Northeast Laboratory Services

P.O. Box 788
Waterville, Maine 04903-0788
227 China Road
Winslow, Maine 04901

Administrative Offices
Phone: 207-873-7711
Fax: 207-873-7022

Customer Service
Phone: 1-800-244-8378
Fax: 207-873-7022

TECHNICAL PRODUCT INFORMATION

BRAIN HEART INFUSION

Catalog No.	P1122	Brain Heart Infusion Agar
Catalog No.	T1140	BHI w/5% Sheep Blood
Catalog No.	T1150	BHI Slant
Catalog No.	T1151	BHI Deep-20 mL
Catalog No.	T1152	BHI Agar Slant
Catalog No.	T1155	BHI Broth – 0.5 mL
Catalog No.	T1158	BHI Broth – 4 mL
Catalog No.	T1160	BHI Broth – 5 mL
Catalog No.	T1161	BHI Broth – 10 mL

INTENDED USE:
Brain Heart Infusion based culture media may be used for the cultivation of a wide variety of microorganisms.

HISTORY/SUMMARY:
Rosenow[1] first described brain-heart infusion broth, which was prepared by adding pieces of brain tissue to a dextrose broth, as an excellent medium for the cultivation of streptococci. Hayden[2], using the Rosenow procedure with the addition of crushed marble, found it an excellent medium for the cultivation of dental pathogens. The Brain Heart Infusion Broth formula, which conforms to the formulation recommended by the National Formulary for the cultivation of a wide spectrum of bacteria[3], is prepared to duplicate the formula of Rosenow and Hayden. Using an infusion of calf brain instead of brain tissue forms a clearer medium with the same nutrient value. Dibasic sodium phosphate is substituted for the original buffer, calcium carbonate.
Hitchens[4] and Later Falk, Bucca and Simmons[5], described the value of adding 0.1% to 0.2% agar to the medium. The agar not only rendered the medium more suitable for the cultivation of anaerobic organisms, but also enhanced the propagation of aerobic organisms. Rosenberg, Epps, and Clark[6] found brain heart infusion with 2% agar an excellent medium for the cultivation of *Actinomyces israelii* when incubated in an atmosphere of 5% $C0_2$. The addition of 10% defibrinated horse blood and 2% agar to the medium will support the growth of the pathogenic fungus *Histoplasma capsulatum* as reported by Howell[7] and *Coccidiodes immitis* as reported by Creitz and Puckett[8]. The medium may be made selective for pathogenic fungi by the addition of streptomycin and penicillin.
Experimental studies employing the addition of antibiotics such as penicillin and streptomycin to the acid as well as the neutral medium proved satisfactory in inhibiting bacterial overgrowth while permitting successful isolation of pathogenic fungi[11, 12]. Cooke[13] and Robinson et al.[6] employed the antibiotic chloramphenicol to inhibit bacteria. Further selectivity against growth of saprophytic fungi as well as bacteria was achieved by the use of both Cycloheximide and chloramphenicol[14]. Dolan[15] employed Chloramphenicol, Cycloheximide and Gentamicin for the selective isolation of *Histoplasma capsulatum, Blastomyces dermatiditis* and *Coccidiodes immitis*.
Kotcher, Robinson, and Miller[9], comparing various types of media for the isolation of *H. capsulatum*, found brain heart infusion agar with defibrinated blood have a higher rate of recovery of this pathogen. Brain Heart Infusion Agar also is recommended for the cultivation of *Actinomyces bovis* under anaerobic conditions with 10% carbon dioxide[10].

PRINCIPLES:
Brain Heart Infusion Broth is a highly nutritious buffered culture medium. Brain Heart Infusion Agar is the gel-form counterpart for the broth with the same nutritive qualities. The addition of sheep blood encourages the cultivation of certain pathogenic fungi. The various antibiotics employed inhibit bacteria and some saprophytic fungi.
Pathogenic yeasts are sensitive to antibiotics at 37°C, especially *Blastomyces dermatiditis*; therefore incubation should be restricted to 25-30°C.

FORMULA:

BRAIN HEART INFUSION BROTH	
Ingredients per liter of purified water	
Brain Heart Infusion from Solids	17.5 g
Pancreatic Digest of Gelatin	10.0 g
Dextrose	2.0 g
Sodium Chloride	5.0 g
Disodium Phosphate	2.5 g
Final pH: 7.4 ± 0.2 at 25°C	

BRAIN HEART INFUSION AGAR	
Ingredients per liter of purified water	
Brain Heart Infusion from Solids	8.0 g
Peptic Digest of Animal Tissue	5.0 g
Pancreatic Digest of Gelatin	16.0 g
Dextrose	2.0 g
Sodium Chloride	5.0 g
Disodium Phosphate	2.5 g
Agar	13.5 g
Final pH: 7.4 ± 0.2 at 25°C	

PROCEDURE:

A. *Mycological:*

It is preferred specimens from suspected mycotic infections be inoculated directly onto culture media, but collection in suitable sterile containers is a satisfactory alternative, if the specimen must be transported to the laboratory. Avoid airtight containers in which moisture might enhance the multiplication of contaminating bacteria. For mailing purposes specimens should be inoculated onto appropriate media prior to shipment.

As soon as possible after receipt, the specimen should be inoculated on appropriate media. Cutaneous specimens as well as biopsy and autopsy materials should be gently imbedded in the surface of the agar. Incubation at 25^{o}C (room temperature) is satisfactory for growth of most dermatophytes except *Trichophyton verrucosum* {opt. 35^{o}C}. Additionally certain T*richophyton* species have special nutritional requirements for good growth. Tube slants should be incubated with loose caps. The medium should be examined regularly for growth for 2-4 weeks before considered nonproductive or negative. Cultures should be examined for macroscopic and microscopic characteristics after adequate growth occurs. Materials for isolation of systemic or subcutaneous mycotic agents may be inoculated onto BHI with antibiotics and incubated at 25^{o}C and 35^{o}C.

Parallel use of BHIA without antibiotics at 25^{o}C and 35^{o}C is recommended for cultivation of Nocardia and Streptomyces species. Enriched media are used for good growth of *Actinomyces, Histoplasma* and *Blastomyces* species.

B. *Bacteriologic Specimens:*

In most cases, specimens are collected on a sterile cotton-tipped swab, placed in a sterile tube and delivered to the laboratory promptly. On the other hand, when swabs are to be transported to a laboratory different from the collection site, other methods should be used. See appropriate texts.

TEST CHARACTERISTICS:

BRAIN HEART INFUSION AGAR

ORGANISMS	RESULTS
Candida albicans	Growth
Escherichia coli	Growth
Staphylococcus aureus	Growth
Streptococcus pyogenes	Growth
Torulopsis glabrata	Growth

BHI AGAR w/SHEEP BLOOD

ORGANISMS	RESULTS
Candida albicans	Growth
Pasturella multocida	Growth
Streptococcus pneumoniae	Growth
Streptococcus pyogenes	Growth

BRAIN HEART INFUSION BROTH

ORGANISMS	RESULTS
Candida albicans	Growth
Corynebacterium diphtheriae	Growth
Pasturella multocida	Growth
Streptococcus pyogenes	Growth

Growth in broth is indicated by turbidity when compared to an uninoculated control. Perform a gram stain, subculture onto appropriate media and incubate at the appropriate temperature. If anaerobes are suspected, subcultures should be incubated anaerobically.
Biochemical and serological testing should be performed to confirm findings.

PRECAUTIONS:
This medium is for In Vitro Diagnostic Use. It supports the growth of pathogens and should be handled with caution by adequately trained personnel under the supervision of a microbiologist.

STORAGE:
This media should be stored at 2-8^{o}C. Adequate storage prolongs the life and quality of the product. Do not use the media beyond its expiration date.

REFERENCES:

1. J. Dental Research, 1:205, 1919.
2. Arch Internal Med., 32:828, 1923.
3. National Formulary, 9th ed., 1950.
4. J. Infect. Dis., 29:390, 1921.
5. J. Bact., 37:121, 1939.
6. J. Infec. Dis., 74:131, 1944.
7. Publ. Health Lab Reports, 63:173,1948.
8. Am. J. Clin. Path., 24:1318, 1954.
9. J. Bact., 62:613, 1951.
10. Diagnostic Procedures and Reagents, A.P.H.A., 4TH ED., 1963.
11. Proc. Soc. Exp. Biol. Med., 38:700, 1938.
12. Science, 14:387, 1951.
13. J. Lab. and Clin. Med., 67:355, 1953.
14. J. Lab. and Clin. Med., 44:422, 1954.
15. App. Microbiol., 21:195, 1971.
16. Difco & BBL Manual, 2003 pages 89-94