

ISVMA VTNE MasterClass

Laboratory Procedures and Evaluation

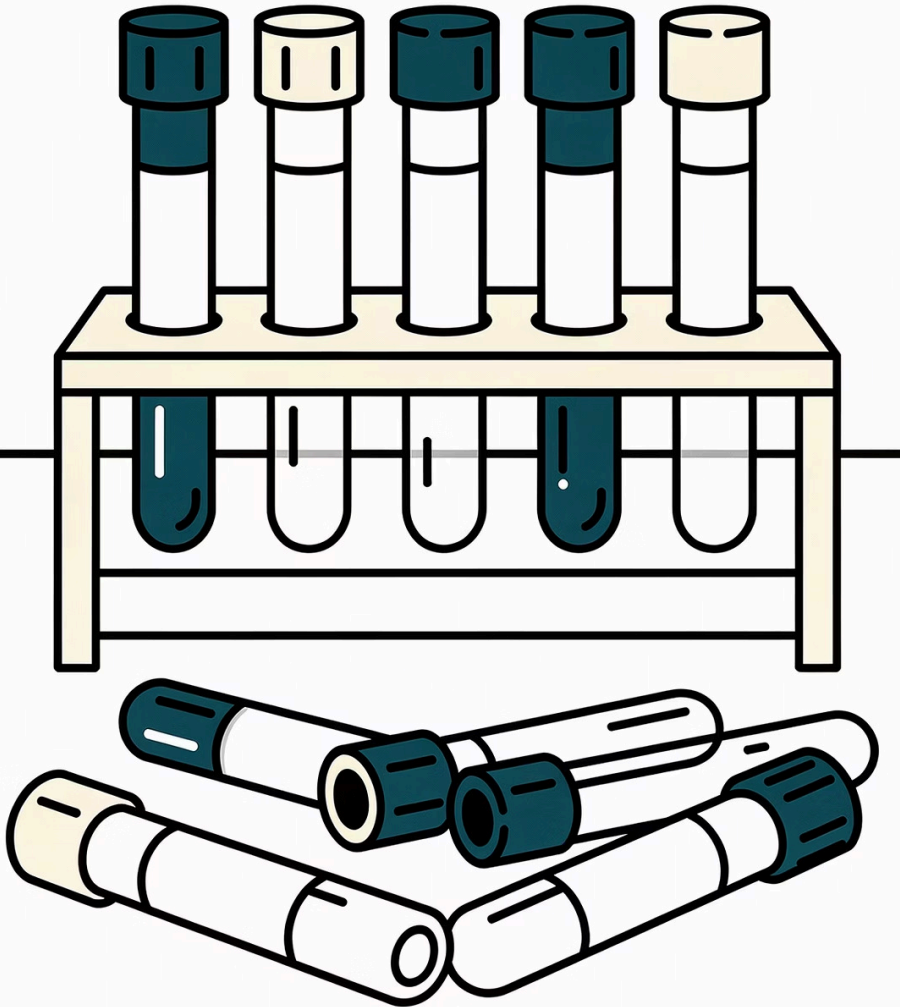
Essential techniques and protocols for veterinary diagnostics

Elizabeth Stark and Sabrina Beck

From VetRaft Solutions



Sample Collection Tubes



Red/Red-Black Top

Clot activator creates serum when spun. Allow whole blood to clot before spinning for best results.

Purple/Lavender Top

EDTA anticoagulant for whole blood samples. Used most often for CBC because EDTA preserves morphology best.

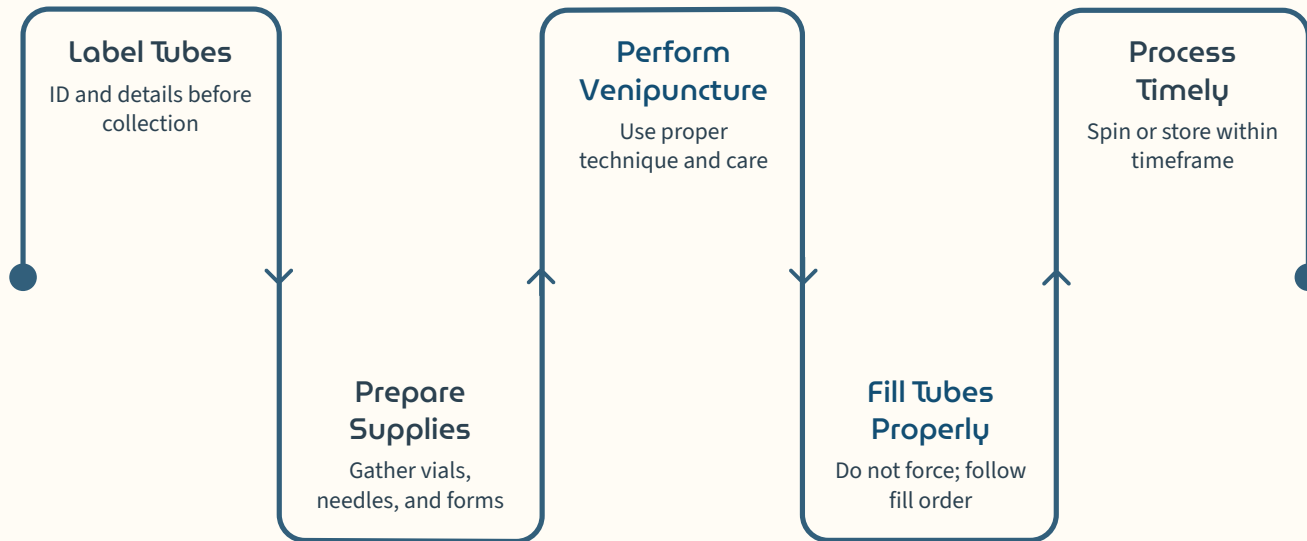
Green Top

Lithium or sodium-heparin tube. Spun down creates plasma for chemistry testing.

Blue Top

Sodium citrate anticoagulant. Blood-to-anticoagulant ratio is critical for accurate clotting time results.

Critical Sample Facts



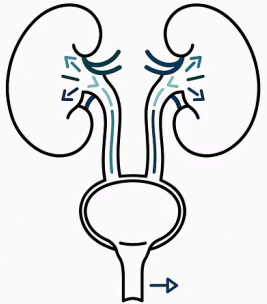
Proper technique ensures accurate test results and prevents sample rejection.

Key Guidelines

- Label blood tubes before collection
- Never force sample into tubes - breaks cells
- Fill anticoagulant vials first
- Gently agitate, don't shake
- Separate serum within 45 min-2 hours
- Refrigerate urine samples immediately

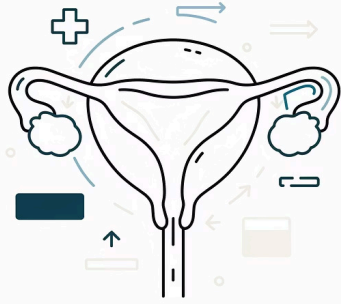
The Power of Urine

Samples are checked for appearance, concentration, and content to give information about key body systems.



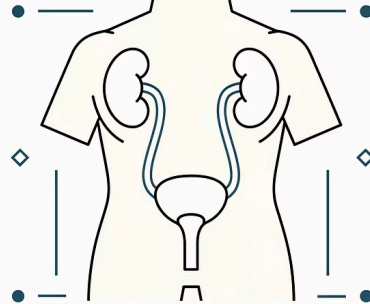
Kidneys

Kidney function and filtration efficiency. Are waste products being cleared?



Bladder

Bladder health and capacity. Signs of infection or inflammation.



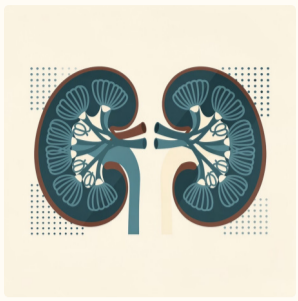
Urinary Tract

Full tract assessment. Detecting blockages, crystals, or abnormal cells.



The Big Picture: Think in BODY SYSTEMS, not individual values

Instead of memorizing 20+ values, group them into 5 systems. Everything fits somewhere.



Kidneys

Filtration ("What can't get out?"):

- BUN
- Creatinine
- SDMA

If waste is high → filtration problem. **"Kidneys = Waste"**

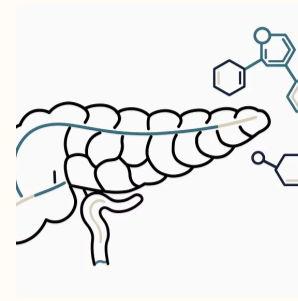


Liver

Processing & Detox ("What gets processed?"):

- ALT
- AST
- ALP
- GGT
- Bilirubin

Leak enzymes (ALT, AST) = cells damaged. Flow enzymes (ALP, GGT) = bile not moving. **"Liver = Leak & Flow"**



Pancreas / Metabolic

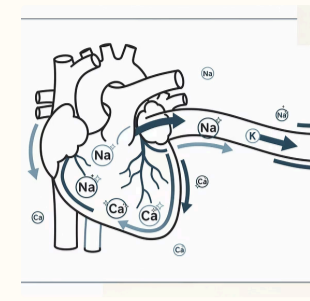
Energy ("Sugar control"):

- Glucose
- Amylase
- Lipase

Glucose ↑ → diabetes/stress.

Lipase ↑ → pancreatitis.

"Pancreas = Sugar & Fat digestion"

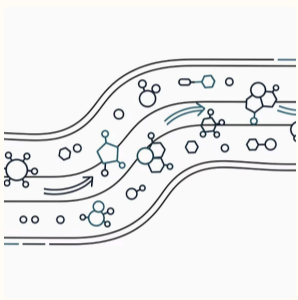


Electrolytes

Balance ("Fluid + heart + nerves"):

- Na
- K
- Cl
- Ca
- Phos

Low Na + high K → think Addison's. High Phos → kidney disease. **"Electrolytes = Hydration & Heart"**



Proteins

Nutrition + Liver + Inflammation:

- TP
- Albumin
- Globulin

Albumin → keeps fluid in vessels.

Globulin → immune system.

"Proteins = Pressure & Immunity"

Breaking Down Each System

📄 🧠 **"KLEP-P"**

K → Kidneys | L → Liver | E → Electrolytes | P → Pancreas | P → Proteins

How to READ a Chemistry Panel

01

Kidneys

"Are they filtering?"

02

Liver

"Are cells damaged or is bile stuck?"

03

Glucose / Pancreas

"Energy problem?"

04

Electrolytes

"Hydration or emergency imbalance?"

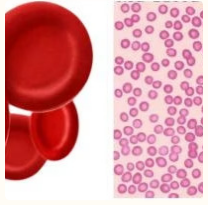
05

Proteins

"Chronic issue? Nutrition? Inflammation?"

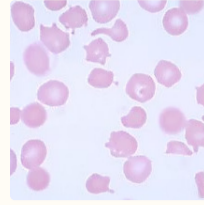
🧠 **Coaching Insight:** Don't memorize labs. Train yourself to ask: "What system is this?" "Is this a leak, blockage, or failure?" "Does this match the patient?" That's how you build confident techs and leaders—not just people who can read a printout.

Blood Cell Identification



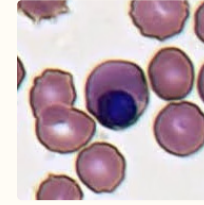
Red Blood Cells

Flat round disks with central indentation. Carry oxygen from lungs throughout the body. No nucleus present.



Poikilocytes

Different Shape RBCs that are a sign of disease or artifact caused by sample handling



nRBC

Baby rbc's

White Blood Cell Types

1

Neutrophils

Granulocyte- First immune responders. Larger than RBCs with multilobed nucleus (2-5 lobes). Travel to infection sites.

2

Lymphocytes

Agranulocyte- Large round cells with prominent nuclei. Handle antibody production and tumor cell destruction.

3

Basophils

Granulocyte- 2-lobed nucleus with tiny purple granules in pink cytoplasm. Defend against allergens and parasites.

4

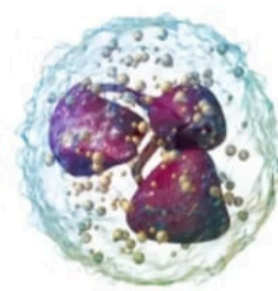
Eosinophils

Granulocyte- 2-lobed nucleus with bright red granules. Provide defense against parasites and promote allergic reactions.

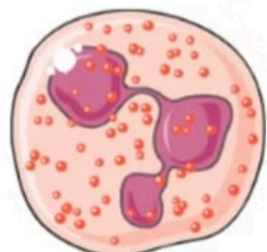
5

Monocytes

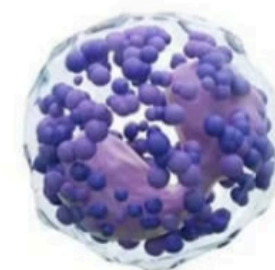
Agranulocyte- Pale bluish-violet nucleus with soft, spongy "bean" appearance. Destroy viruses, bacteria, fungi, and protozoa.



Neutrophil



Eosinophil



Basophil

WBC



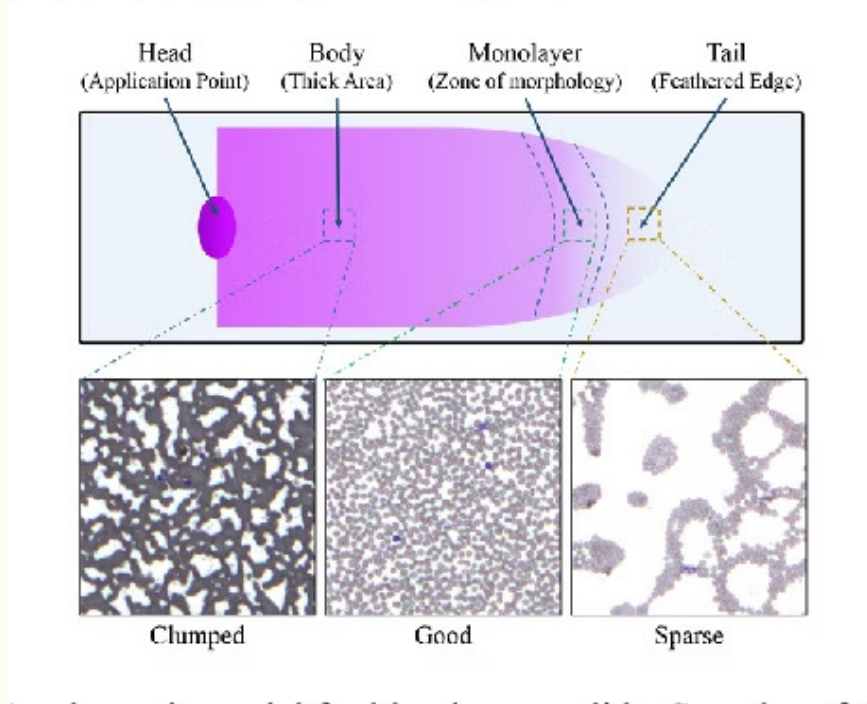
Lymphocyte



Monocyte

Blood Smear Parts

are also shown in Fig. 1.



Viewing Location Matters!

Body- thickest area where RBCs are piled on top of each other

Monolayer- diagnostic area

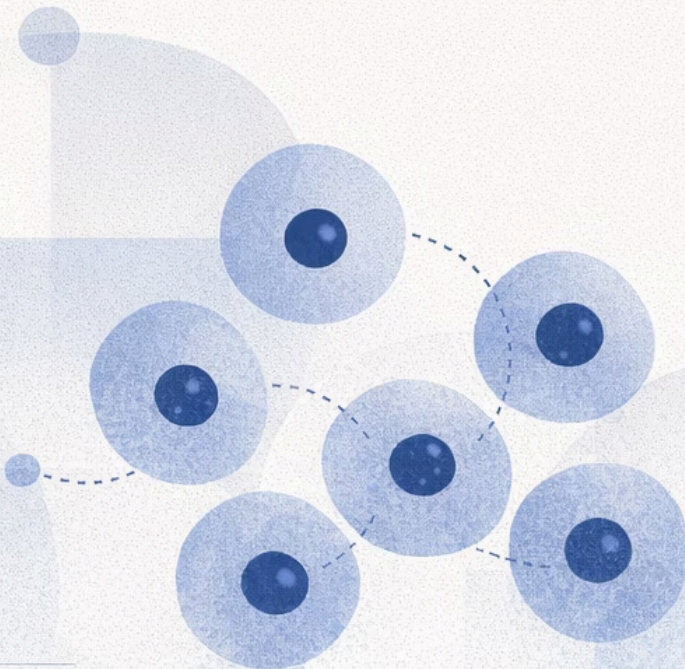
Feathered edge- view for blood parasites

Cytological Assessment: Benign vs. Malignant

Understanding the key distinctions between benign and malignant cellular changes is crucial for accurate diagnosis in veterinary medicine.

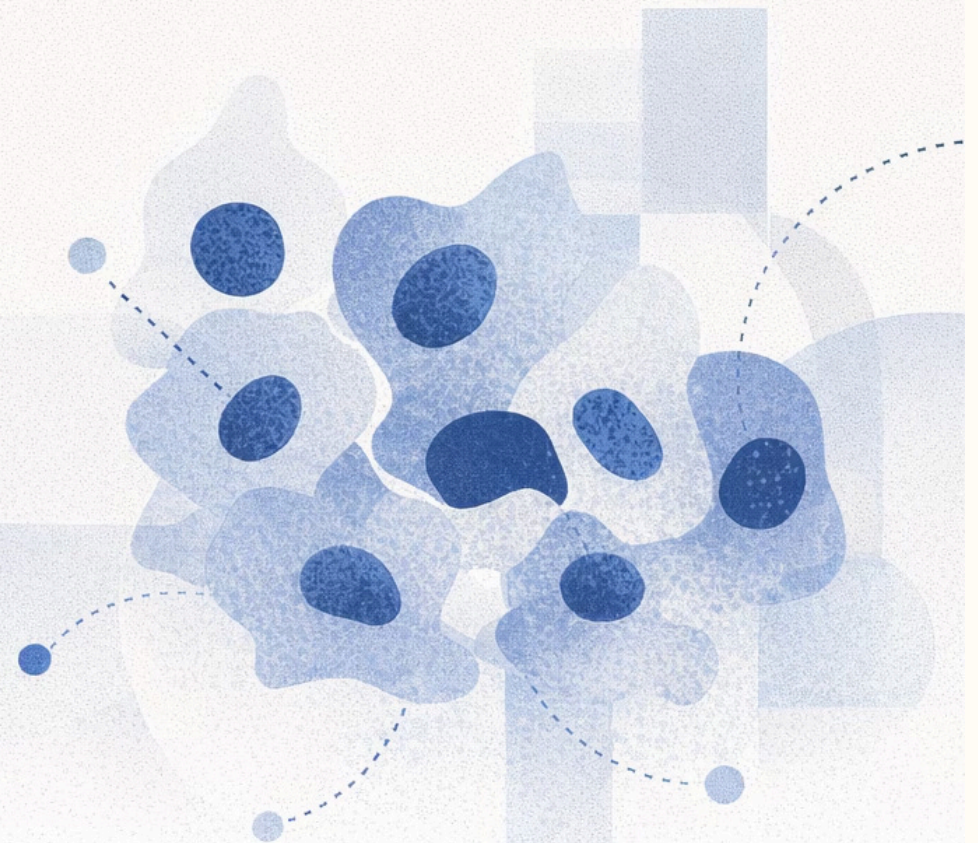
Benign

Less likely to spread,
often hyperplasia,
few malignant criteria present



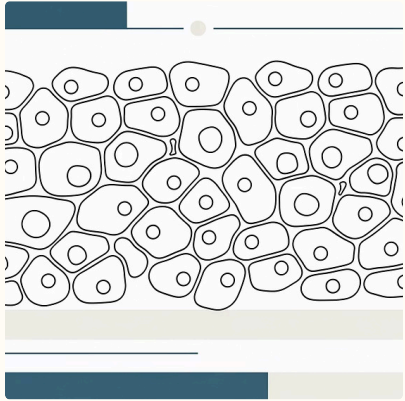
Malignant

Likely to spread,
3+ malignancy criteria met



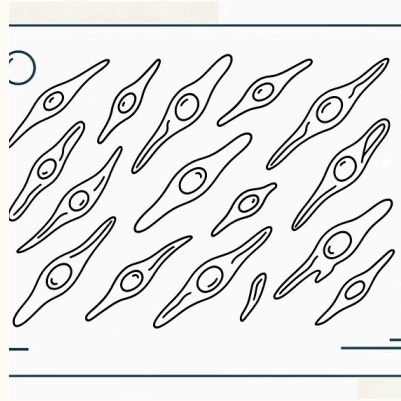
Tumor Classifications

Understanding the three primary classifications helps differentiate tumor types in cytological samples.



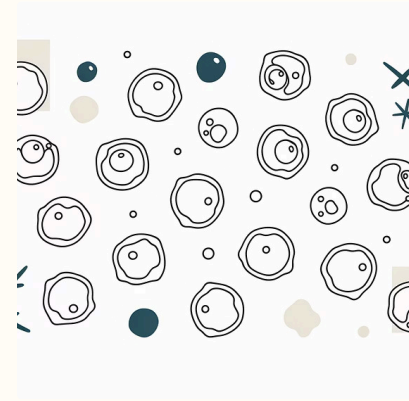
Epithelial Tumors (Carcinomas)

Highly cellular, with cells that typically exfoliate in cohesive sheets, often exhibiting distinct cell-to-cell adhesion.



Mesenchymal Tumors (Sarcomas)

Generally less cellular, characterized by individual, elongated spindle-shaped cells that appear disconnected in smears.

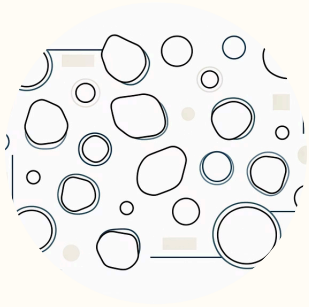


Round Cell Tumors

Exfoliate exceptionally well, presenting as distinct, individual round cells. Common examples include lymphoma and mast cell tumors.

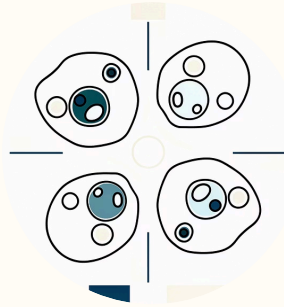
Criteria for Malignancy

Identifying these key cellular features helps differentiate benign from malignant processes.



Anisocytosis

Variation in cell size



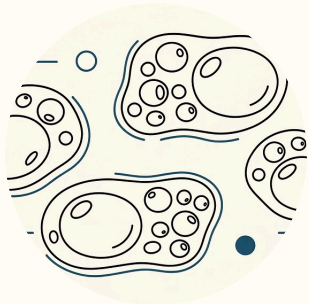
Anisokaryosis

Variation in nuclear size



Pleomorphism

Variation in cell shape and form



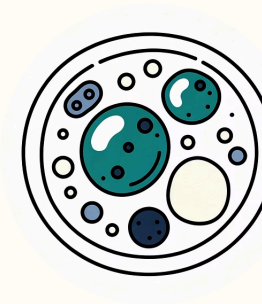
High N:C Ratio

Nucleus takes up a large proportion of the cell's volume



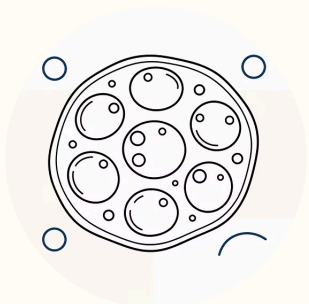
Coarse Chromatin

Clumped or irregularly distributed genetic material



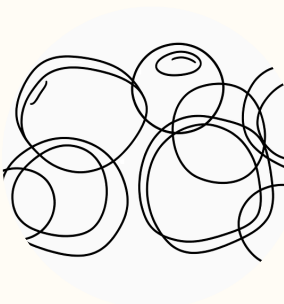
Prominent Nucleoli

Large or irregularly shaped nucleoli within the nucleus



Multinucleation

Presence of multiple nuclei within a single cell




Nuclear Molding

Nuclei conforming to the shape of adjacent nuclei



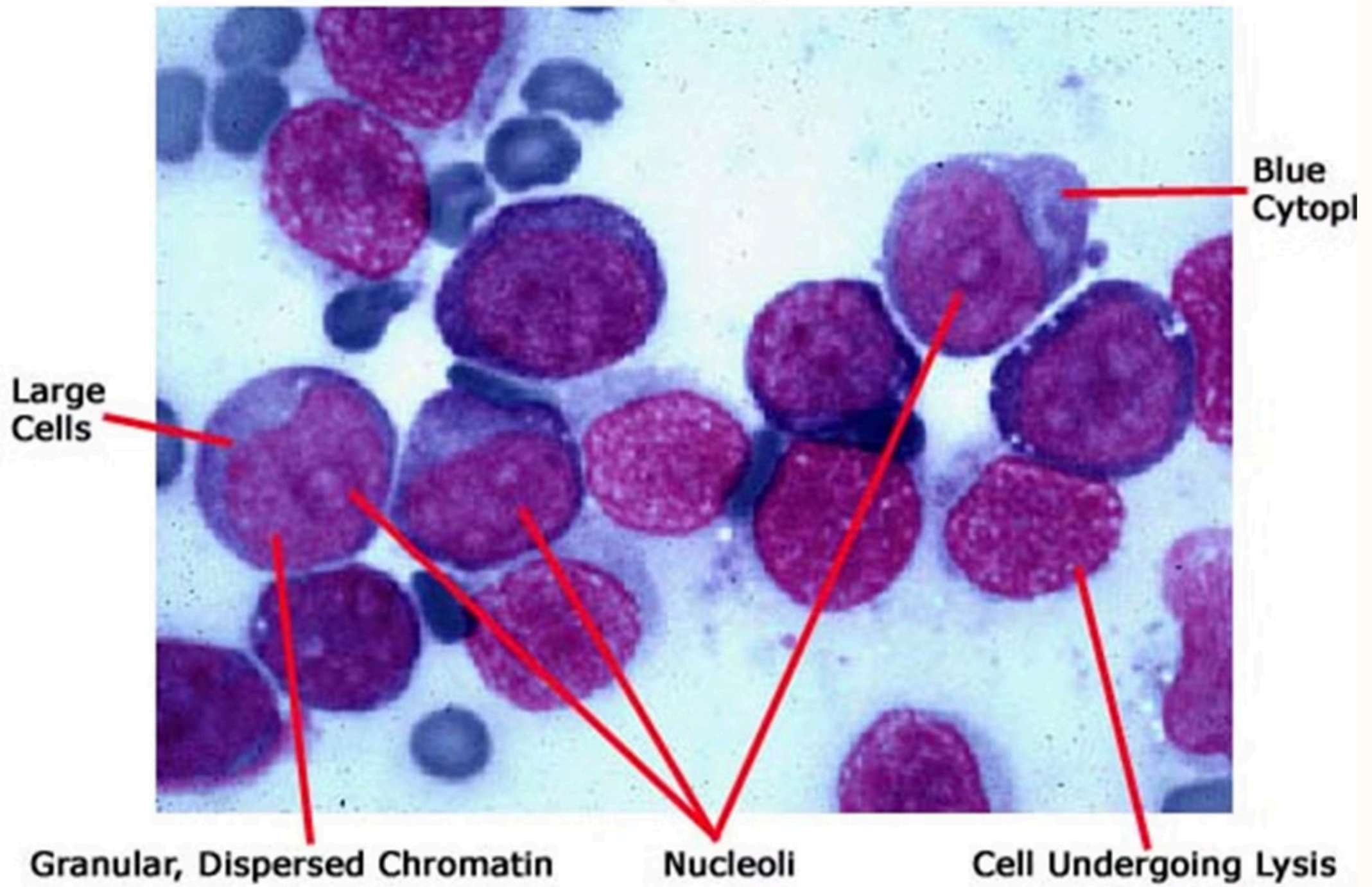
High Mitotic Activity

Increased number of cells undergoing division

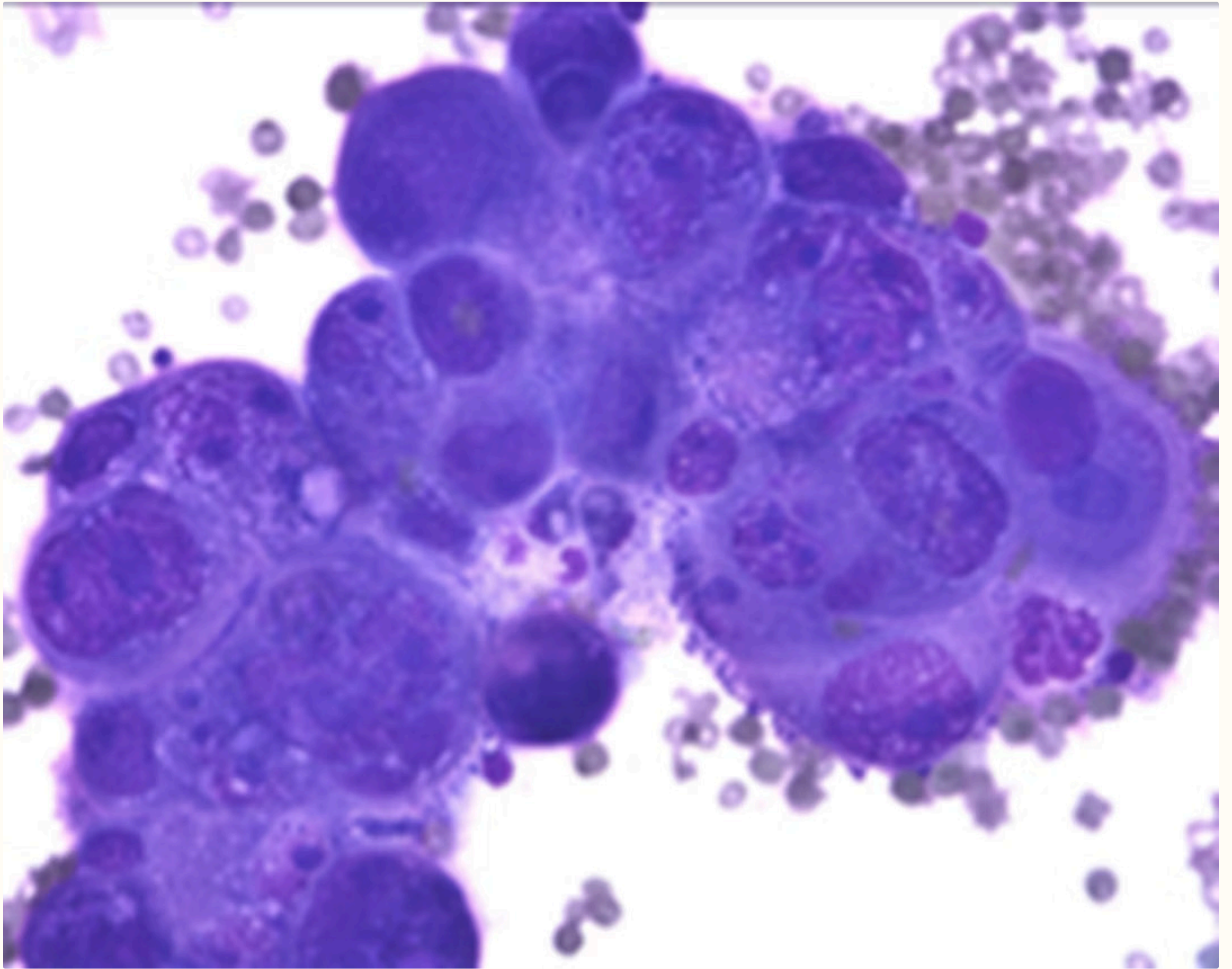
 **Key Indicator:** Three or more criteria present are highly suspicious for malignancy.

Let's Take a Look Together..

Immature Lymphocytes Predominate



What do you see?

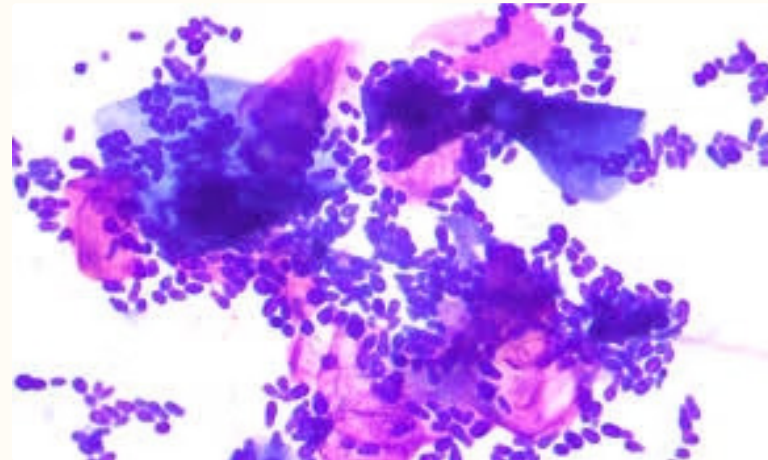


Ear Cytology Findings

Common Organisms

Viewing: Oil immersion, condenser raised, light increased

Symptoms: Itching, strong odor, discharge



Yeast

Malassezia sp - Peanut-shaped budding organism, 3-5 μ m, strong stain uptake.

Cocci Bacteria

Staphylococcus - Small round clusters, Gram positive, strong stain.

Rod Bacteria

Pseudomonas - Long oval shape, Gram negative, 0.5-1.5 μ m diameter. (foul odor)

Fecal Examination Methods



01

Direct Smear

Mix small sample with saline on slide, add coverslip, examine immediately. Quick screening method.

03

Centrifugal Float

Strain mixed sample, centrifuge 6 minutes, fill to meniscus, wait 10 minutes. Most sensitive method.

02

Float

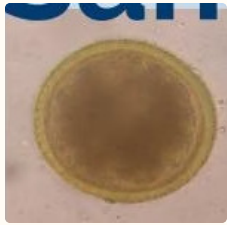
Mix sample with float solution, fill tube to meniscus, place coverslip, wait 10 minutes. Eggs rise to top.

04

Snap

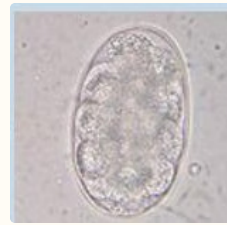
Usually sent to the lab for ELISA testing. Most accurate for smaller harder to detect parasites.

Common Fecal Parasites



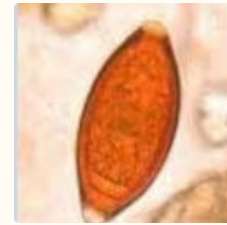
Roundworm

Toxocara sp- Thick oval cyst. Passed through feces, causes weight loss.



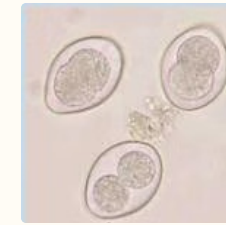
Hookworm

Ancylostoma sp - Thin oval cyst. Latches to feed on blood, causes anemia.



Whipworm

Trichuris vulpis - Football-shaped with polar plugs. Causes bloody diarrhea.



Coccidia

Isospora sp - Small oval oocyst. Causes diarrhea and dehydration in young animals.



Tapeworm perglodid

Dipylidium caninum - Rice-like segments. Transmitted by fleas carrying eggs.



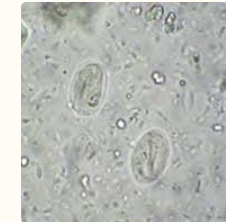
Tapeworm egg

Hymenolepsis sp- Perglodid holds packets of eggs. Hooks visible on individual egg.



Giardia Trophozoite

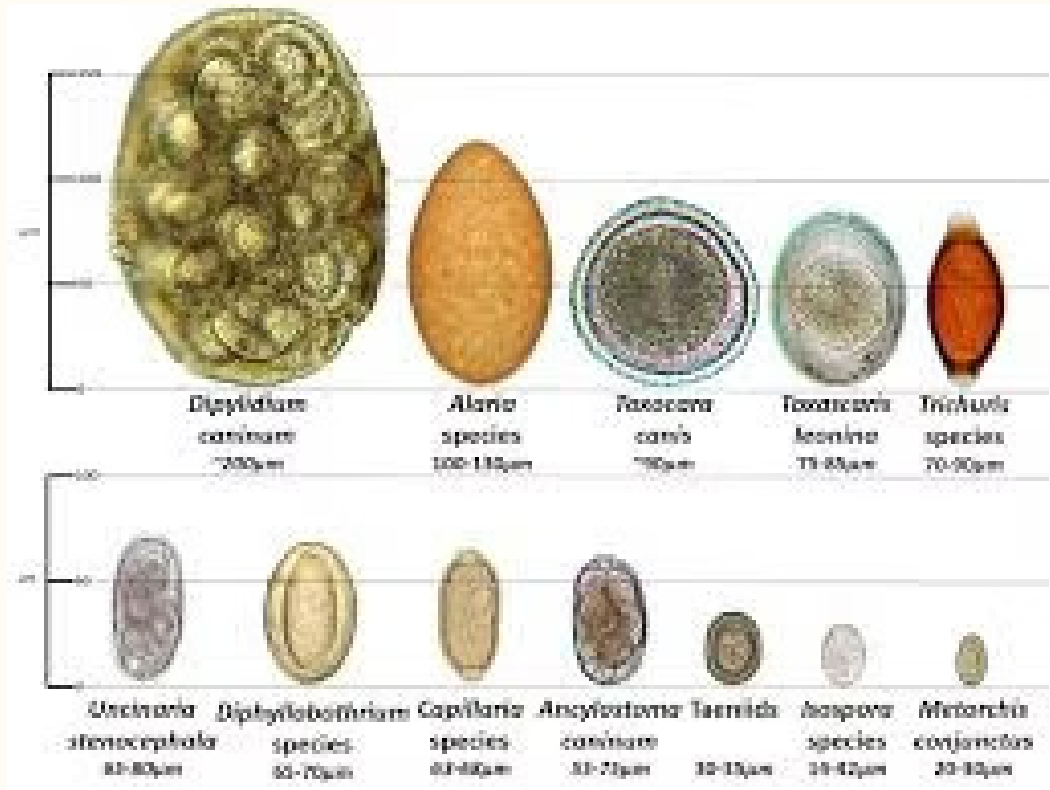
Trophozoite- Smallest of relative parasites seen under microscope. Trophs will be moving.



Giardia Cyst

Very small. Seen on direct smear or float.

Comparative Sizes



Microscope viewing and measurement matters!

Some microscopes have a scale to measure objects.

Different species have different parasites.

Keep in mind some parasites are species specific.

Case Studies



 Merck Veterinary Manual



Case-Study:Shar-pei with Icterus-Merck Veterinary Manual



 Merck Veterinary Manual



Case-Study:Irish terrier with mass on head-Merck Veterinary Manual

 www.merckvetmanual.com



Loading...