LSM AGAR
(LIPASE SALT MANNITOL)

INTENDED USE
Remel LSM Agar (Lipase Salt Mannitol) is a solid medium recommended for use in qualitative procedures for primary isolation and presumptive identification of *Staphylococcus aureus*.

SUMMARY AND EXPLANATION
The use of culture media containing sodium chloride for selective isolation of staphylococci was first reported by Koch in 1942.[1] Chapman added 7.5% sodium chloride to phenol red mannitol agar for selective recovery of staphylococci from food sources.[2] Gunn et al. later modified the Chapman formulation by incorporating 2% egg yolk in the medium.[3] In 1996, Merlino et al. evaluated LSM Agar for detection of *S. aureus* from 418 clinical specimens.[4] They found LSM Agar to be superior to other media tested for recovery and recognition of *S. aureus* on the basis of lipase activity and inhibition of gram-negative rods.

PRINCIPLE
Peptones and beef extract supply nitrogen, carbon, and sulfur necessary for the growth of bacteria. Sodium chloride (7.5 %) is a selective agent which inhibits most bacteria other than staphylococci, including gram-negative rods. Phenol red is a pH indicator. Acid production, as a result of mannitol fermentation by *S. aureus*, results in the formation of yellow colonies surrounded by yellow zones. Lipase (lipovitellenin) activity results in precipitation of the egg yolk indicated by an opaque zone.

REAGENTS (CLASSICAL FORMULA)*

Sodium Chloride	75.0	g	Beef Extract	1.0	g
D-Mannitol	10.0	g	Phenol Red	25.0	mg
Casein Peptone	5.0	g	Egg Yolk	20.0	ml
Meat Peptone	5.0	g	Agar	15.0	g
			Demineralized Water	1000.0	ml

pH 7.4 ± 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.
2. If material is being cultured directly from a swab, roll the swab over a small area of the agar surface, and streak for isolation.
3. Incubate the plate aerobically at 33-37°C for 24-48 hours.
4. Examine plate for characteristic colony morphology and color change. *S. aureus* colonies are yellow with opaque yellow zones. Coagulase-negative staphylococci colonies are small and nonpigmented to slightly pink.

QUALITY CONTROL
All lot numbers of LSM Agar have been tested using the following quality control organisms and have been found to be acceptable. 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	INCUBATION	RESULTS
Staphylococcus aureus ATCC® 25923	Aerobic, 18-24 h @ 33-37°C	Yellow colonies with opaque, yellow zones
Staphylococcus epidermidis ATCC® 12228	Aerobic, 18-24 h @ 33-37°C	Small, nonpigmented to slightly pink colonies
Escherichia coli ATCC® 25922	Aerobic, 18-24 h @ 33-37°C	Inhibition (partial to complete)

LIMITATIONS
1. Colonies isolated on LSM that are morphologically characteristic of staphylococci should be subcultured to a nonselective medium (e.g., blood agar) prior to coagulase testing.[5] -Definitive identification of *Staphylococcus* spp. requires additional biochemical testing. Consult appropriate references for further instructions.[6,7]
2. Some strains of *S. aureus* may exhibit delayed mannitol fermentation. Plates should be incubated a full 48 hours before being discarded as negative.[5]
3. Removing the colony with a swab will allow the best visualization of the opaque zone, which otherwise may be a delayed reaction.[5]

BIBLIOGRAPHY

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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.

IFU 1540, Revised September 29, 2008 Printed in U.S.A.

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