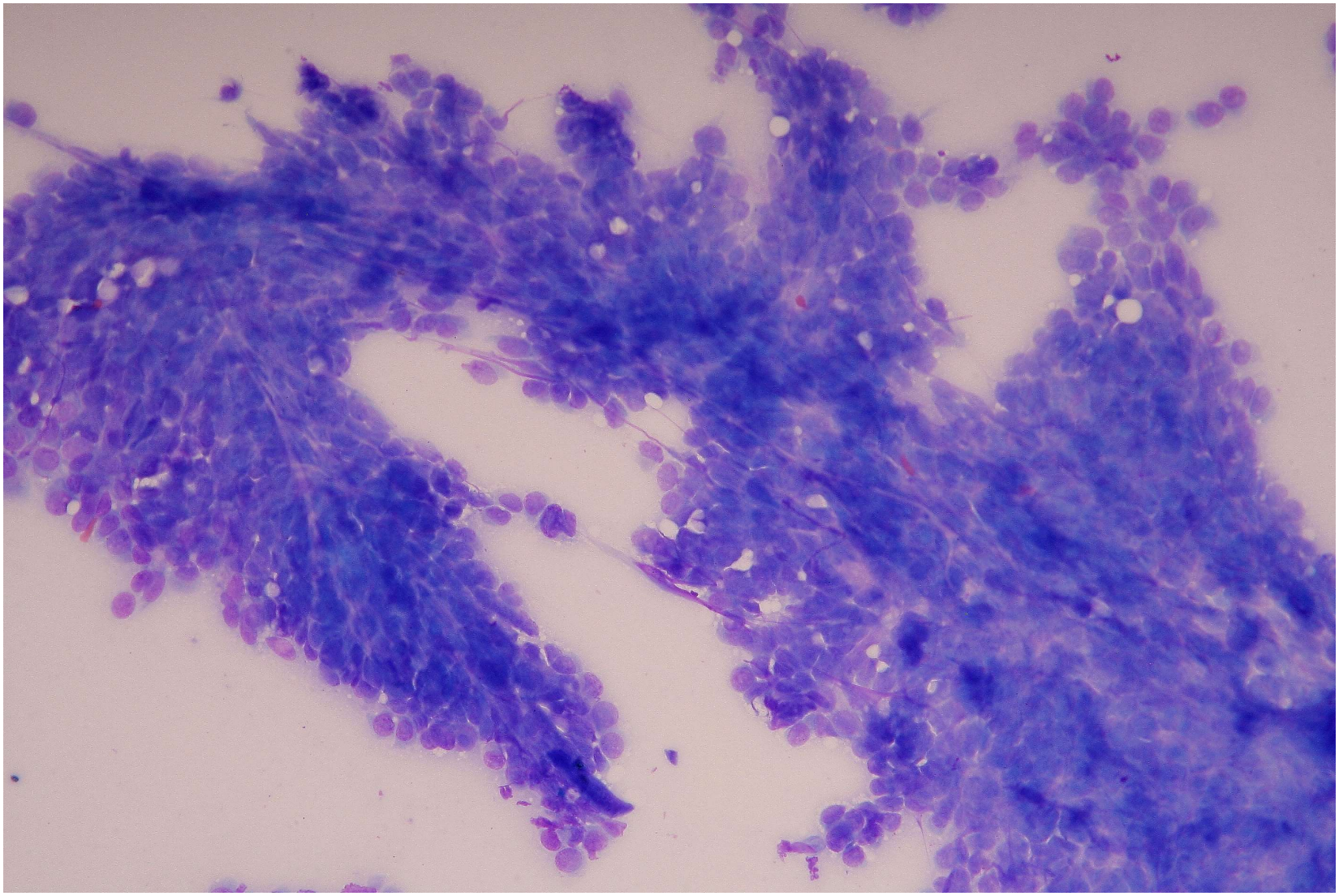
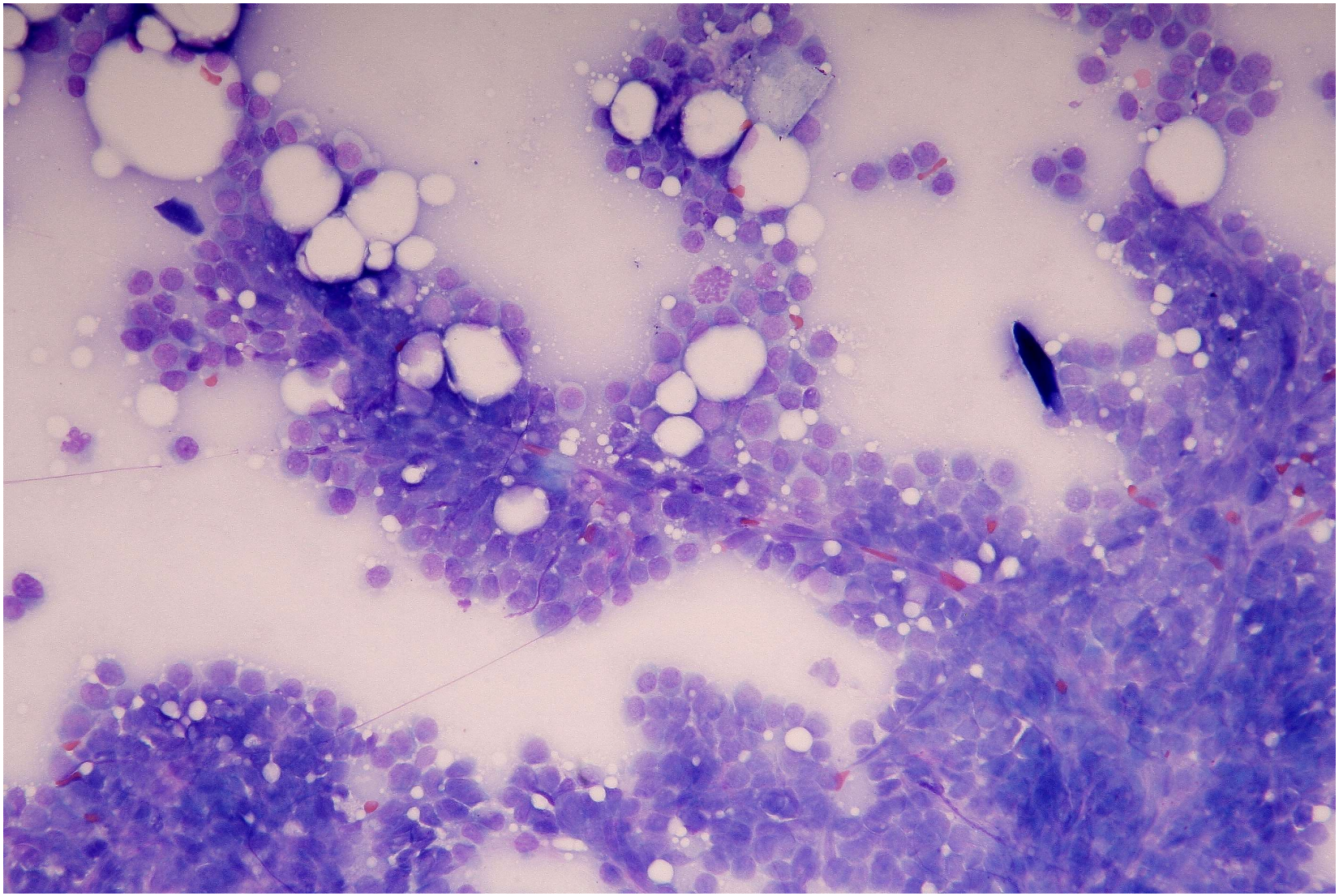


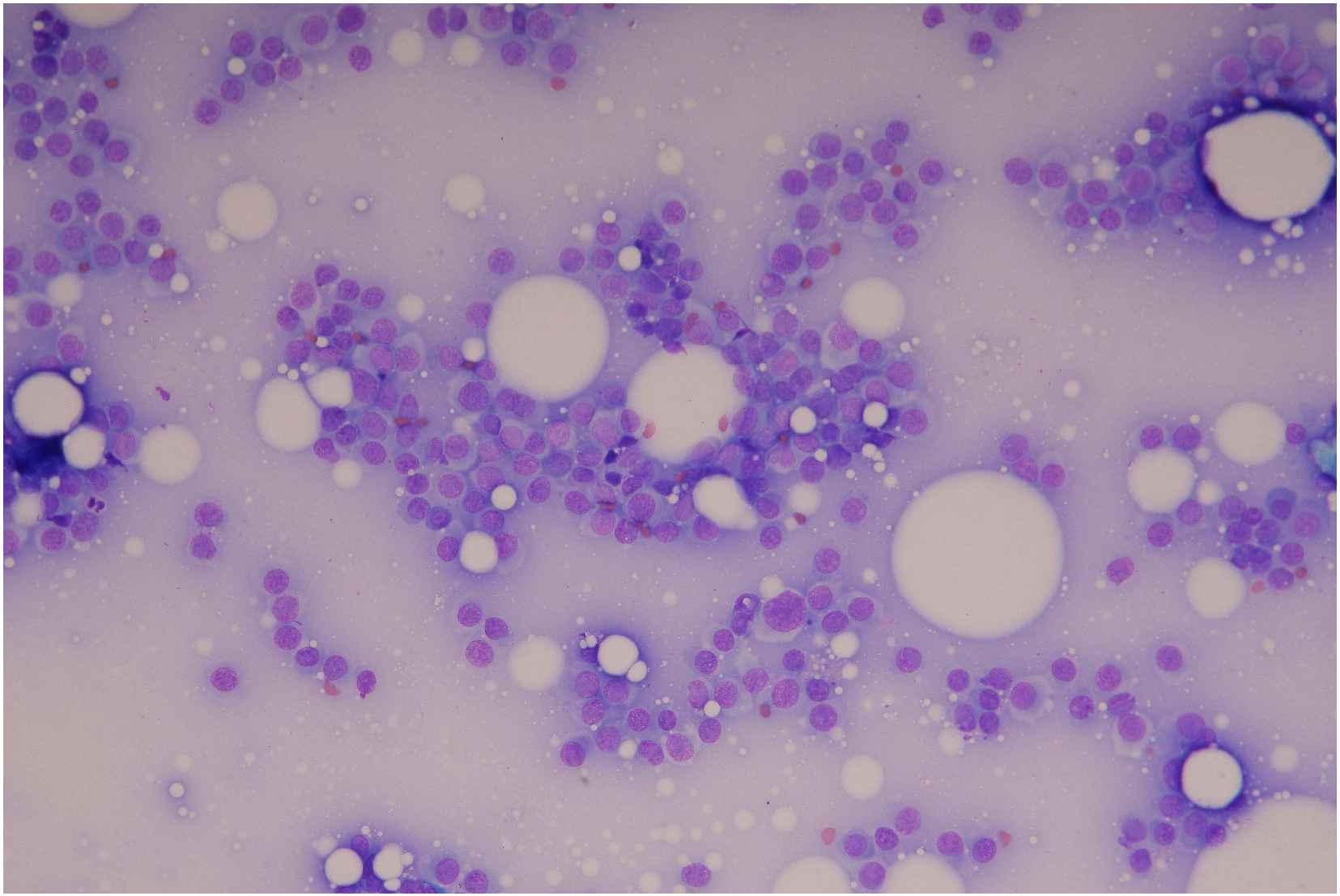
Figure 4. Mature endospores of *Rhinosporidium*. When the spores are well spread out, they appear eosinophilic with a thick cell wall (arrows) and are surrounded by a variably-sized, clear halo (arrowheads). Numerous eosinophilic globular structures can be seen within some mature endospores. Wright's-Giemsa.

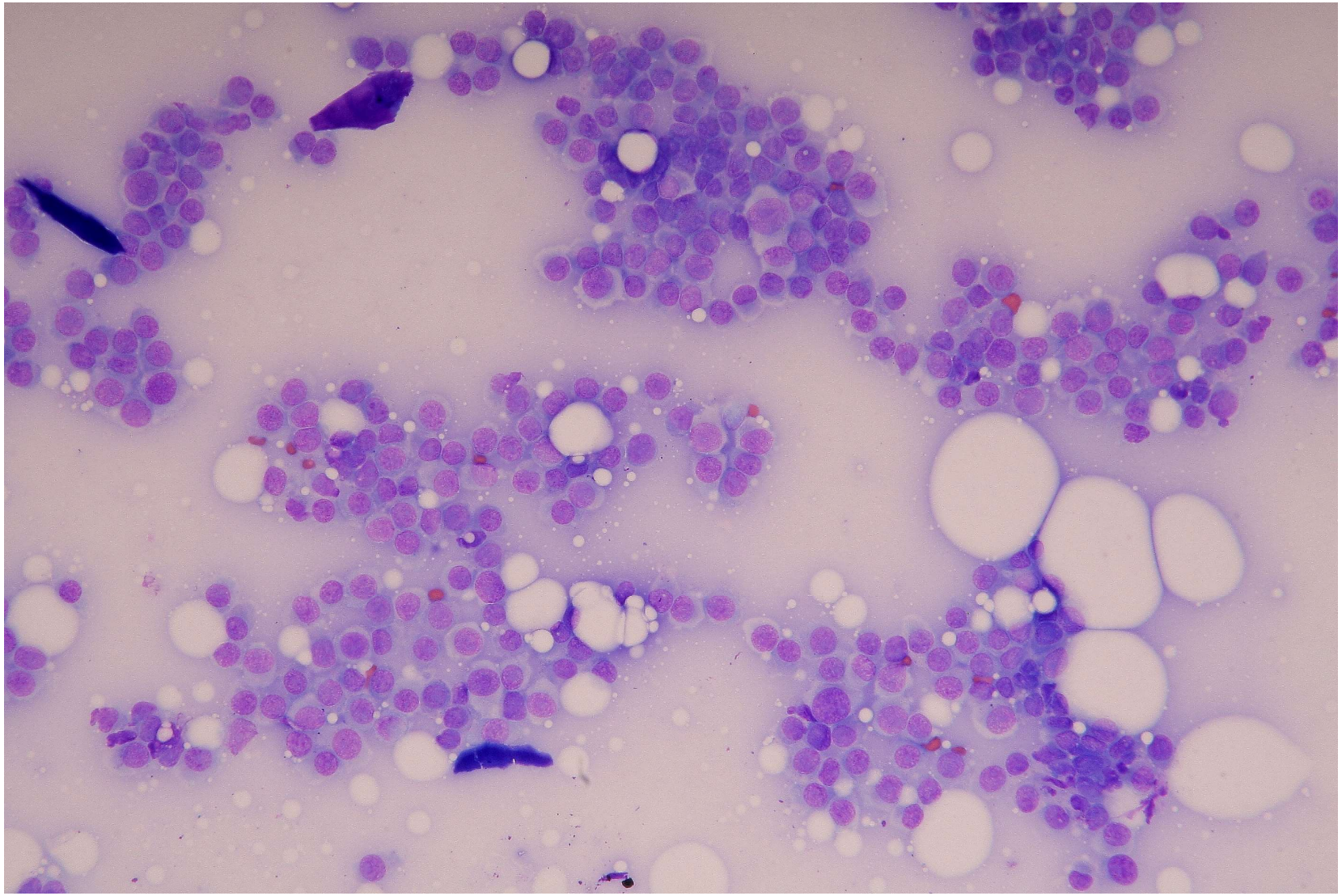
Case #8

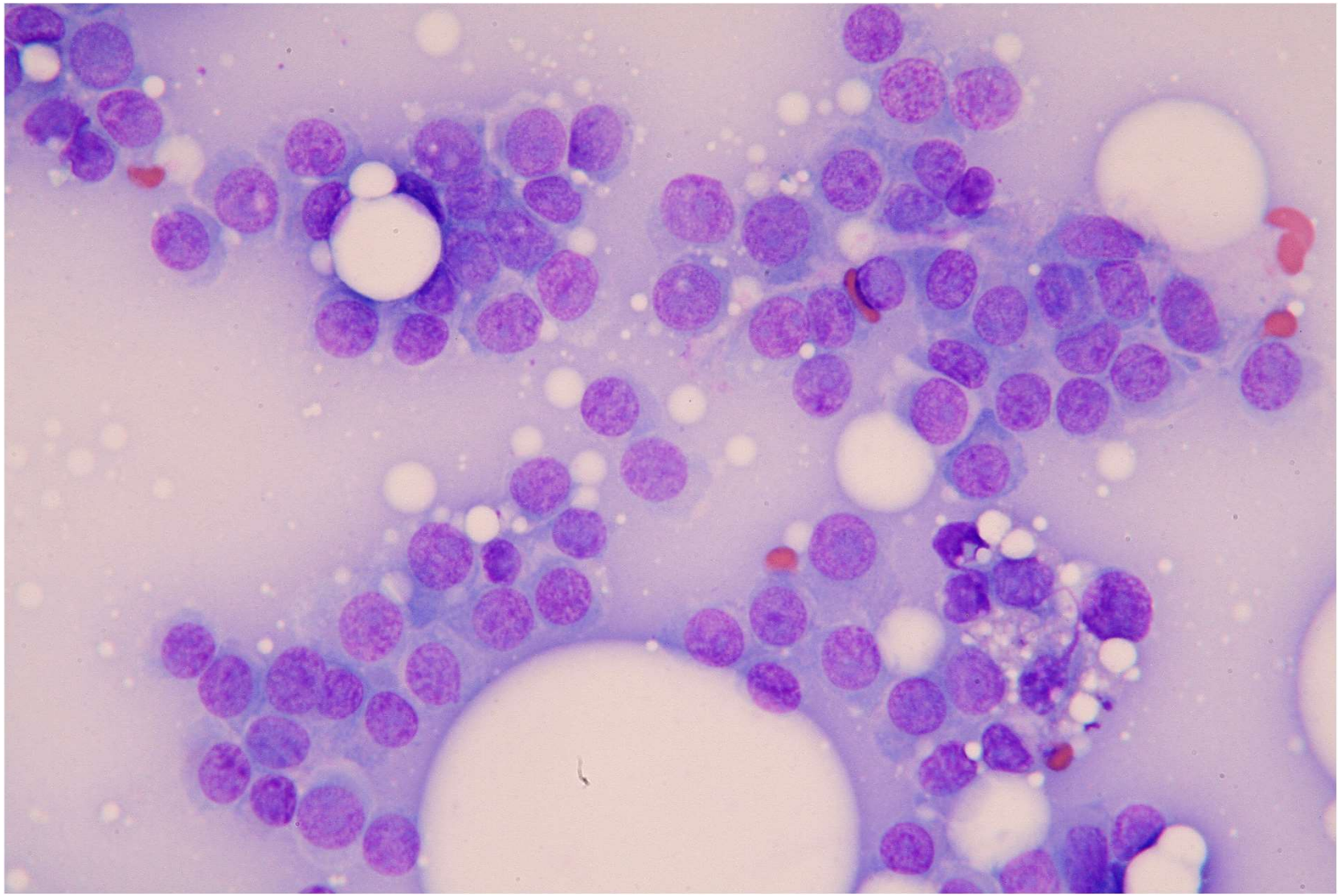
- Dog, mongrel, 8-year-old, male
- Cutaneous mass on ventral chest
- FNCS of the mass
- MGG stain











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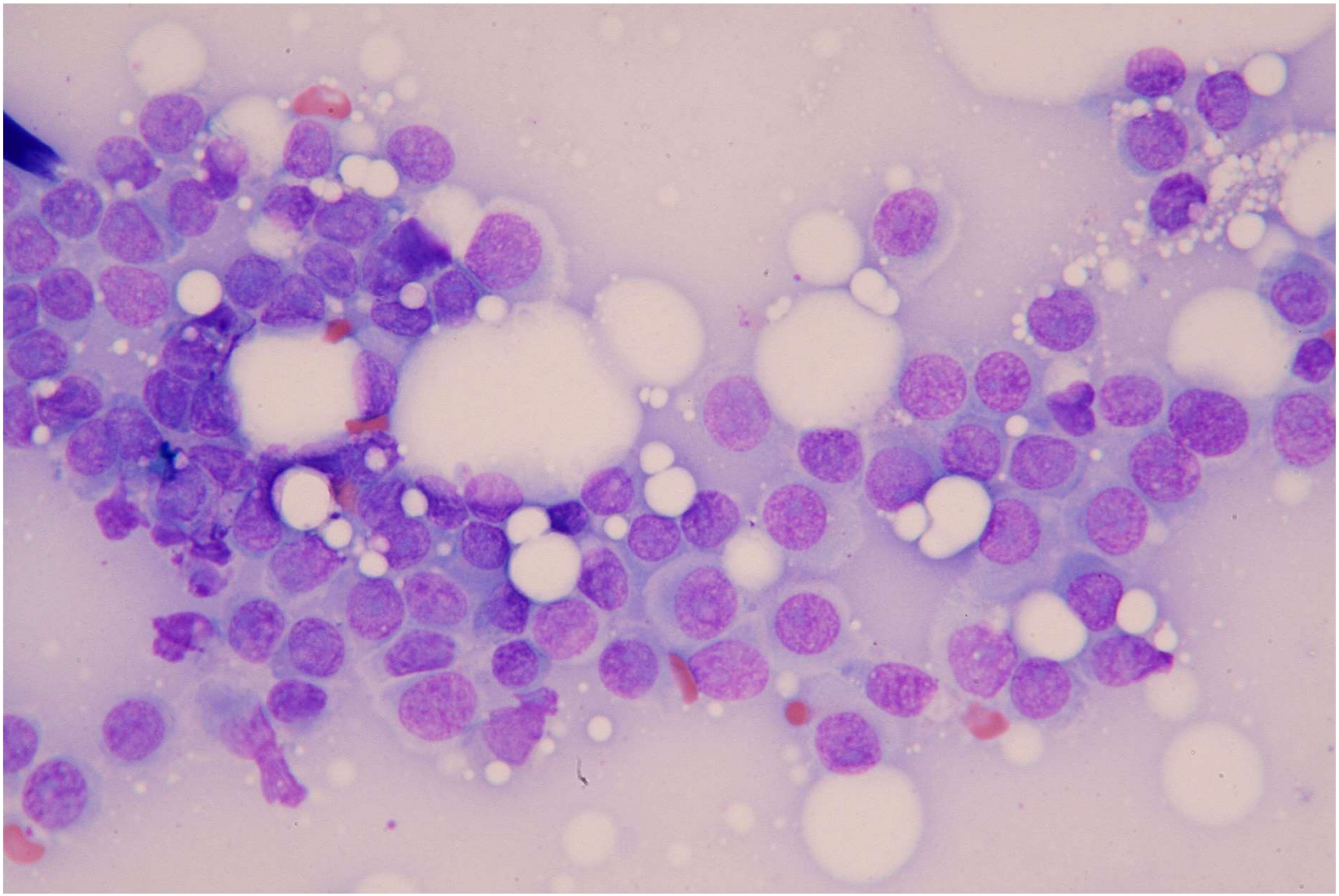

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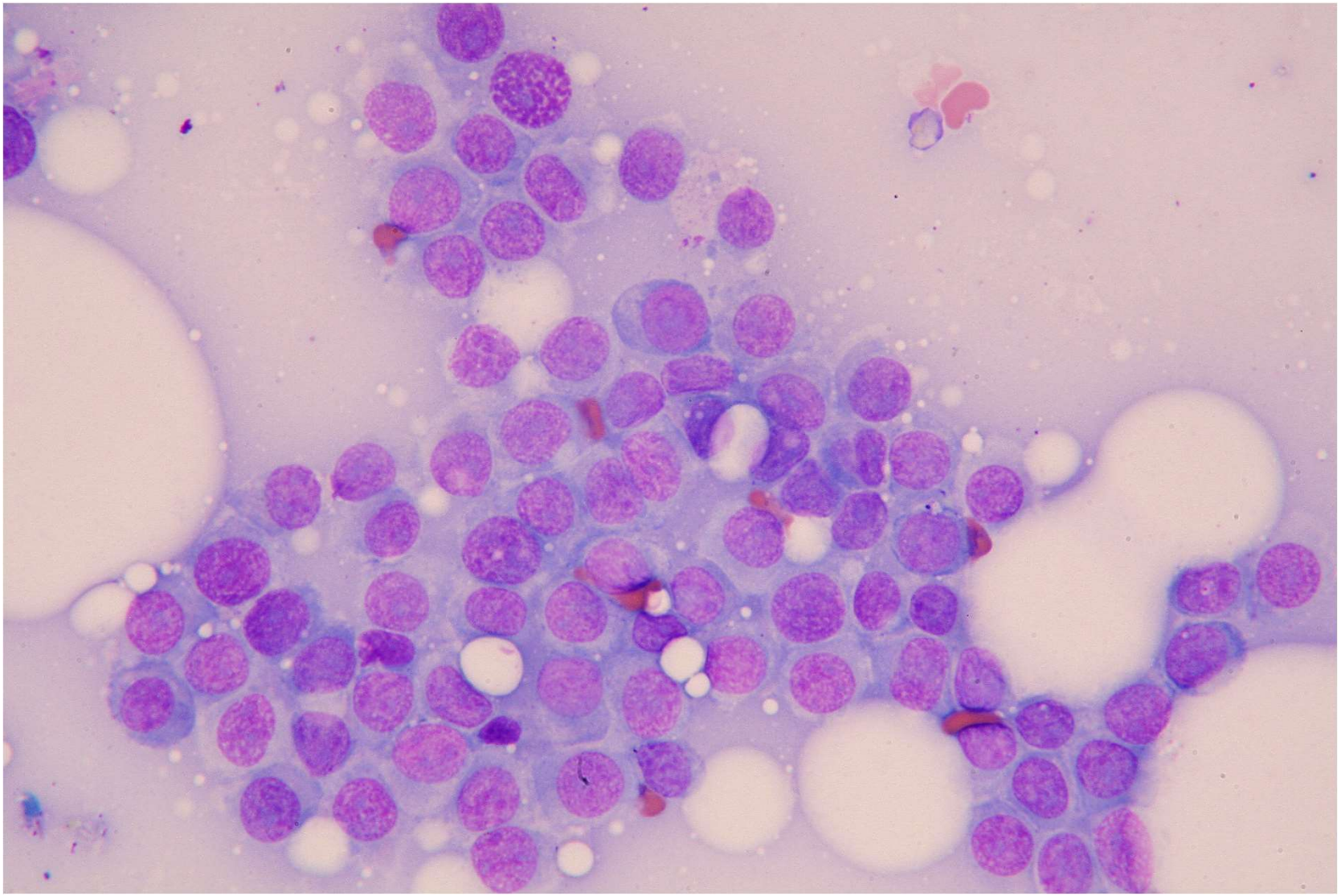

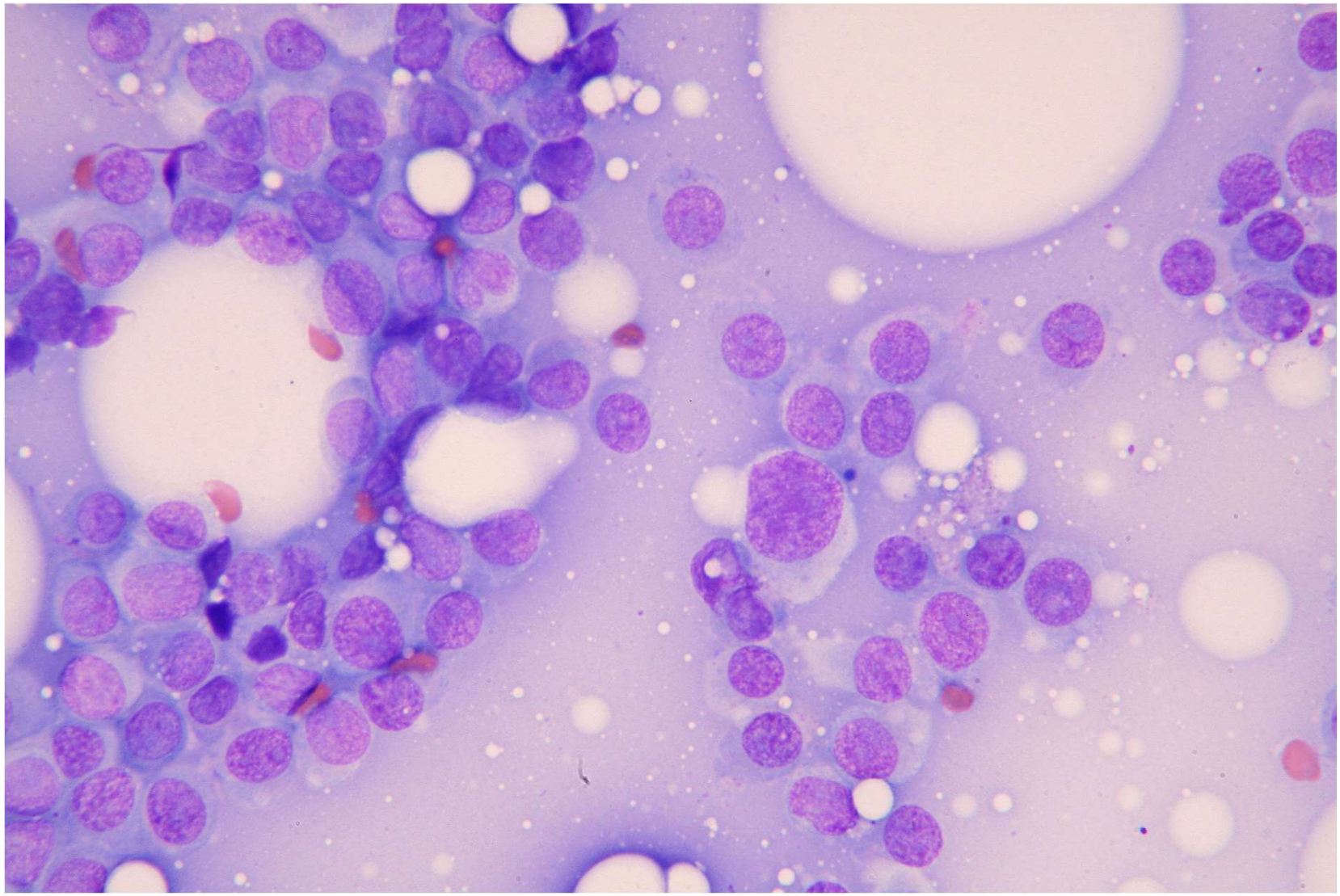

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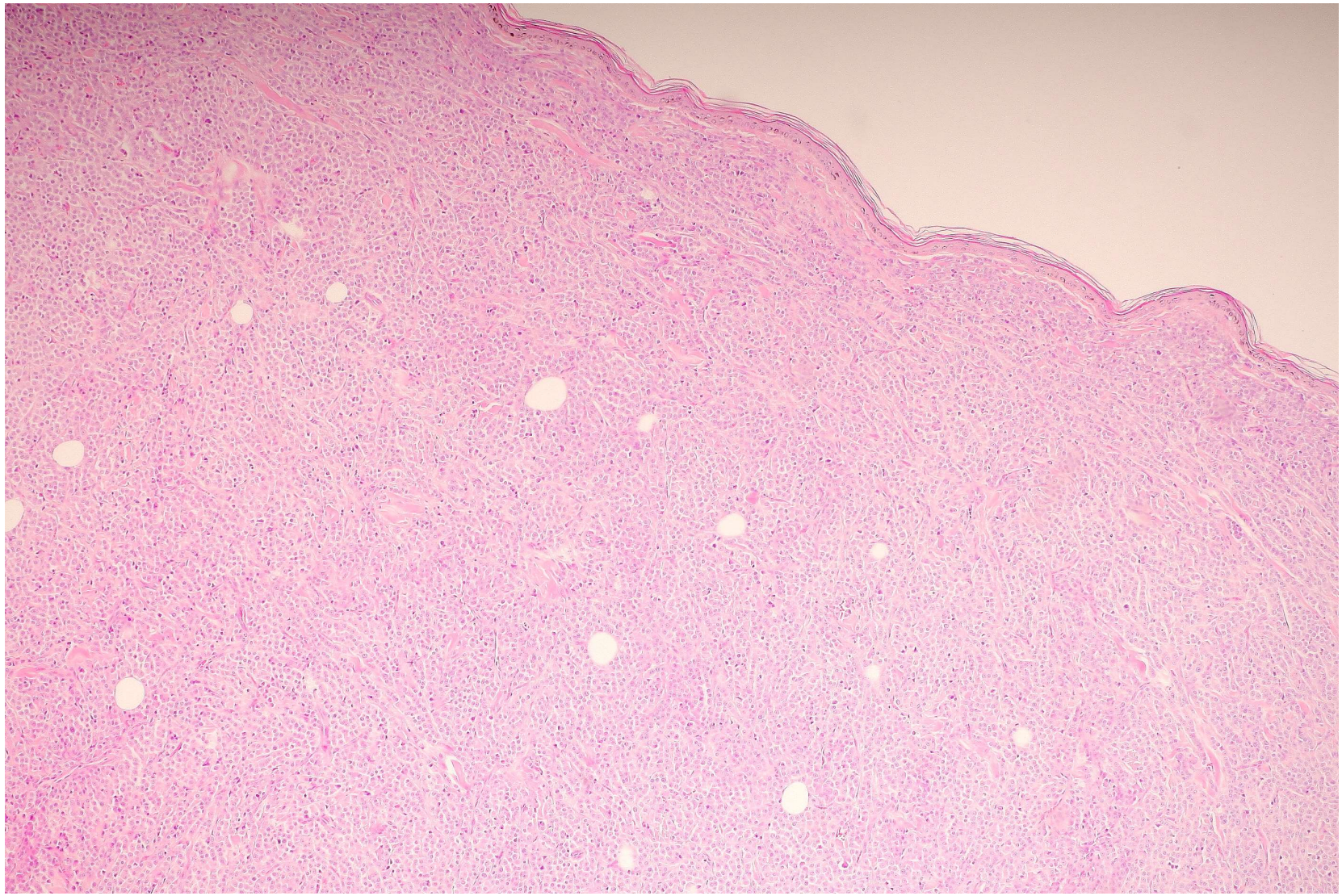
Cytologic findings

- High cellularity
  - Distribution in loose aggregates
  - Sometimes in perivascular arrangements
- Discrete round cells
  - Gray to blue cytoplasm
  - Sometimes presence of large achromatic globules
  - Round nuclei
  - Anisokaryosis and anisocytosis mild to moderate

Diagnosis

- Cytologic diagnosis
  - liposarcoma
- Histologic diagnosis
  - Round cell neoplasia
  - IHC: MUM1++
  - Extramedullary plasmocytoma



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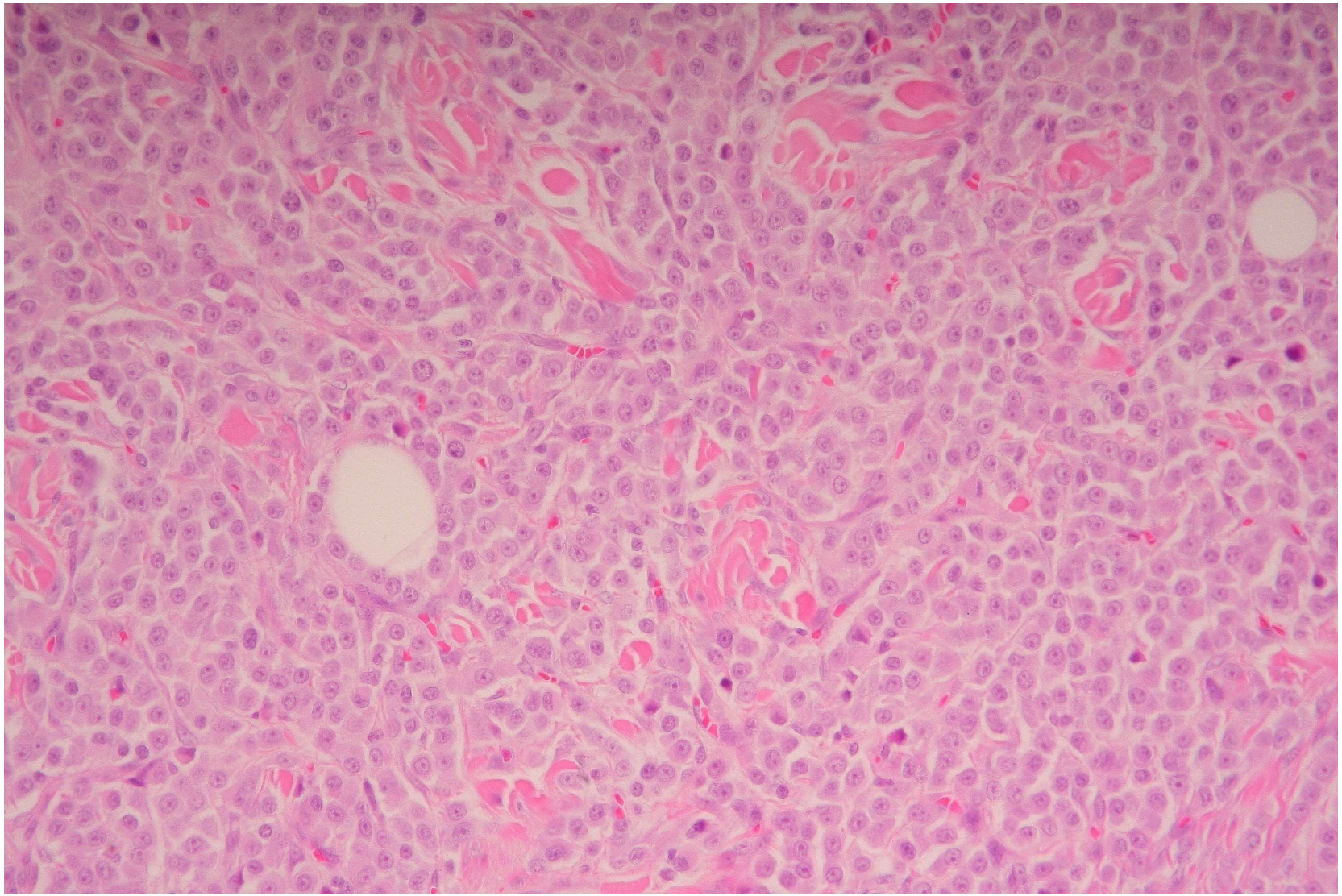

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Discussion

- Two studies propose a subclassification of canine plasmacytoma based on the variable morphologic (histologic) features
  - Hyaline type
  - Mature type
  - Cleaved type
  - Asynchronous type
  - Polymorphous-blastic type
- Features of different subtypes can be found within a particular tumor mass
- It doesn't exist in cytology a parallel subclassification
- The difference may not have clinical or prognostic significance

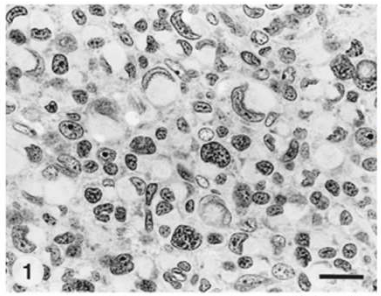


Fig. 1. Canine extramedullary plasmacytoma. Hyaline type with clearly visible sickle-shaped nucleus positioned eccentrically in the cell. Giemsa, plastic section. Bar = 20 μm.

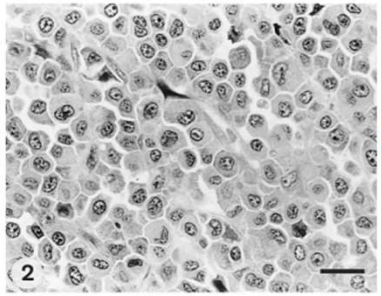


Fig. 2. cEMP. Mature type tumor cells with round to oval, eccentrically positioned nucleus, and a perinuclear halo. Giemsa, plastic section. Bar = 20 μm.

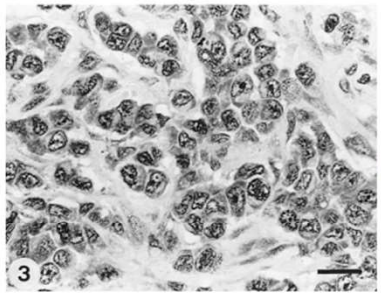


Fig. 3. cEMP. Cleaved type with anisocytosis, indented and cleaved nucleus, and an increased number of fibrous septa. Giemsa, plastic section. Bar = 20 μm.

Vet Pathol **36**:23–27 (1999)

Prognostic Value of Histopathological Grading in Canine Extramedullary Plasmacytomas

S. J. Platz, W. Breuer, S. Pfleghaar, G. Minkus, and W. Hermanns

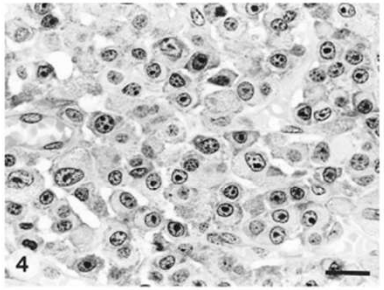


Fig. 4. cEMP. Asynchronous type tumor cells with blastic nucleus and central nucleolus, together with abundant cytoplasm. Giemsa, plastic section. Bar = 20 μm.

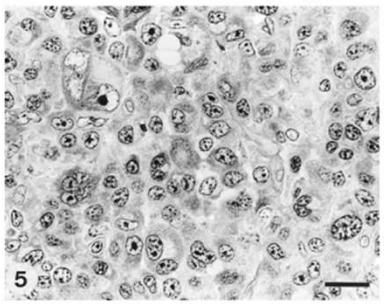
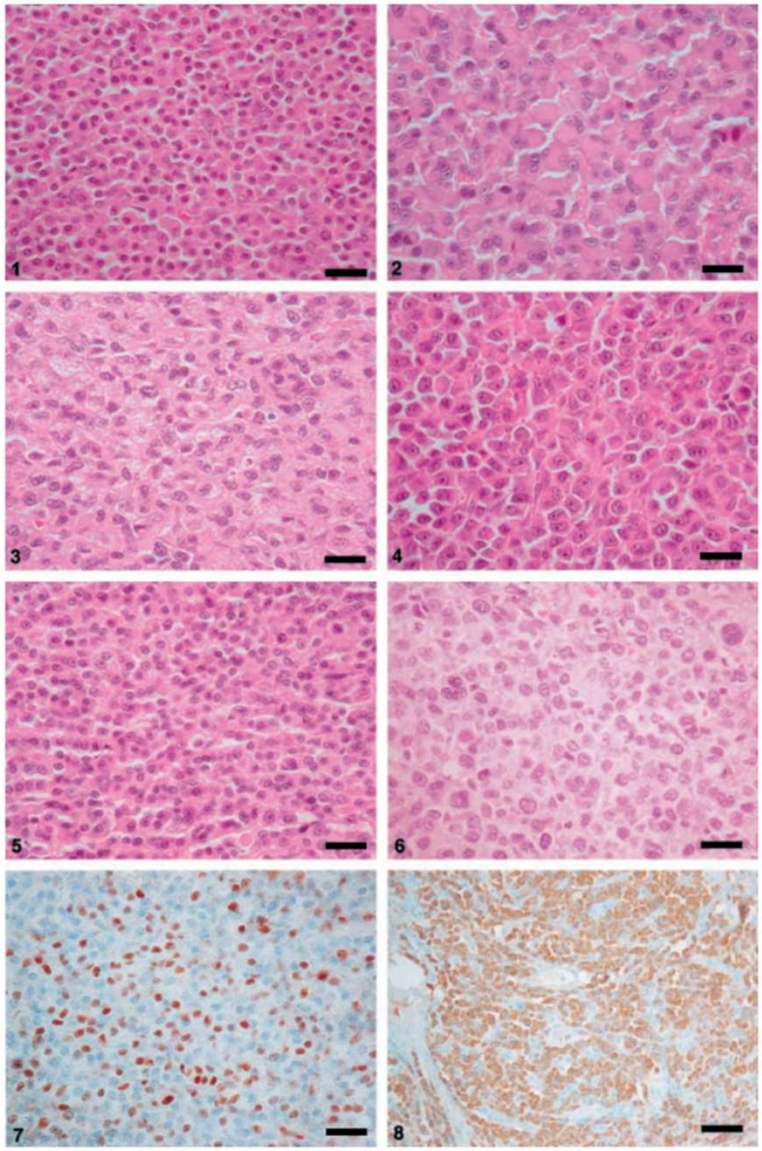


Fig. 5. cEMP. Polymorphous-blastic type tumor cells with anisocytosis, more or less blastic nuclei, and numerous mononuclear giant cells. Giemsa, plastic section. Bar = 20 μm.



J. Vet. Med. A **49**, 307–312 (2002)

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PATHOLOGY

Department of Pathology, Faculty of Veterinary Medicine, Utrecht University, Utrecht, The Netherlands

Clinico-pathological Aspects of Canine Cutaneous and Mucocutaneous Plasmacytomas

I. T. Cangul[1], M. Wijnen[1]*, E. van Garderen[1] and T. S. G. A. M. van den Ingh[1,2]

Mature type ($n = 10$, Fig. 1): Most of the tumour cells were indistinguishable from mature plasma cells. The cells were oval to round and had eccentrically located nuclei with clumped chromatin. The cytoplasm was eosinophilic and in some cells a perinuclear halo was visible. Mitotic index was very low and multinucleated giant cells were hardly observed. In one case that occurred in the ano-rectal region most of the tumour cells contained Russell bodies.

Hyalin type ($n = 1$, Fig. 2): The most prominent feature of this cell type was the large quantity of lightly eosinophilic staining cytoplasm and the eccentrically located crescent shaped nuclei. Nucleoli were centrally located in a number of tumour cells. A perinuclear halo was visible in some cells. The mitotic index was low and multinucleated giant cells were seldom seen.

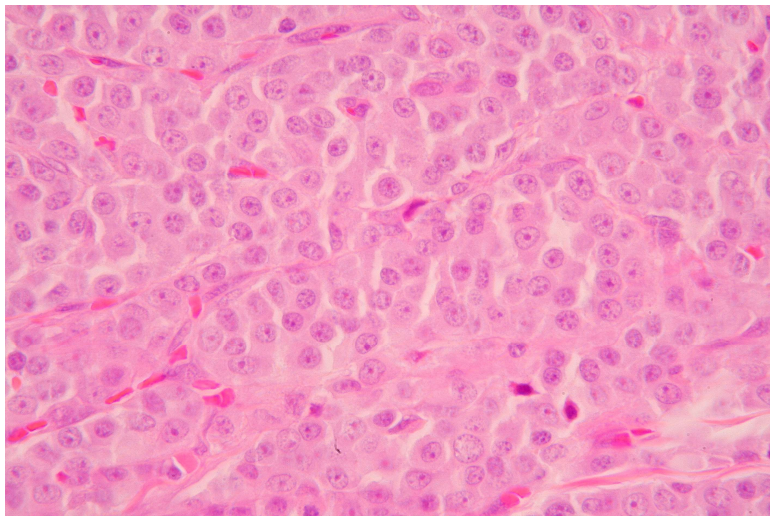
Cleaved type ($n = 19$, Fig. 3): This type was characterized by cleaved or convoluted nuclei and pale cytoplasm with indistinct cell borders. The nucleoli were hard to observe and the chromatin was finely granulated. The number of mitoses and multinucleated giant cells was low to moderate. The amount of collagenous septa within the tumour varied from moderate to marked.

Asynchronous type ($n = 11$, Fig. 4): The most prominent feature was the nuclear-cytoplasmic asynchrony in tumour cells. Most of the cells had large eccentric nuclei with prominent nucleoli and abundant basophilic cytoplasm with a prominent perinuclear halo. The number of mitosis was very low and multinucleated giant cells were hardly seen.

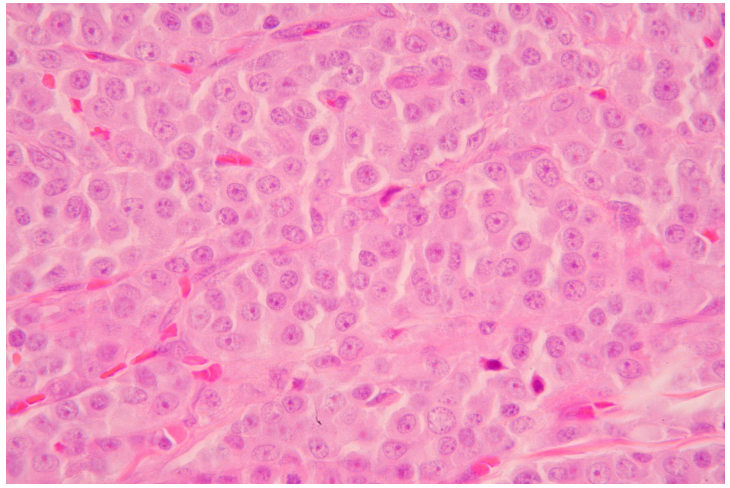
Monomorphous blastic type ($n = 21$, Fig. 5): This was the most commonly occurring type of (muco)cutaneous plasmacytoma in the present series. Tumours were characterized by monotonous, solid infiltrations of similar-sized round to oval cells with large, euchromatic nuclei and centrally located, small, but prominent nucleoli. The number of mitosis was low and multinucleated giant cells were seldom seen.

Polymorphous blastic type ($n = 2$, Fig. 6): The most characteristic feature of this type was the cellular pleomorphism. Large, round to ovoid shaped blastic cells were admixed with mature or cleaved type cells. Nucleoli, mostly prominent and centrally located, were present in some cells. The mitotic index was very high in both cases and multinucleated giant cells were seen in all areas in high numbers.

	Hyaline	Mature	Cleaved	Asynchronous	Polymorphus
cytoplasm	Transparent Sometimes presence of halo	Vacuoles and fine granules; perinuclear halo	Perinuclear halo/pale cytoplasma	Vacuoles and perinuclear halo; asynchrony	Vacuolar, perinuclear halo not detectable
nucleus	Sickle shaped;	Round to oval; cartweehl appearance	Cleaved nucleus; anisocytosis	Blastic appearance; central nucleolus	Nucleoli; marked anisocytosis
Location of nucleus	Very eccentric	eccentric	n.d.	n.d.	eccentric
Multinuclei	Sometimes binucleated cells	Generally binucleated	Up to four nuclei	n.d.	Up to nine polymorphous nuclei
Giant cells	None/rare	None	Low to moderate	Rare/high number	High number



	Hyaline	Mature	Cleaved	Monomorphous	Asynchronous	Polymorphus
Cytoplasm	Transparent Sometimes presence of halo	Vacuoles and fine granules; perinuclear halo	Perinuclear halo/pale cytoplasma	n.n.	Vacuoles and perinuclear halo; asynchrony	Vacuolar, perinuclear halo not detectable
Nucleus	Sickle shaped;	Round to oval; cartweehl appearance	Cleaved nucleus; anisocytosis	Large, euchromatic nucleus, single nucleolus	Blastic appearance; central nucleolus	Nucleoli; marked anisocytosis
Location of nucleus	Very eccentric	eccentric	n.d.	Centrally located	n.d.	eccentric
Multinuclei	Sometimes binucleated cells	Generally binucleated	Up to four nuclei	None	n.d.	Up to nine polymorphous nuclei
Giant cells	None/rare	None	Low to moderate	Very rare	Rare/high number	High number



Discussion

- On the basis of the criteria described by Cangul et al., this plasma cell tumor should be histologically (cytologically??) classified as **monomorphous type**.
- According with both authors (Cangul, 2002; Platz, 1999), no correlations seem to exist between cell type, location and prognosis
- The only problem is to do, by cytologic examination, the correct diagnosis of plasmacytoma

Case #9

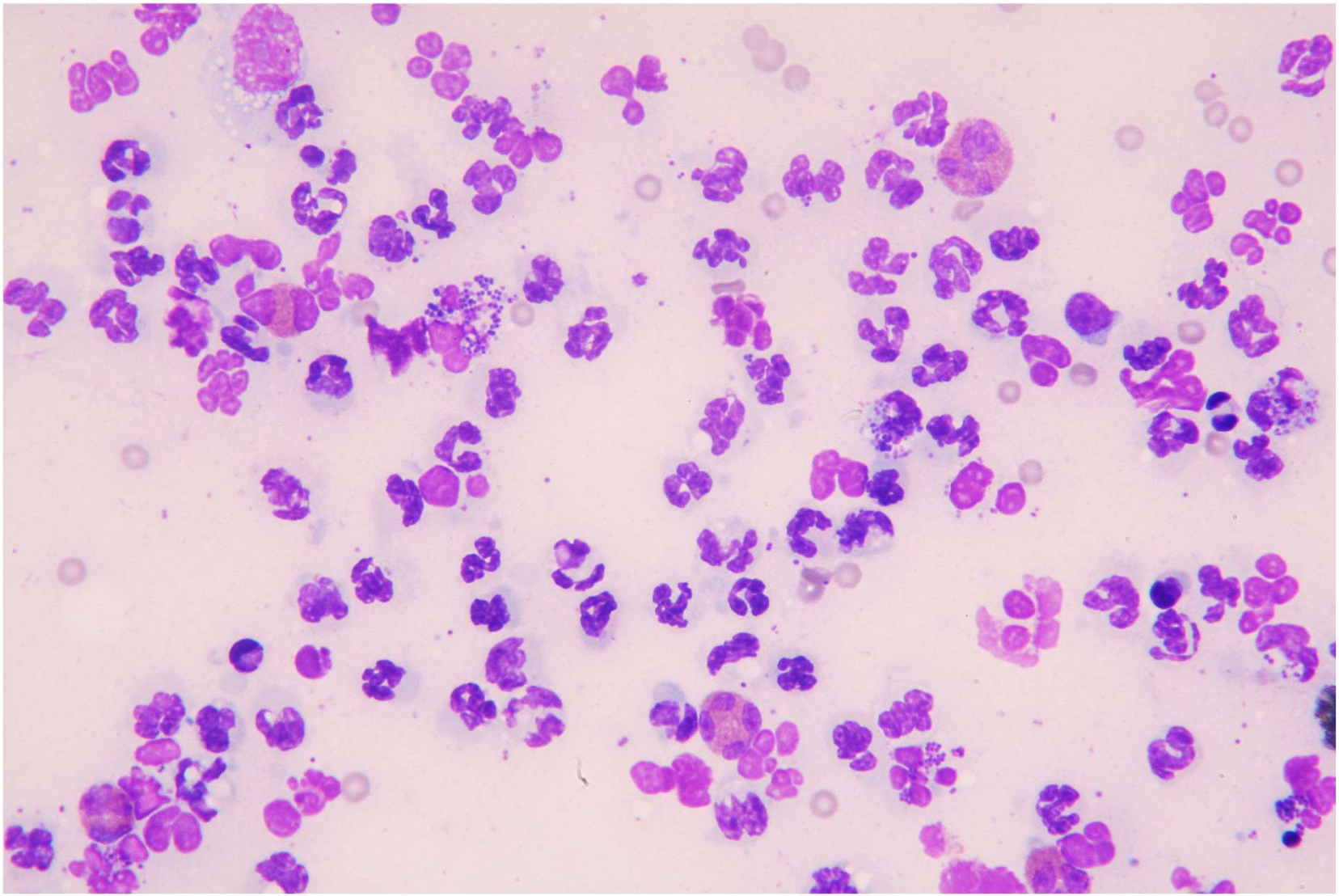
- Cat, DSH, 3-year-old, male
- External life in wild country
-
- Synovial fluid from left knee

- Flushing
- MGG stain

Case #9

- Cat, DSH, 3-year-old, male
-
- Synovial fluid from left knee

- Flushing
- MGG stain



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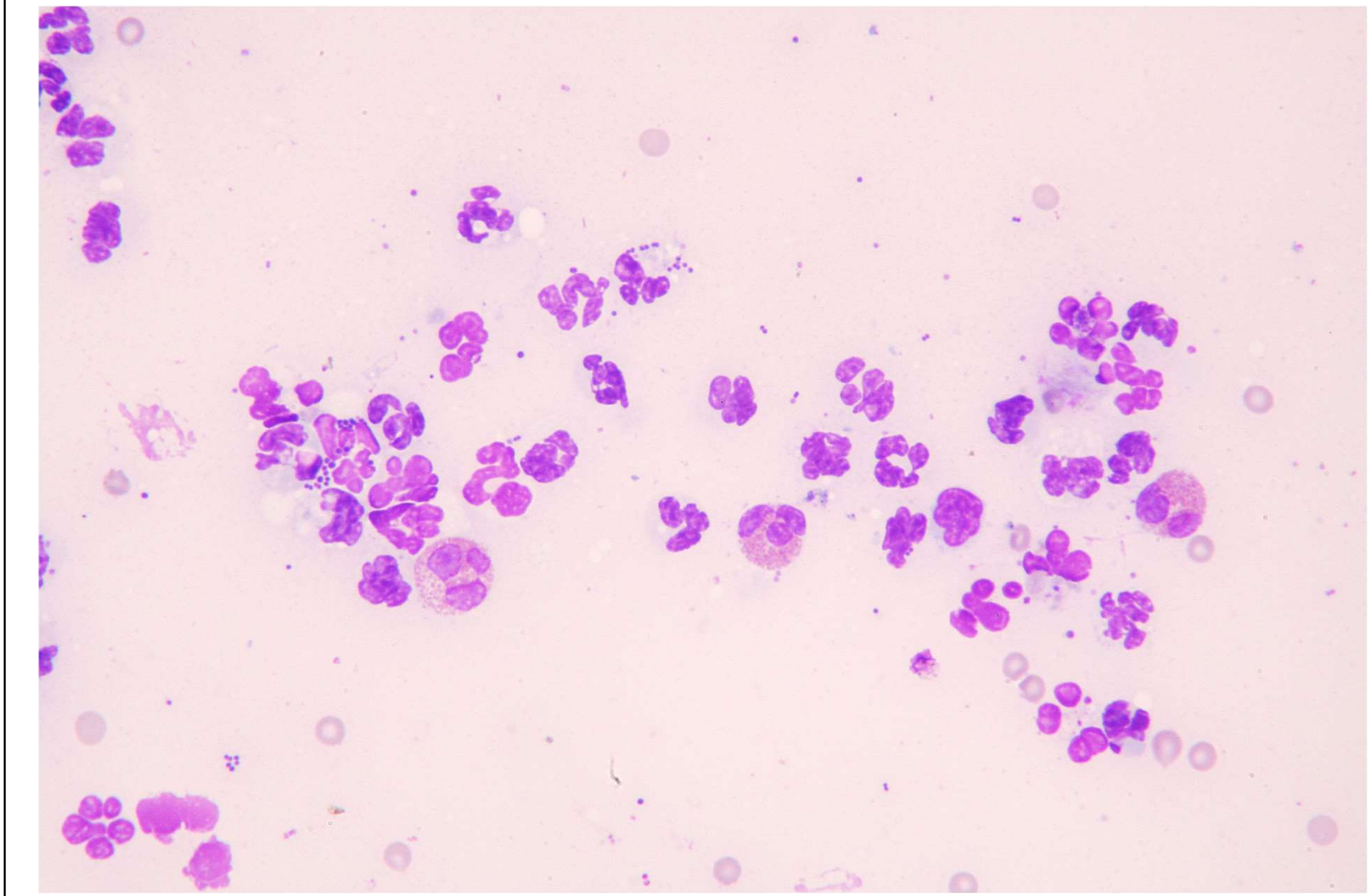

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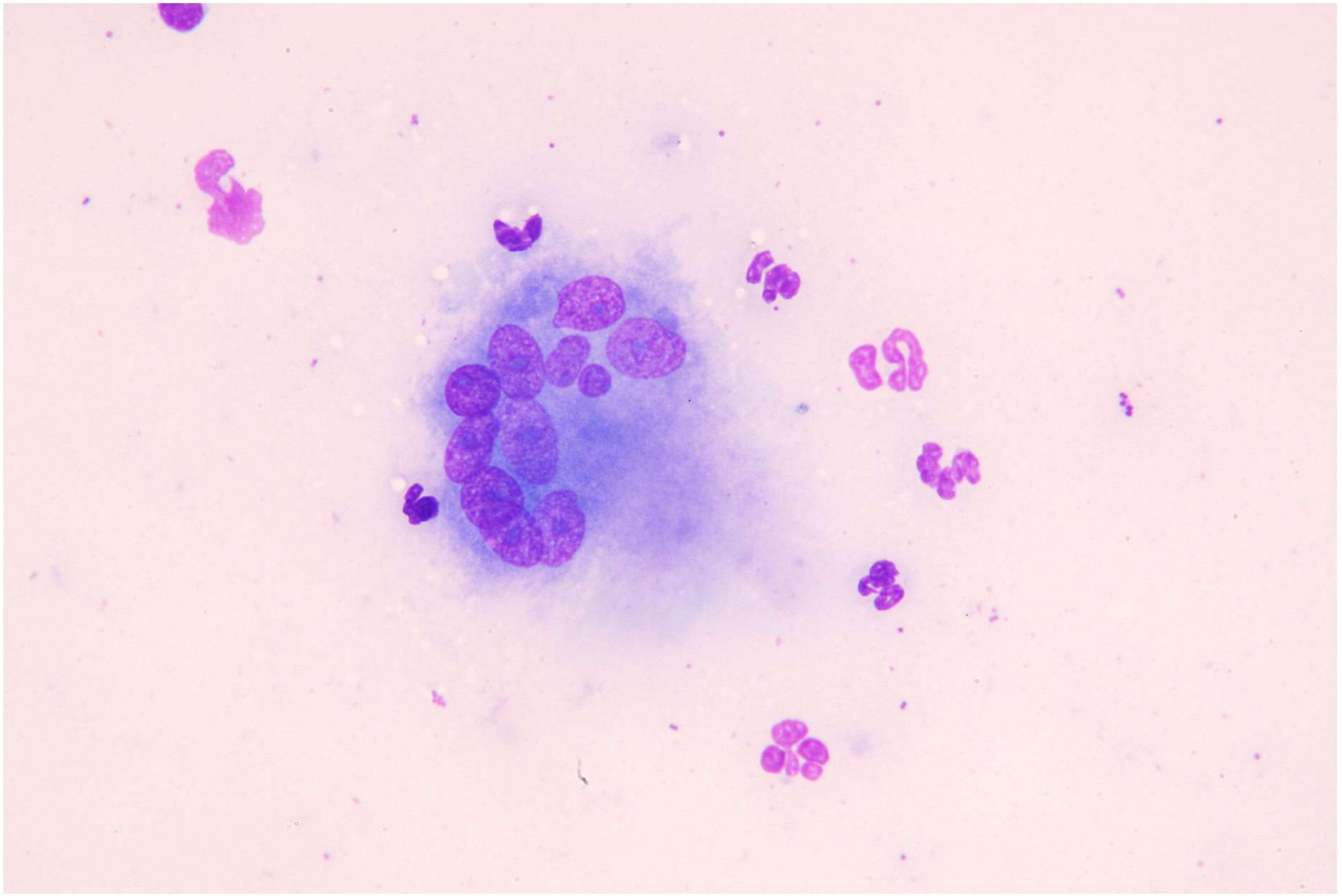

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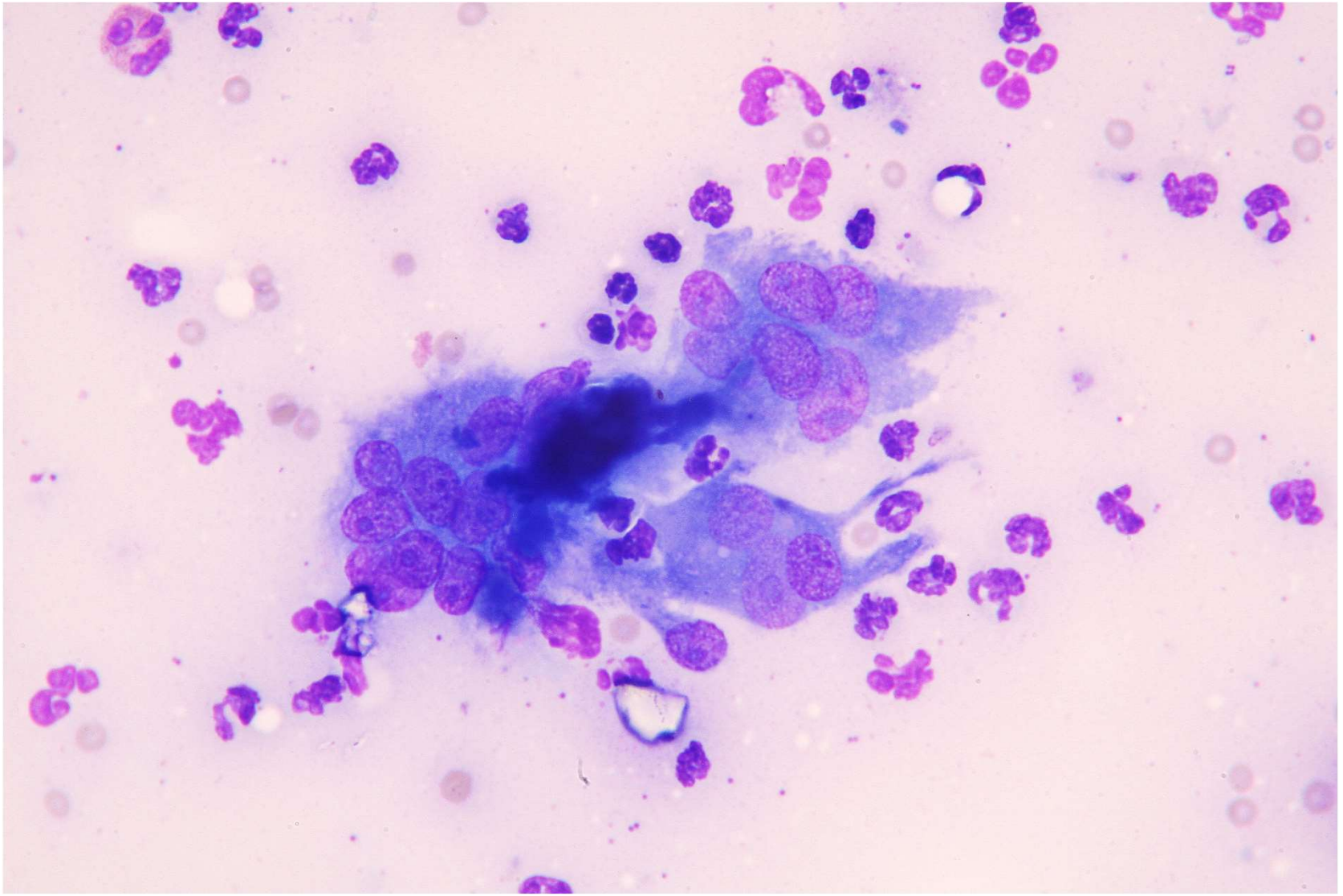

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Cytologic findings

- Suppurative inflammation
- High number of coccoid bacteria
  - Phagocytosis of bacteria
- Rare non-neutrophilic inflammatory cells
- Rare multinucleated giant cells

Diagnosis

- Cytologic diagnosis
  - Septic suppurative arthrosynovitis

Discussion

- Compared with immune-mediated diseases, infectious causes of arthropathy are uncommon in dogs but may be somewhat more common in cats
- Causes:
  - **Bacterial Infections:**
    - **Penetrating wounds:** Cat bites or puncture wounds are a common route for bacteria to enter the joint.
    - **Surgical procedures:** Infection can occur during or after joint surgery.
    - **Hematogenous spread:** Bacteria can travel through the bloodstream from other infected sites in the body.
    - **Common bacteria:** Pasteurella species, coliform bacteria, and staphylococci are frequently implicated in feline septic arthritis.

Discussion

- Other infectious causes:
  - **Fungal Infections:**
    - Fungi can also cause septic arthritis in cats, though less commonly than bacteria.
  - **Viral Infections:**
    - While less common, some viruses like feline calicivirus can lead to joint inflammation and lameness.
  - **Rickettsia and Spirochetes:**
    - These microorganisms can also cause septic arthritis, though they are less frequent.

Discussion

- Risk Factors:
  - **Trauma:**
    - Any injury to a joint, including fractures or dislocations, increases the risk of infection.
  - **Osteoarthritis:**
    - Existing joint disease can make the joint more vulnerable to infection.
  - **Immunosuppressive conditions:**
    - Drugs that suppress the immune system can increase the risk of infection.
    - Cats with weakened immune systems are more susceptible to developing septic arthritis.
  - **Obesity:**
    - Obesity can contribute to joint problems and increase the risk of secondary infection.

Discussion

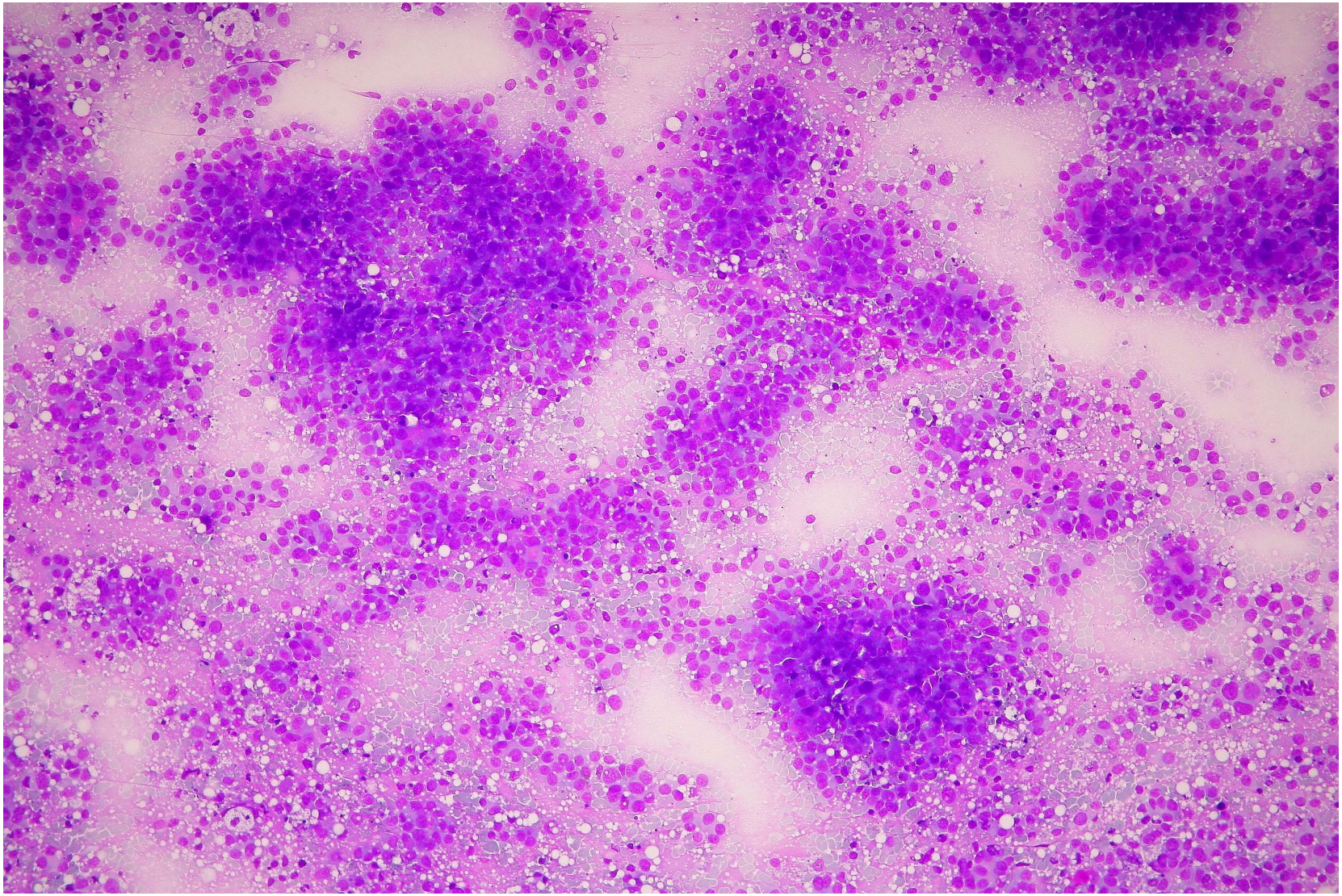
- Therapy:
  - Clindamycin: 11 g/kg s.i.d. x 10 days
    - Great improvement, but relapse after a few days
  - Repetition of the same therapy
    - After the repetition the cat recovered completely
    - Actually, he is going well

Case #10

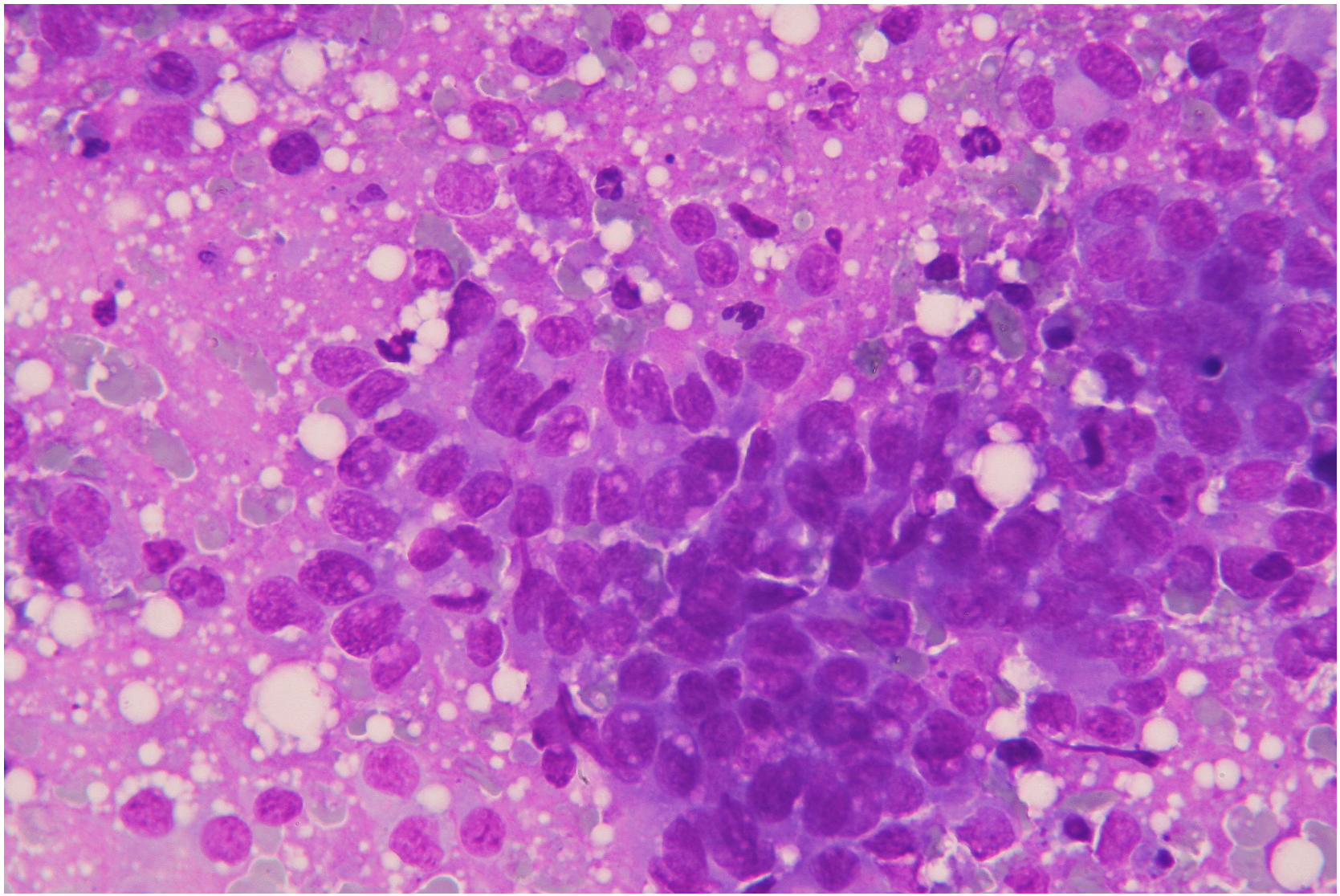
- Dog, Setter, 12-year-old, female
-
- Renal mass (a)
- Multiple mass in the lungs (b)

- FNCS of kidney and lung
- MGG stain

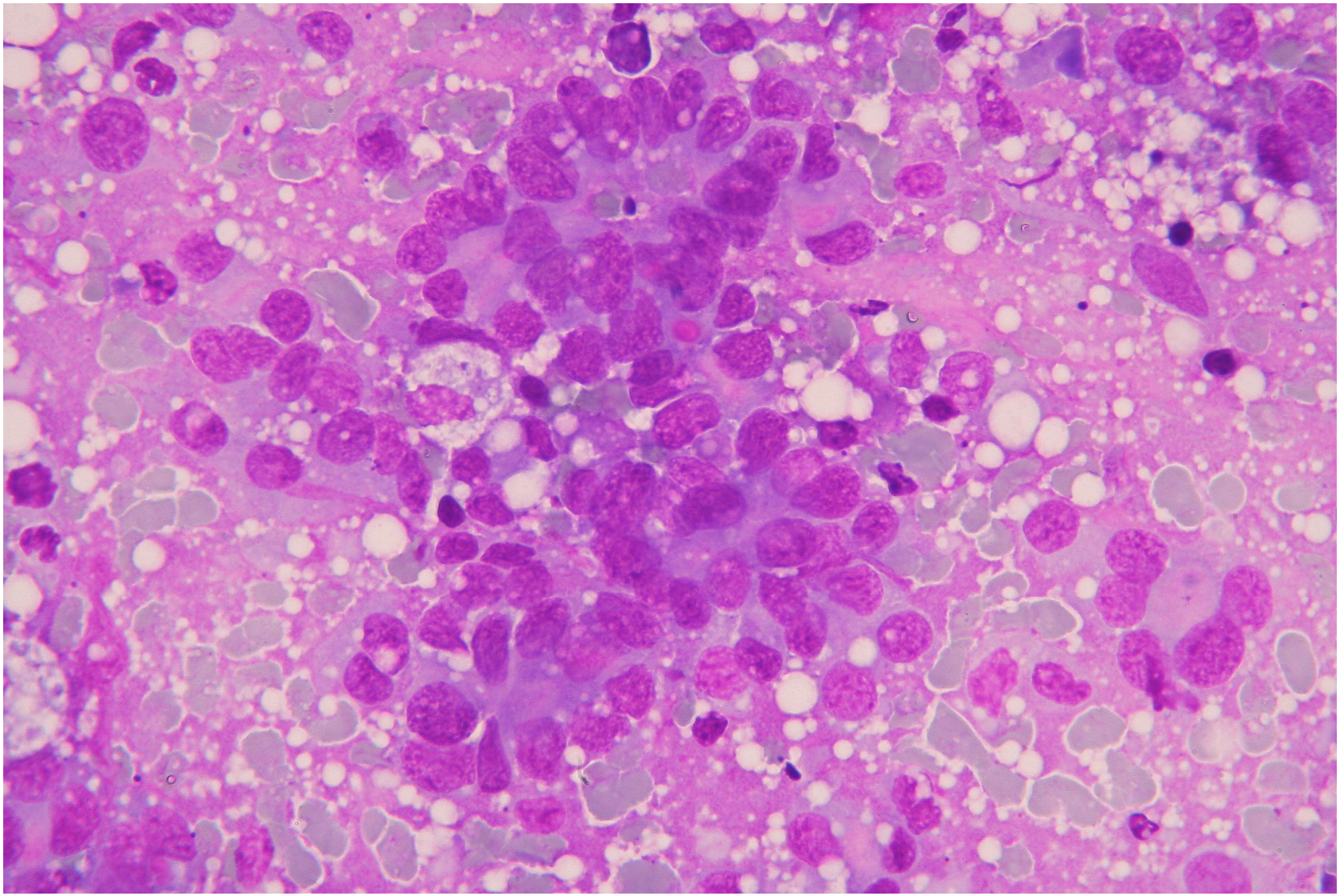
Renal mass



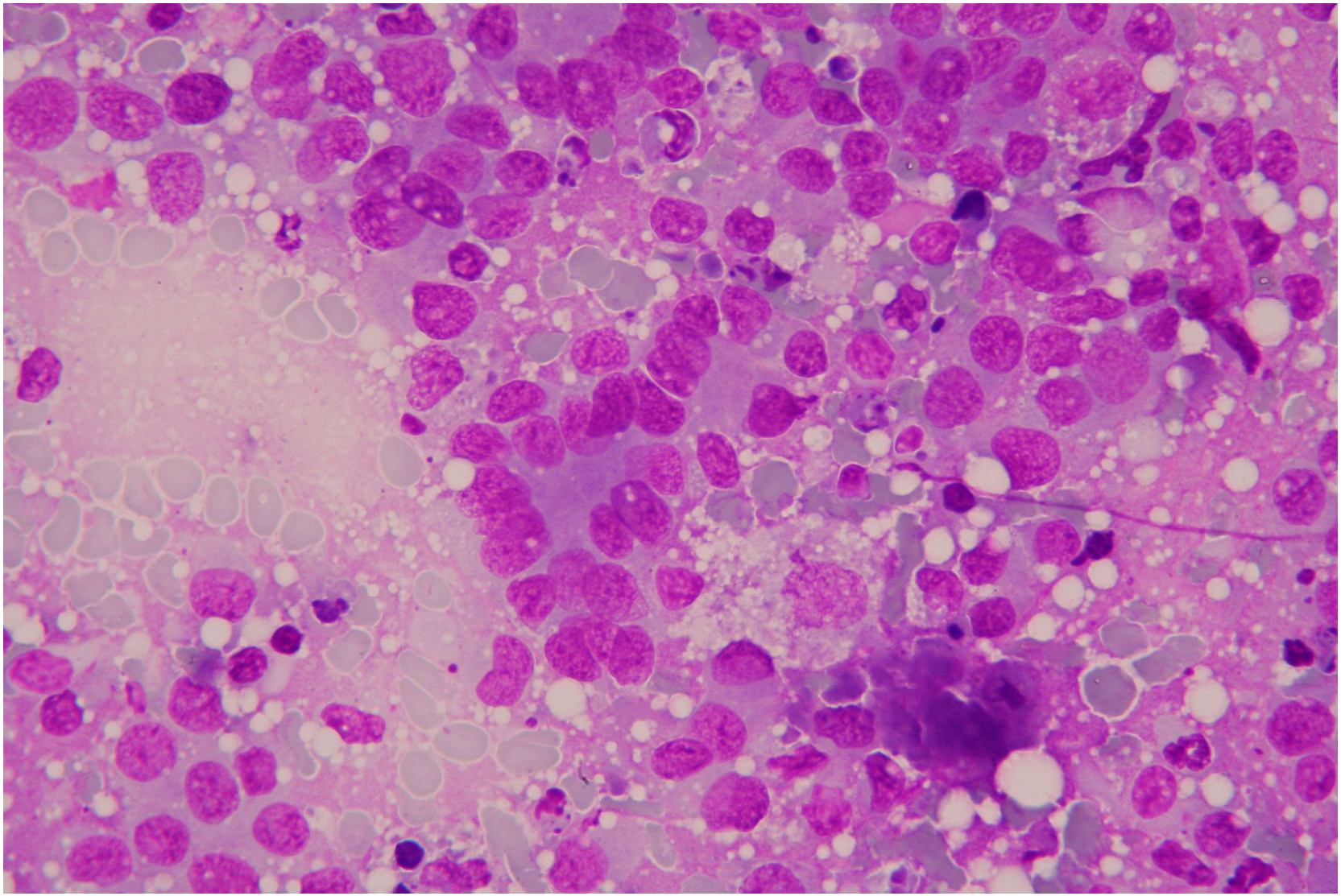
Renal mass



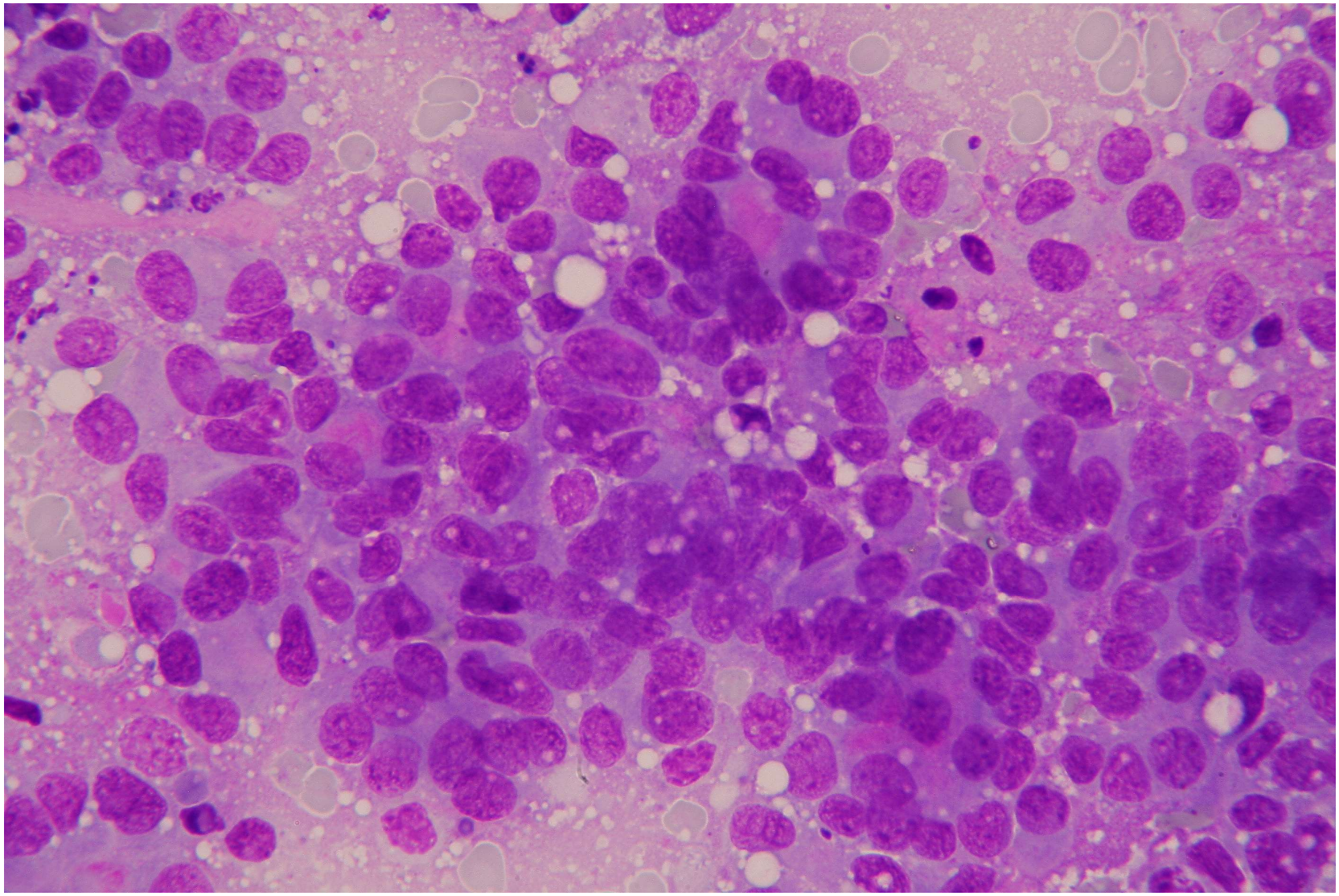
Renal mass



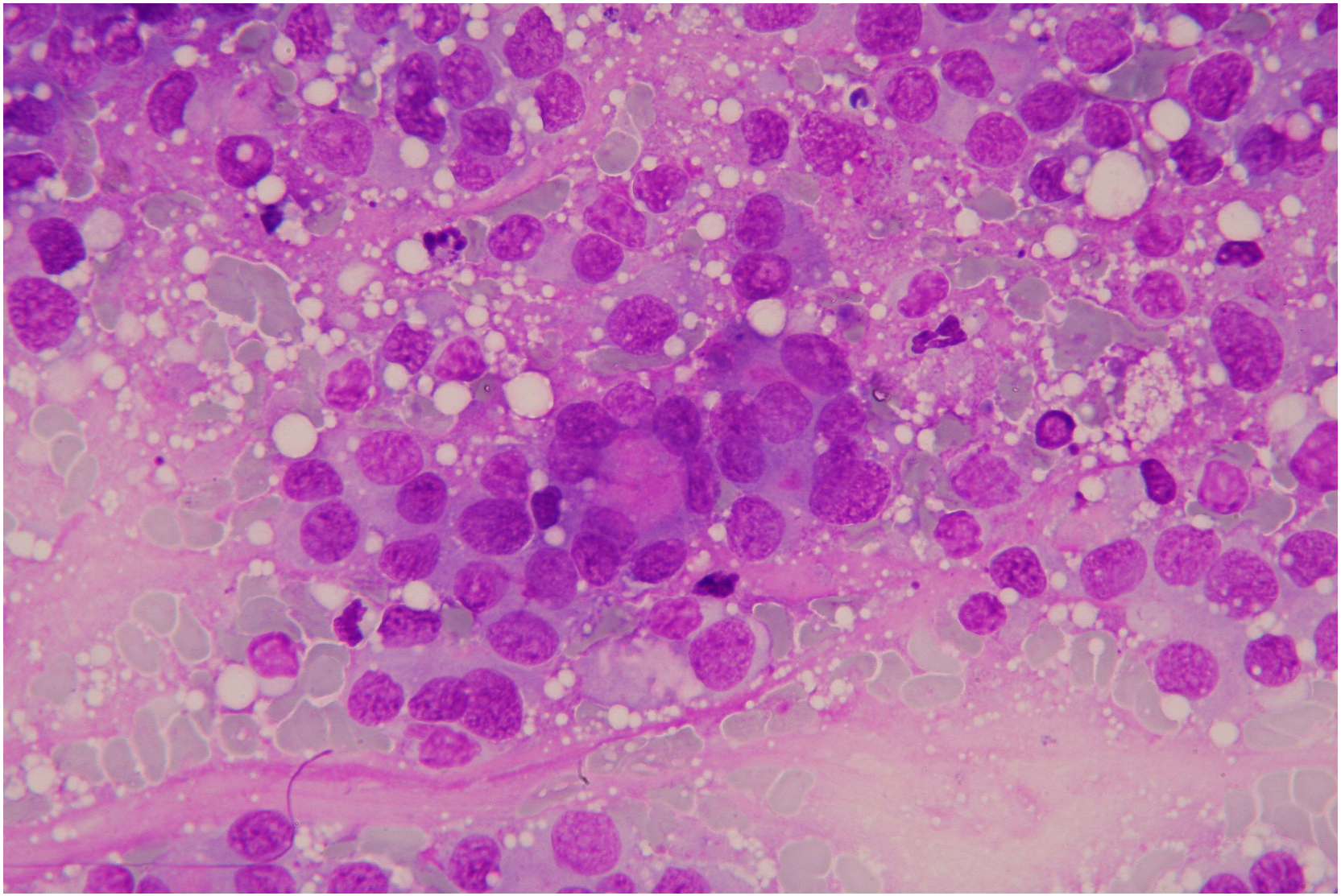
Renal mass



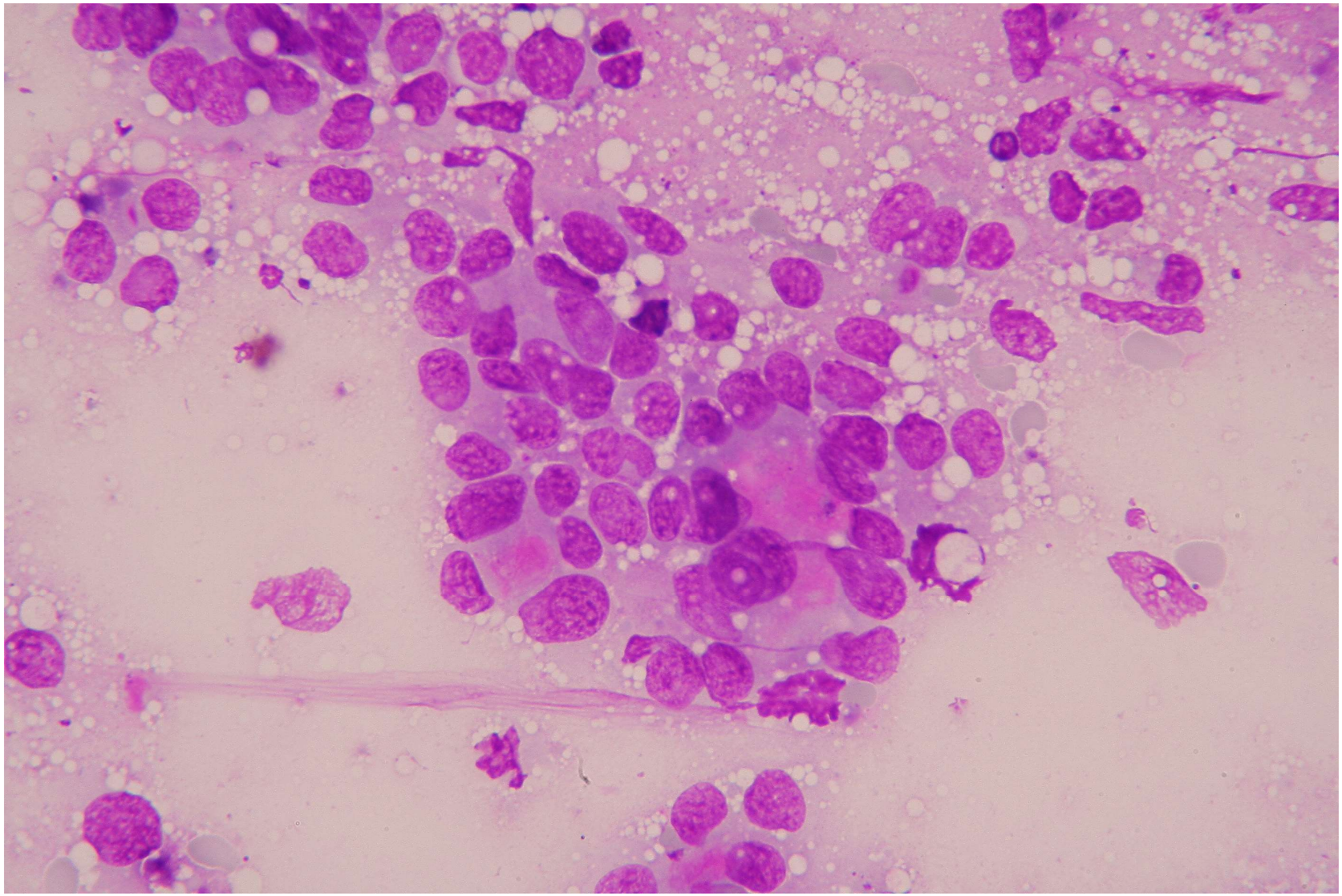
Renal mass



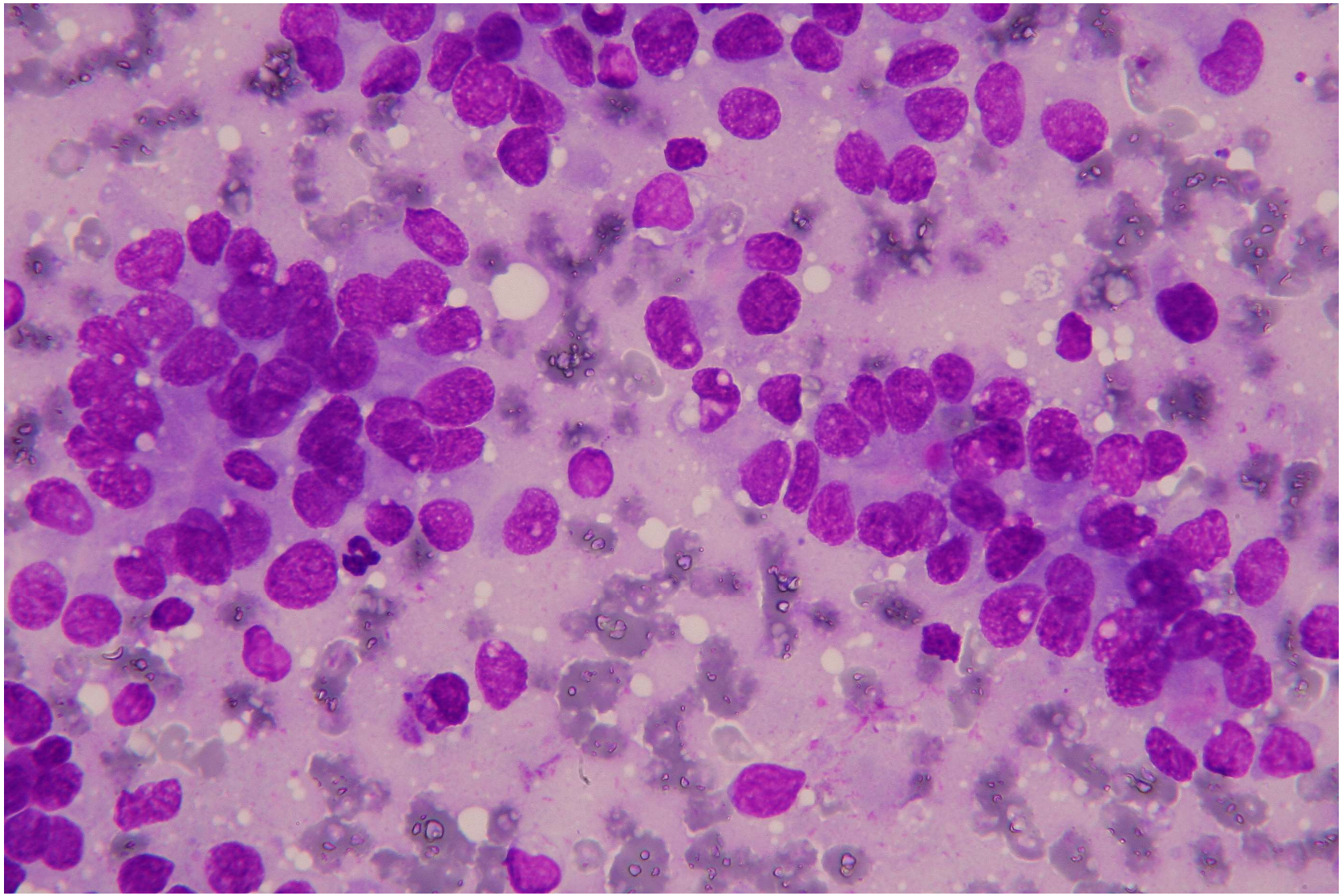
Renal mass



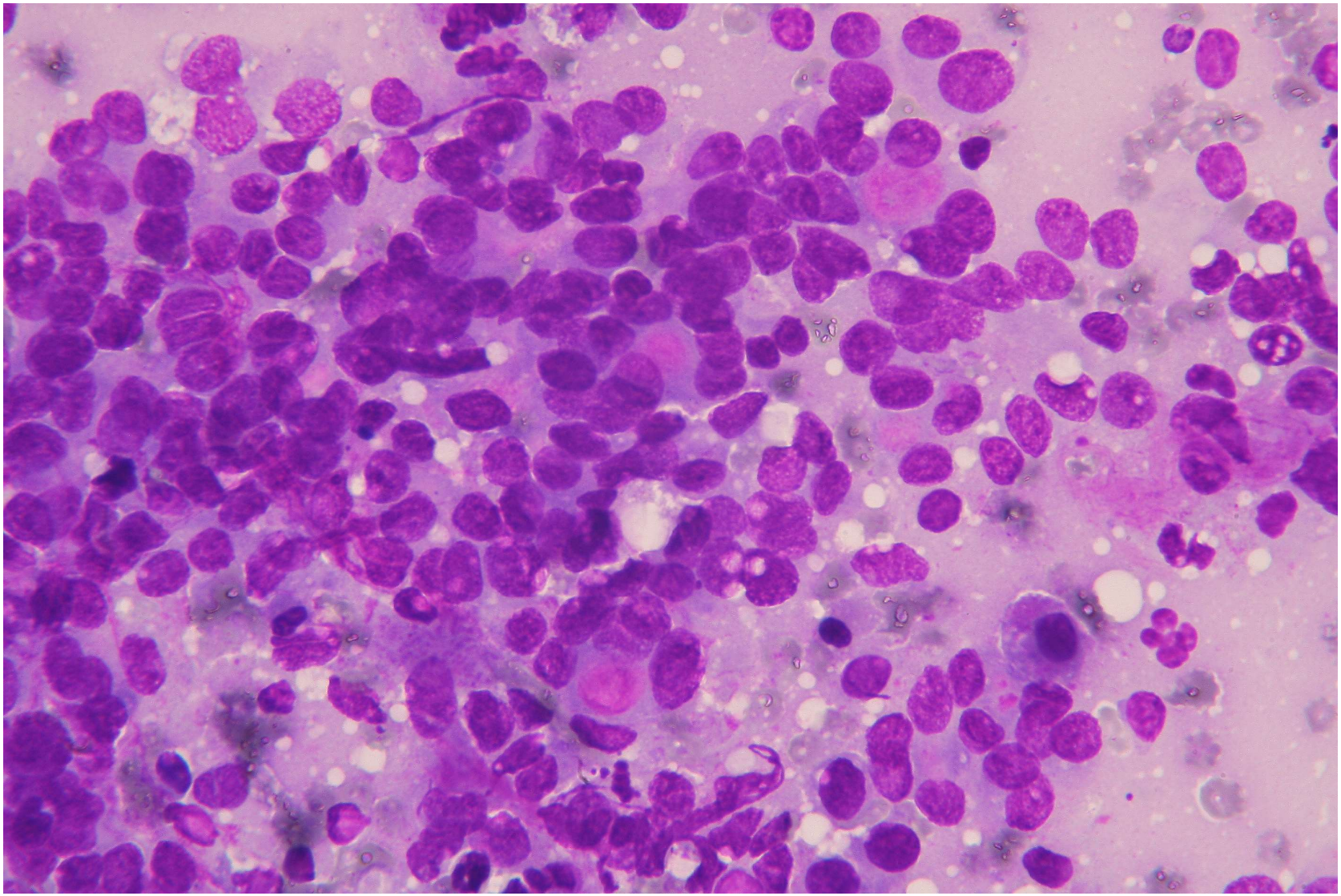
Renal mass



Pulmonary mass



Pulmonary mass

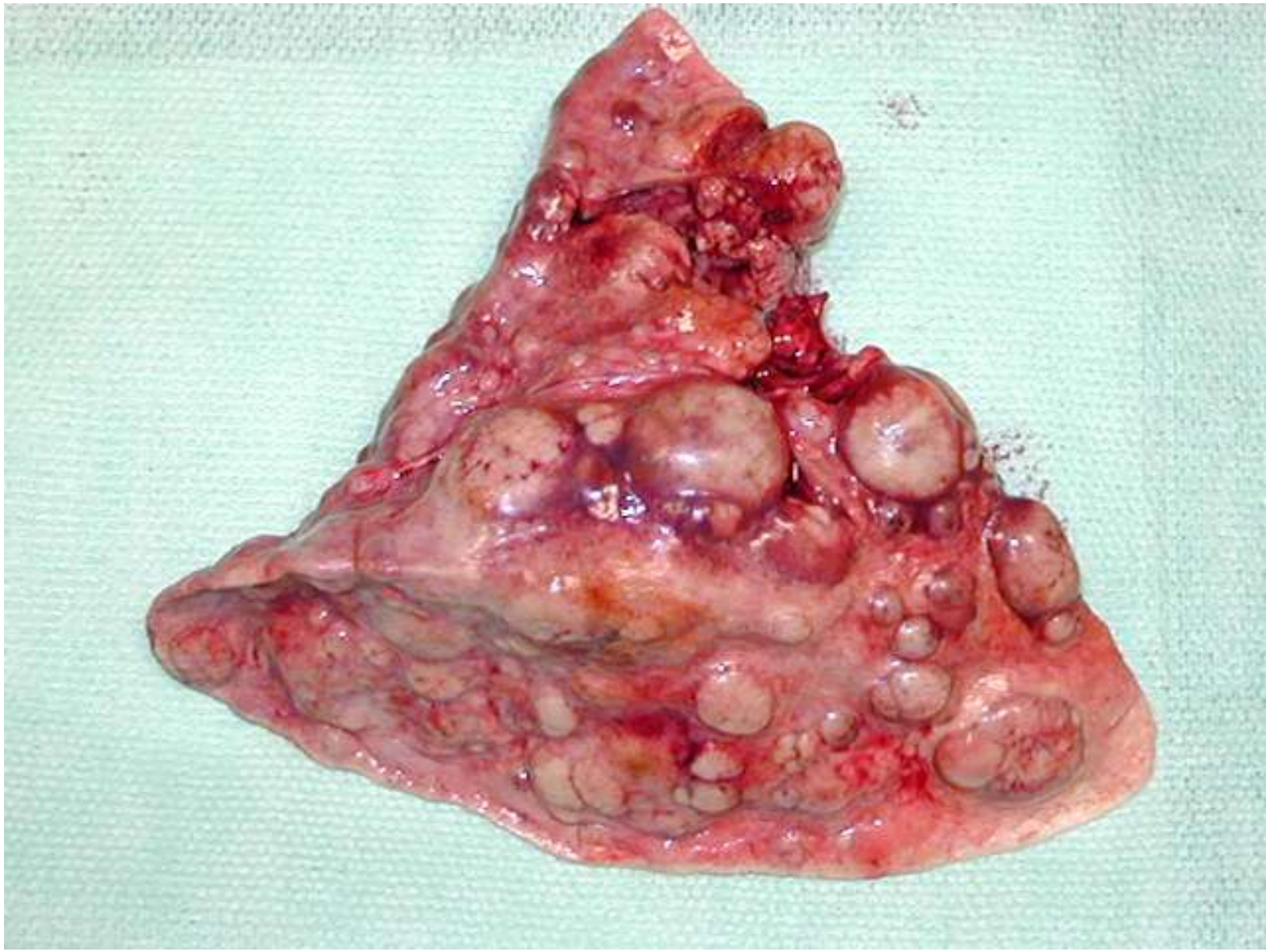


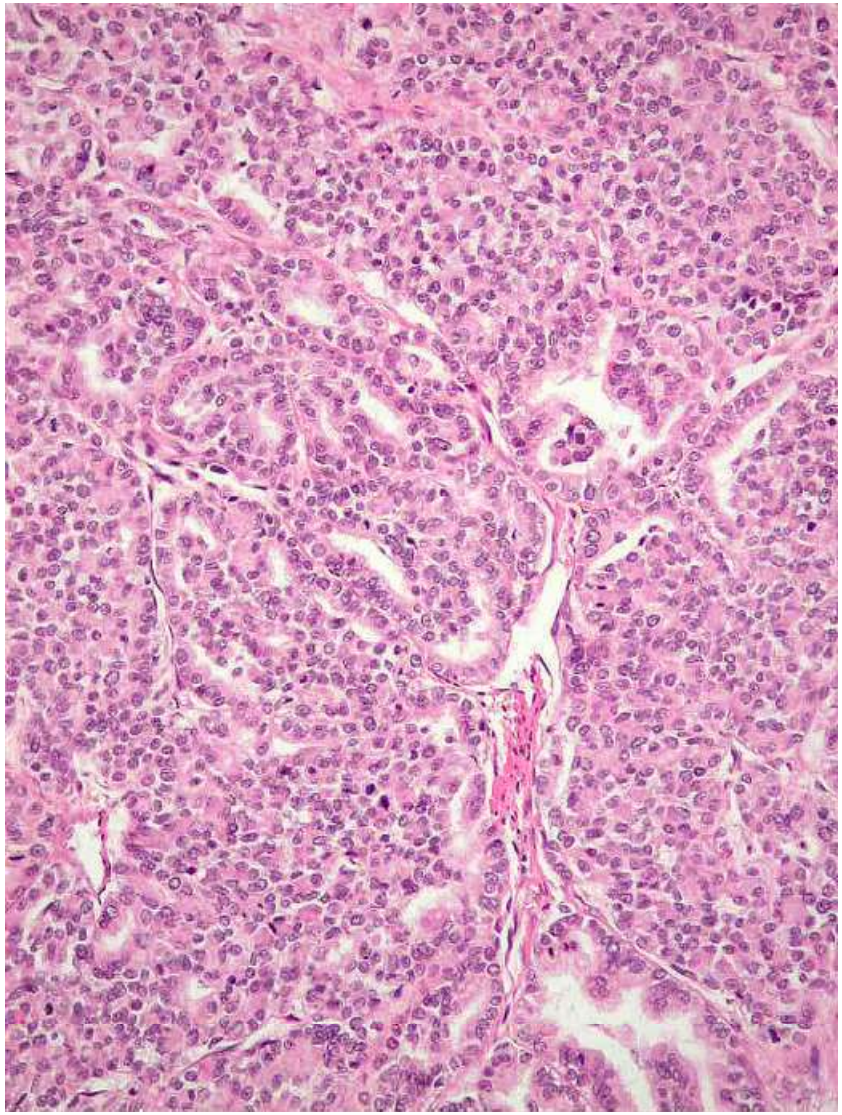
Cytologic findings

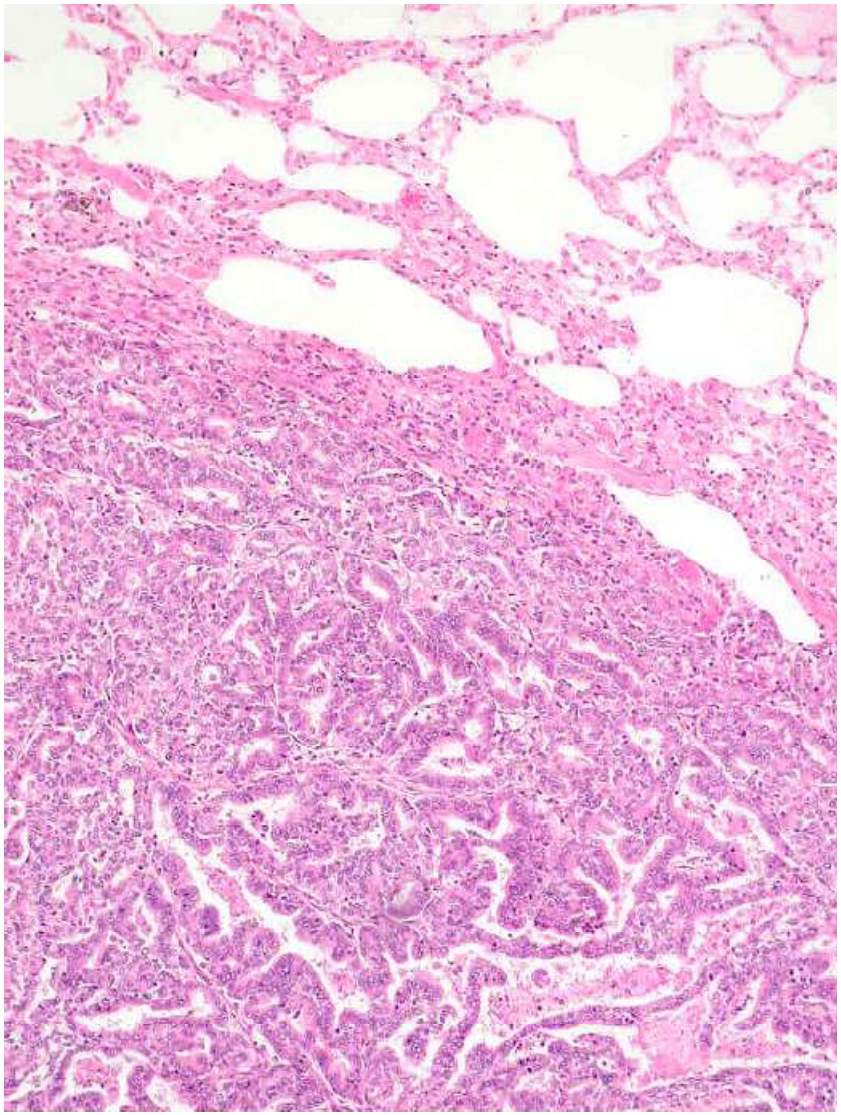
- Large aggregates of epithelial cells
  - Indistinct cell borders
  - Frequent presence of cytoplasmic globules
  - Round to ovoid nuclei
    - Irregularly clumped chromatin
    - Anisocytosis and anisokaryosis severe
  - Dischoesive clusters
  - Frequent distribution in microacinar or tubular arrangements
- Same features are present in both samples from renal and lung lesions

Diagnosis

- Cytologic diagnosis
  - Renal carcinoma, morphologically consistent with tubular type, clear cells
- Histological diagnosis
  - Renal carcinoma, tubular type, clear cells







Discussion

- Renal tumors in dogs:
  - Epithelial tumor: 70%
    - The cells of origin are proximal or distal convoluted tubular epithelium of the collecting ducts
  - Mesenchymal tumors: 25%
  - Nephroblastoma: 5%
- Secundary tumor (metastatic)

Discussion

- Renal epithelial carcinoma in dogs is subdivided into histological and cytological types:
  - Histologic subdivision:
    - Solid (34%)
    - Tubular (24%)
    - Papillary (21%)
    - Cystic (multilocular cystic - 4%)
  - Cytologic subdivision:
    - Chromophobic
    - Eosinophilic
    - Clear cells
    - Mixture of the three

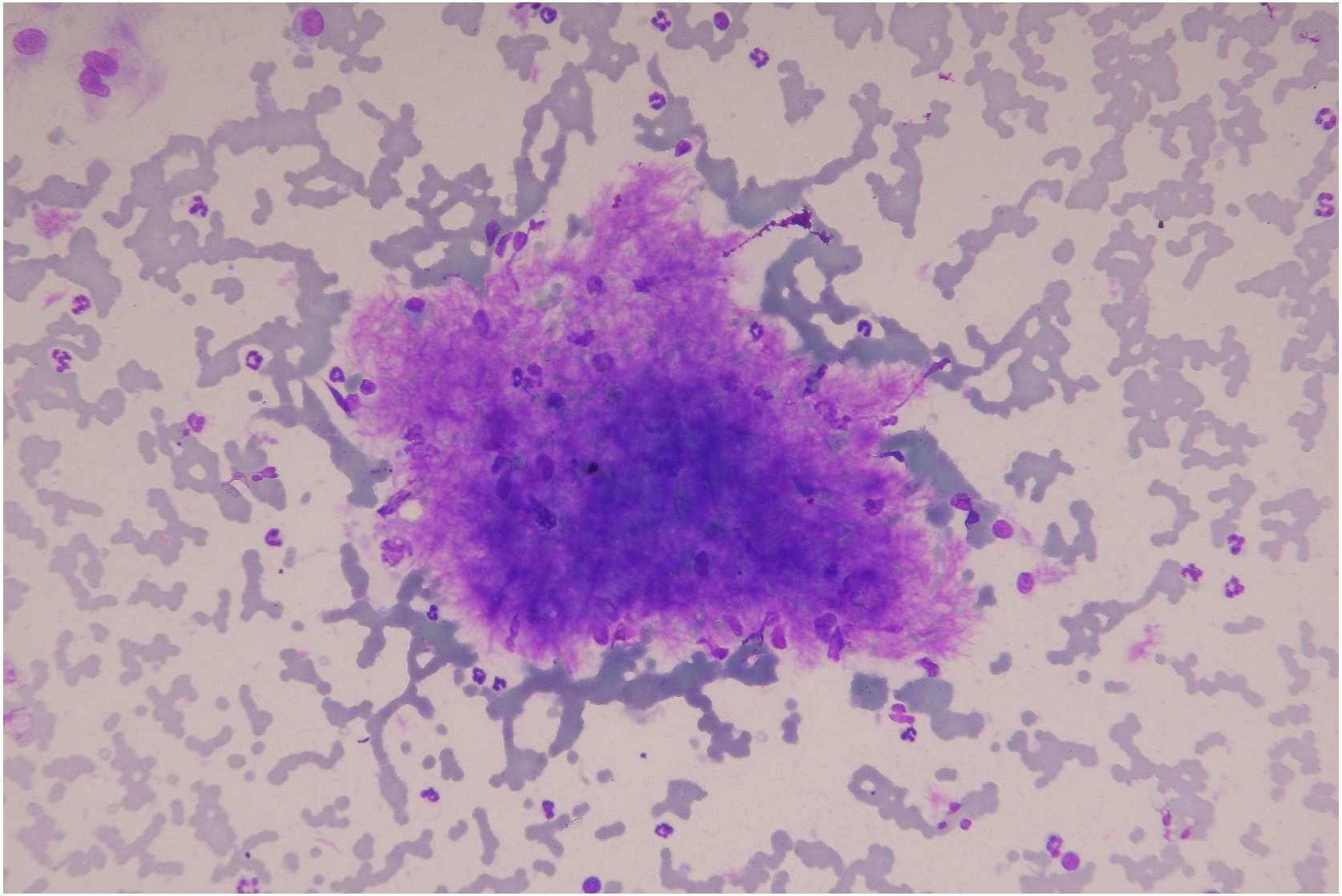
Discussion

- Clear cells carcinoma had:
  - decreased MST (median survival time)
  - Increased risk of death
  - 50% metastatis rate

Case #11 – bonus track!!

- Cat, DSH, 1-year-old, neutered male
-
- Rescued stray cat, in shelter
- Dehydrated and anorexic
- 1 week diarroea
- FIV-FeLV negative
- Enlargement of the spleen

- FNCS of the spleen
- MGG stain



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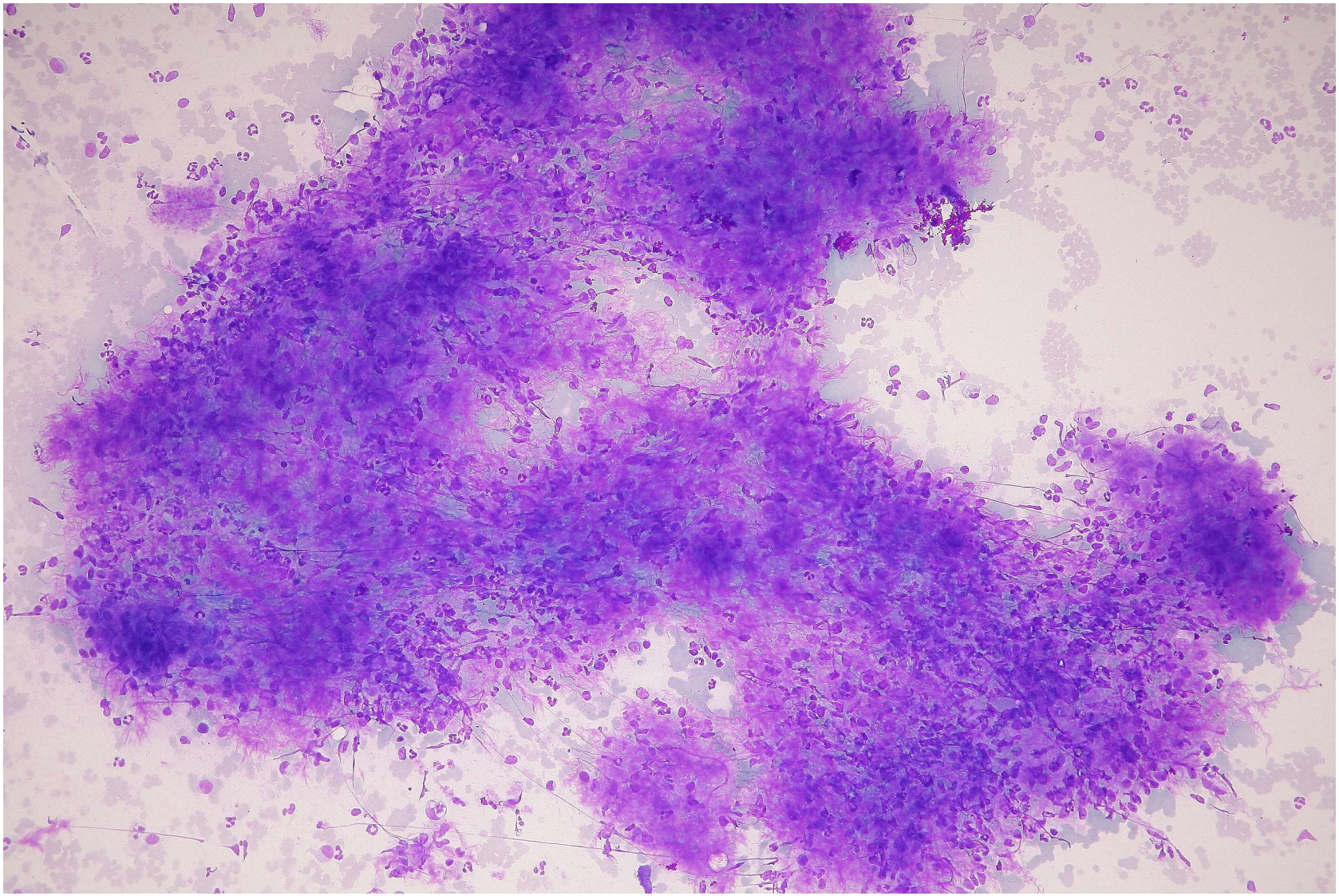

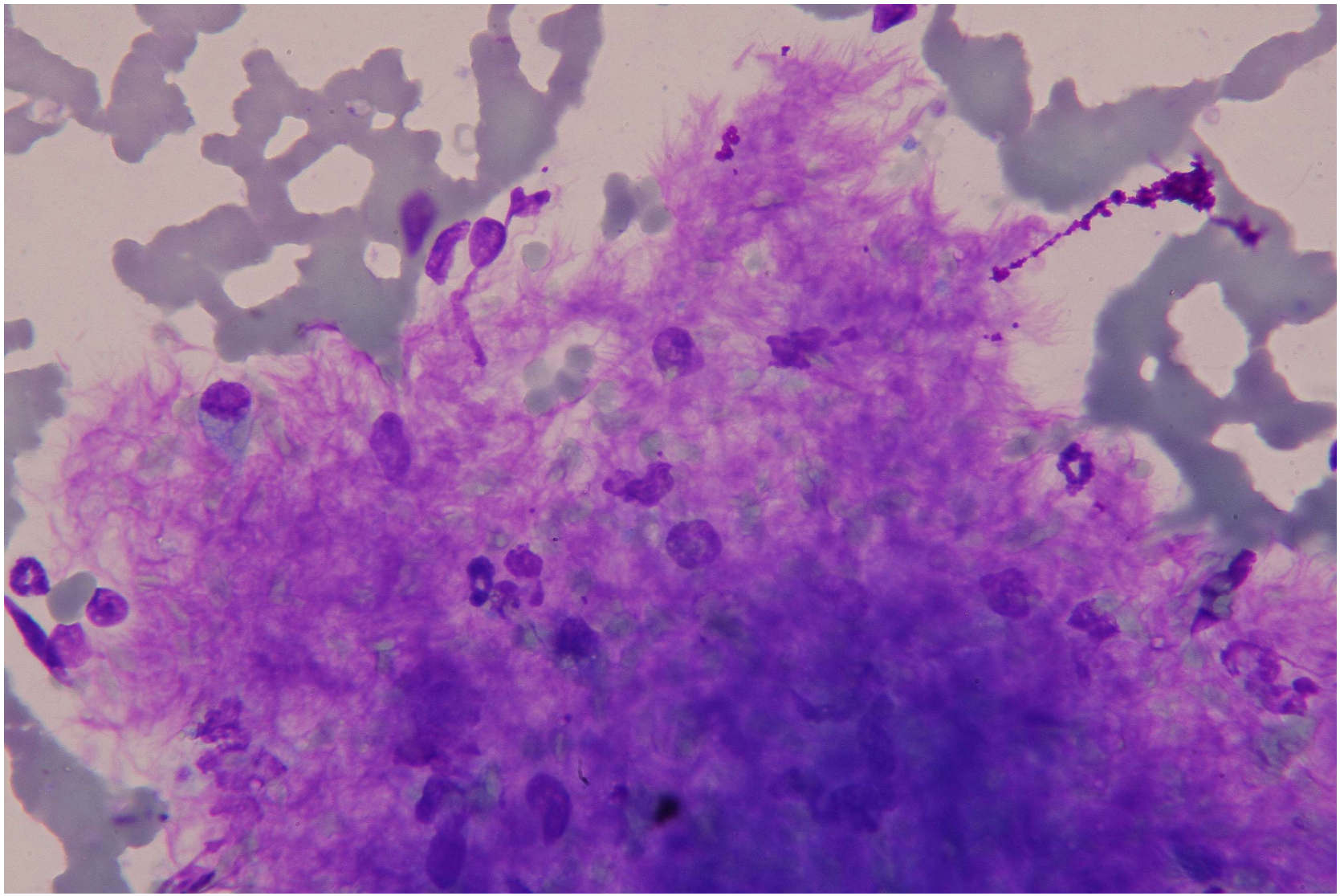

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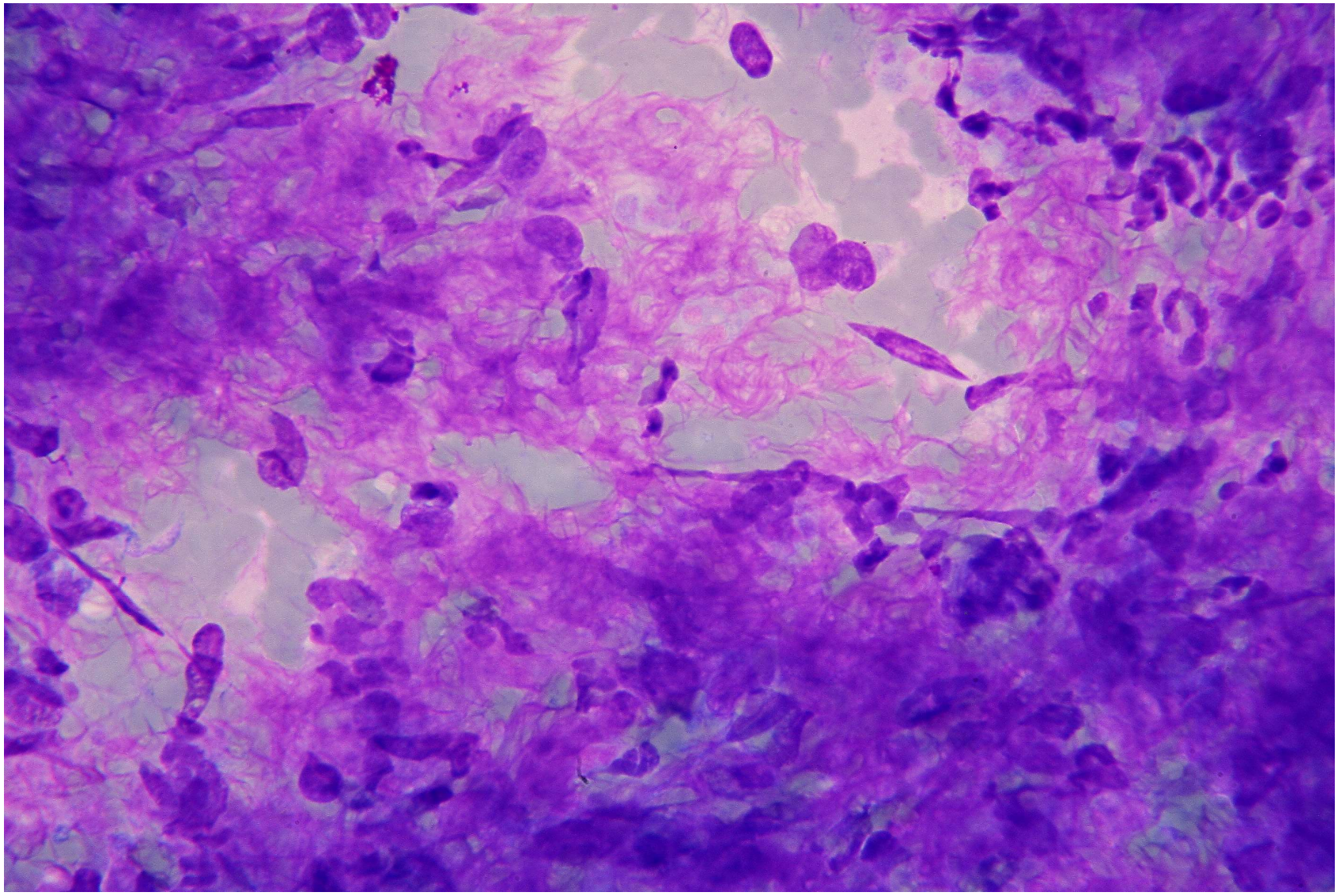

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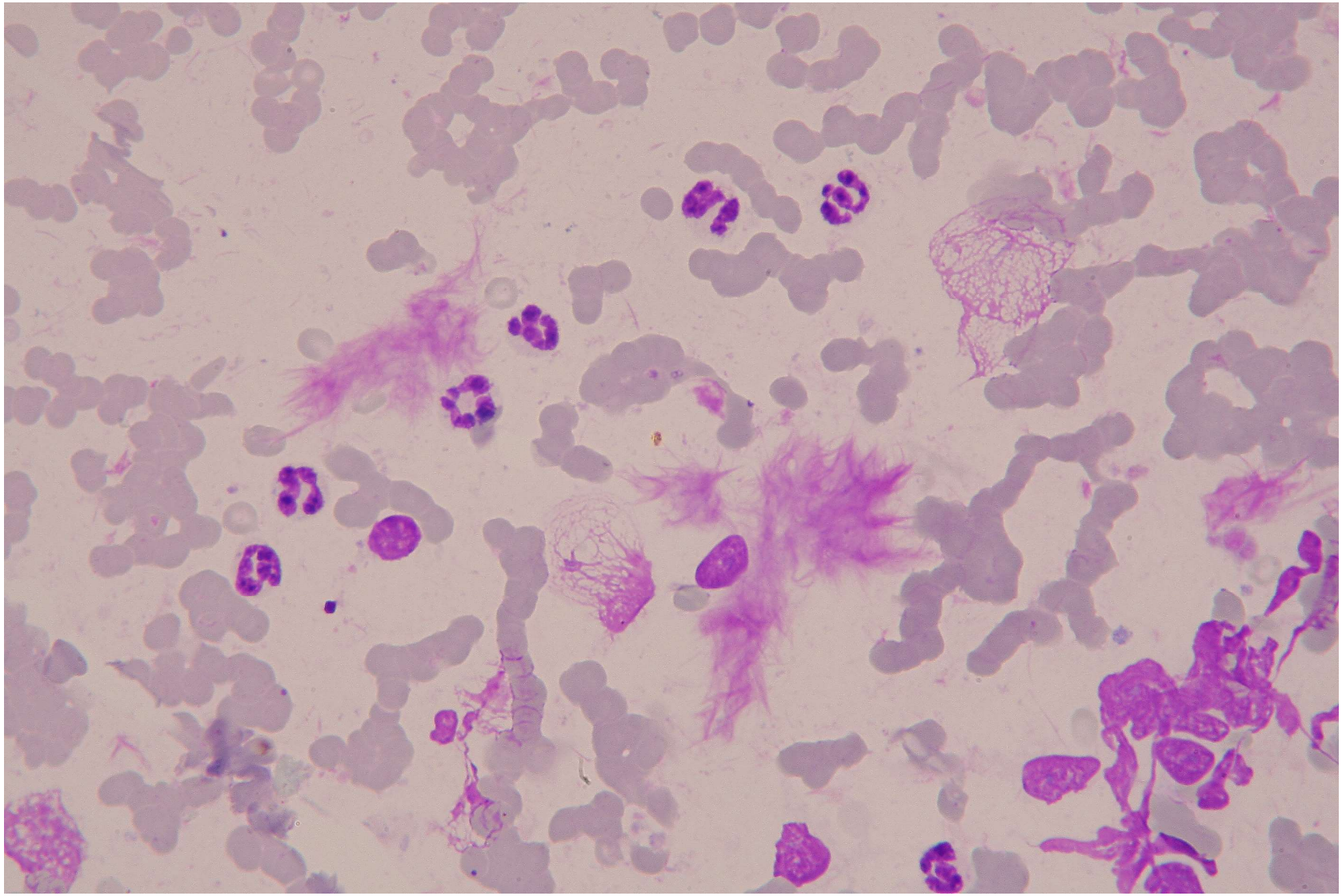

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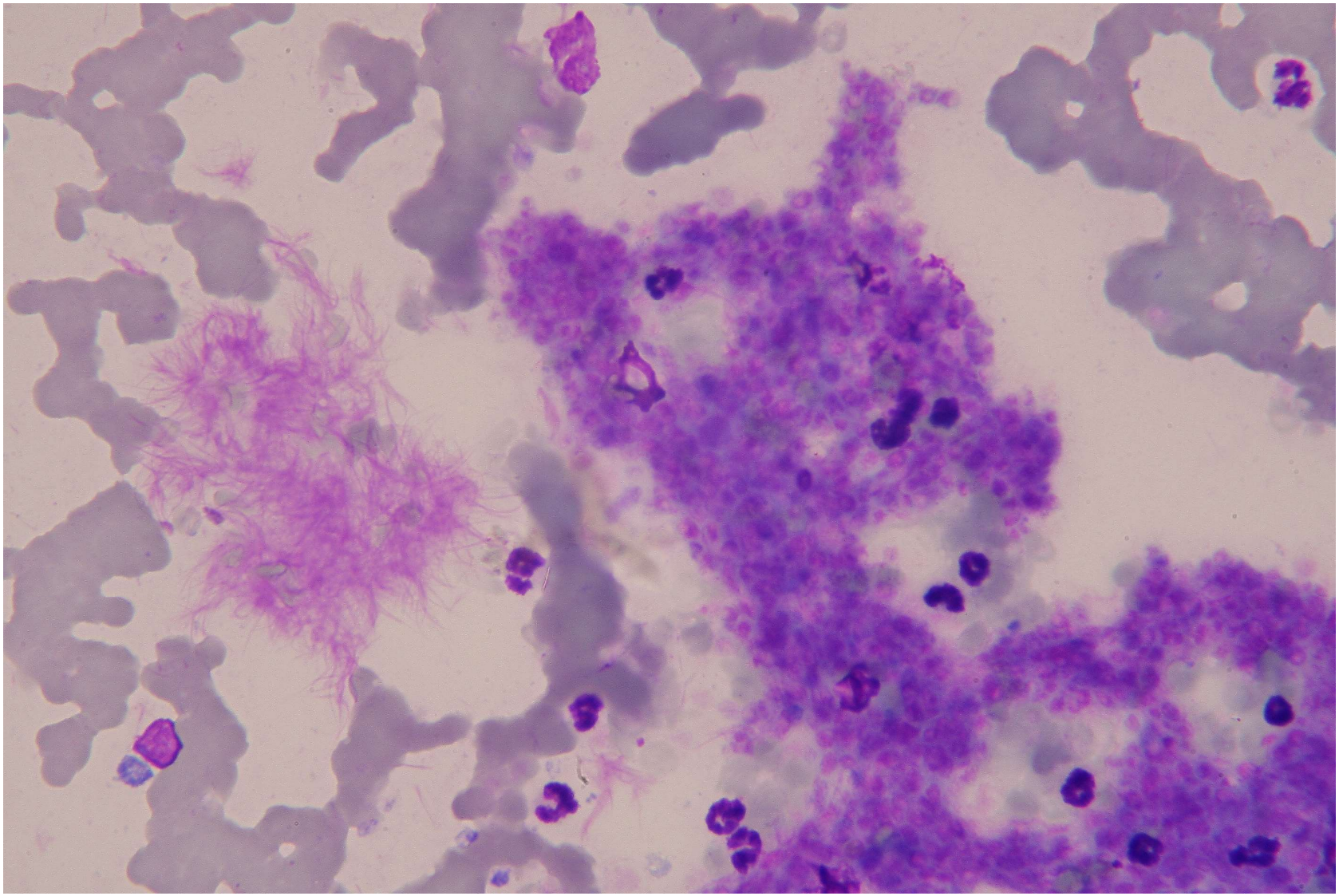

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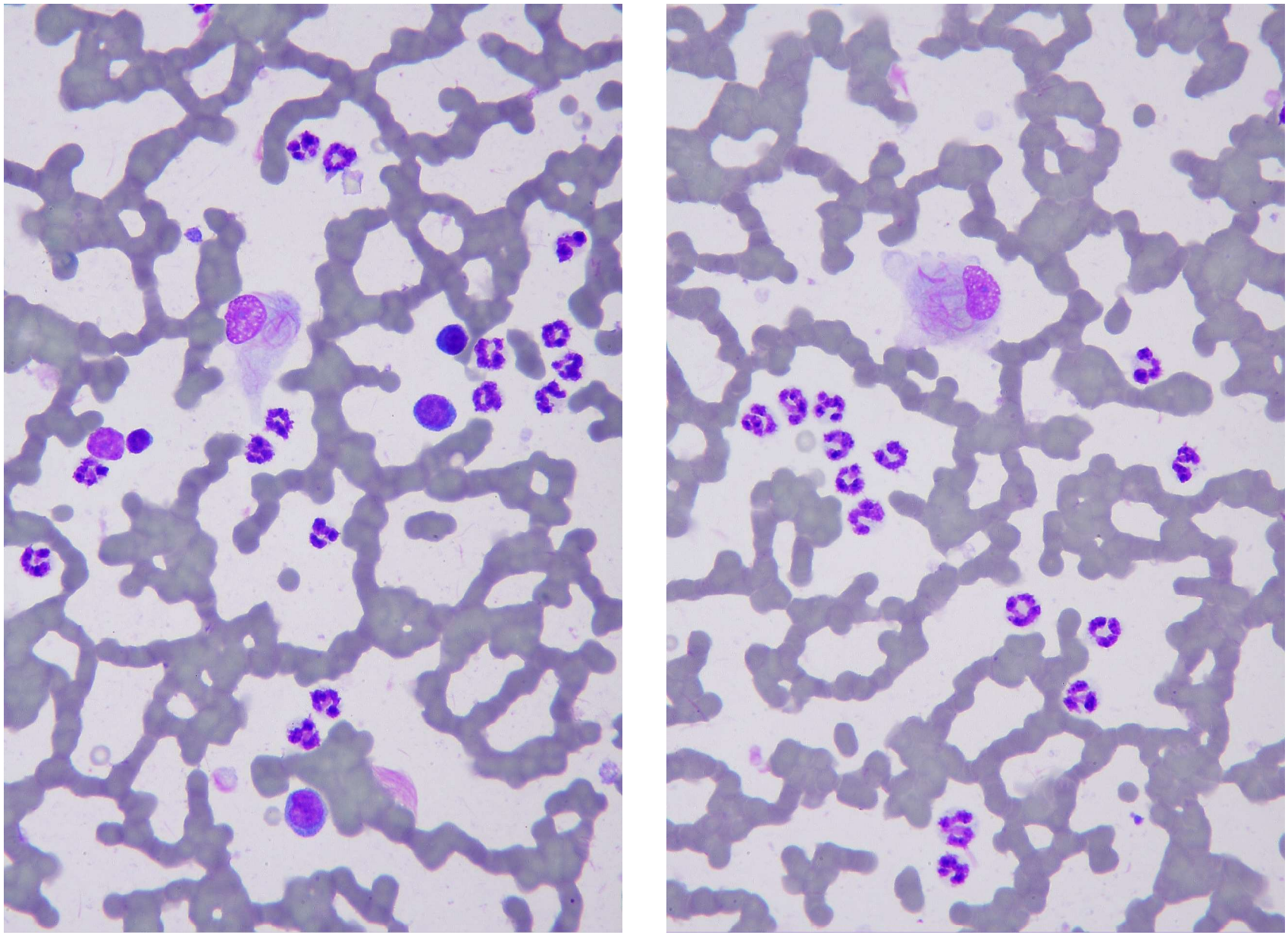
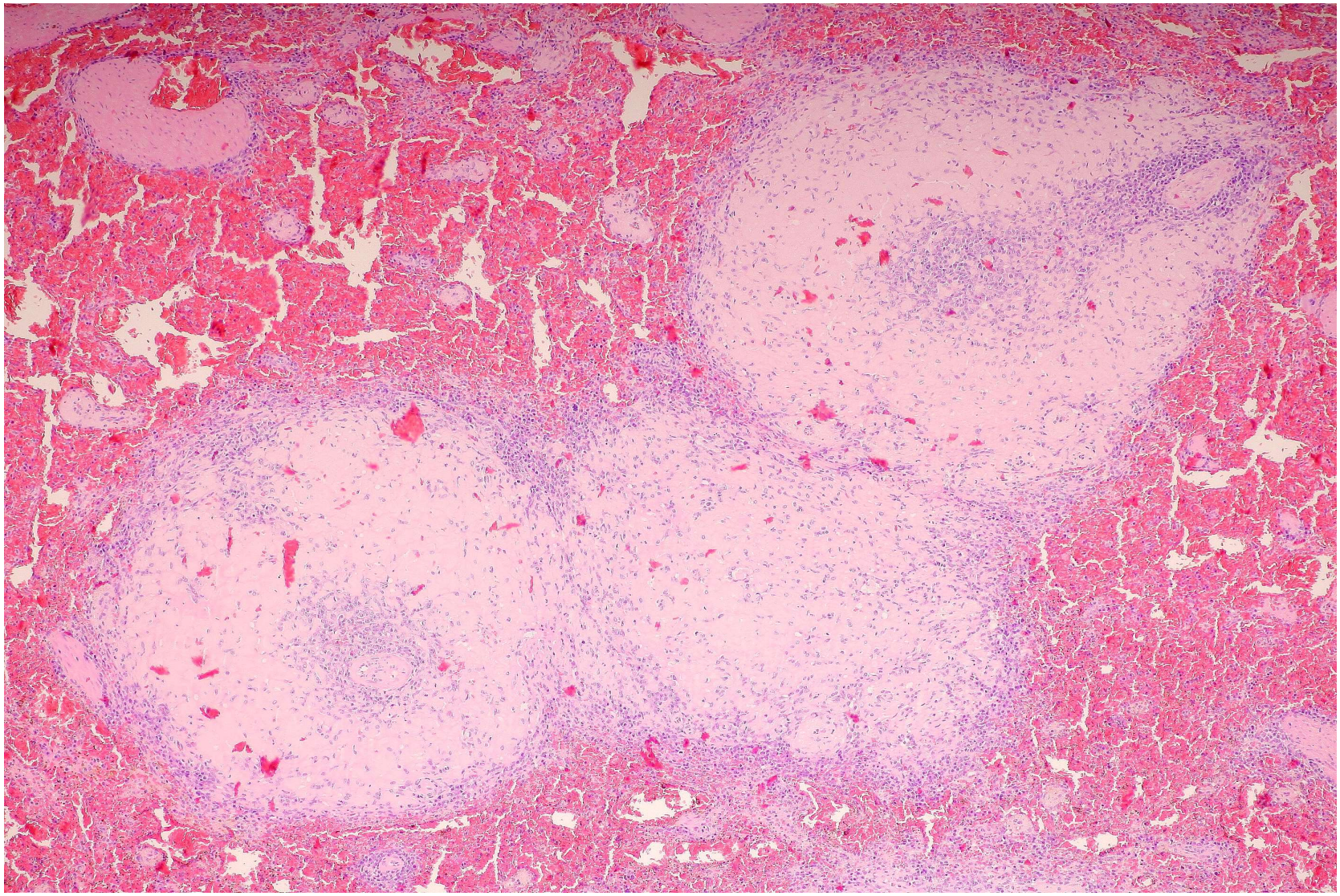


Cytologic findings

- Polymorphic lymphoid cells
- Dense fibrillar material, morphologically consistent with amyloid
- Macrophagic phagocytosis of the same material

Diagnosis

- Cytologic diagnosis:
  - Splenic amyloidosis
- Histological diagnosis
  - Splenic amyloidosis



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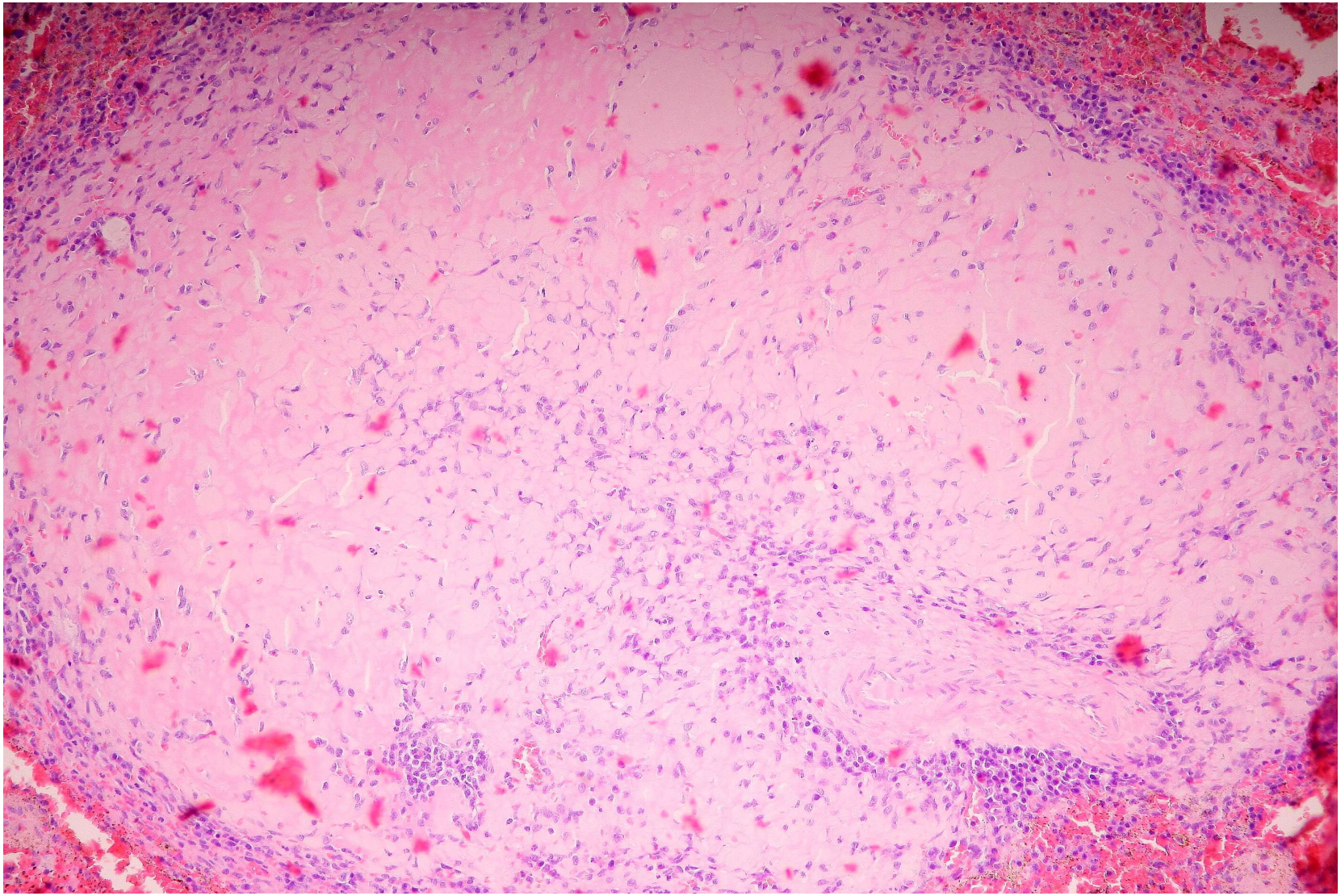

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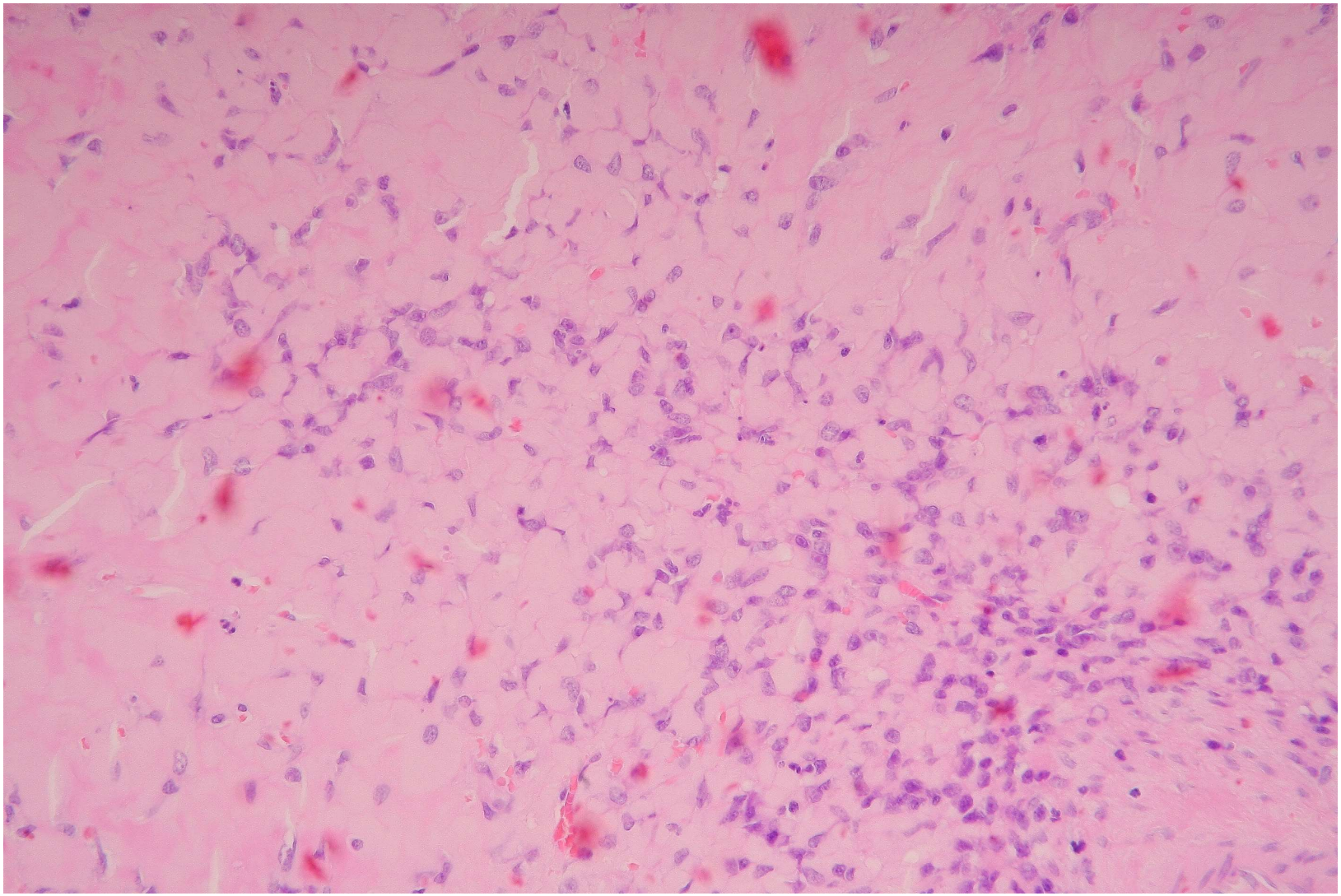

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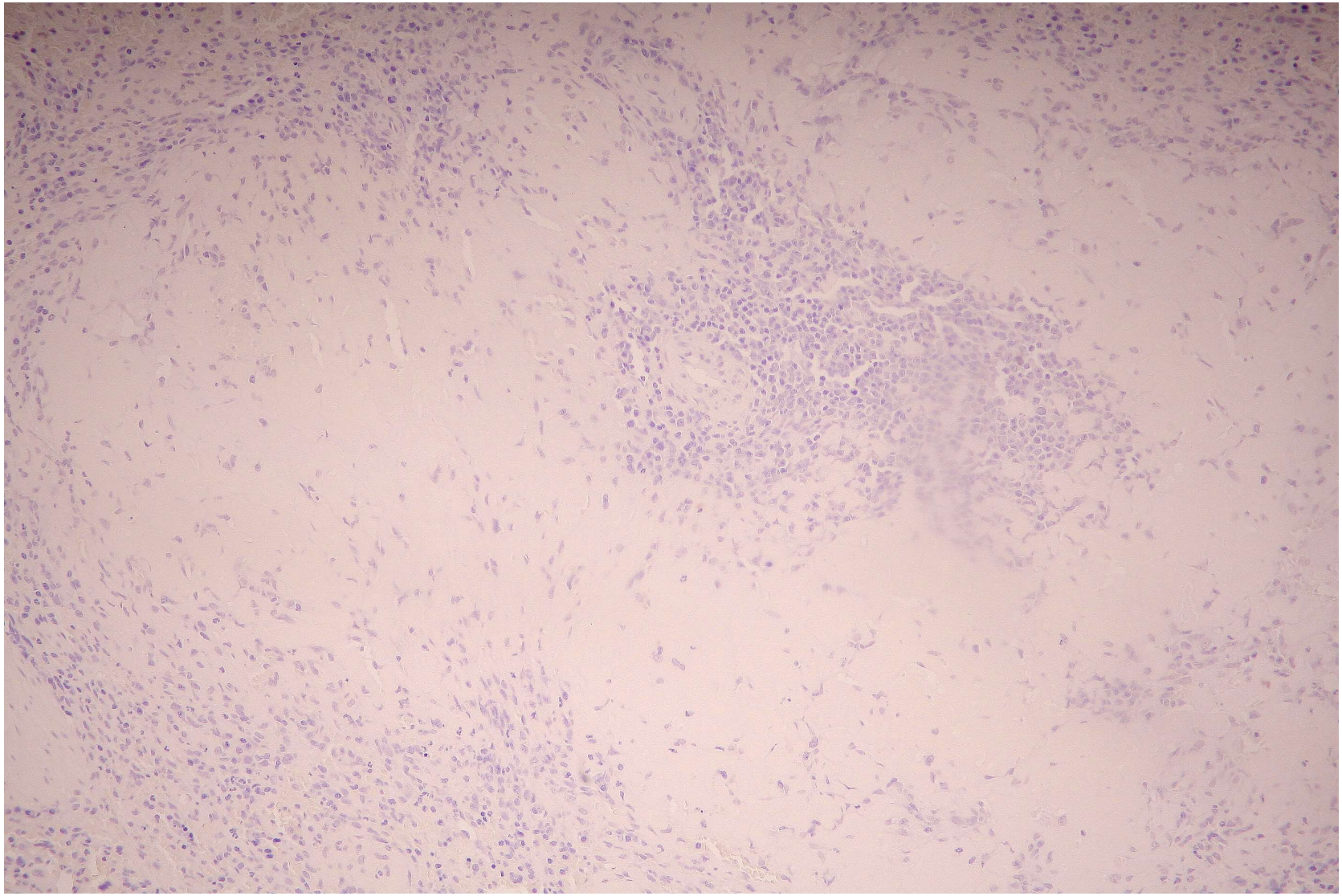

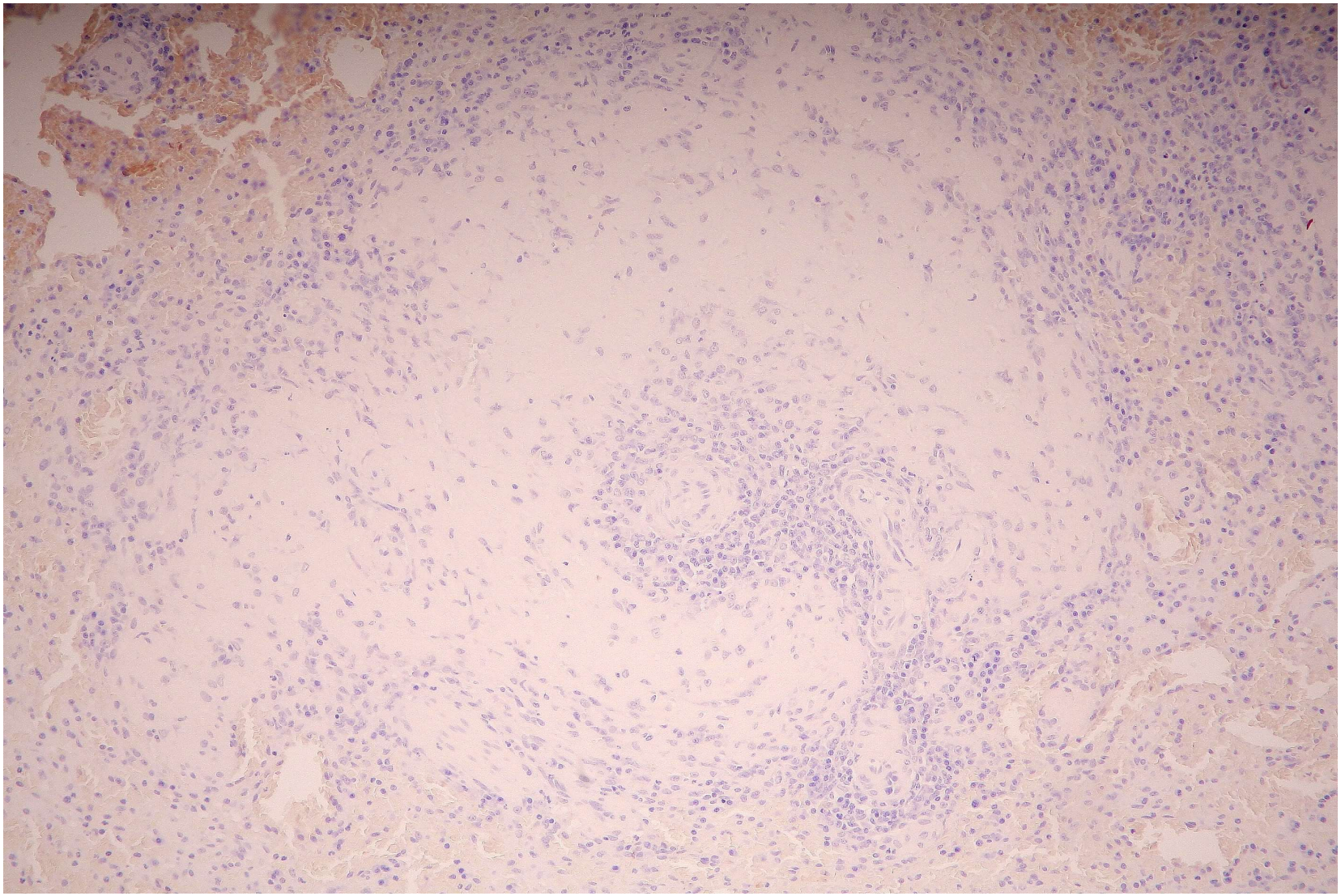

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Discussion

- From my point of view, the described material is amyloid
- However, the special stain Congo Red was diffusely negative

- Some other suggestion about the nature of this material??

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Review Article

Congo Red and amyloids: history and relationship

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CR, now a classic dye, has played a role in the history of amyloid research. However, there is currently ample evidence of nonspecific binding of CR in studies on the identification of amyloids. The dye has been shown to bind non-amyloid substances, in addition to not binding amyloids in *in vitro* experiments and in *in vivo* histochemical studies. There is evidence that a specific amyloid cross-β structure is not necessary for binding to the dye, and the mechanism of CR binding to amyloids depends on a number of conditions, including the type of solvent, the composition of the solution, pH etc.

Due to modern scientific and methodological developments, researchers have a variety of possible methods available to study amyloids, according to their interest (Table 1) and can take into account the characteristic features and limitations of different methods. In this review, we discussed in detail the disadvantages of the CR staining method. Care should be taken when using the CR staining method to avoid misinterpretation of data.

Discussion

- Deposition of SAA in cats occurs as a consequence of proinflammatory cytokines released during inflammatory or neoplastic disorders
- However, the high incidence of cats with increased SAA concentration doesn't correlate with the rare incidence of amyloidosis
  - Risk factors for amyloidosis
    - Chronic inflammatory diseases
      - Chronic enteropathies
      - Gingivostomatitis
      - Chronic respiratory tract infectious diseases
    - Infections
      - FIV, FCoV and FeLV are not associated with the presence of amyloidosis (Ferri et al, 2023)
    - Unknow environmental factors