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Growth Media for Bacteria: Types of Culture Media

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Perspective

Culture media contains nutrients and physical growth parameters necessary for microbial growth. All microorganisms cannot grow alone in a single media and many can't grow in any known media. Bacterial culture media are often classified on the idea of composition, consistency, and purpose.

Classification of bacterial culture media on the basis of consistency

Solid medium

Solid medium contains agar composition of 1.5-2.0% and inert solidifying agent. Solid medium contains a physical structure and allows bacteria to grow in physically informative or useful ways (e.g. as colonies or in streaks). Solid medium is beneficial for isolating bacteria or for determining the colony characteristics of the isolate.

Semisolid medium

Semisolid medium is ready with agar concentrations of 0.5%. Semisolid medium contains soft custard-like consistency which is beneficial for the cultivation of microaerophilic bacteria or for the determination of bacterial motility.

Liquid (Broth) medium

Broth mediums contain specific amounts of nutrients but don't have any trace of gelling agents like gelatin or agar. Broth medium serves various purposes like to grow an population of organisms, fermentation studies, and various other tests. E.g. sugar fermentation tests, MR-VP broth.

Classification of bacterial Culture media on the basis of purpose/ functional use/ application

Many special-purpose media are needed to help in recognition, enumeration, and isolation of certain types of bacteria. To meet these necessities, numerous media are available.

General-Purpose Media

Basal media also referred to as general-purpose media are simple media that support the growth conditions of most non-fastidious bacteria. Peptone water, nutrient broth, and agar (NA) are considered basal mediums. These sorts of media are generally used for the first isolation of microorganisms.

Enriched Media

By adding of additional nutrients such as blood, serum, egg yolk, etc, to the basal medium makes an enriched medium. Enriched media are wont to grow nutritionally exacting (fastidious) bacteria. agar, chocolate agar, Loeffler's serum slope, etc are a couple of samples of enriched media. Agar are often prepared by adding 5-10% (by volume) blood to agar base. Chocolate agar is additionally referred to as blood agar or lysed agar.

Selective and Enrichment Media

These media are designed to inhibit unwanted commensal or contaminating bacteria and help to recover pathogens from mix population of bacteria. While selective media are agar-based, enrichment media are liquid in consistency. Both these media serve an equivalent purpose. Any agar media can serve as selective by the addition of certain inhibitory agents that don't affect the pathogen of interest. Various approaches to creating a medium selective include addition of antibiotics, dyes, chemicals, alteration of pH, or a mixture of any of these.

Selective Media

Principle: Differential growth suppression

Selective medium is designed to suppress the growth of some microorganisms while allowing the growth of others. Selective medium is agar-based (solid) medium so that individual colonies may be isolated. Examples:

1. Thayer Martin Agar used to isolate Neisseria gonorrhoeae contains antibiotics; vancomycin, colistin, and nystatin.

2. Mannitol Salt Agar and Salt Milk Agar used to isolate *S.aureus* contain 10%NaCl.

3. Potassium tellurite medium used to isolate C.diphtheriae contains 0.04% potassium tellurite.

4. MacConkey's Agar used for Enterobacteriaceae members contains bile salt that inhibits growth of gram-positive bacteria.

Enrichment Media

Enrichment medium is employed to extend the relative concentration of certain microorganisms within the culture before plating on solid selective medium. Unlike selective media, enrichment culture is usually used as a broth medium. Enrichment media are liquid media that also serves to inhibit commensals within the clinical specimen. Selenite F broth, tetrathionate broth, and alkaline peptone water (APW) are wont to recover pathogens from fecal specimens.

Differential/ Indicator Media

Certain media are designed in such a way that different bacteria can be recognized on the basis of their colony color. Various approaches include incorporation of dyes, metabolic substrates, etc, so that those bacteria that utilize them appear as differently colored colonies. Such media are called differential media or indicator media. Differential media allow the growth of more than one microorganism of interest but with morphologically distinguishable colonies.

Transport media

Clinical specimens must be transported to the laboratory immediately after collection to stop overgrowth of contaminating organisms or commensals and maintain the viability of the potential pathogens. This will be achieved by using transport media. Such media prevent drying (desiccation) of a specimen, maintain the pathogen to commensal ratio, and inhibit the overgrowth of unwanted bacteria. Some of these media (Stuart's & Amie's) are semi-solid in consistency.

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Anaerobic media

Anaerobic bacteria need special media for growth because they have low oxygen content, reduced oxidation-reduction potential and additional nutrients. Media for anaerobes may need to be supplemented with nutrients like hemin and vitamin K. Such media can also need to be reduced by physical or chemical means. Boiling the medium serves to expel any dissolved oxygen. The addition of 1% glucose, 0.1% thioglycollate, 0.1% vitamin C, 0.05% cysteine, or heated iron filings can render a medium reduced. Before using, the medium must be boiled during a water bath to expel any dissolved oxygen then sealed with sterile liquid paraffin.

Assay media

These media are used for the assay of vitamins, amino acids, and antibiotics. E.g. antibiotic assay media are used for determining antibiotic potency by the microbiological assay technique.

Other types of medium include;

• Media for enumeration of microorganism,

• Media for characterization of microorganism,

• Maintenance media etc.

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