Candida

Candida

- small (4–6 m), oval,

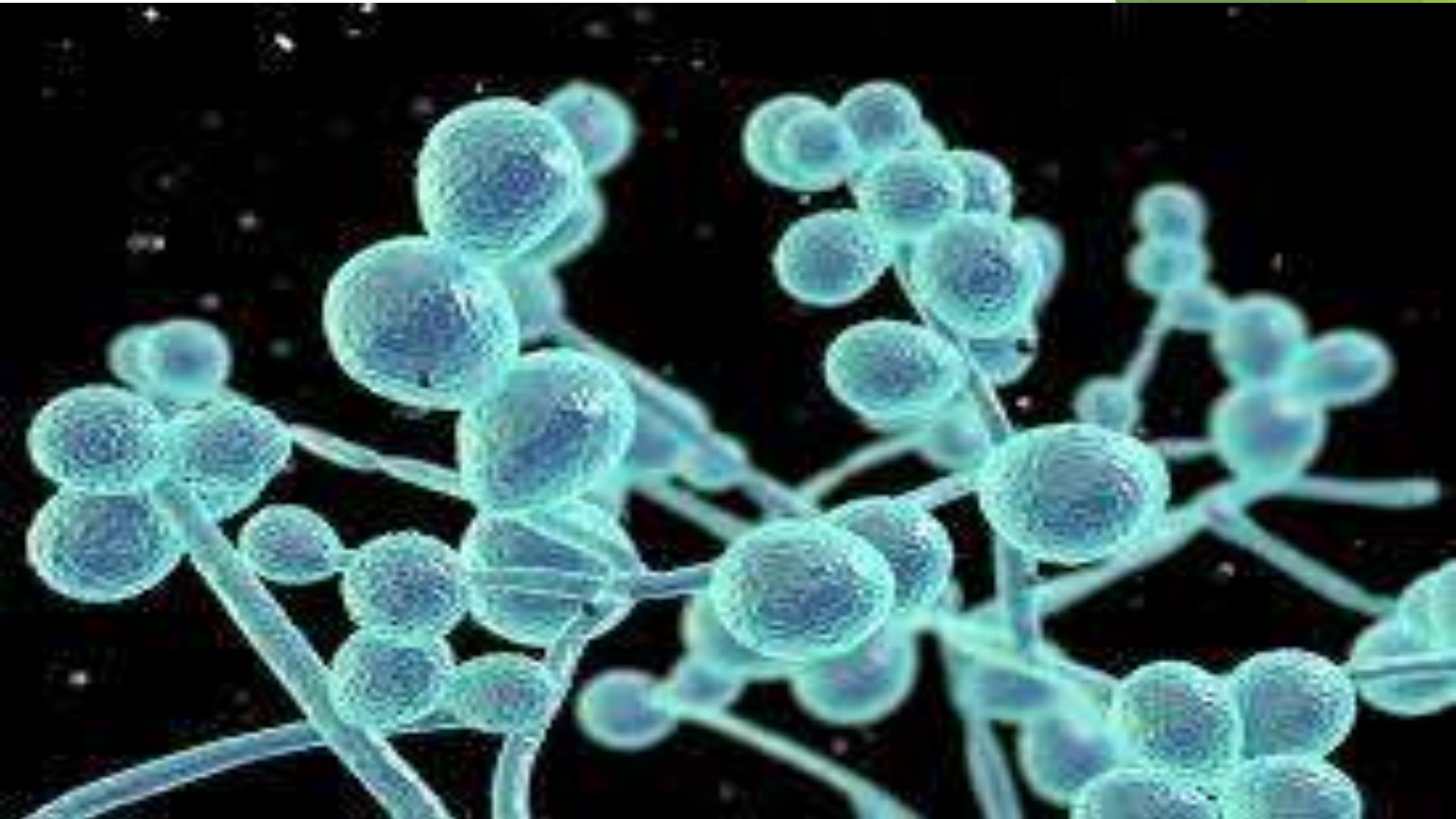
-thin-walled

-yeastlike fungi that reproduce by budding or fission.

-comprised of over 200 species

-Only a few species cause disease in humans

- The medically significant Candida species include: Candida albicans, Candida (Torulopsis) glabrata, Candida parapsilosis, Candida tropicalis, Candida krusei, Candida kefyr, Candida guilliermondii, Candida lusitaniae, C. stellatoidea, and Candida dubliniensis

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Virulence Factors

-undergoes reversible morphological transition between budding pseudohyphal and hyphal growth forms.

- Yeast cells may be disseminated more effectively, whereas hyphae are thought to promote invasion of epithelial and endothelial tissue and help evade macrophage

-adherence to epithelial cells and proteins

- Several genes and their products

-sequence (ALS) family of protein encoding cell-surface adhesion glycoproteins (x-agglutinins)

- HWP-1, which encodes a protein (Hwp1), an adhesin attaching to buccal epithelial cell

-The ability of Candida species to overcome the suppressive effect of antifungal chemotherapy

Esophageal Candidiasis

- increased because of AIDS, as well as the increased pool of transplant recipients, cancer and other severely immunocompromised patients.

- Predisposing factors include exposure to local irradiation, recent cytotoxic chemotherapy, antibiotics, corticosteroids, and neutropenia

- presents with dysphagia, odynophagia, and retrosternal pain. Constitutional findings, including fever, only occasionally occur.

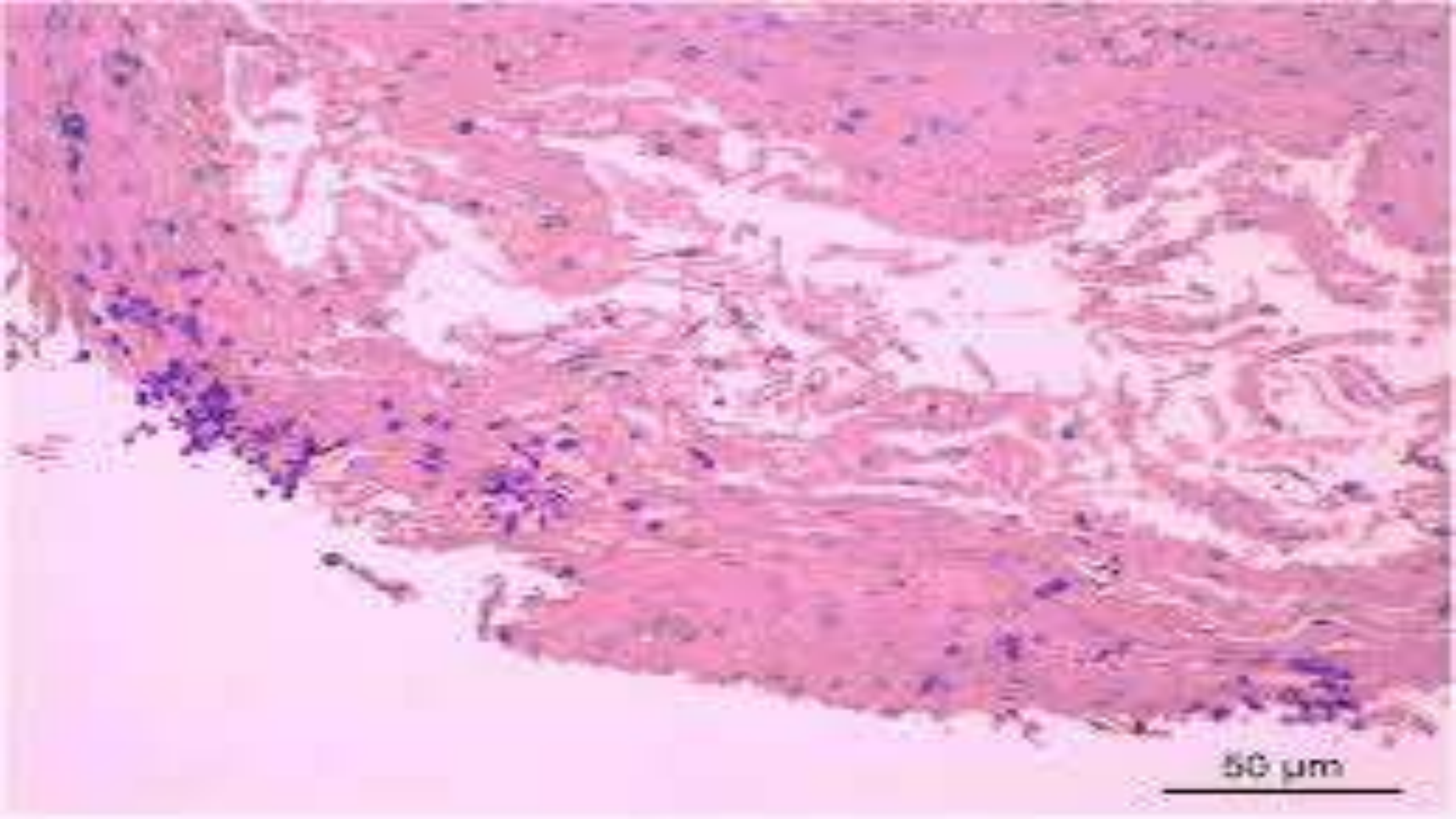

A5
1.0
A


B

- Type I, a few white or beige plagues, up to 2 mm in diameter;
- Type II, plaques are more numerous, larger than 2 mm in diameter;
- Type III, confluent, linear and nodular elevated plaques with hyperemia and frank ulceration
- Type IV, similar to Type III but with increased mucosal friability and occasional narrowing of the lumen

Gastric Candidiasis

- , Candida organisms are normal components of gastric flora.
- Candida infections of the stomach are documented less frequently than in the esophagus, implying greater gastric mucosal resistance to Candida infection
- pain, nausea and vomiting.
- Cause Candida Enterocolitis and Diarrhea Syndromes
- Increase in AIDS and Cancer cases


50 µm

Cutaneous Candidiasis

- Candida can invade any body surface and cause superficial infection of the skin, hair
- Dry intact skin is a potent barrier to fungal invasion, and hydration of the epidermis decreases resistance
- These organisms favor growth in warm, moist areas such as the skin folds of obese individuals, between the fingers and toes, perineal areas, and genitocrural folds.

Generalized Cutaneous Candidiasis

- This syndrome is a rare form of candidiasis that manifests as a diffuse eruption over the trunk, thorax, and extremities.

- Patients have a history of generalized pruritus, with increased severity in the genitocrural folds, anal region, axillae, hands, and feet.

- Examination reveals a widespread rash that begins as individual vesicles that evolve into large confluent areas

Chronic Mucocutaneous Candidiasis

- This syndrome involves multiple superficial sites, primarily the mouth, facial skin, hair and nails
- Group 1 is chronic oral candidiasis associated with HIV
- Group 2 comprises CMC associated with endocrinopathy and has also been called “Candida endocrinopathy syndrome”
- Group 3 is localized CMC that is characterized by hyperkeratosis and cutaneous horn formation that affects both hands

Vulvovaginal Candidiasis

- Candida vaginitis is the second most common vaginal infection

- Several factors are increased rates of asymptomatic vaginal colonization with Candida including pregnancy (30%- 40%), oral contraceptives with a high estrogen content, and uncontrolled diabetes mellitus

- 10%-20% of asymptomatic, healthy women of childbearing age

Vulvovaginal Candidiasis

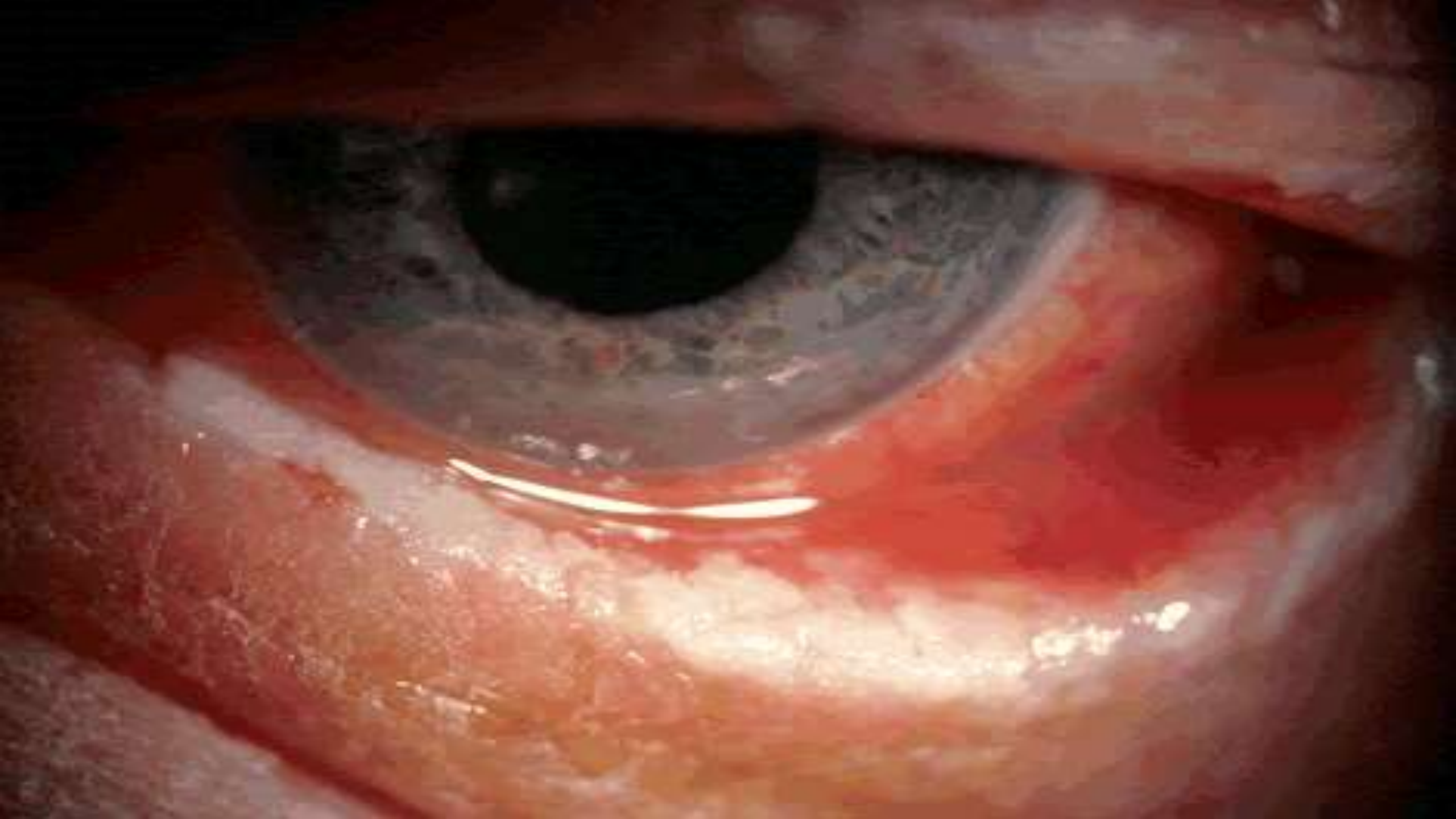
Risk factors
- Diabetes
- HIV
- Recent antibiotic use
- Pregnancy

Clinical
- Pruritus
- Dysuria
- Dyspareunia

Discharge
- White, cottage cheese-like
- pH < 4.5
- KOH odor neg
- Pseudohyphae, spores

Ocular Candidiasis

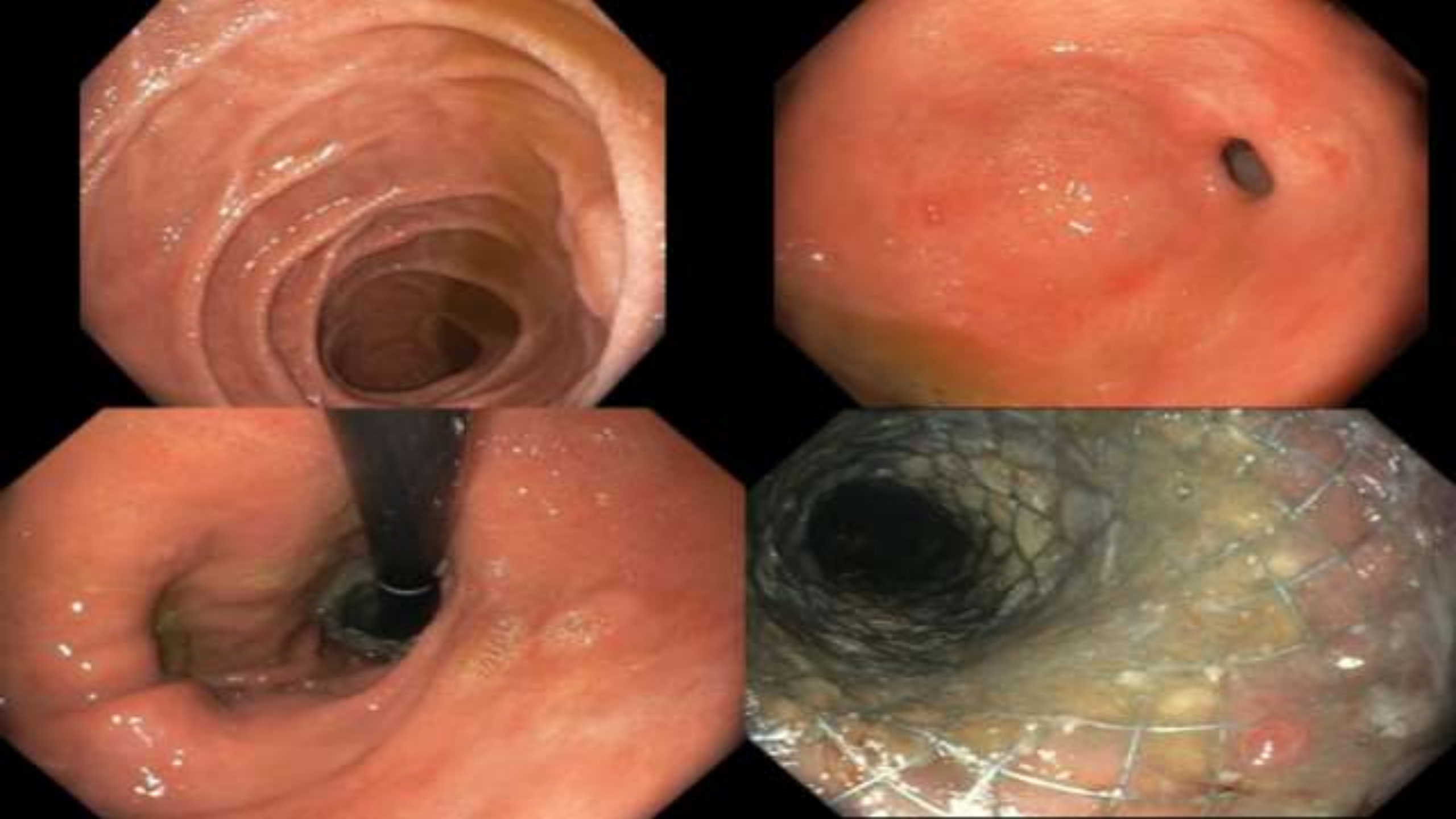
- access to the eye by one of two routes,
-
- either direct inoculation during eye surgery or trauma,
- or as the result of hematogenous spread
- Any eye structure may be involved including conjunctiva, cornea, lens, ciliary body, vitreous humor, and uveal tract.
- Eye involvement may be unilateral or bilateral.
- Lead to blindness if late in treatment



Cardiac and Endovascular Candidiasis

- Candida myocarditis is the result of hematogenous dissemination with development of one or more abscesses within the myocardium.

- Most frequently, abscesses are microabscesses usually diagnosed at autopsy.



Chronic Systemic Candidiasis

- Hepatosplenic candidiasis (HSC) is a chronic form of disseminated candidiasis

- the term chronic systemic candidiasis since other organs (eyes, skin, and soft tissue) may be involved

- reach submucosal blood vessels that drain into the portal venous system and then into the liver where focal Candida abscesses are established.

Neonatal Candidiasis

- The most serious of these syndromes is neonatal systemic candidiasis.
- Developing either via ascending infection of the uterine contents prior to birth
-
- or from colonization acquired during passage through the birth canal
- hematogenous dissemination of Candida presents in the first days or weeks of life with symptoms identical to those of neoa
- In afew hours of birth with a diffuse maculopapular, erythematous rash involving almost any part of the skin

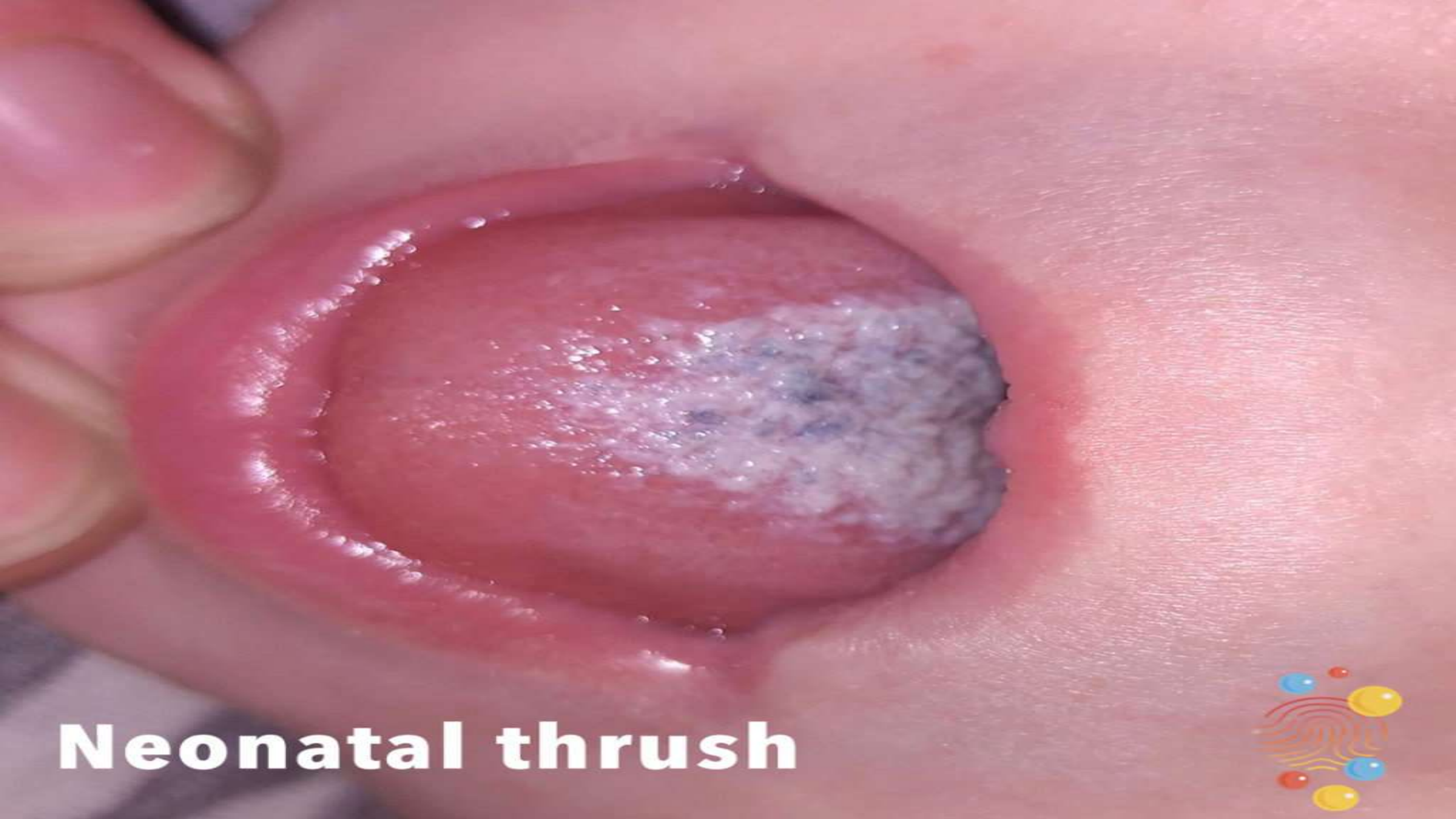
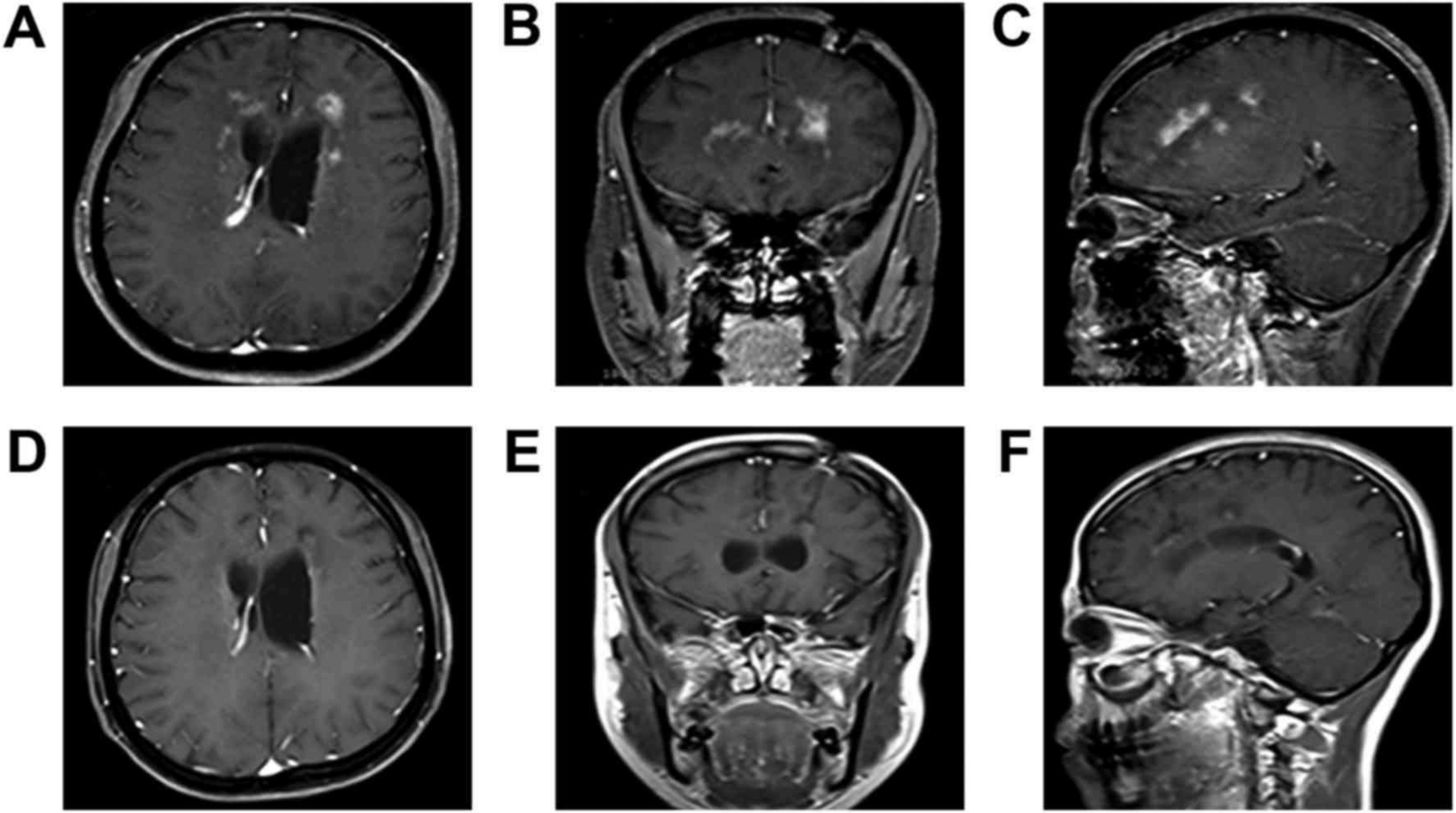

Neonatal thrush

Figure 1. Erythematous papules coalescing into plaques with overlying pinpoint vesiculo-

Central Nervous System Candidiasis

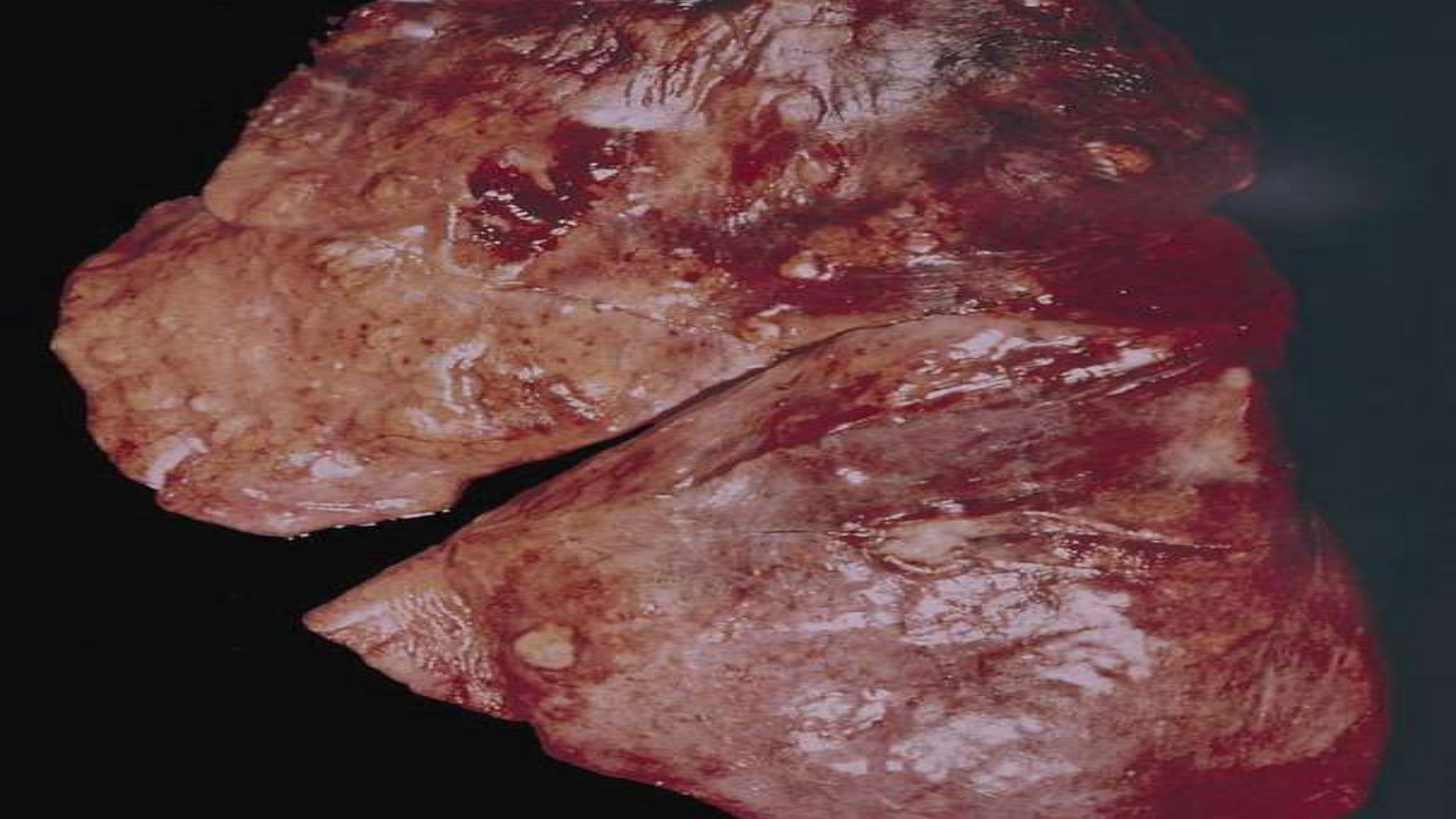
- Cerebral parenchymal infection occurs as a single or multiple micro- or macroabscesses scattered throughout the brain

- often difficult and frequently delayed in all age groups but especially in preterm low birth-weight neonates, resulting in considerable morbidity and mortality.


A
B
C
D
E
F

Pulmonary Candidiasis

- found in sputum, and their role as a possible cause of pulmonary disease is a frequent clinical dilemma.
- Two forms of Candida pneumonia
- One form is local or diffuse bronchopneumonia as a consequence of bronchogenic spread
- The second form is pneumonia resulting from widespread seeding of the lung in a patient with candidemia

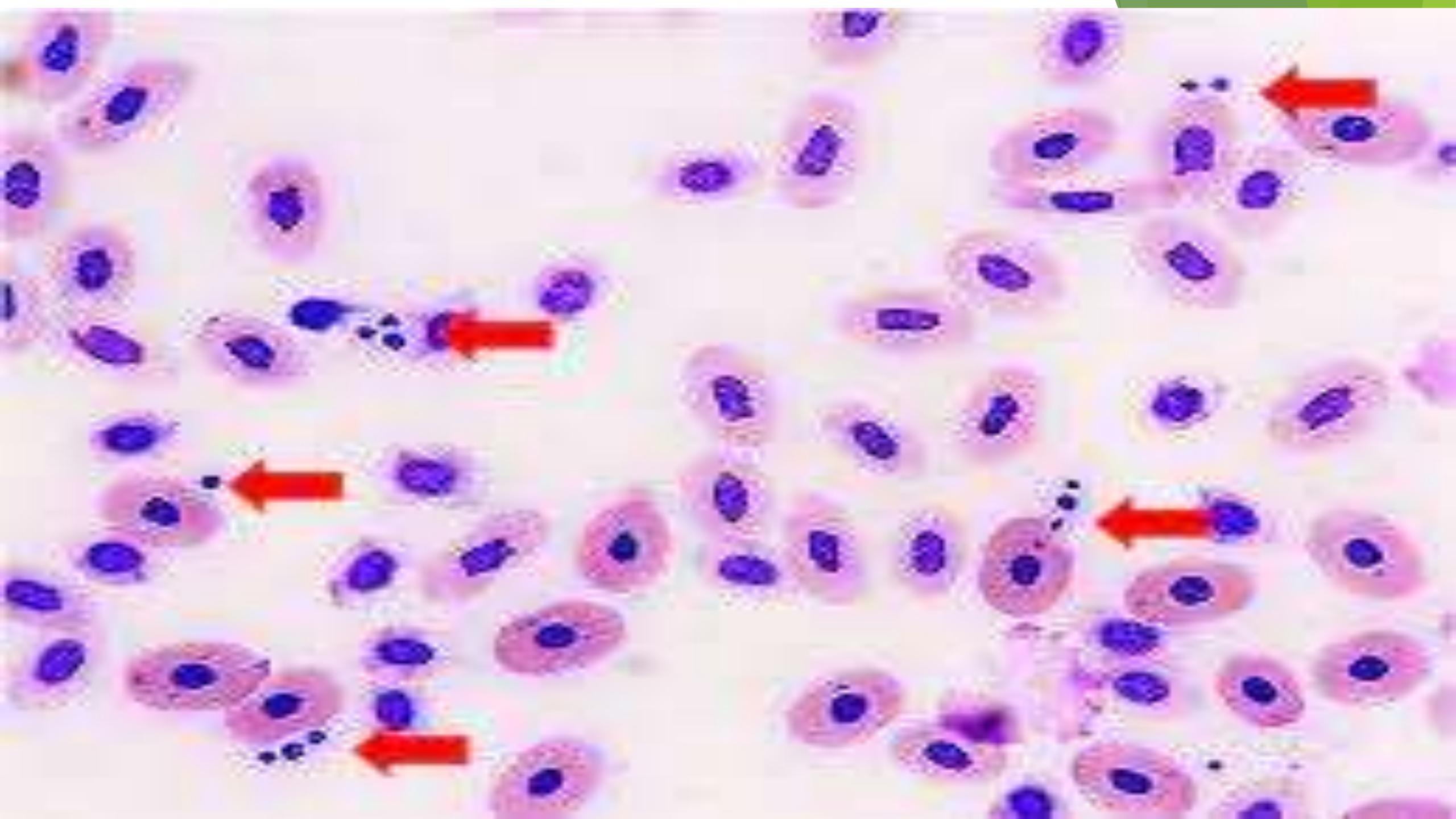


Urinary Tract Candidiasis

- Candiduria is a relatively rare finding in otherwise healthy people

- the results of urine cultures were positive for 10 of 440 healthy adults

- increased among hospitalized patients, especially those patients with indwelling drainage devices



Candida Infections in Burns

- Fungal infection is a serious complication of major burns
- rates of candidemia ranging from 1.8% to 5%.
- An additional risk is related to the surface area of the burn.

Laboratory Diagnosis

- ◗ Specimens These include exudates or tissues for microscopy obtained from skin or nails examined by microscope for demonstration of pseudohyphae or budding yeast cells of Candida.

- results are usually available in 48–72 hours
- A positive culture only indicates that Candida species are present in the tissues examined.
- CHROMagar Candida media allows for the presumptive identification of several Candida species by using color reactions in specialized media that demonstrate different colony colors,
- the API 20C AUX, API 32C, Vitek 2 ID-YST, RapidID yeast Plus, and ID32C are several biochemical assays that allow the identification of the different Candida species

- Serologic assays include testing for Candida antibodies, antigens and metabolites.

- (PCR) and DNA probes have the advantage of being able to detect small amounts of Candida DNA in either blood or tissues

Microscopy

- Gram-stained smear of the exudates or tissue shows Gram-positive, oval, budding yeast and pseudohyphae . Since Candida is found as a part of normal flora on normal skin or mucosa,.

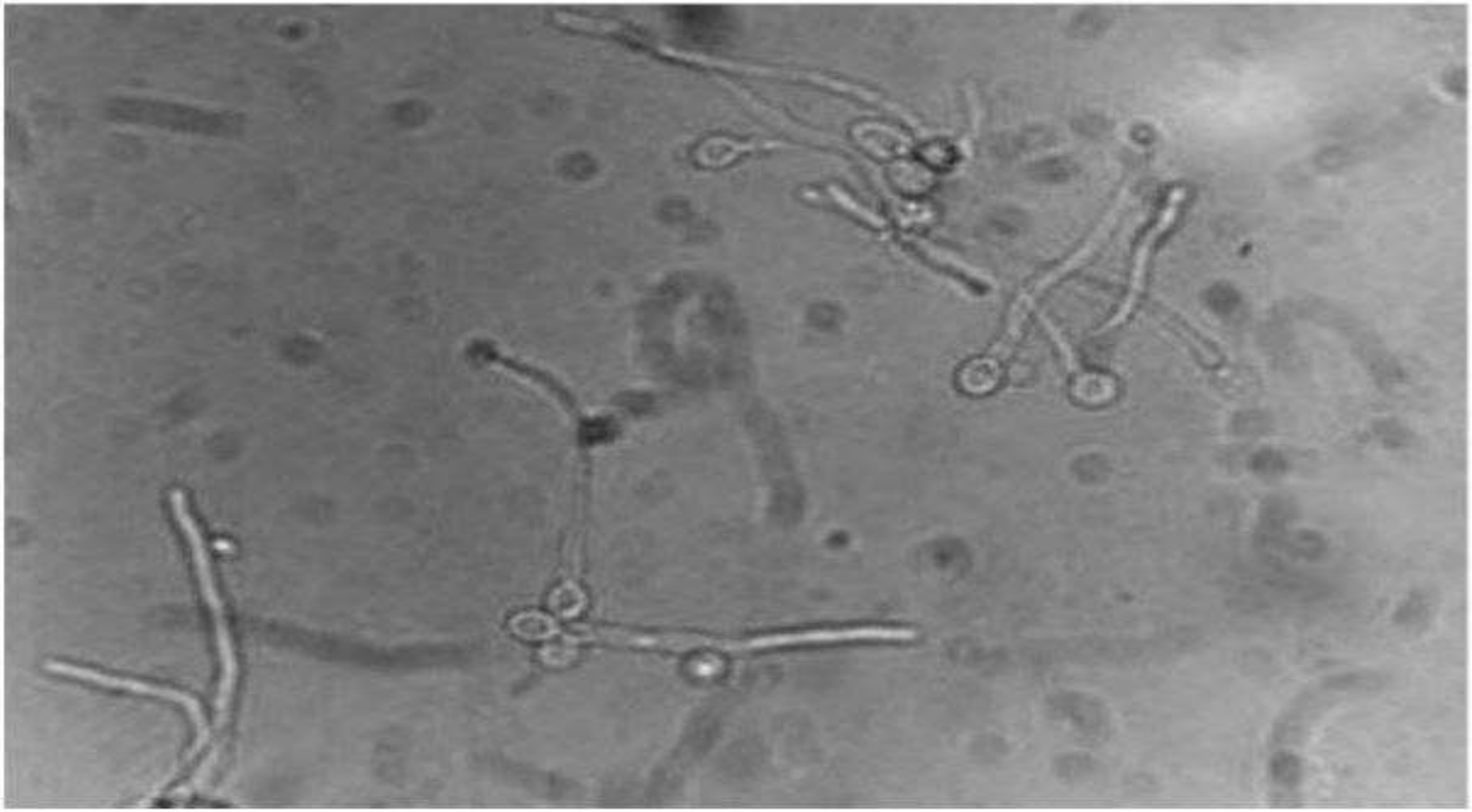


FIG. 74-2. *Candida albicans* showing formation of the germ tube (×400).

- only the presence of large numbers of Candida is of significance. Demonstration of pseudohyphae indicates infection, and tissue invasion is of more diagnostic value

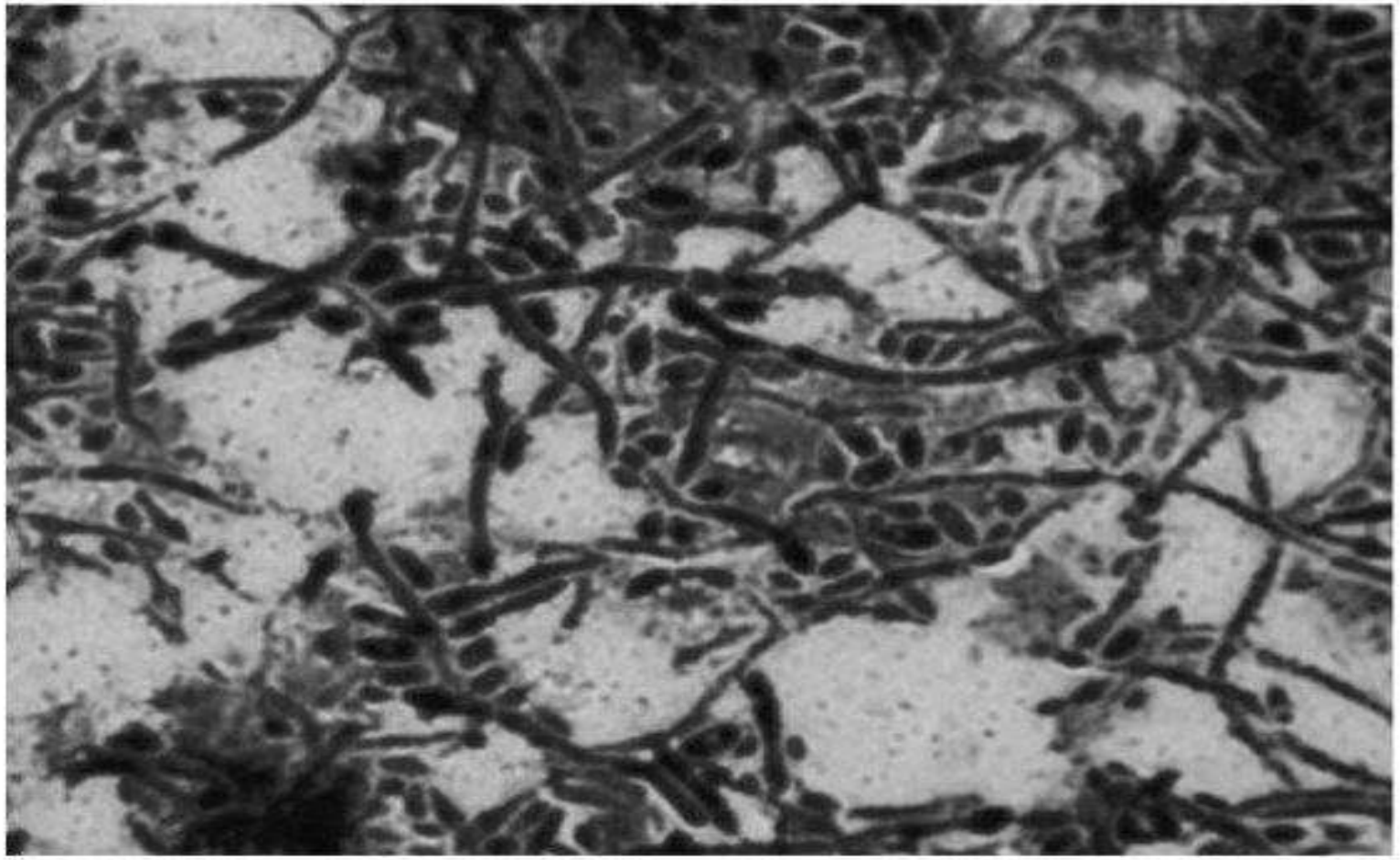
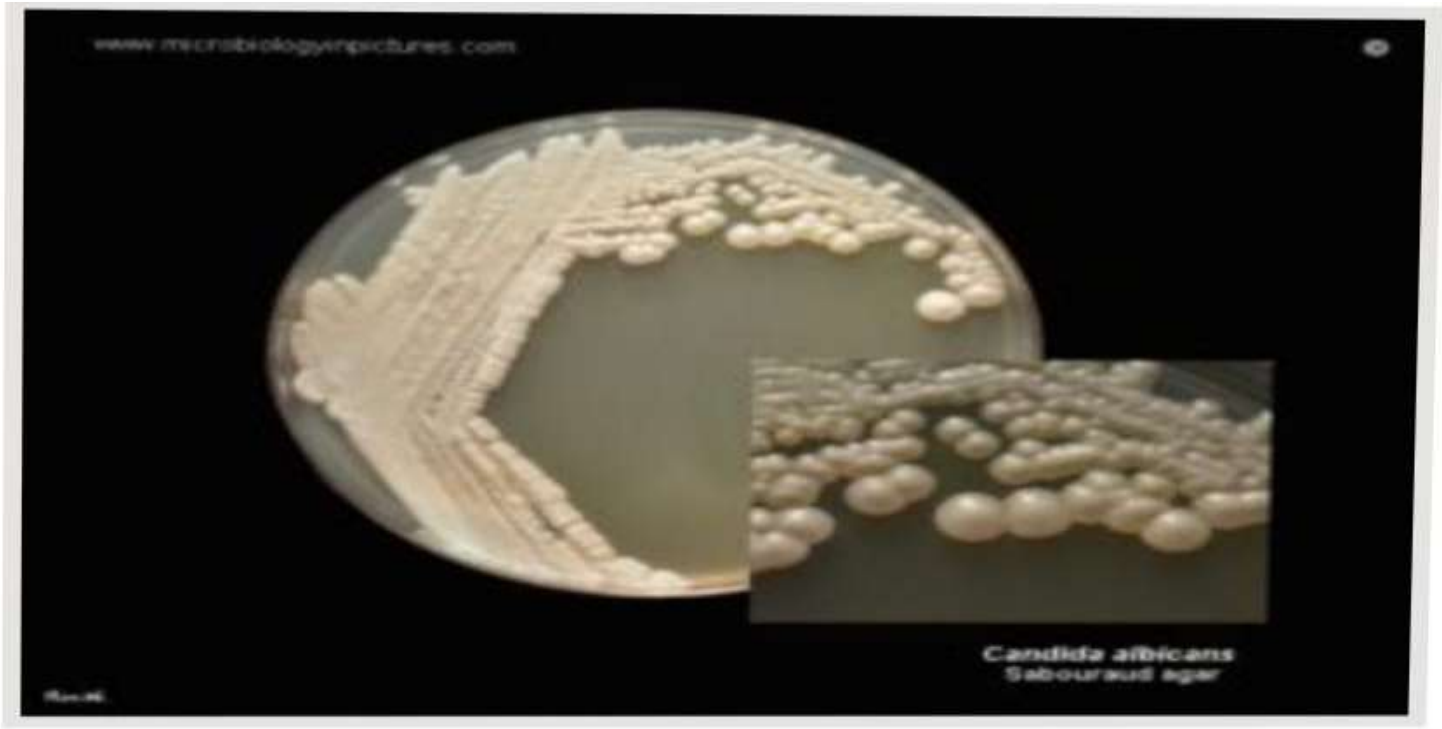


FIG. 74-1. Gram-stained smear showing Gram-positive, oval, budding yeast and pseudohyphae (×1000).

Culture

- Culture on Sabouraud's dextrose agar (SDA) produces typical creamy white, smooth colonies. Different Candida species are identified by their growth characteristics, sugar fermentation, and assimilation tests. Germ tube is a rapid method for identification of C. albicans and Candida dubliniensis.

- The basic culture media used in isolating clinical Candida species are blood agar , Potato Dextrose Agar (PDA) or broth (PDB) , Sabouraud brain heart infusion agar , Sabouraud Dextrose Agar (SDA) or broth (SDB) , Yeast Nitrogen Base (YNB) and Yeast Potato Dextrose (YPD) agar or broth . Lee's synthetic medium can be used for ...



Candida albicans on SDA

- Creamy, pasty colonies, smooth after 24-48 hours at 25-37°C
- Yeast smell (odour)

Culture on blood agar

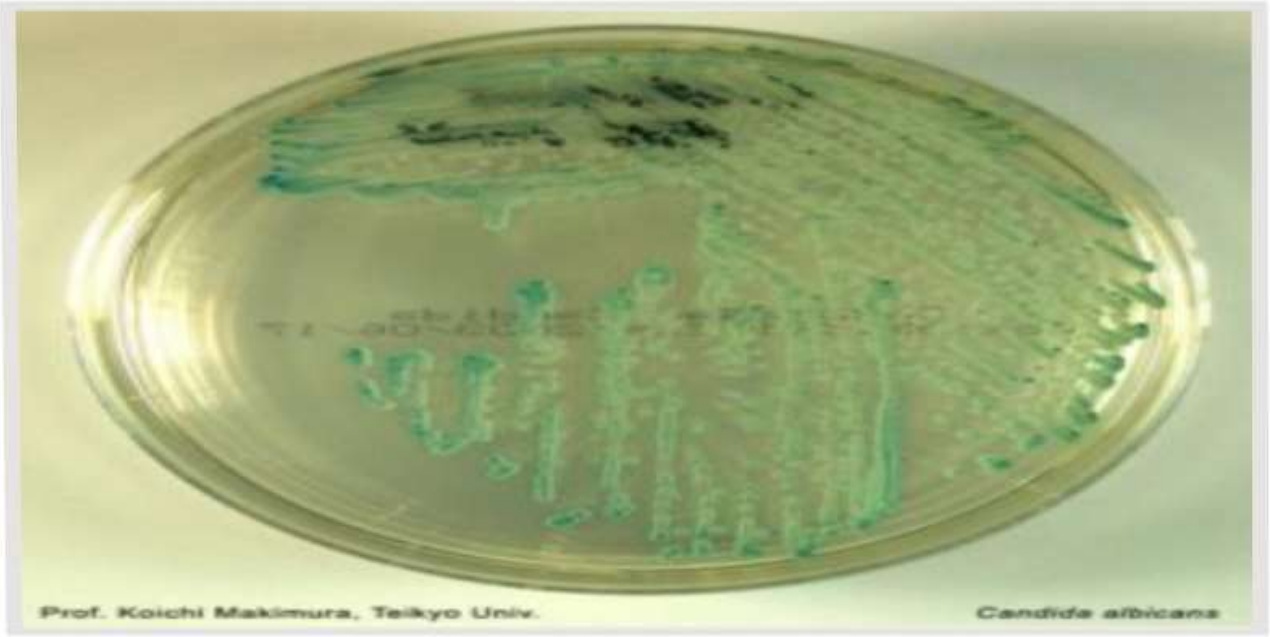
- Foot-like extensions from the margin
  White creamy color

Blood Agar

Candida albicans on Blood Agar

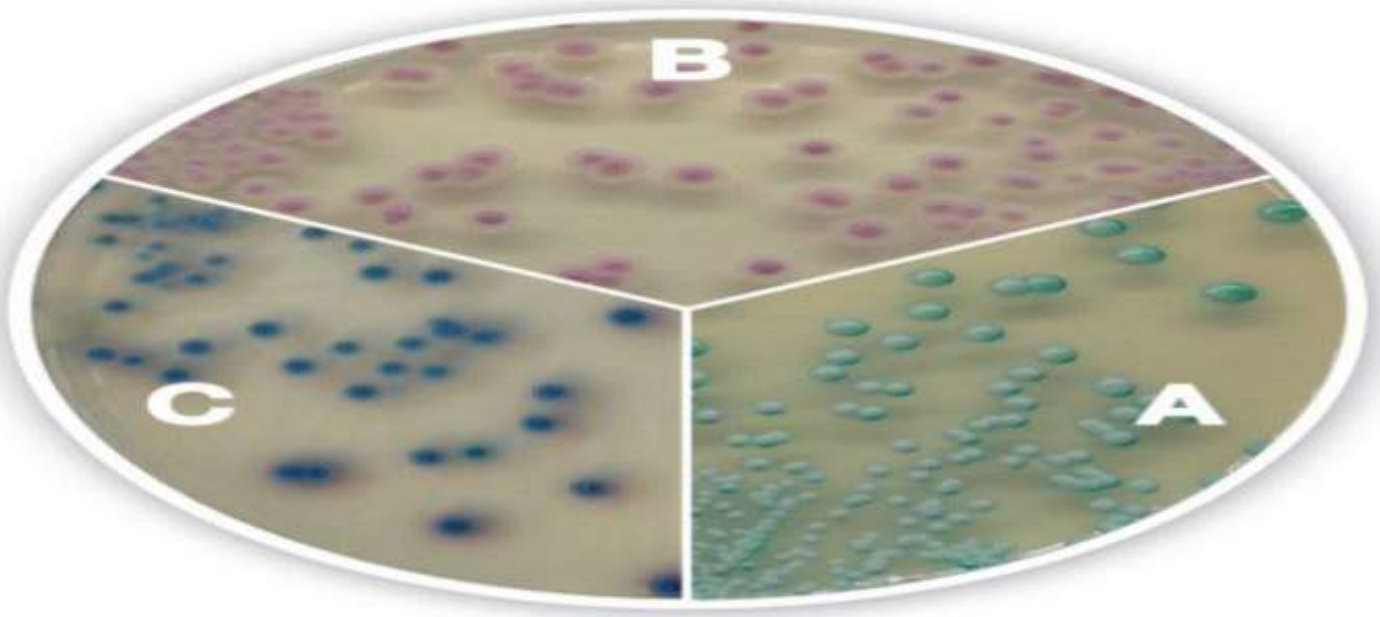
Green colonies

CHROMAGAR



Candida albicans on Chromagar

Candida chromogenic Agar for microbiology



Staining of species:

A: *Candida albicans* turquoise-green (glucuronidase)
B: *Candida krusei* purple-pink (galactosidase)
C: *Candida tropicalis* blue (glucosidase)
Candida parasilosis and *C. glabrata* light-purple to light white

Nonculture Candida detection tests

- These include
- (a) Candida mannan assay,
- (b) Candida heat-labile-antigen assay,
- (c) D-arabinitol assay,
- (d) D-inositol assay,
- (e) 1,3-beta-D-glucan assay. Beta-Dglucan assay is a broad-spectrum test that detects Candida as well as Aspergillus

Treatment of Candida

Table 2. Azole therapy of vulvovaginal candidiasis.

Drug	Formulation	Dosage
Butoconazole		
Femstat®	2% cream	5 g x 3 days
Gynezole®	2% vaginal suppository	1 suppository once
Clotrimazole		
Gynelotromin®	1% cream	5 g x 7–14 days
Mycelex®	10% cream	5 g single application
	100 mg vaginal tablet	1 tablet x 7 days
	100 mg vaginal tablet	2 tablet x 3 days
	500 mg vaginal tablet	1 tablet once
Miconazole	2% cream	5 g x 7 days
(Monistat®)	100 mg vaginal suppository	1 suppository x 7 days
	200 mg vaginal suppository	1 suppository x 3 days
	1200 mg vaginal suppository	1 suppository once
Econazole	150 mg vaginal tablet	1 tablet x 3 days
Fenticonazole	2% cream	5 g x 7 days
Tioconazole (Vagistat®)	2% cream	5 g x 3 days
Monistat®	6.5% cream	5 g single dose
Terconazole	0.4% cream	5 g x 7 days
(Terazol®)	0.8% cream	5 g x 3 days
	80 mg vaginal suppository	80 mg x 3 days
Fluconazole (Diflucan®)*	Oral tablet	150 mg single dose
Ketoconazole (Nizoral®)*	200 mg oral tablet	400 mg x 5 days
Itraconazole (Sporonox®)*	100 mg oral tablet	200 mg x 3 days

**Oral systemic therapy.*