ACVP

AMERICAN COLLEGE OF VETERINARY PATHOLOGISTS

Example Questions: Clinical Pathology

Phase II Certifying Examination

These questions illustrate possible question styles and content examples for the Phase II Certifying Examination.

- Helpful information is on the ACVP website, including the Candidate Handbook

- The Phase II Certifying Examination consists of 300 equally weighted multiple-choice questions (3, 4 or 5 choices) administered in 3 sections of 100 questions each:

  Section 1:

  - **Knowledge** - usually only text, can be single images or data tables

  Section 2:

  - **Interpretation** - usually single images or data tables

  Section 3:

  - **Extended integrated interpretation** – usually multiple microscopic or other images and/or data tables

- Unless otherwise informed, assume the stain used for samples in microscopic images are Wright-Giemsa (cytology & hematology) or Hematoxylin & Eosin (histology)

- Questions can be text only or can have single or multiple microscopic or other images and/or data tables.

Example Question 1

Section 1: Knowledge – text only, cytology

1. What is the presence of extracellular myelin-like material in canine cerebrospinal fluid associated with?

    A. Necrosis
    B. Neoplasia
    C. Inflammation
    D. Sampling artifact

Answer: **D**

Example Question 2

Section 1: Knowledge - text only, hemostasis

2. In cats, prolonged aPTT and normal PT without a bleeding tendency occurs with deficiency of which factor?

    A. Factor IX
    B. Factor XI
    C. Factor VII
    D. Factor XII

Answer: **D**

Example Question 3

Section 2: Interpretation - single data table, biochemistry

Laboratory data from an African Grey parrot.

Test (units)	Patient (Baseline)	Flag (Baseline)	Reference Interval (Baseline)	Patient (at 3 hours of water deprivation)	Patient (post vasopressin administration)
Sodium (mmol/L)	159	H	134 - 152	159	-
Glucose (mmol/L)	13	H	6 - 9	-	-
Urine specific gravity	1.003		1.005 - 1.020	1.003	1.020
Plasma osmolality (mOsmol/kg)	327	H	299 - 313	340	312

Which condition is most likely?

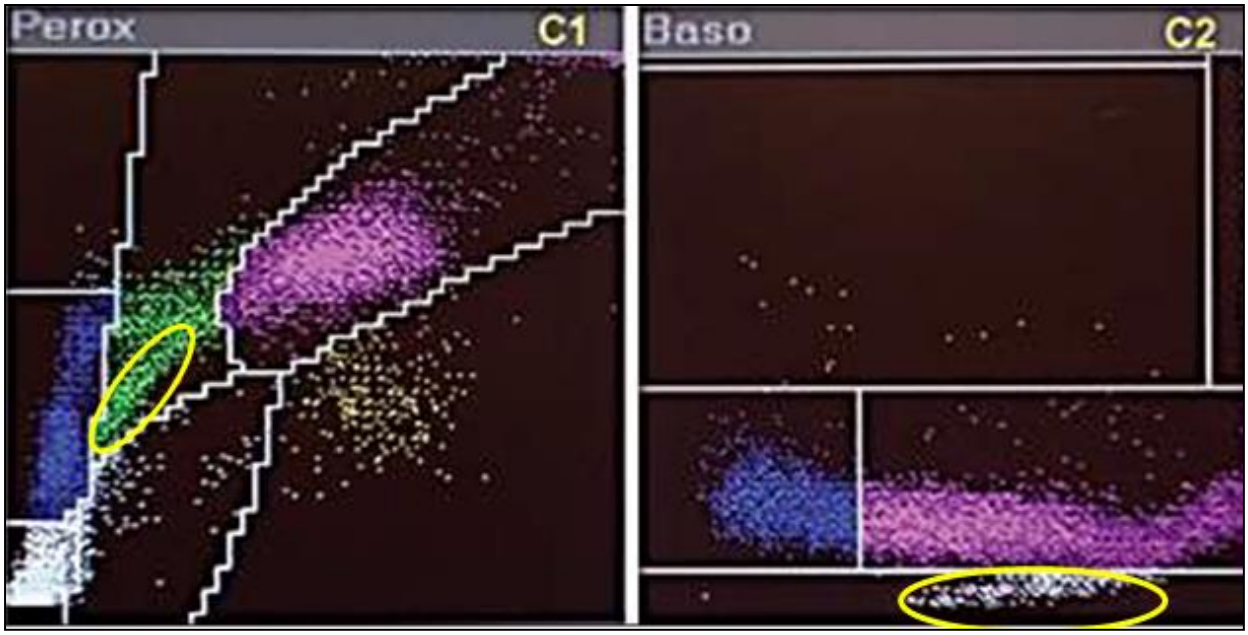
A. Diabetes mellitus
B. Medullary washout
C. Psychogenic polydipsia
D. Central diabetes insipidus

Answer: **D**

Example Question 4

Section 2: Interpretation - single image, hematology

Cytograms from an Advia hematology analyzer.



What is indicated by the circled regions?

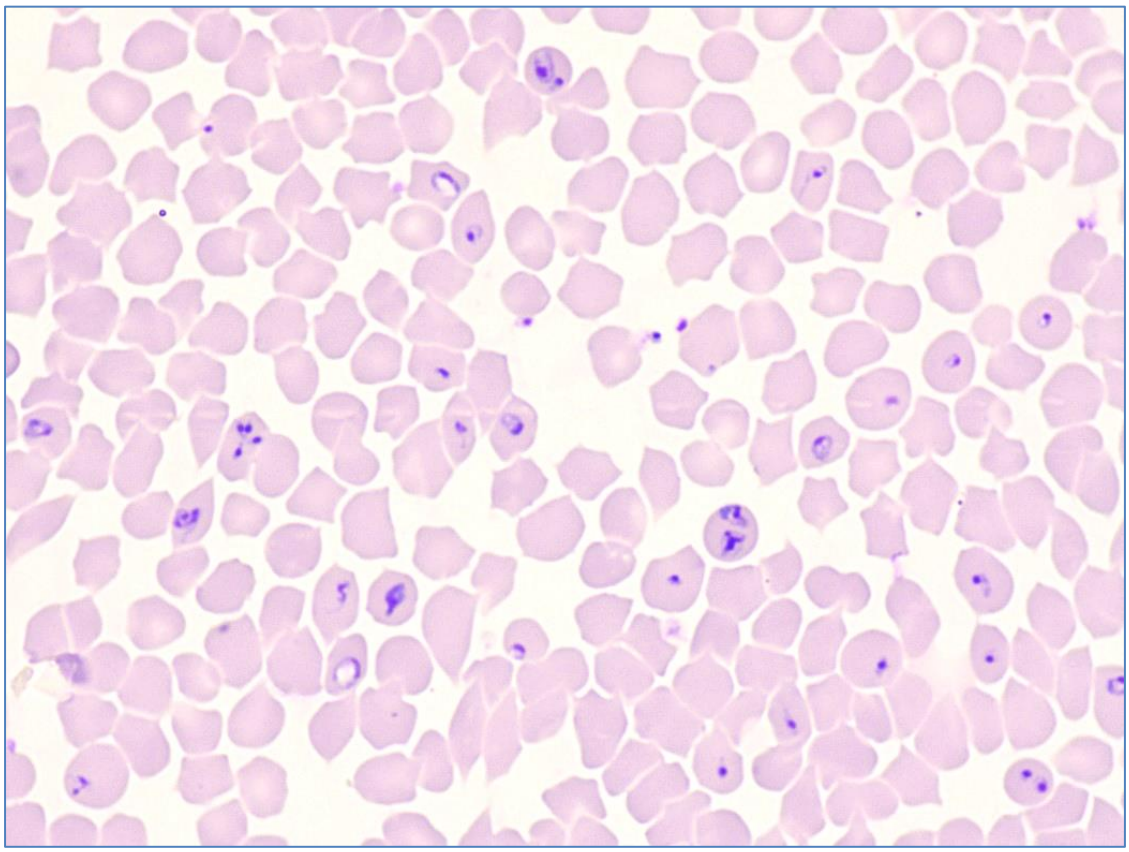
A. Lipemia
B. Hemolysis
C. Lymphocytes
D. Platelet clumps

Answer: **A**

Example Question 5

Section 2: Interpretation - single image, hematology

Blood smear from a horse.



What is the genus and species of the erythroparasite?

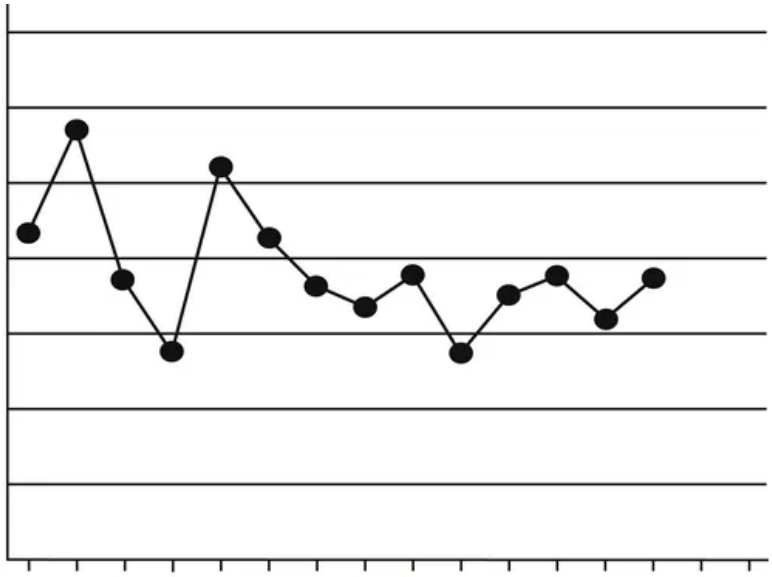
A. *Theileria equi*
B. *Babesia gibsoni*
C. *Neorickettsia risticii*
D. *Anaplasma phagocytophilum*

Answer: **A**

Example Question 6

Section 2: Interpretation - single image, quality assurance

What is plotted on the x-axis and y-axis, respectively, in this Levey-Jennings plot?



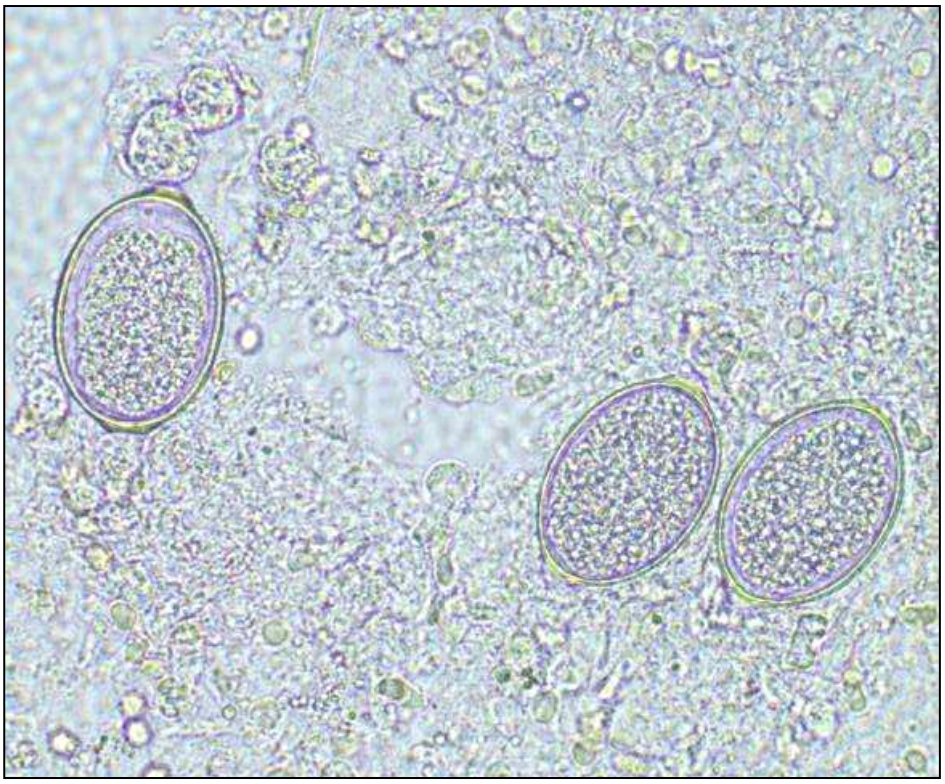
A. Precision and accuracy
B. Speed and assay range
C. Time and concentration
D. Specificity and sensitivity

Answer: **C**

Example Question 7

Section 2: Interpretation - single image, cytology

Nasal flush (unstained wet mount) from a dog.



Which is the most appropriate interpretation?

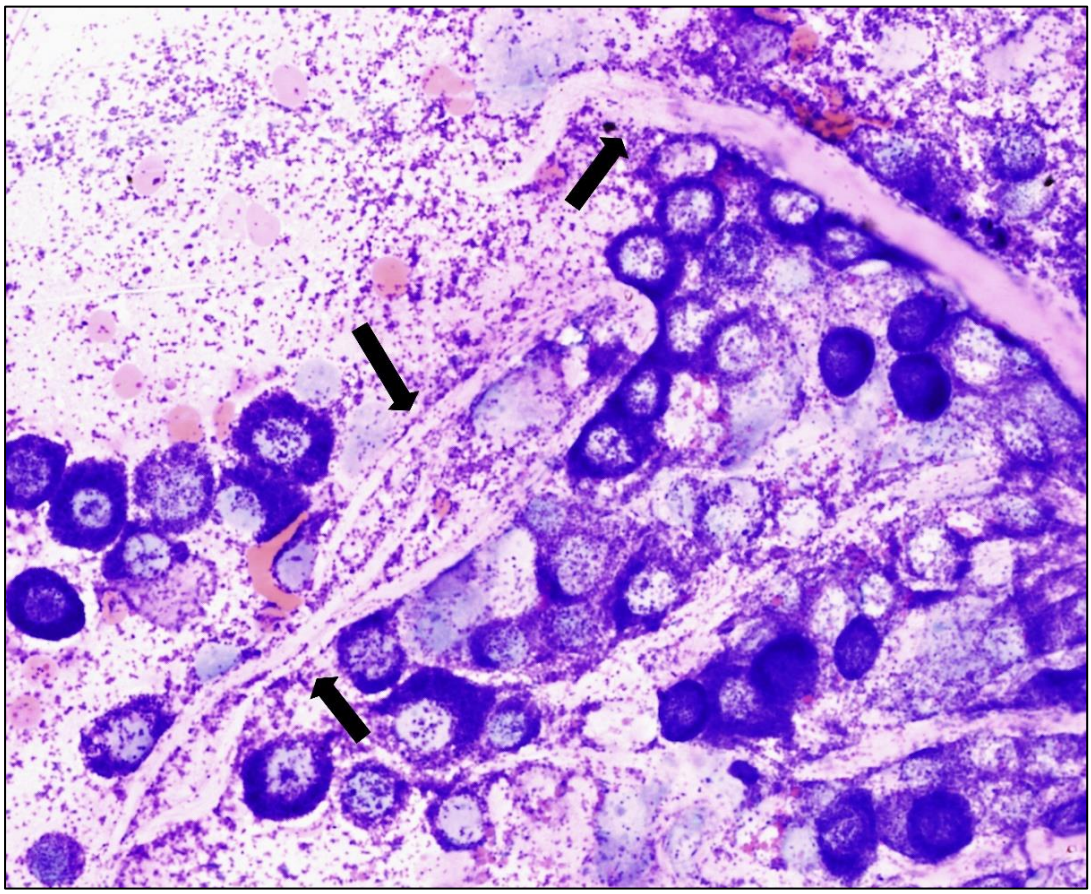
A. Pollen inhalation
B. *Eucoleus* infection
C. *Rhinosporidium* infection
D. Oropharyngeal contamination

Answer: **B**

Example Question 8

Section 2: Interpretation - single image, cytology

Cutaneous mass aspirate from a dog.



Using Masson's trichrome, the structures indicated by the arrows are expected to stain which color?

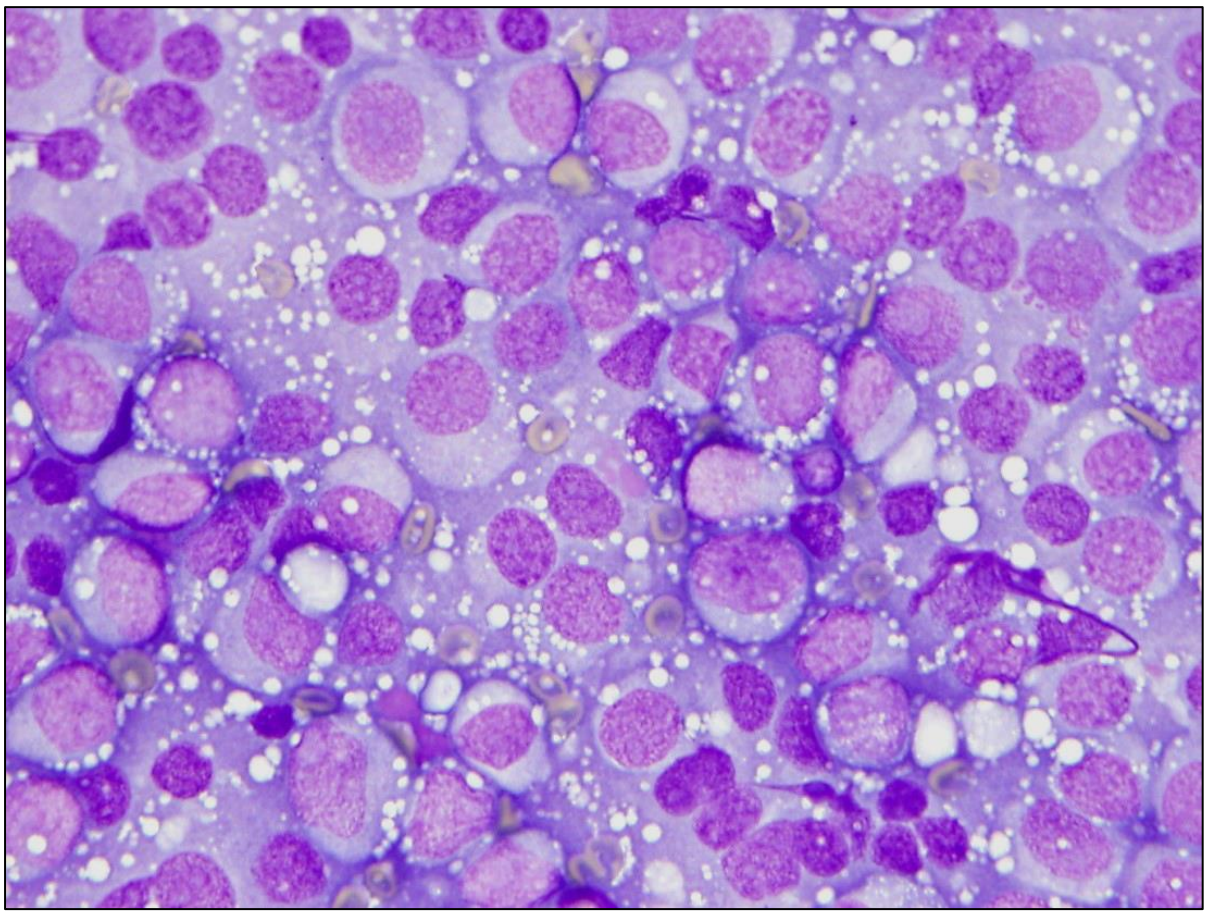
A. Red
B. Blue
C. Purple

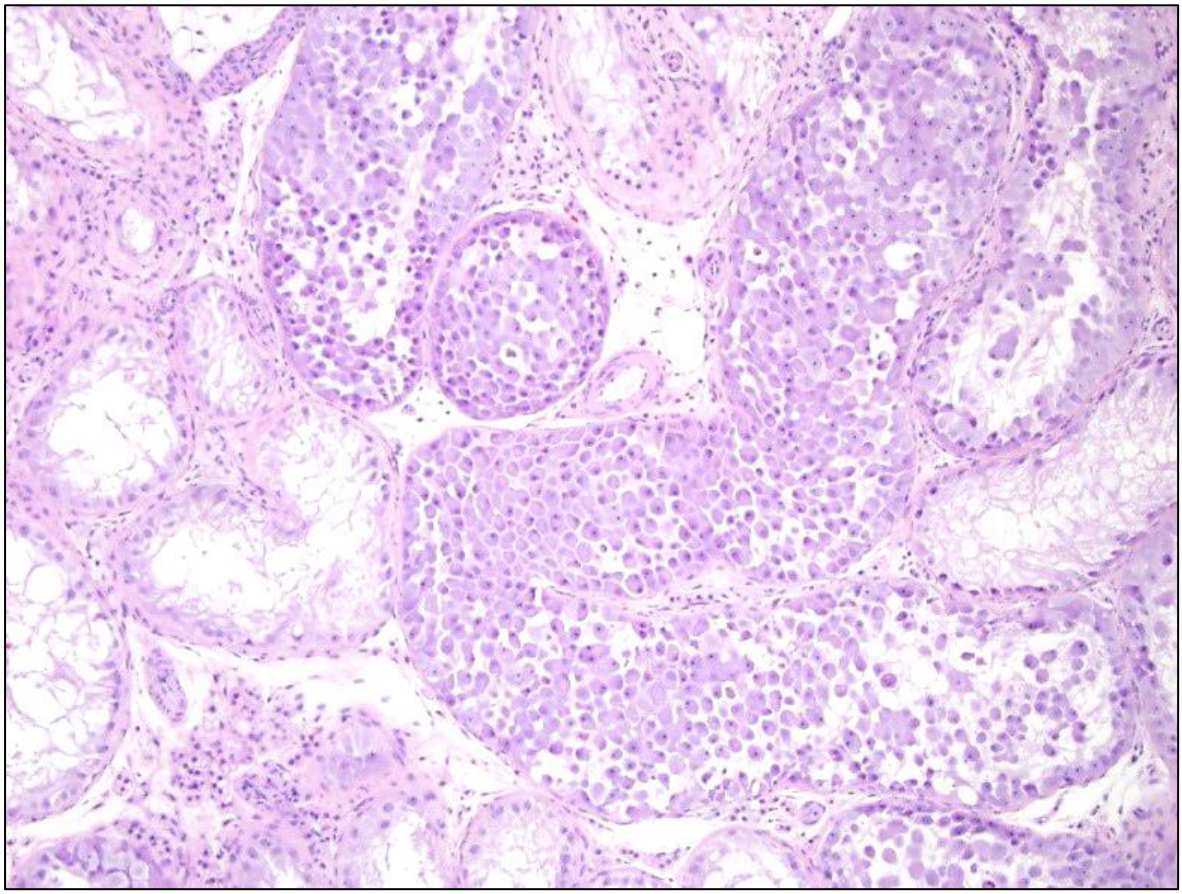
Answer: **B**

Example Question 9

Section 3: Extended integrated interpretation - multiple images, cytology and histology

Aspirate and tissue section from an 8 cm intra-abdominal mass in a dog.





Which neoplasm is most likely?

A. Seminoma
B. Lymphoma
C. Histiocytic sarcoma
D. Metastatic carcinoma
E. Transmissible venereal tumor

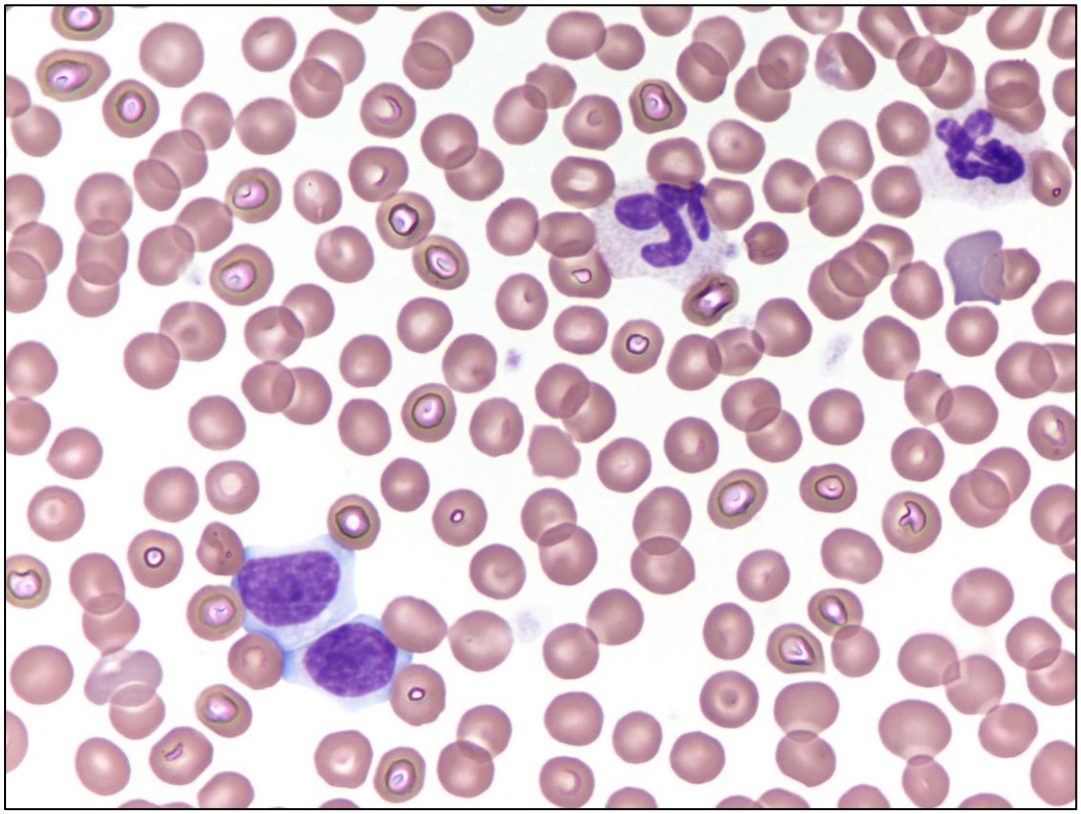
Answer: **A**

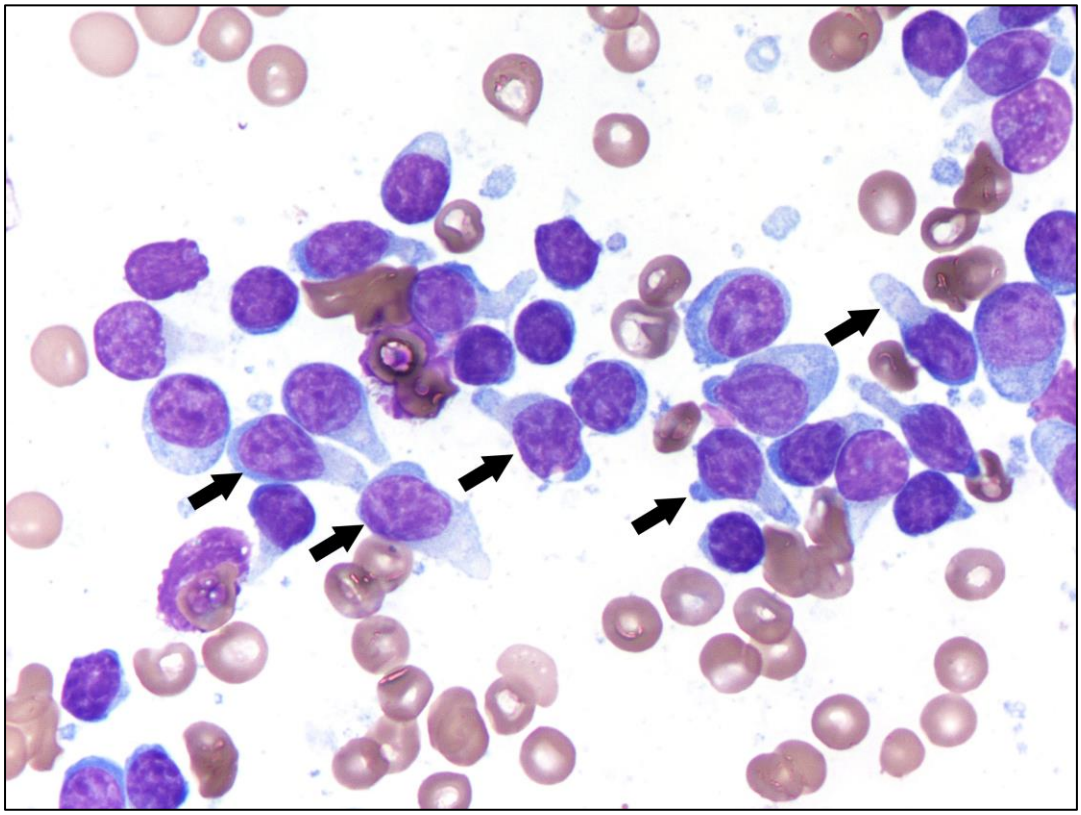
Example Question 10

Section 3: Extended integrated interpretation - multiple images and/or data tables, hematology, cytology

Hematologic data, blood smear and lymph node aspirate from a dog with lymphadenomegaly as the only physical abnormality.

Test	Units	Patient	Flag	Reference Interval
Hct	%	45		37 - 55
WBC	x 10^9/L	22.5	H	4.8 - 13.9
Segmented neutrophils	x 10^9/L	9.0		2.6 - 10.8
Lymphocytes	x 10^9/L	7.5	H	0.7 - 3.2
Monocytes	x 10^9/L	0.5		0.1 - 1.1
Eosinophils	x 10^9/L	0.5		0 - 1.2
Platelets	x 10^9/L	325		145 - 463





Which immunophenotypic results are most likely for the cells indicated by the arrows?

A. CD3+, CD4+, CD45-
B. CD3+, CD4-, CD 45+
C. CD3-, CD5+, CD 45-

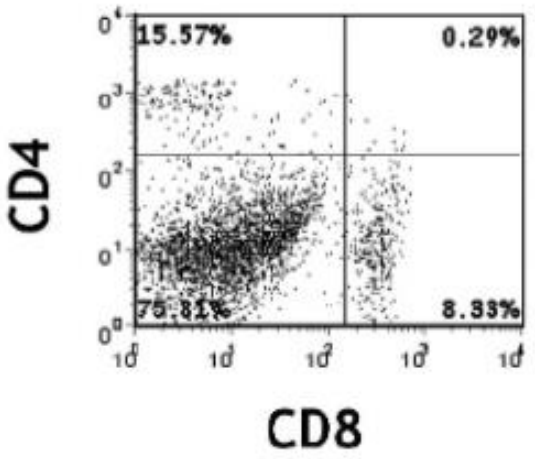
Answer: **A**

Example Question 11

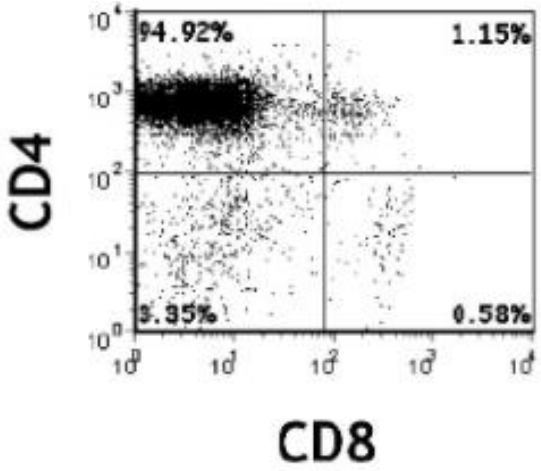
Section 3: Extended integrated interpretation - multiple images and/or data tables, cytology

Which flow cytometry scattergram from a canine mediastinal mass fits best with a thymoma?

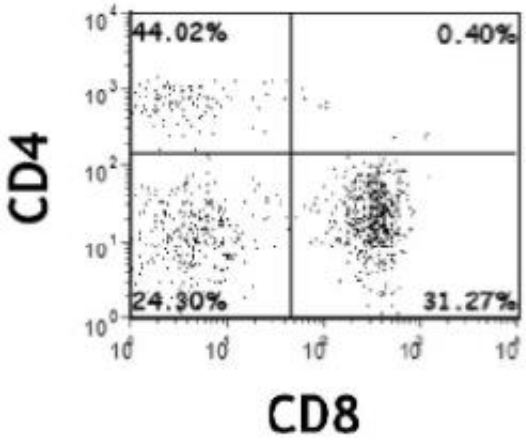
A.



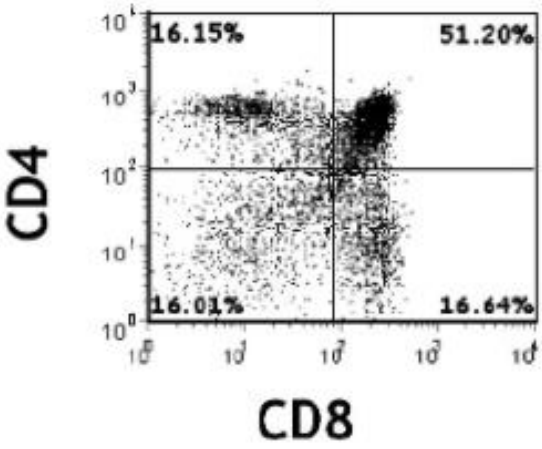
B.



C.



D.



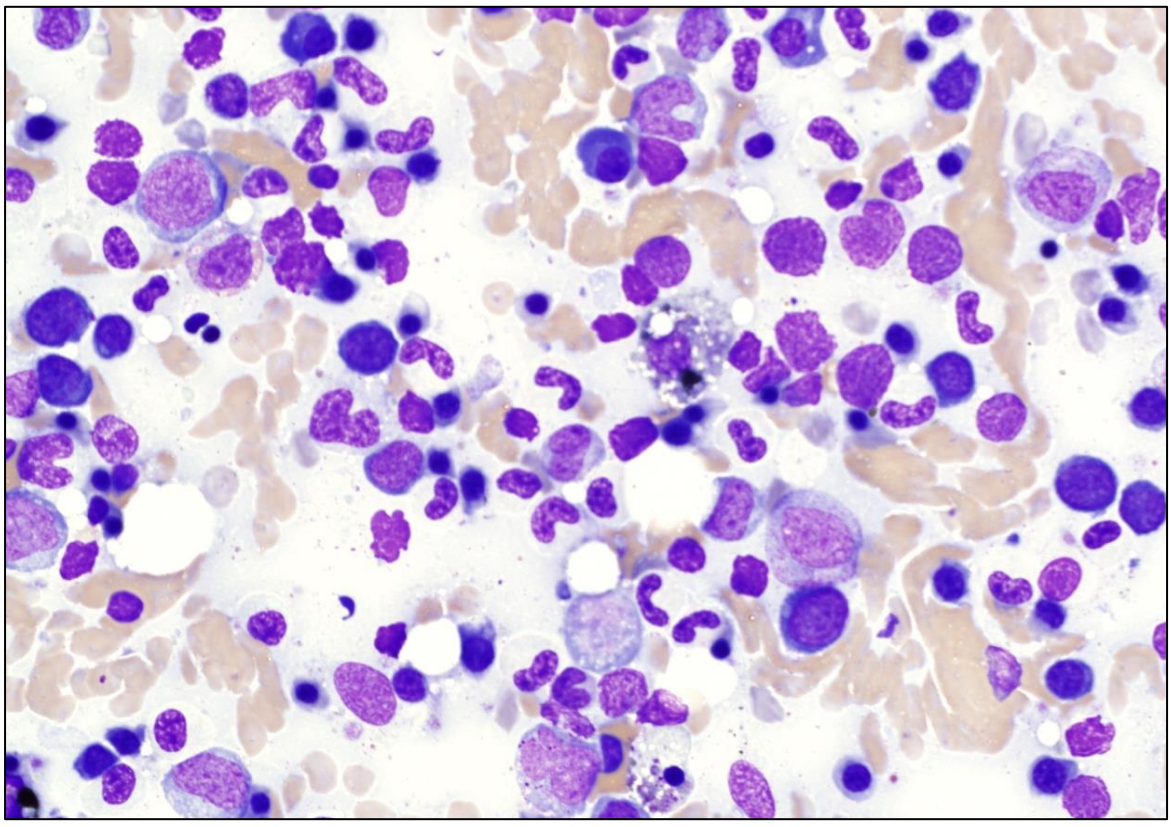
Answer: **D**

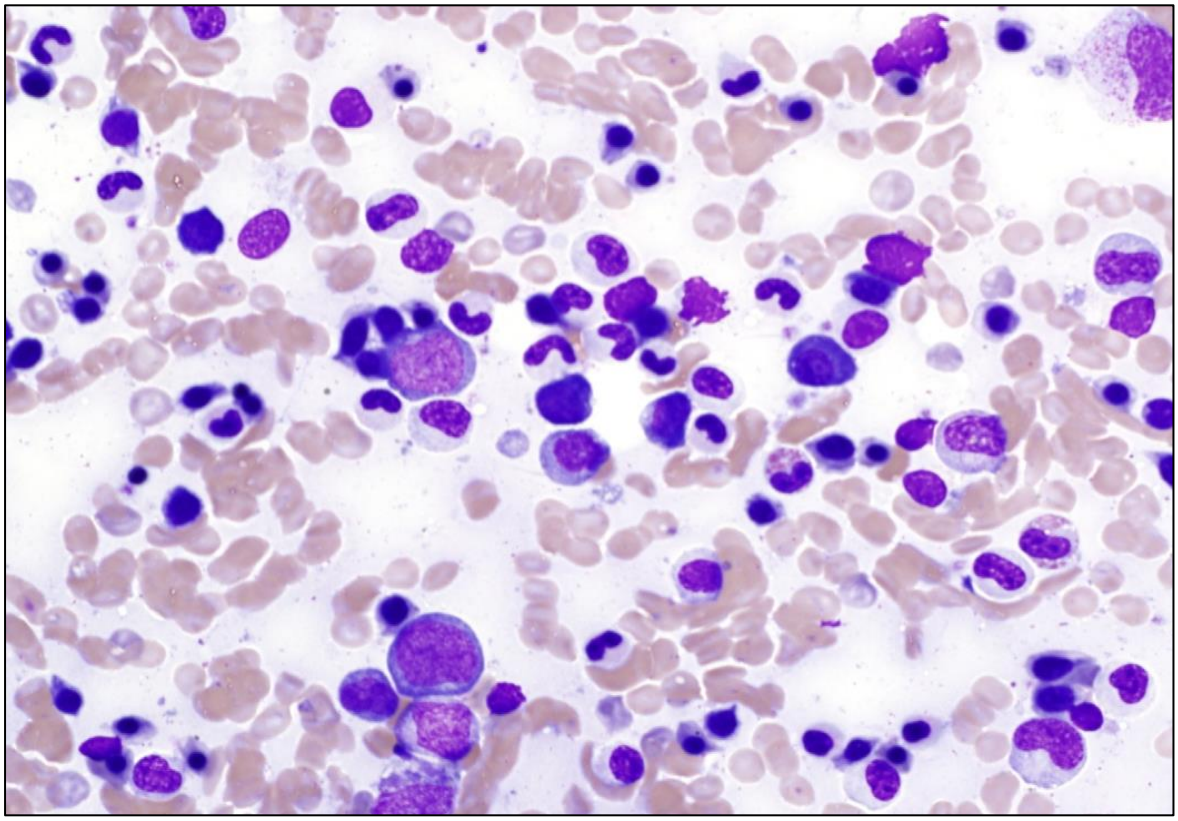
Example Question 12

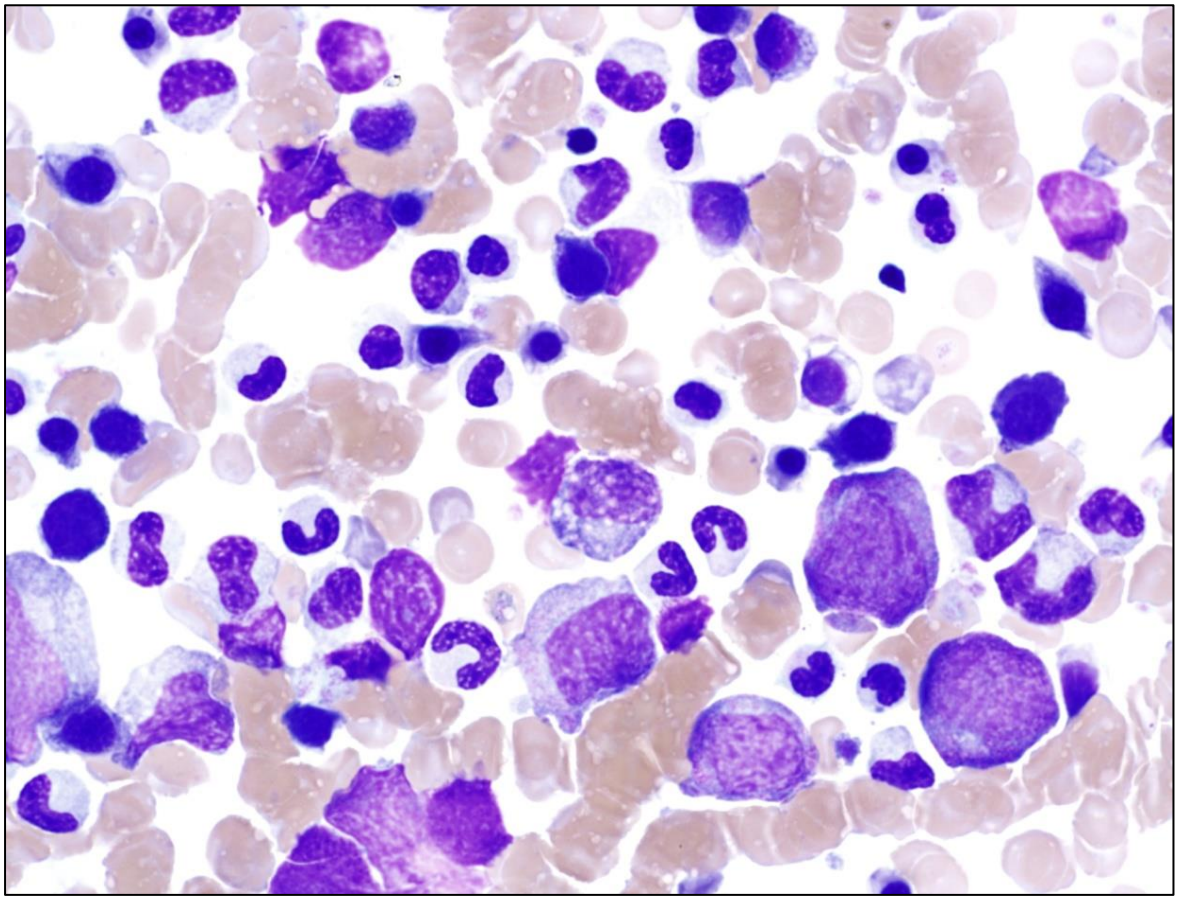
Section 3: Extended integrated interpretation - multiple images and data tables, hematology

Hematologic data and bone marrow aspirate from an 8-year-old dog with mild lethargy. Images are representative of the granulocytic series throughout the marrow.

Test	Units	Patient	Flag	Reference Interval
Hematocrit	L/L	0.36	L	0.40 – 0.55
Reticulocytes	x 10^9/L	25		0 - 85
WBC	x 10^9/L	5.8		5.7 - 14.9
Platelets	x 10^9/L	305		220 - 490







Which condition is most likely?

A. Myelodysplastic syndrome
B. Inherited Pelger-Huet anomaly
C. Immune-mediated neutrophil maturation arrest
D. Absent granulocyte reserve from acute inflammation

Answer: **B**

Example Question 13

Section 3: Extended integrated interpretation - multiple data tables, biochemistry

Biochemical and urinalysis data from a 7-year-old castrated male mixed breed dog.

Test	Units	Patient	Flag	Reference Interval
Sodium	mmol/L	146		141 - 150
Potassium	mmol/L	2.9	L	3.9 – 5.3
Chloride	mmol/L	123	H	109 - 119
Total CO_2	mmol/L	11	L	19 – 30
Calcium	mg/dL	12.1		9.7 – 12.3
Phosphorus	mg/dL	1.6	L	2.9 – 6.2
Urea	mg/dL	25		7 - 32
Creatinine	mg/dL	1.3		0.5 – 1.5
Glucose	mg/dL	125		67 - 132
Total Protein	g/dL	5.3		4.8 – 6.9

Routine urinalysis	**Patient**
Specific gravity	1.037
pH	7.2
Glucose	Negative
Protein	Negative
Ketones	Negative
Blood	Negative
Bacteria	Negative
Additional urine tests	
Lactic acid	Negative
Amino acids	Negative
Citric acid	Decreased
Fractional HCO_3 excretion after increasing plasma HCO_3 to normal	Normal (< 5%)

Which is the most likely diagnosis?

A. Hyporeninemic hypoaldosteronism
B. Distal (Type 1) renal tubular acidosis
C. Proximal (Type 2) renal tubular acidosis
D. Syndrome of inappropriate ADH secretion

Answer: **B**

Example Question 14

Section 3: Extended integrated interpretation - multiple data tables, biochemistry

Biochemical and urinalysis data from a 10-year-old spayed female Beagle dog. Aside from being thin and having mild periodontal disease, there are no physical examination abnormalities. The CBC is unremarkable.

Test	Units	Patient	Flag	Reference Interval
Sodium	mmol/L	147		141 - 150
Potassium	mmol/L	4.2		3.9 – 5.3
Chloride	mmol/L	117		109 - 119
Total CO_2	mmol/L	6	L	19 – 30
Calcium	mg/dL	9.8		9.7 – 12.3
Phosphorus	mg/dL	15.0	H	2.2 – 7.9
Urea	mg/dL	110	H	7 - 32
Creatinine	mg/dL	4.6	H	0.5 – 1.5
Glucose	mg/dL	161	H	67 - 132
Total Protein	g/dL	6.6		4.8 – 6.9
Albumin	g/dL	1.7	L	2.3 – 3.9
Globulin	g/dL	4.9	H	2.2 – 3.5
CK	U/L	423		22 - 491
AST	U/L	51		21 - 53
ALT	U/L	601	H	14 – 87
SDH	U/L	36	H	0 - 12
ALP	U/L	433	H	20 – 157
GGT	U/L	22	H	5 – 16
Total bilirubin	mg/dL	0.9	H	0.1 – 0.8
Cholesterol	mg/dL	422	H	149 - 319

Urinalysis	**Patient**
Collection timing	Concurrent to blood collection
Collection method	Cystocentesis
Color	Colorless
Clarity	Clear
Specific gravity	1.010
Reagent Strip	
pH	6.0
Protein	3+
Glucose	Negative
Ketones	Negative
Bilirubin	Negative
Blood	Negative
Sediment	
WBC (per 400x field)	3 - 4
RBC (per 400x field)	0
Epithelial cells (per 400x field)	1 - 3 transitional
Casts (per 100x field)	None
Crystals	None
Bacteria	None

Which interpretation is appropriate for the acid-base data and renal concentrating ability?

	Acid base	Renal concentrating ability
A	Secretional metabolic acidosis	Inadequate
B	Titrational metaboilc acidosis	Inadequate
C	Secretional metabolic acidosis	Adequate
D	Titrational metaboilc acidosis	Adequate

A. A
B. B
C. C
D. D

Answer: **B**

Another question that could be asked for the same history, signalment, and data:

The proteinuria is most likely attributable to which process?

A. Pre-renal cause
B. Tubular disease
C. Post-renal cause
D. Glomerular disease

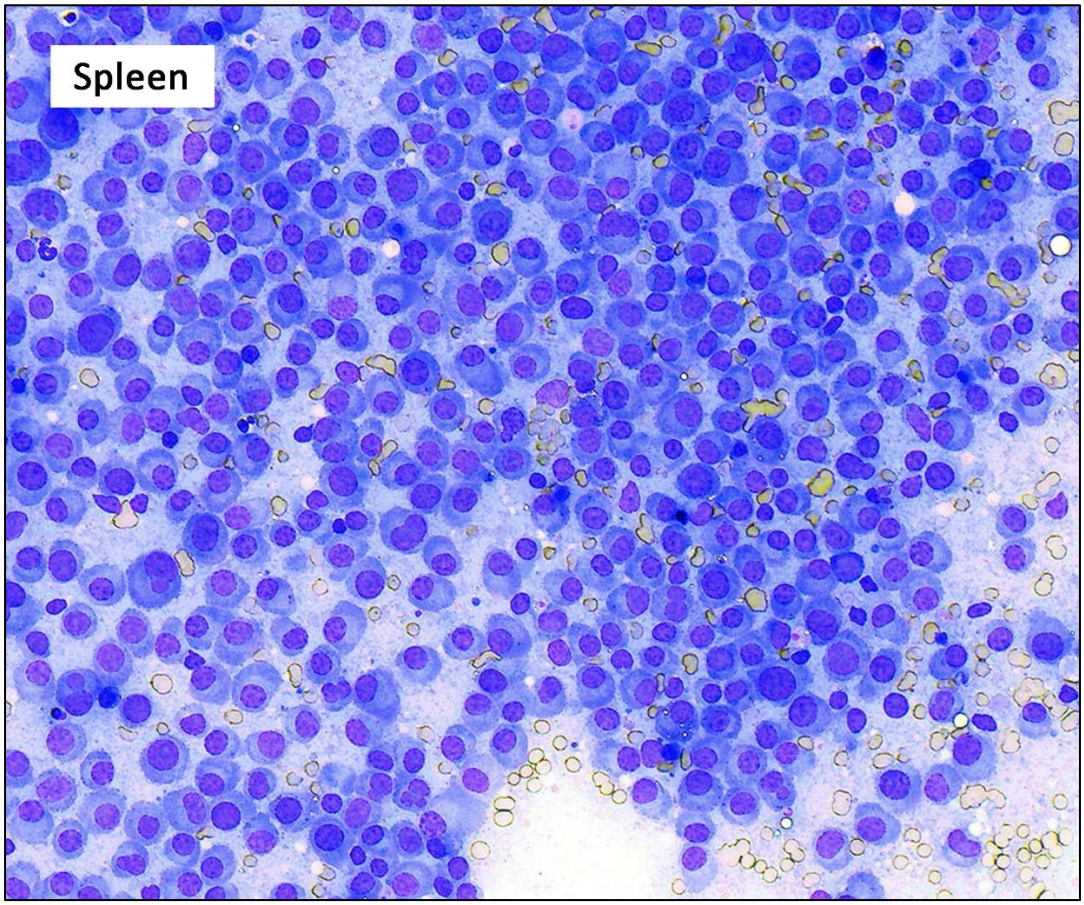
Answer: **D**

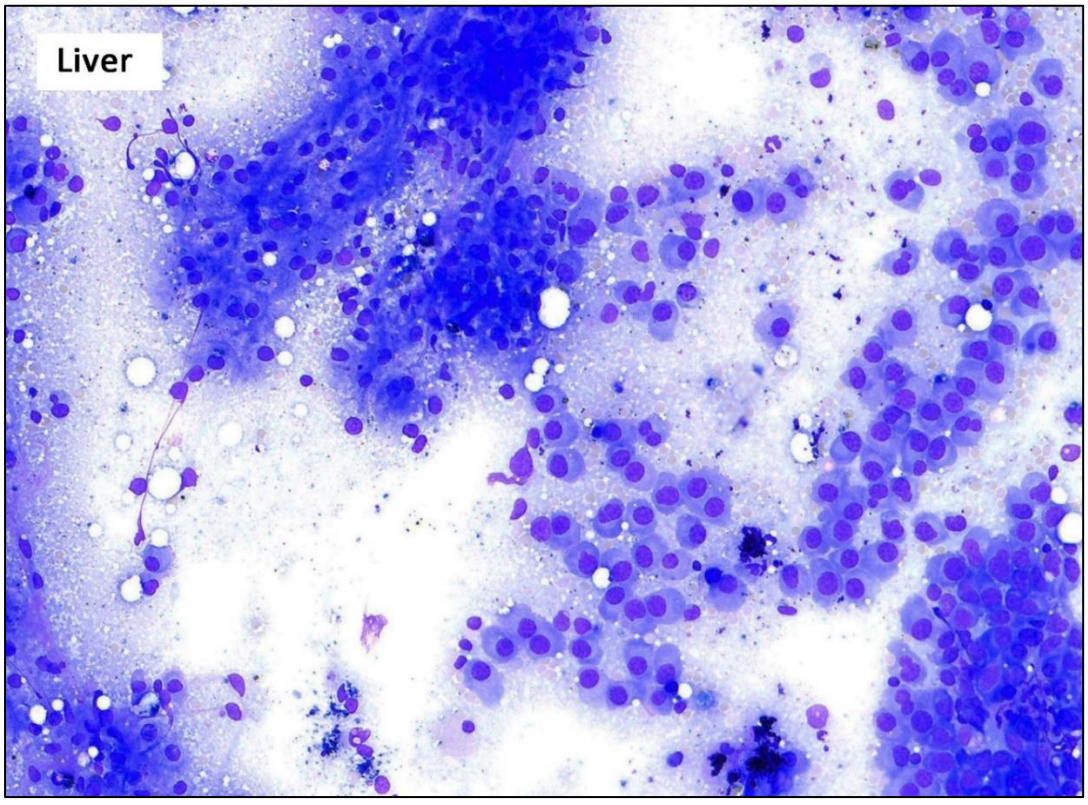
Example Question 15

Section 3: Extended integrated interpretation - multiple images and/or data tables - hematology, biochemistry, cytology, SPE

Laboratory data and aspirates of spleen and liver from a 9-year-old male castrated Siamese cat with lethargy, weight loss and hepatosplenomegaly.

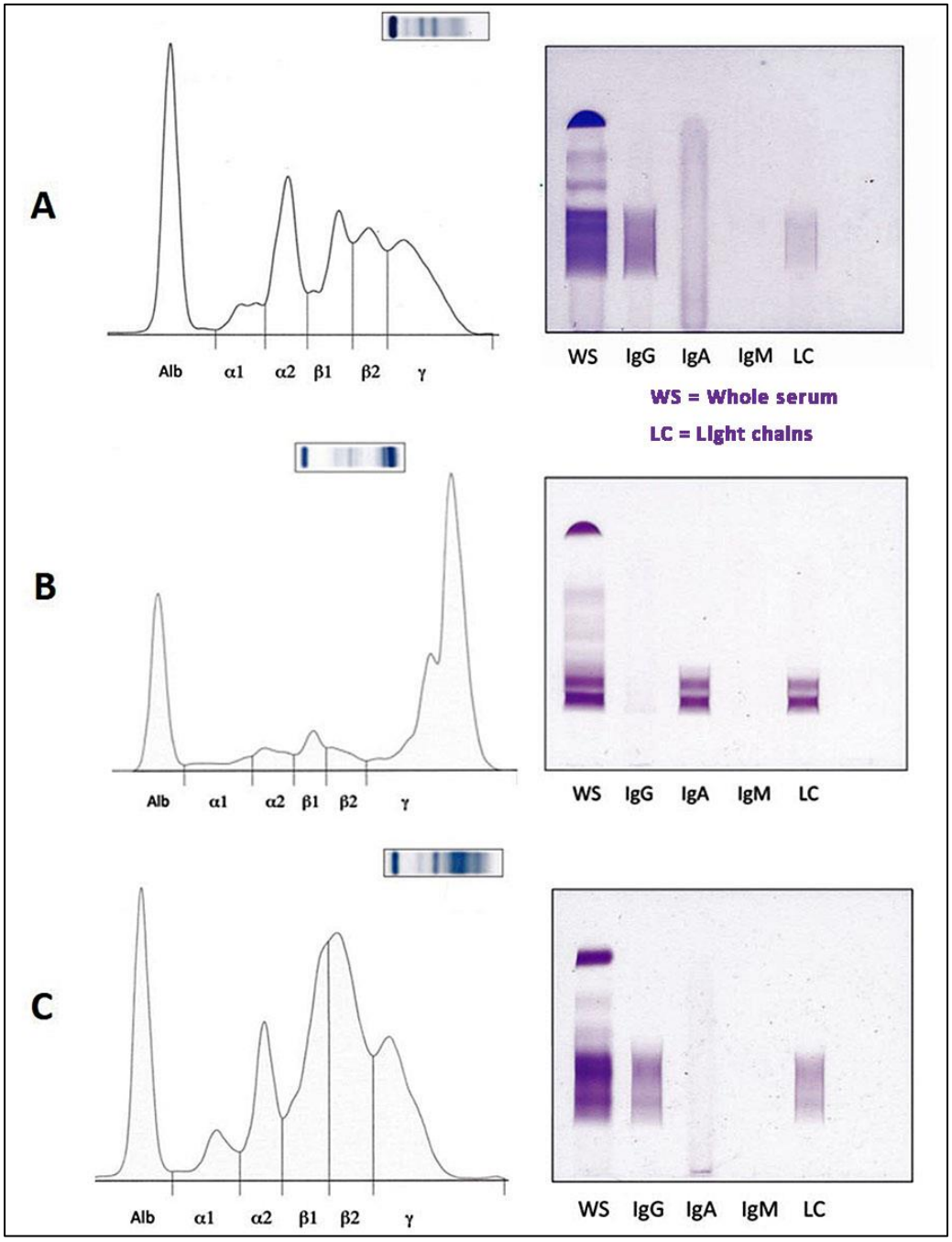
Test	Units	Patient	Flag	Reference Interval
Hematology				
RBC	x 10^6/uL	4.3	L	6.5 - 12.2
Hct	%	24	L	30 - 52
Reticulocytes	x 10^3/µL	10		3.0 - 50
WBC	x 10^3/µL	5.1		2.9 - 17.0
Segmented neutrophils	x 10^3/µL	2.0	L	2.3 - 10.3
Lymphocytes	x 10^3/µL	2.6		0.9 - 6.8
Monocytes	x 10^3/µL	0.5		0.0 – 0.6
Platelets	x 10^3/µL	58	L	200 - 900
Serum biochemistry				
Urea	mg/dL	24		16 - 37
Creatinine	mg/dL	1.7		0.9 - 2.3
Glucose	mg/dL	137		72 - 175
Total protein	g/dL	11.5	H	6.3 - 8.8
Albumin	g/dL	2.0	L	2.3 - 3.9
Globulin	g/dL	9.5	H	3.0 - 5.9


Spleen


Liver

Which paired serum protein electrophoretogram and immunofixation electrophoresis result is most likely?

A. A
B. B
C. C



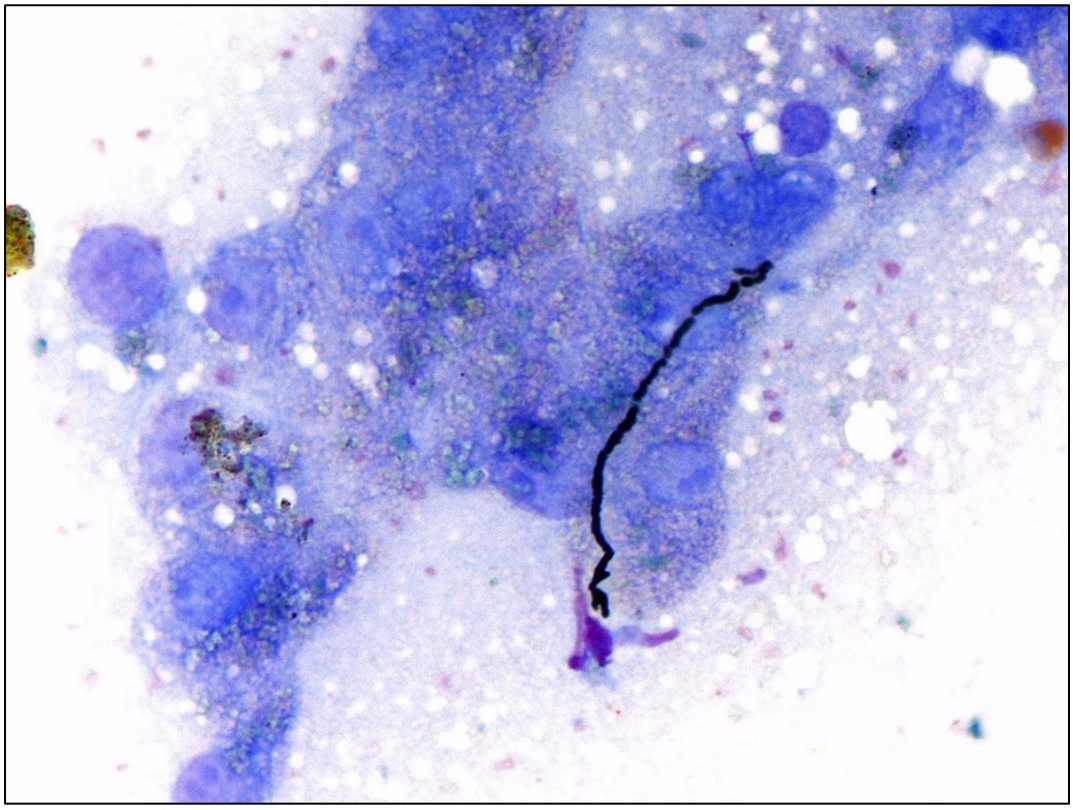
Answer: **B**

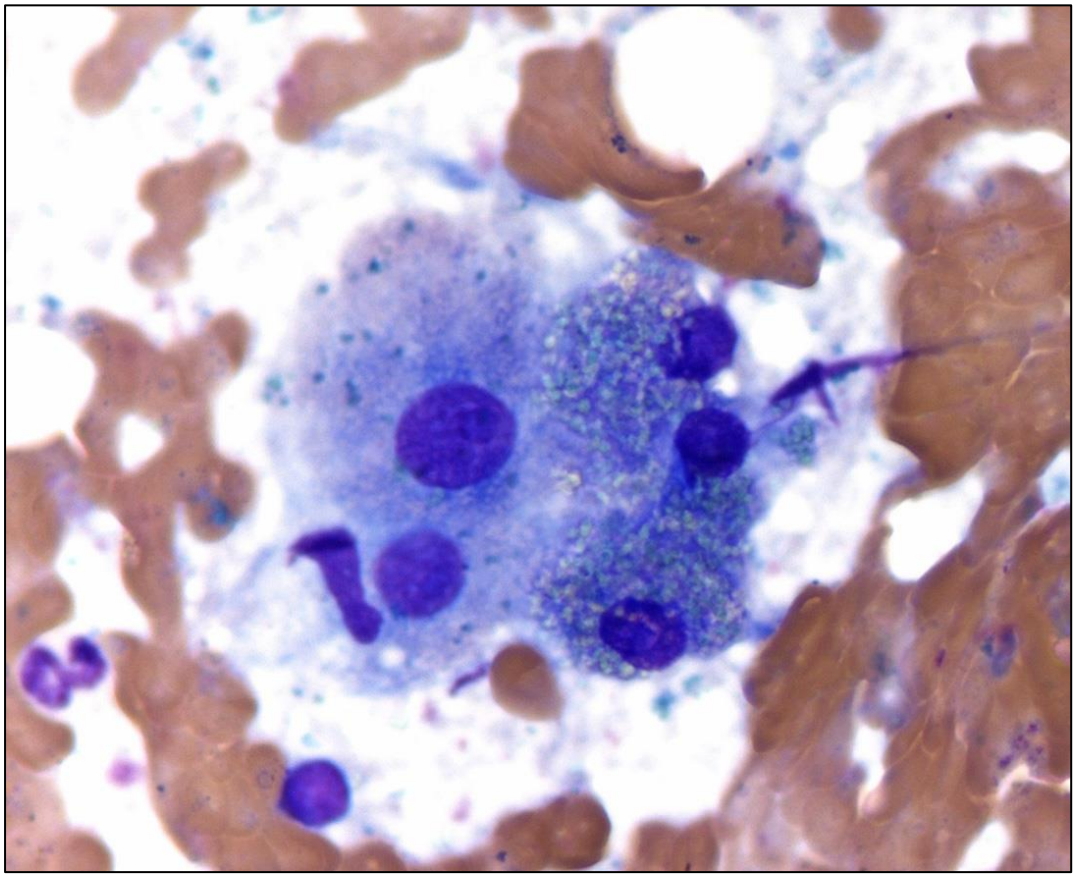
Example Question 16

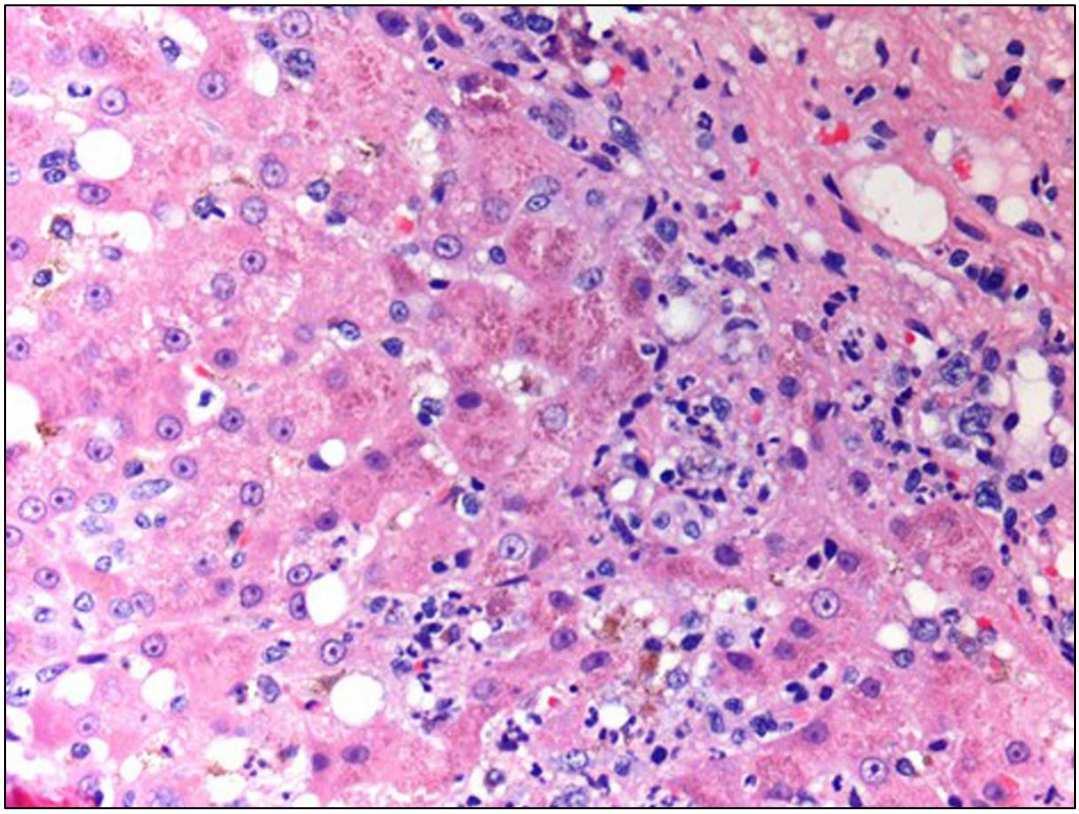
Section 3: Extended integrated interpretation - multiple images and/or data tables - hematology, biochemistry, cytology, histology

Hematologic and biochemical data, hepatic aspirate and hepatic tissue section from an adult dog with lethargy, inappetence and weight loss.

Test	Units	Patient	Flag	Reference Interval
Hct	%	33	L	37 - 55
Reticulocytes	x 10^9/L	25		0 - 80
WBC	x 10^9/L	20.0	H	4.8 - 13.9
Neutrophils	x 10^9/L	17.0	H	2.6 - 10.8
Lymphocytes	x 10^9/L	0.3	L	0.7 - 3.2
Monocytes	x 10^9/L	2.7	H	0.1 - 1.1
Eosinophils	x 10^9/L	0		0.0 - 1.2
Platelets	x 10^{12}/L	147		145 - 465
ALT	U/L	520	H	10 - 55
ALP	U/L	355	H	15 - 120
Bile acids (fasted)	µmol/L	41	H	<13
Bile acids (post-prandial)	µmol/L	184	H	<25







Which disease is most likely?

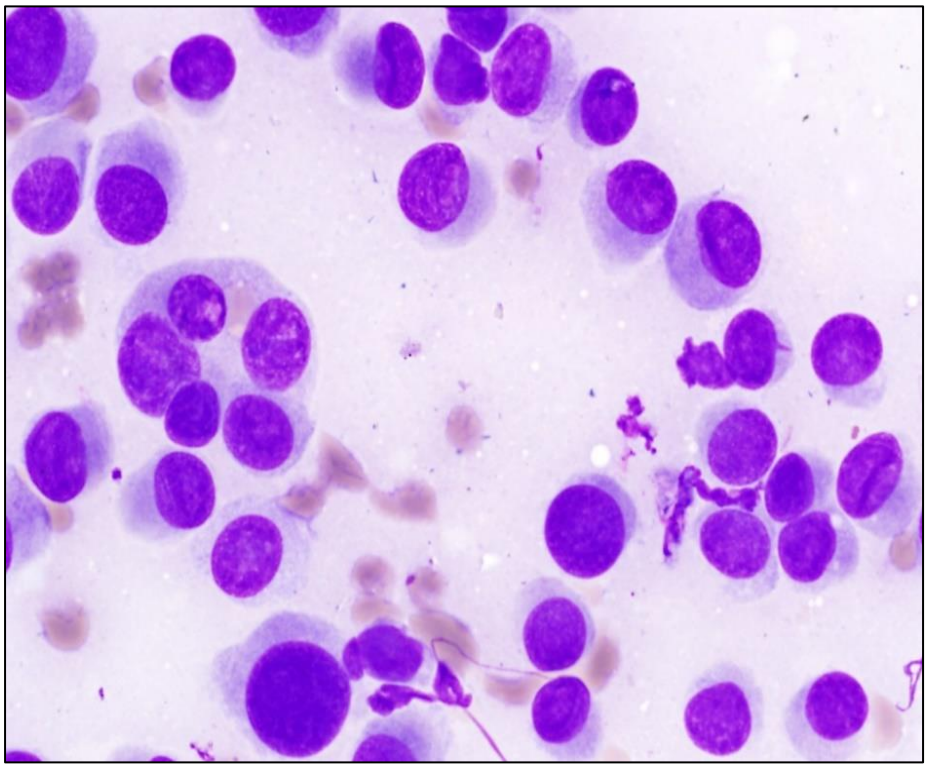
A. Copper toxicity
B. Hemochromatosis
C. Cholangiohepatitis
D. Hyperadrenocorticism

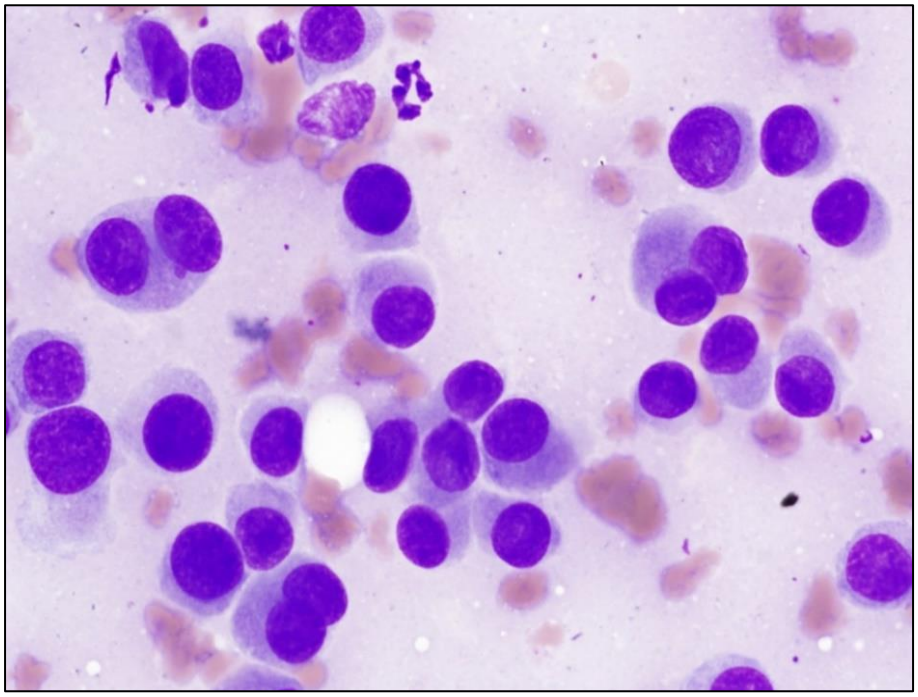
Answer: **A**

Example Question 17

Section 3: Extended integrated interpretation - multiple images and/or data tables, cytology

Aspirate and immunohistochemical panel from a 2 cm cutaneous mass on the pinna of an adult dog.





Immunohistochemical stain	Result
CD-3	Negative
CD-20	Positive
PAX-5	Negative
SOX-10	Negative
Vimentin	Positive
Cytokeratin	Negative
MUM-1/IRF-4	Positive

Which neoplasm is most strongly supported?

A. Histiocytoma
B. T cell lymphoma
C. Plasma cell tumor
D. Amelanotic melanoma

Answer: **C**