Beta-Glucuronidase Agar

IDM 37  An agar medium for demonstration of beta-glucuronidase activity.

Formula  grams per litre

Peptone mixture  12.0
p-nitrophenyl-β-D-glucopyranosiduronic Acid  0.3
Agar A (RM10)  15.0

pH approx 7.5 ± 0.1

Directions

1. Suspend by swirling the contents of the sachet in the stated volume of distilled or deionised water, or 27.3g of powder in 1 litre.
2. Heat gently with thorough mixing and boil to dissolve completely.
3. Autoclave at 121°C (15 p.s.i.) for 15 minutes.
4. Mix well and pour into Petri dishes which have been labelled using the self-adhesive labels provided.
5. Plates may be used immediately after drying or stored in sealed plastic bags at 4°C for up to 2 weeks before use.

Description

In 1976 Kilian and Bülow\(^1\) demonstrated the potential usefulness of tests for the rapid detection of bacterial glycosidase enzymes in differentiating strains within the family Enterobacteriaceae. The methods described used heavy suspensions of viable but non-multiplying bacteria. The most interesting test appeared to be that for beta-glucuronidase activity using the substrate 4-nitrophenyl-beta-D-glucopyranosiduronic acid. Of the 633 strains of Enterobacteriaceae and Vibrionaceae tested, beta-glucuronidase activity was demonstrated only in *Escherichia* and *Shigella* species. A total of 97% of *E.coli* strains tested possessed beta-glucuronidase.

Kilian and Bülow\(^1\) later developed an agar version of the test which permitted the detection of beta-glucuronidase activity when used as a primary medium for the cultivation and examination of urine specimens. Out of 2004 urine isolates of *E.coli* 94% showed beta-glucuronidase activity, while in contrast, the enzyme was not detected in any of the 1,295 strains representing 12 other genera.

Le Minor *et al* (1962)\(^3\) had previously detected beta-glucuronidase activity in about a third of over 4,000 *Salmonella* strains they tested.

The specificity of the beta-glucuronidase test for *E.coli* among lactose fermenting Enterobacteriaceae was confirmed by Hansen and Yourassowsky.\(^4\) They examined 400 strains of lactose fermenting Enterobacteriaceae using a disc method and found 94% of *E.coli* strains beta-glucuronidase positive but all other strains negative.

A major part of the workload of most routine clinical microbiology laboratories is the processing of large numbers of urine specimens from which *E.coli* is the most common organism isolated. Mond *et al* (1965)\(^5\) and Trepeta and Edberg (1984)\(^6\) independently reported *E.coli* in over 80% of cases of significant bacteriuria. The need for a simple to use, inexpensive, rapid and reliable screening method for *E.coli* in suspected bacteriuria is therefore apparent.

Henrichsen\(^7\) developed such a system which involves the examination of mid-stream urine specimens by a semi-quantitative cultural method and also by direct microscopic examination. When the presence of significant bacteriuria is indicated by microscopy two screening agars, beta-glucuronidase agar and inositol agar, are inoculated directly from the urine specimen by streaking and results are available next day by visual examination of the colonies formed. In this study *E.coli* constituted 76.5% of all the Enterobacteriaceae present in significant numbers and all were correctly identified by the screening agars. Beta-glucuronidase activity was again only demonstrated in *Escherichia* and *Shigella* species.

The cost-effective benefits of multipoint inoculation are becoming increasingly recognised and Mast has now developed a dehydrated, autoclavable Beta-Glucuronidase Agar (IDM37) specifically designed for use in this technique.

Henrichsen (1985)\(^8\) confirmed the sensitivity and specificity of Mast Beta-Glucuronidase Agar for *Escherichia* and *Shigella* and commented on the extremely low cost per test. Most of the beta-glucuronidase positive *shigella* were *Sh.sonnei* strains, which because they are potential late lactose fermenters could theoretically be confused with *E.coli*. However, *Shigella* species are very rarely encountered in urine samples so the usefulness of Mast Beta-Glucuronidase Agar as a urine screening medium for *E.coli* remains.
In Use

Inoculate the surface of the well dried medium using a multipoint inoculator. Allow the inoculum drops to dry before disturbing. Incubate for 18-24 hours at 37°C. A yellow colour in the medium surrounding the growth spot indicates a positive result.

Growth spots showing no colour change or growth spots which are yellow but with no surrounding yellow colour are negative.

References

5. Mond NC, Percival A, Williams JD, Brumfitt W. Lancet 1965; I: 514-516