BD™ MacConkey II Agar

INTENDED USE

BD MacConkey II Agar is a selective and differential medium for the isolation and differentiation of *Enterobacteriaceae* and a variety of other Gram negative rods from clinical specimens.

PRINCIPLES AND EXPLANATION OF THE PROCEDURE

Microbiological method.

At the present time, many culture media are available for the isolation, cultivation and identification of *Enterobacteriaceae* and certain nonfermenters. One of the earliest of these was developed by MacConkey and published in 1900 and 1905.[1,2] This formulation was devised in the knowledge that bile salts are precipitated by acids and certain enteric micro-organisms ferment lactose whereas others do not possess this ability. Later on, this medium was modified several times.[3,4]

MacConkey Agar is only slightly selective since the concentration of bile salts, which inhibits gram-positive micro-organisms, is low in comparison with other enteric plating media. This medium is recommended for use with clinical specimens likely to contain mixed microbial flora, such as urine, respiratory, wound, and others, because it allows a preliminary grouping of enteric and other gram-negative bacteria in lactose fermenters and lactose nonfermenters.[5,6] MacConkey Agar is also utilized in the microbiological examination of foods.[7]

The MacConkey II Agar formulation was designed to improve the inhibition of swarming *Proteus* species, to achieve more definitive differentiation of lactose fermenters and nonfermenters, and for superior growth of enteric bacteria.

In **BD MacConkey II Agar**, peptones provide nutrients. Crystal violet inhibits Gram positive bacteria, especially enterococci and staphylococci. Differentiation of enteric micro-organisms is achieved by the combination of lactose and the neutral red pH indicator. Colorless or pink to red colonies are produced depending upon the ability of the isolate to ferment the carbohydrate.

REAGENTS

BD MacConkey II Agar

Formula* Per Liter Purified Water

Pancreatic Digest of Gelatin	17.0 g
Pancreatic Digest of Casein	1.5
Peptic Digest of Animal Tissue	1.5
Lactose	10.0
Bile Salts	1.5
Sodium Chloride	5.0
Neutral Red	0.03
Crystal Violet	0.001
Agar	13.5

pH 7.1 ± 0.2

*Adjusted and/or supplemented as required to meet performance criteria.

PRECAUTIONS

IVD . For professional use only.

Do not use plates if they show evidence of microbial contamination, discoloration, drying, cracking or other signs of deterioration.

Consult **GENERAL INSTRUCTIONS FOR USE** document for aseptic handling procedures, biohazards, and disposal of used product.

STORAGE AND SHELF LIFE

On receipt, store plates in the dark at 2 to 8° C, in their original sleeve wrapping until just prior to use. Avoid freezing and overheating. The plates may be inoculated up to the expiration date (see package label) and incubated for the recommended incubation times.
Plates from opened stacks of 10 plates can be used for one week when stored in a clean area at 2 to 8° C.

USER QUALITY CONTROL

Inoculate representative samples with the following strains (for details, see **GENERAL INSTRUCTIONS FOR USE** document). Incubate plates at 35 ± 2°C in an aerobic atmosphere. Examine plates after 18 to 24 h for amount of growth, colony size, pigmentation and selectivity.

Strains	**Growth Results**
Escherichia coli ATCC™ 25922	Growth; pink colonies
Proteus mirabilis ATCC 12453	Growth; colorless to beige colonies, swarming inhibited
Salmonella Typhimurium ATCC 14028	Growth; colorless to beige colonies
Salmonella Abony DSM 4224	Growth; colorless to beige colonies
Shigella flexneri ATCC 12022	Growth; colorless colonies
Enterococcus faecalis ATCC 29212	Inhibition partial to complete
Staphylococcus aureus ATCC 25923	Inhibition partial to complete
Uninoculated	Light pink, slightly opalescent

PROCEDURE

Materials Provided

BD MacConkey II Agar (90 mm **Stacker™** plates). Microbiologically controlled.

Materials Not Provided

Ancillary culture media, reagents and laboratory equipment as required.

Specimen Types

This is a selective medium for the isolation of *Enterobacteriaceae* and a variety of other Gram negative rods and can be used for all types of clinical specimens and for a variety of non-clinical materials (see also **PERFORMANCE CHARACTERISTICS AND LIMITATIONS OF THE PROCEDURE**).

Test Procedure

Streak the specimen as soon as possible after it is received in the laboratory. The streak plate is used primarily to isolate pure cultures from specimens containing mixed flora.
Alternatively, if material is being cultured directly from a swab, roll the swab over a small area of the surface at the edge; then streak from this inoculated area. A nonselective medium such as Columbia Agar with 5% Sheep Blood must also be inoculated to provide an indication of other organisms present in the specimen.
Incubate plates, protected from light, at 35 ± 2°C (do not use CO_2-enriched atmosphere with MacConkey II Agar) for 18 to 24 h or longer if necessary.

Results

Typical colonial morphology on **BD MacConkey II Agar** is as follows:

Organisms	**Growth Results**
E. coli	Pink to rose-red colonies (may be surrounded by a zone of precipitated bile)
Enterobacter, Klebsiella	Mucoid, pink colonies
Proteus	Colorless colonies, swarming around isolated colonies is inhibited*
Salmonella, Shigella	Colorless colonies. Medium color: orange to amber
Pseudomonas	Irregular, colorless to pink colonies

Gram positive bacteria are partially to completely inhibited.

PERFORMANCE CHARACTERISTICS AND LIMITATIONS OF THE PROCEDURE

BD MacConkey II Agar is one of the standard media used for primary plating of clinical specimens and for a variety of nonclinical materials. On this medium, all organisms of the family *Enterobacteriaceae* and a variety of other Gram negative rods, e.g., *Pseudomonas* and related genera, will grow.[5-9] Nonfermenters or other Gram negative rods susceptible to the selective ingredients do not grow on this medium. Consult the respective chapters in the references before using the medium for specific organisms.[5,9]

It has been reported that some *Enterobacteriaceae* and *Pseudomonas aeruginosa* are inhibited on MacConkey Agar when incubated in a CO_2 -enriched atmosphere.[10]

Although certain diagnostic tests may be performed directly on this medium, biochemical and, if indicated, immunological testing using pure cultures is necessary for complete identification. Consult appropriate references. [5-7,9]

REFERENCES

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2. MacConkey, A. 1905. Lactose-fermenting bacteria in faeces. J. Hyg. 5:333-379.
3. Levine, M., and H.W. Schoenlein. 1930. A compilation of culture media for the cultivation of microorganisms. The Williams & Wilkins Company, Baltimore.
4. MacFaddin, J.F. 1985. Media for isolation-cultivation- identification-maintenance of medical bacteria, vol. I. Williams & Wilkins, Baltimore.
5. Baron, E.J., L.R. Peterson, and S.M. Finegold. 1994. Bailey & Scott's diagnostic microbiology, 9th ed. Mosby-Year Book, Inc., St. Louis.
6. Farmer III, J.J. 2003. *Enterobacteriaceae:* introduction and identification. *In:* Murray, P. R., E. J. Baron, J.H. Jorgensen, M. A. Pfaller, and R. H. Yolken (ed.). Manual of clinical microbiology, 8th ed. American Society for Microbiology, Washington, D.C.
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8. Thomson, R.B., and J.M. Miller. 2003. Specimen collection, transport, and processing: bacteriology. *In:* Murray, P. R., E. J. Baron, J.H. Jorgensen, M. A. Pfaller, and R. H. Yolken (ed.). Manual of clinical microbiology, 8th ed. American Society for Microbiology, Washington, D.C.
9. Murray, P. R., E. J. Baron, J.H. Jorgensen, M. A. Pfaller, and R. H. Yolken (ed.). 2003. Manual of clinical microbiology, 8th ed. American Society for Microbiology, Washington, D.C.
10. Mazura-Reetz, G., T.R. Neblett, and J.M. Galperin. 1979. MacConkey agar: CO_2 vs. ambient incubation, abstr. C 179, p. 339. Abstr. 79th Annu. Meet. Am. Soc. Microbiol. 1979.

PACKAGING/AVAILABILITY

BD MacConkey II Agar

Cat. No. 254025	Ready-to-use plated media, 20 plates
Cat. No. 254078	Ready-to-use plated media, 120 plates

FURTHER INFORMATION

For further information please contact your local BD representative.

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