

MACCONKEY AGAR

INTENDED USE

Remel MacConkey Agar is a solid medium recommended for use in qualitative procedures for selective and differential isolation of gram-negative bacilli on the basis of lactose fermentation.

SUMMARY AND EXPLANATION

In 1900, MacConkey first described a neutral red bile salt medium for cultivation and identification of enteric organisms.¹ A detailed description of the selective and differential properties of the medium was published in 1905.² Over the years, MacConkey's original formula has been modified; the agar content has been reduced, the concentration of bile salts and neutral red has been adjusted, and sodium chloride has been added.³ The modification of MacConkey Agar which resulted has demonstrated improved inhibition of swarming by *Proteus* spp.

PRINCIPLE

Peptones provide nitrogenous nutrients and amino acids necessary for bacterial growth. Lactose is a carbon source for energy. Sodium chloride supplies essential electrolytes and maintains osmotic equilibrium. Crystal violet and bile salts are selective agents which inhibit most gram-positive organisms. Differentiation of gram-negative bacilli is accomplished by addition of lactose and neutral red which is an indicator. Gram-negative bacilli which ferment lactose form pink colonies. Nonlactose-fermenters, such as *Salmonella* and *Shigella*, form colorless, transparent colonies. The swarming of *Proteus* is inhibited; however, occasional strains may swarm.

REAGENTS (CLASSICAL FORMULA)*

Gelatin Peptone	17.0 g	Meat Peptone	1.5 g
Lactose.....	10.0 g	Neutral Red	30.0 mg
Sodium Chloride.....	5.0 g	Crystal Violet	1.0 mg
Bile Salts	1.5 g	Agar.....	13.5 g
Casein Peptone.....	1.5 g	Deminerlized Water	1000.0 ml

pH 7.1 ± 0.2 @ 25°C

*Adjusted as required to meet performance standards.

PROCEDURE

1. Inoculate and streak the specimen as soon as possible after it is received in the laboratory. Selective and nonselective media should be inoculated to increase the potential for recovery of enteric pathogens when the number of gram-negative bacilli is low and to provide isolation of other organisms present in the specimen.
2. If material is being cultured directly from a swab, roll the swab over a small area of the agar surface. Streak the plate for isolation using a sterile inoculating loop.
3. Incubate plates in ambient air at 33-37°C for 18-24 hours.
4. Examine plates for typical colony morphology. On MacConkey Agar, lactose-fermenters form pink colonies and nonlactose-fermenters form colonies which are transparent or colorless.

Pour Tube: Melt the pour tube in a boiling water bath and cool to 45-50°C. Mix and dispense into a sterile petri dish and proceed with the instructions above.

QUALITY CONTROL

All lot numbers of MacConkey Agar have been tested using the following quality control organisms and have been found to be acceptable. This quality control testing meets or exceeds CLSI standards.⁴ Testing of control organisms should be performed in accordance with established laboratory quality control procedures. If aberrant quality control results are noted, patient results should not be reported.

CONTROL

- **Escherichia coli* ATCC® 25922
- **Proteus mirabilis* ATCC® 12453
- Proteus vulgaris* ATCC® 6380
- **Salmonella enterica* serovar Typhimurium ATCC® 14028
- **Enterococcus faecalis* ATCC® 29212
- Staphylococcus aureus* ATCC® 25923

*CLSI recommended organism

INCUBATION

- Ambient, 18-24 h @ 33-37°C
- Ambient, 18-24 h @ 33-37°C
- Ambient, 18-24 h @ 33-37°C
- Ambient, 18-24 h @ 33-37°C
- Ambient, 18-24 h @ 33-37°C
- Ambient, 18-24 h @ 33-37°C

RESULTS

- Growth, pink colonies
- Growth, colorless colonies, inhibition of swarming
- Growth, colorless colonies, inhibition of swarming
- Growth, colorless colonies
- Inhibition (partial to complete)
- Inhibition (partial to complete)

BIBLIOGRAPHY

1. MacConkey, A.T. 1900. Lancet. ii:20.
2. MacConkey, A.T. 1905. J. Hyg. 5:333.
3. MacFaddin, J.F. 1985. Media for Isolation-Cultivation-Identification-Maintenance of Medical Bacteria. Vol. 1. Williams & Wilkins, Baltimore, MD.
4. Clinical and Laboratory Standards Institute (CLSI). 2004. Quality Control for Commercially Prepared Microbiological Culture Media; Approved Standard, 3rd ed. M22-A3. CLSI, Wayne, PA.

Refer to the front of Remel *Technical Manual of Microbiological Media* for **General Information** regarding precautions, product storage and deterioration, specimen collection, storage and transportation, materials required, quality control, and limitations.

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