CORN MEAL AGAR

- For in vitro use only -

Plated Media
PC70 – Corn Meal Agar
PC70DP – Corn Meal Agar (Double Pour)
PC71 – Corn Meal Agar with Tween
PC72 – Corn Meal Blue Agar

Tubed Media
TC81 – Corn Meal Agar w 1% Dextrose
TC82-18 – CMA with Tween [Pour Plate]
TC83-10 – Corn Meal Agar w 2% Dextrose

Our Corn Meal Agar is primarily used to elicit chlamydospore production by *Candida albicans*.

Candida albicans is an ubiquitous yeast commonly found in the GI tracts of humans and can exists as part of our natural flora. *Candida albicans* possesses several virulence factors that allow it to invade host tissue and produce a life-threatening pathology, especially in patients who are immunocompromised.

Corn Meal Agar, devised by Hazen and Reed, is a simple, general-purpose medium used to cultivate yeasts and molds. Corn Meal Agar promotes the development of various microscopic morphological structures by yeasts that aid in their identification. A defining characteristic for *Candida albicans* is its ability to produce chlamydospores, and their detection is an accepted criterion for the identification of this species.

Kelly and Funigiello reformulated Corn Meal Agar by adding Polysorbate 80 (Tween 80) and reported enhanced chlamydospore production by *Candida albicans*. Other formulations include Corn Meal Blue Agar, which contains the dye trypan blue. Trypan blue colors the medium a bright blue and provides a contrasting background when viewing morphological structures of yeast cultures.

Corn Meal Agar with Dextrose is commonly used in the differentiation of *Trichophyton* species based on chromogenesis. The dextrose formulations should not be used for detection of chlamydospore production by *Candida albicans*.

Formula per Litre of Medium

Infusion from Corn Meal.....2.0 g
Agar.....15.0 g

pH 6.0 ± 0.2

Additional Ingredients per Liter

PC71 Corn Meal Agar with Tween
Tween (Polysorbate 80) ..... 10.0 g

PC72 Corn Meal Blue Agar
Trypan Blue ..... 0.01 g
Tween ..... 10.0 g

TC81 Corn Meal Agar with 1% Dextrose
Dextrose ..... 10.0 g

TC83 Corn Meal Agar with 2% Dextrose
Dextrose ..... 20.0 g

Recommended Procedure

For Corn Meal Agar without Dextrose

1. Allow medium to reach room temperature.
2. Obtain a pure yeast culture from a suitable isolation medium other than Corn Meal such as Sabouraud Dextrose Agar (Dalynn PS15).
3. Using a sterile inoculating needle, pick the center of a colony and make two or three parallel scratches (stab into the medium through to the bottom of the plate) on the agar surface about ½ inch apart holding the

needle at a 45° angle.
4. Flame a coverslip, and after it cools, place it over the central area of the stab marks.
5. Incubate aerobically at 25-30°C.
6. After 24 to 72 hours of incubation, use a microscope (low and high power objectives) to examine the morphological characteristics of the culture through the coverslip and along its edge.

For Corn Meal Agar with Dextrose

1. Allow medium to reach room temperature.
2. Inoculate by performing a four-quadrant streak to obtain well-isolated colonies. For tubed media, streak the surface of the medium in a fishtail motion from the bottom up.
3. Incubate aerobically at room temperature or at 35°C, if necessary.
4. Examine plates and tubes daily for up to 21 days.

Interpretation of Results

Microscopic examination of yeast cultures should reveal distinguishing characteristics including the presence of hypae, pseudohyphae, blastospores, chlamydospores, arthrospores, and/or chromogenesis.

If *Candida albicans* is present, then round, thick-walled chlamydospores should be observed. Some strains of *Candida tropicalis* and *Candida stellatoidea* may also produce chlamydospores on Corn Meal Agar with Tween, and further testing may be required to differentiate these species from *C. albicans*. However, it should be noted that changes in species epithets has fused *Candida stellatoidea* with *Candida albicans* and differentiation between these two species may be unnecessary.

Other structures of other yeasts may also be observed; therefore special attention should be given to the size and shape of the pseudohyphae and the arrangement of blastoconidia along the pseudohyphae. This information may provide a presumptive identification of the yeast culture.

Refer to appropriate references for detailed description of yeast morphologies. Additional physiological, biochemical, and enzymatic tests may be required for complete identification.

For dextrose formulations, examine plates daily for growth and pigmentation. Note both the color of the mycelium as well as the reverse side. For example, *Trichophyton rubrum* will display cottony white mycelium with typical red pigmentation on the reverse side. Identification of dermatophytes is often based on colony characteristics and microscopic examination. These criteria alone, however, may be insufficient and additional tests should be performed to complete identification.

- *Some Candida albicans strains lose their ability to produce chlamydospores after repeated subculturing*
- *Always include a positive control to ensure the quality and performance of the medium*
- *Some strains of C. tropicalis may form tear-shaped chlamydospores*

Quality Control

After checking for correct pH, colour, depth, and sterility, the following organisms are used to determine the growth performance of the completed medium.

Organism	Expected Results
Corn Meal (or Blue) Agar	
Candida albicans ATCC 10231	Growth
Corn Meal Agar with Dextrose	
Trichophyton rubrum ATCC 38484	Growth (Red coloration)

Storage and Shelf Life

Our Corn Meal Agar should be protected from direct light and stored at 4°C to 8°C; for plated mediums, the medium side should be uppermost to prevent excessive accumulation of moisture on the agar surface. Under these conditions, the mediums have the following shelf lives from the date of manufacture:

PC70 – Corn Meal Agar – 12 weeks
PC70DP – Corn Meal Agar (DP) – 12 weeks
PC71 – Corn Meal Agar w Tween – 12 weeks
PC72 – Corn Meal Blue Agar – 8 weeks
TC81 – CMA w 1% Dextrose – 16 weeks
TC82-18 – CMA with Tween – 16 weeks
TC83-10 – CMA w 2% Dextrose – 16 weeks

References

1. Hazen EL, Reed FC. Monograph laboratory identification of pathogenic fungi simplified. Springfield: American Lecture Series, 1955.
2. Kelly JP, Funigiello F. A study of media designed to promote chlamydospore production. J Lab Clin Med 1959; 53:807.
3. Walker L, Huppert M. Corn meal-Tween agar: an improved medium for the identification of *Candida albicans*. Tech Bull Med Technol 1960; 30: 10.
4. Conant NF, Smith DT, Baker RD, Callaway JL. Manual of clinical mycology. Philadelphia: WB Saunders Company, 1971.
5. MacFaddin JF. Media for isolation cultivation identification maintenance of medical bacteria, vol 1. Baltimore, MD: Williams and Wilkins, 1985.
6. Murray, P.R., E. Baron, M. Pfaller, F. Tenover, R. Yolken. Manual of Clinical Microbiology. 7th ed. Washington: ASM, 1999.

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