



**Medical Analysis
Department**

Giardia lamblia & Balantidium coli Microscopical Urine Examination

Parasitology (MA 301)

Summer School

Lab 2

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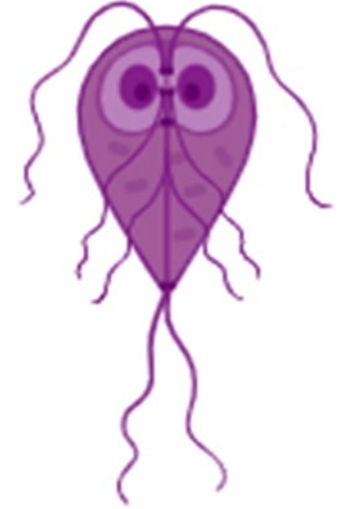
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Giardia lamblia



Introduction

Giardia lamblia is a flagellated protozoan parasite that infects the small intestine of humans and other mammals, causing giardiasis,

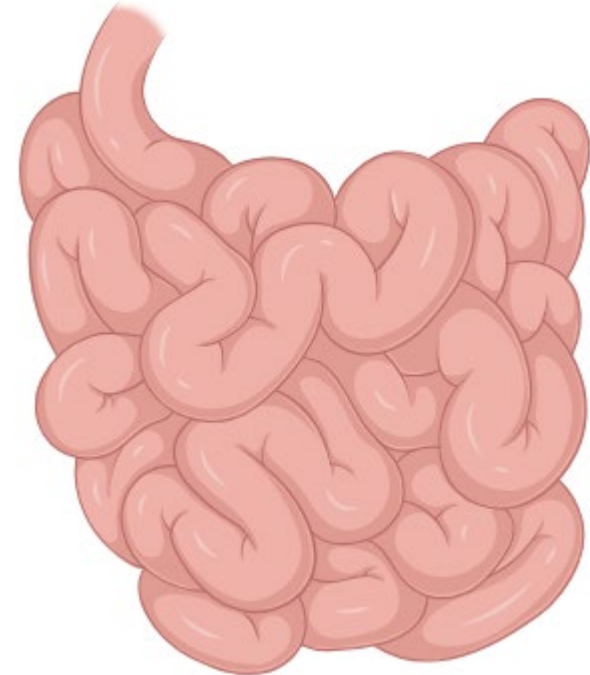


Mode of infection

It is transmitted mainly through ingestion of cysts in contaminated water, food, or by fecal–oral contact. The parasite exists in two forms: the infectious cyst and the motile trophozoite.

Habitat

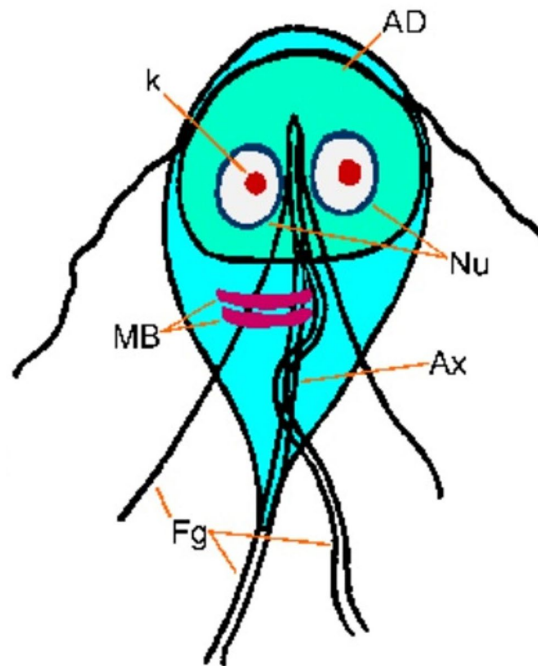
G. lamblia lives in the duodenum and upper jejunum and is the only protozoan parasite found in the lumen of the human small intestine



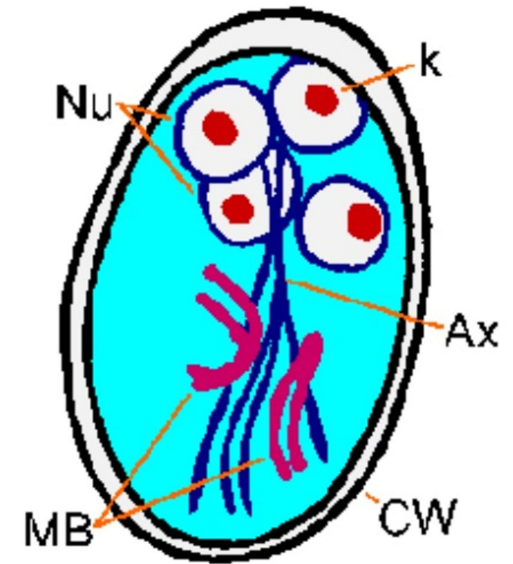
Morphology

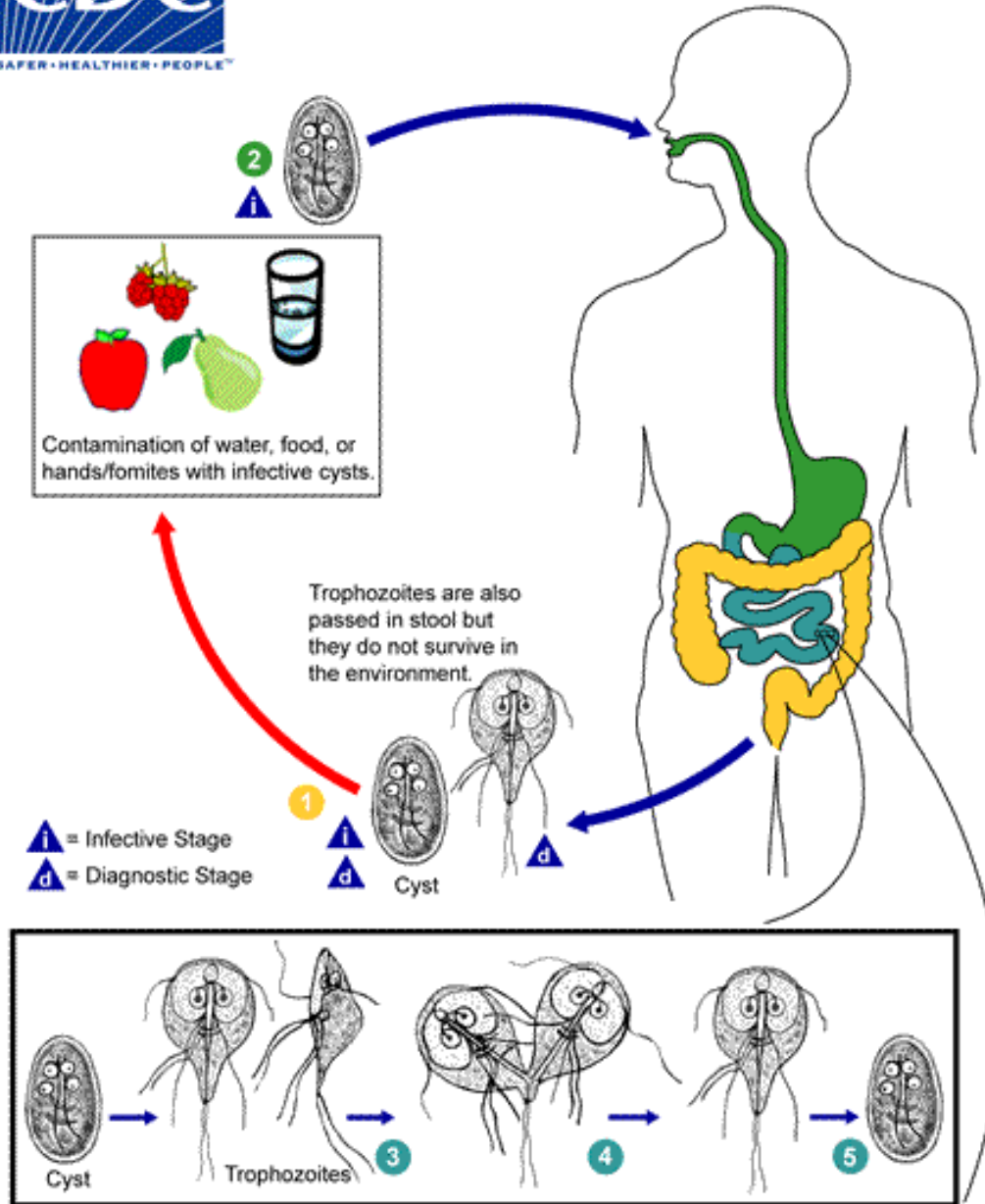
It exists in two forms:

1. Trophozoite (or vegetative form)



2. Cyst (or cystic form).





Laboratory Diagnosis

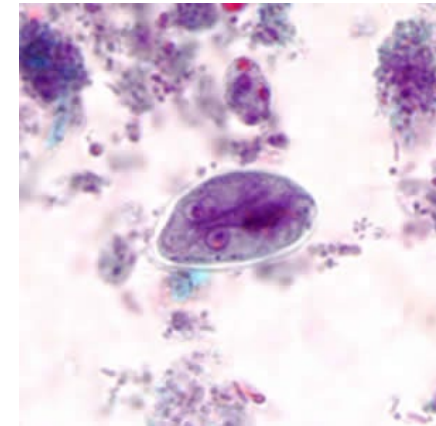
Stool Examination

1. Microscopical examination

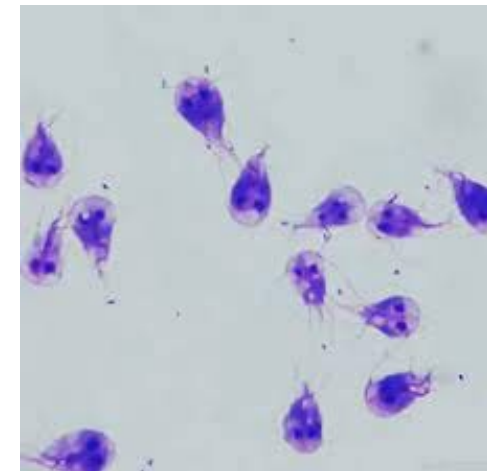
Giardiasis can be diagnosed by the identification of cysts of *Giardia lamblia* in the formed stools and the trophozoites and cysts of the parasite in diarrheal stools

- On microscopic examination, cysts and trophozoites can be found in diarrheal stools by saline and iodine wet preparations. Often, multiple specimens need to be examined.

Cyst



Trophozoite



Laboratory Diagnosis

2. Macroscopical Examination

- Steatorrhea



3. Serodiagnosis

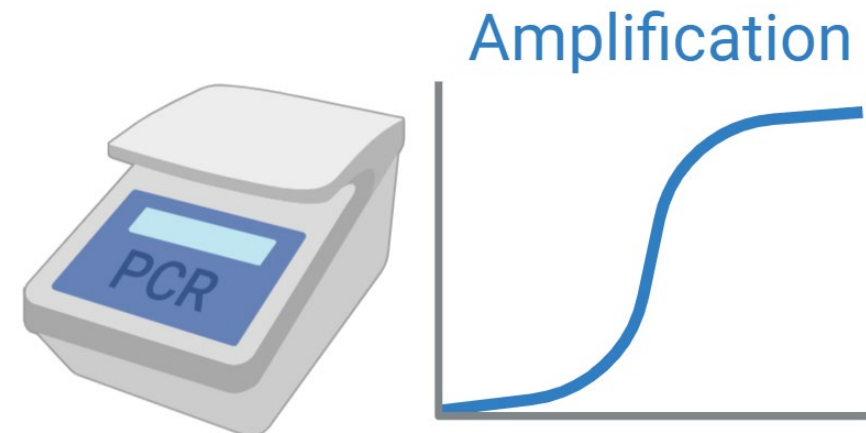
- Antigen detection: ELISA
- Antibody detection: ELISA



Laboratory Diagnosis

4. Molecular Method

Deoxyribonucleic acid (DNA) probes and polymerase chain reaction (PCR) have been used to demonstrate parasitic genome in the stool specimen



Balantidium coli

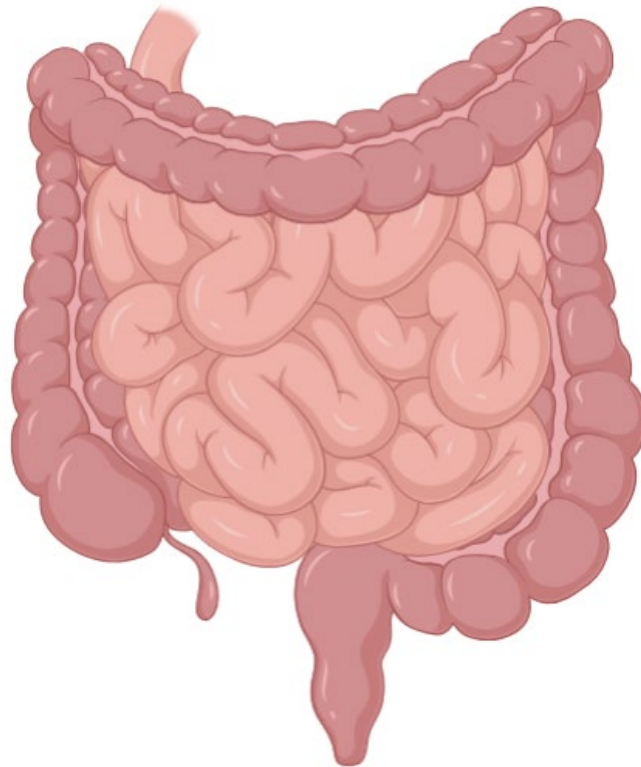
Introduction

Balantidium coli belongs to the Phylum Ciliophora

- It is the only ciliate protozoan parasite of humans.
- It is the largest protozoan parasite of humans.
- Largest protozoan parasite residing in the large intestine of human: Balantidium coli.

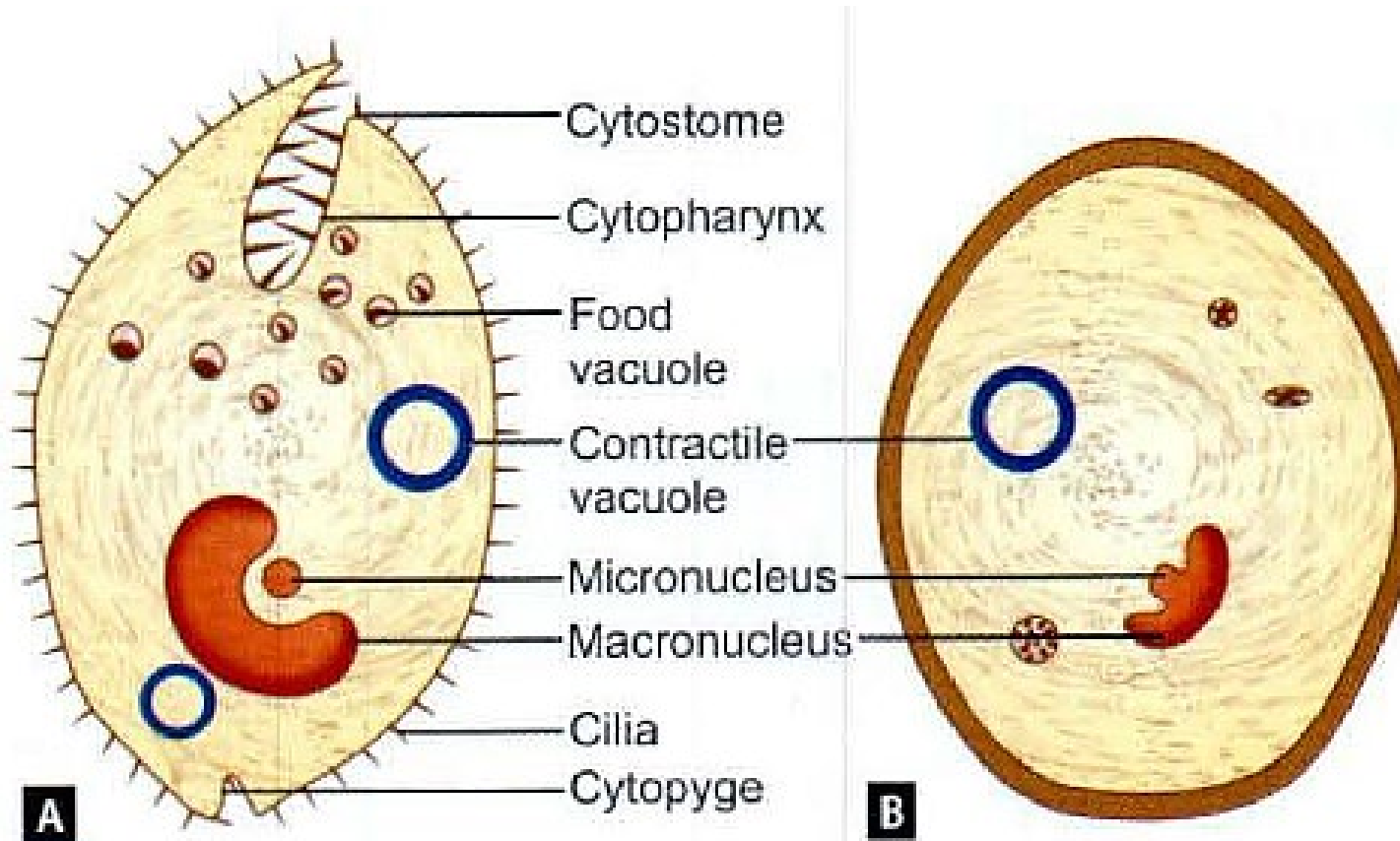
Habitat

Balantidium coli resides in the large intestine of man, pigs and monkeys.



Morphology

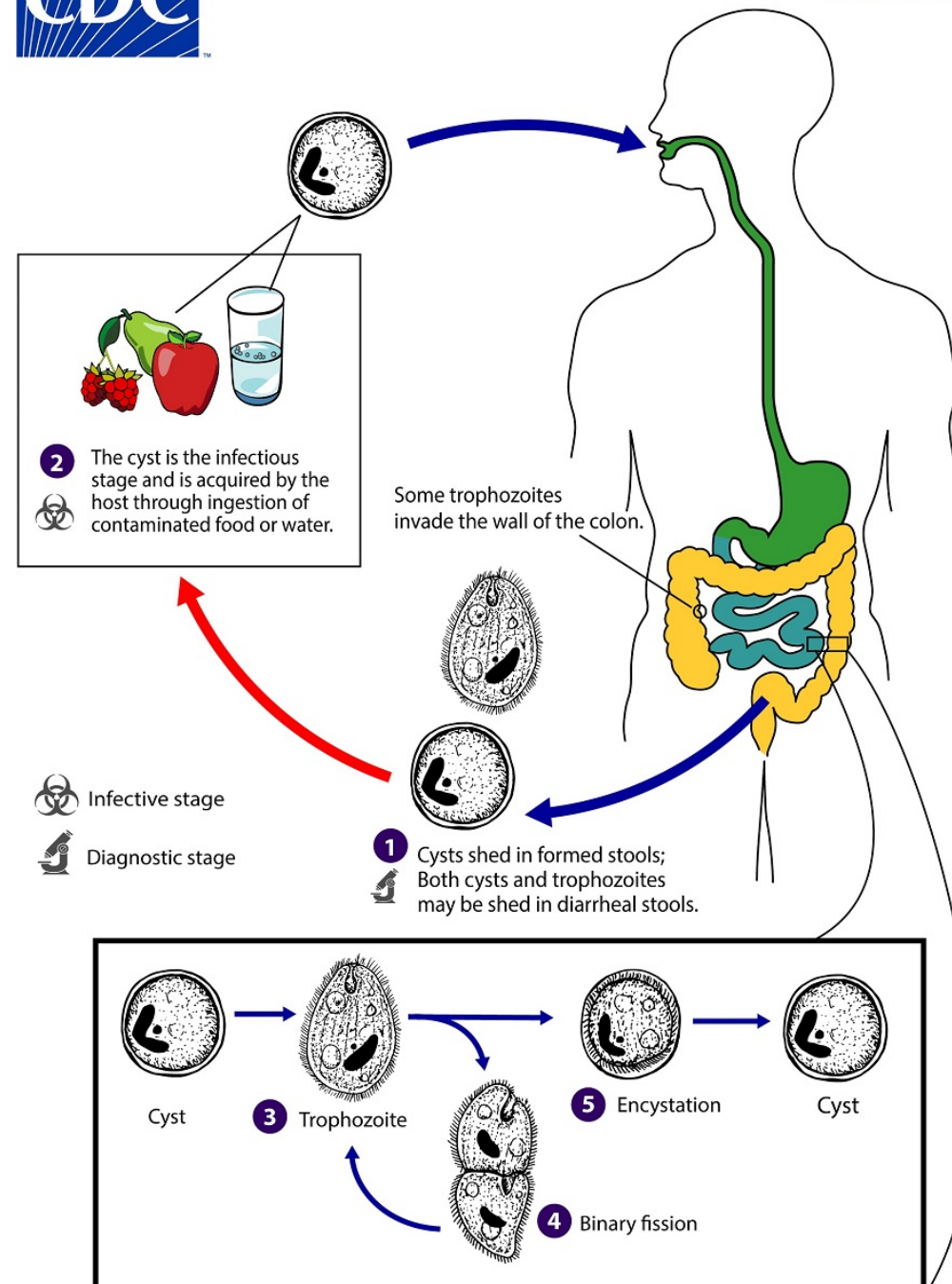
Balantidium coli occurs in two stages: (A) trophozoite and (B) cyst



Life cycle



Balantidium coli



Laboratory diagnosis

Stool Examination

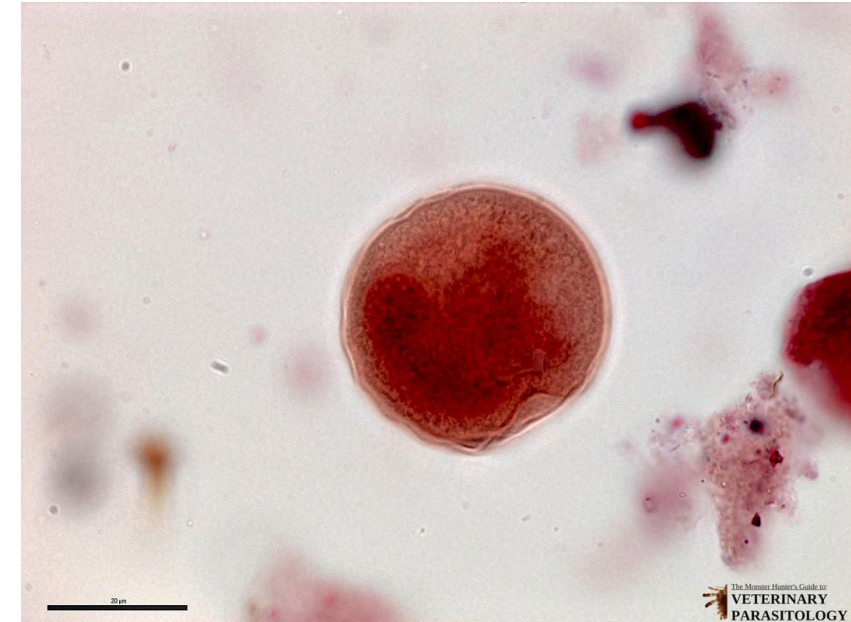
Diagnosis of *B. coli* infection is established by demonstration of trophozoites and cysts in faeces.

- Motile trophozoites occur in diarrheic faeces, and cysts are found in formed stools.
- The trophozoites can be easily recognised by their large size, macronucleus and rapid-revolving motility.
- The cysts can also be recognised in the formed stools by their round shape and presence of a large macronucleus.

Balantidium coli (Trophozoite)



Balantidium coli (Cyst)



General Urine Examination

Introduction

General Urine Examination (GUE) is a routine test performed to assess the physical, chemical, and microscopic characteristics of urine. It helps in the diagnosis of renal diseases, urinary tract infections, metabolic disorders, and systemic conditions.

Clinical Importance of GUE

1. Assessment of Kidney Function

- Detects proteinuria, hematuria, casts → early signs of glomerular or tubular disease.
- Specific gravity, pH, and sediment help evaluate renal concentrating ability.

2. Diagnosis of Urinary Tract Infections (UTI)

- Presence of WBCs, bacteria, nitrite, and leukocyte esterase → strong indicators of infection.

3. Detection of Systemic Diseases

- Diabetes mellitus: glucosuria, ketonuria.
- Liver disease/hemolysis: bilirubin, urobilinogen.
- Hypertension/cardiovascular disease: secondary renal changes.

Clinical Importance of GUE

4. Hydration and Electrolyte Balance

- Specific gravity and volume reflect dehydration, overhydration, or electrolyte imbalance.

5. Detection of Metabolic Disorders

- Ketonuria → diabetic ketoacidosis, starvation.
- Crystals (uric acid, oxalates) → gout, kidney stones, metabolic abnormalities.

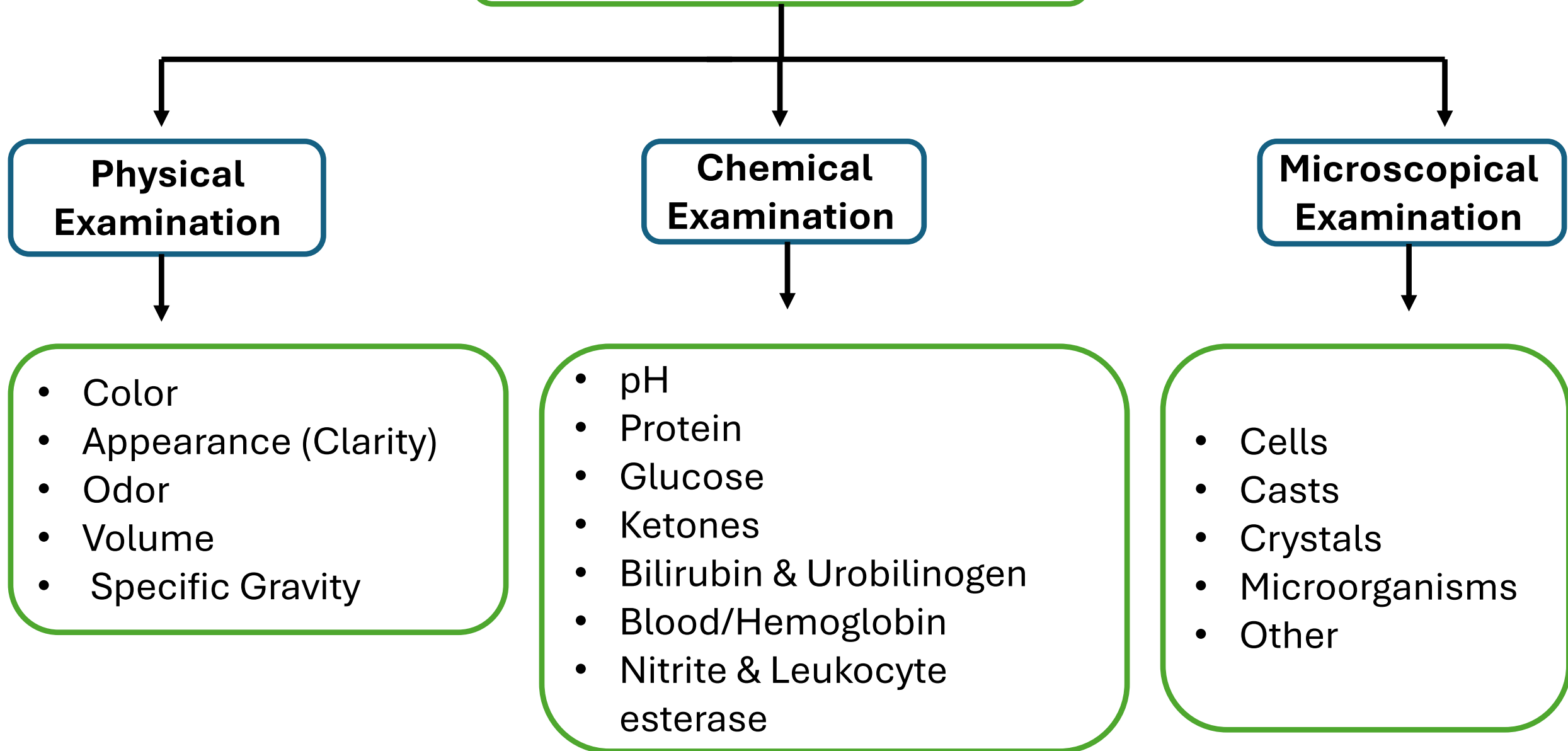
6. Monitoring Disease Progression & Treatment

- Follow-up of renal diseases, diabetes, hypertension, and UTI therapy.

Specimen Collection

- Type: Fresh, midstream, clean-catch urine.
- Container: Clean, dry, labeled container (sterile if for culture).
- Volume: 10–15 mL minimum.
- Timing: Morning sample preferred (more concentrated).
- Precautions: Avoid contamination with feces, vaginal secretions, or disinfectants.

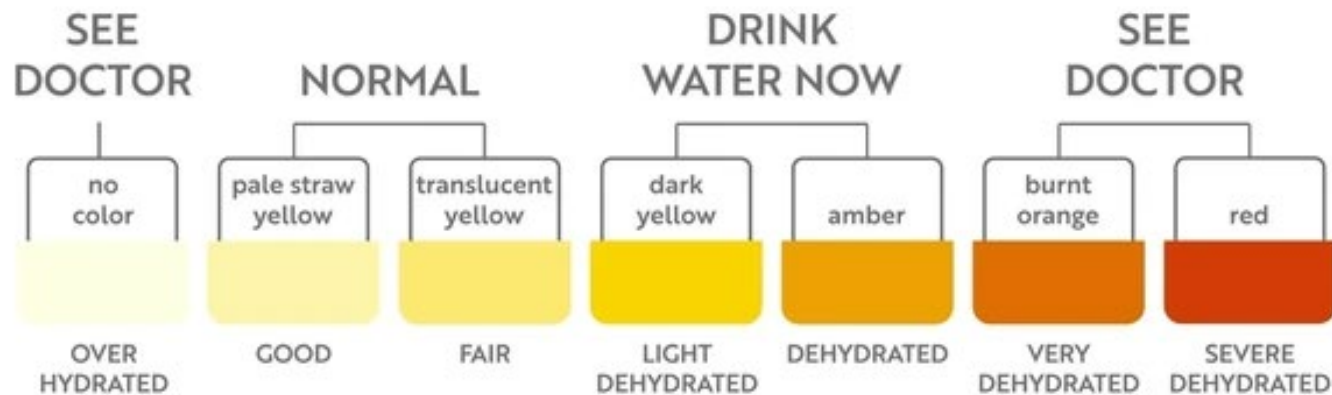
General Urine Examination



1. Color

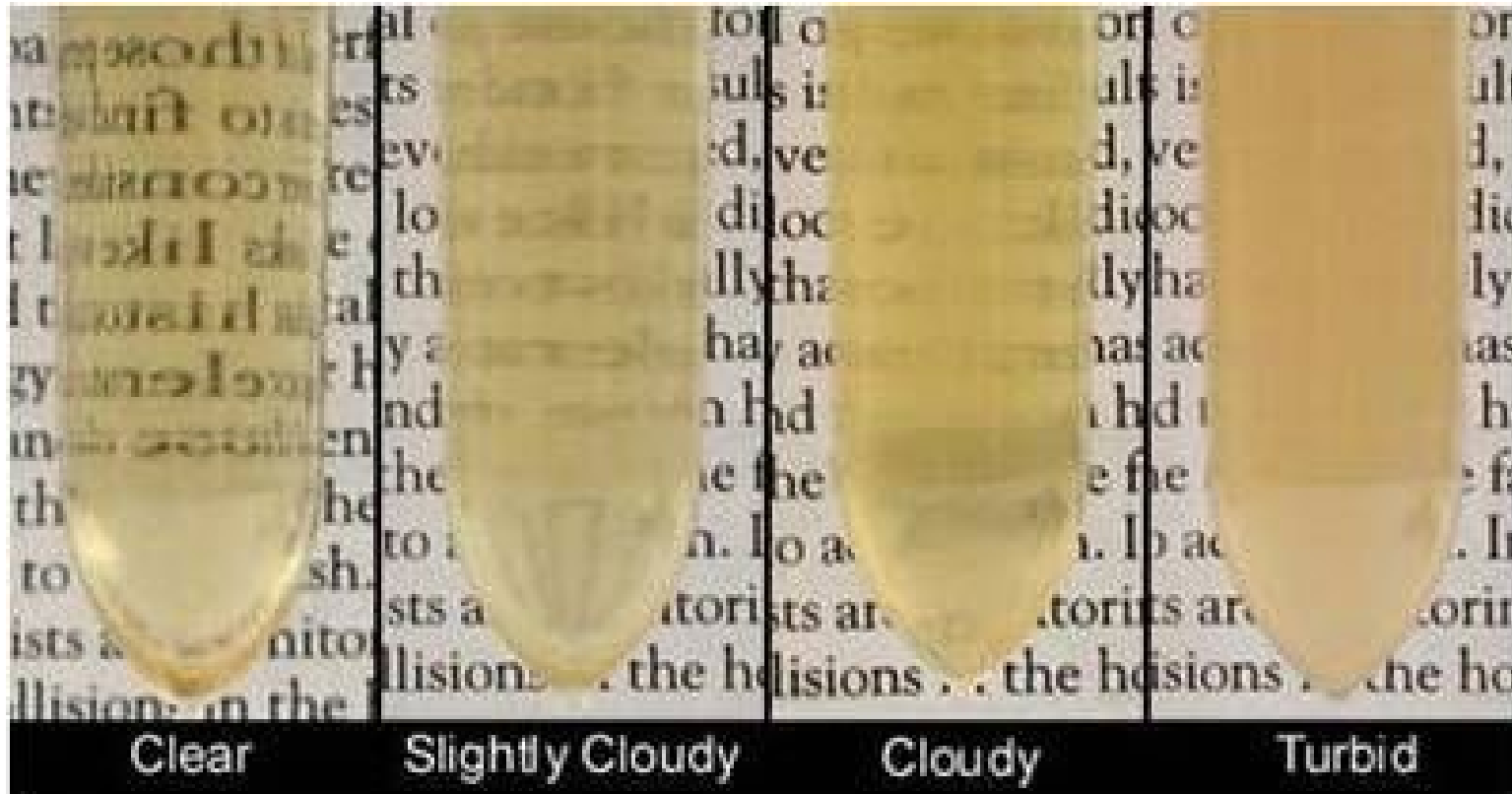
- Normal: pale yellow (urochrome pigment).
- Dark yellow: concentrated urine
- Red/brown: blood/hemoglobin/myoglobin
- Milky: pus/lipids

URINE COLOR CHART



2. Appearance (Clarity)

Clear / cloudy / turbid.



3. Odor

Normal faint odor; fruity (ketones), foul (infection).

4. Volume

Volume (24-hr): Normal 800–2000 mL.

Polyuria, oliguria, anuria.

- Oliguria: reduced urine (<400 mL/day).
- Anuria: almost no urine (<100 mL/day).
- Polyuria: excess urine (>3 L/day in adults).

Microscopic Examination

Findings:

- **Cells:** RBCs, WBCs, epithelial cells.
- **Casts:** Hyaline, granular, cellular, waxy.
- **Crystals:** Uric acid, calcium oxalate, triple phosphate.
- **Microorganisms:** Bacteria, yeast, parasites (Trichomonas, Schistosoma haematobium eggs).
- **Other:** Spermatozoa, mucus, artifacts.

Microscopical Urinalysis Atlas

[https://med.libretexts.org/Courses/Oregon_Institute_of_Technology/Urinalysis_Atlas%3A_A_Pictorial_Guide_to_Formed_Elements_in_Urine_\(Doty_and_Taylor\)](https://med.libretexts.org/Courses/Oregon_Institute_of_Technology/Urinalysis_Atlas%3A_A_Pictorial_Guide_to_Formed_Elements_in_Urine_(Doty_and_Taylor))



References

- Paniker, C. K. J. & Ghosh, S. 2021. *Paniker's textbook of medical parasitology*, New Delhi, Jaypee Brothers Medical Publishers.