

**Acanthamoeba sp., Strain CDC:V313**

**Catalog No. NR-46466**

**For research use only. Not for human use.**

**Contributor:**

Govinda S. Visvesvara, Ph.D., Centers for Disease Control and Prevention, National Center for Emerging and Zoonotic Infectious Diseases, Division of Foodborne, Waterborne and Environmental Diseases, Waterborne Disease Prevention Branch, Atlanta, Georgia, USA

**Manufacturer:**

BEI Resources

**Product Description:**

Protozoa Classification: *Acanthamoebidae*, *Acanthamoeba*

Species: *Acanthamoeba* sp.

Strain: CDC:V313

Original Source: *Acanthamoeba* sp., strain CDC:V313 was isolated in 1994 from the nasal tissue of a male in Georgia, USA.<sup>1-3</sup>

Comment: *Acanthamoeba* sp., strain CDC:V313 was deposited to BEI Resources as type T4 based on 18S ribosomal RNA gene sequence.<sup>1-3</sup>

Amoebae belonging to the genus *Acanthamoeba* inhabit a wide variety of environmental niches worldwide and have been isolated from soil, freshwater, air, humans, and animals, both domestic and feral, and are able to exist both as free-living amoebae and as parasitic pathogens.<sup>3</sup> In healthy humans, *Acanthamoeba* is the causative agent of *Acanthamoeba* keratitis, an increasingly-prevalent sight-threatening eye disease among contact lens wearers. In immunocompromised individuals, *Acanthamoeba* can cause disseminated infections of other tissues and, in severe cases, the fatal disease granulomatous amebic encephalitis.<sup>3-6</sup>

*Acanthamoeba* are currently classified by twelve sequence types (T1 to T12) based on nuclear small ribosomal subunit RNA genotyping and divided into three morphological groups: Group I (T7, T8, T9), Group II (T3, T4, T11) and Group III (T1, T2, T5, T6, T10, T12).<sup>6</sup> Identification of *Acanthamoeba* on the genus level is based on spiny surface projections (acanthopodia) present on the surface of trophozoites.<sup>3</sup> Highly-specific PCR methods for subgeneric identification of isolates have been developed for both clinical and environmental applications.<sup>7</sup>

**Material Provided:**

Each vial of NR-46466 contains approximately 0.5 mL of culture in cryopreservative (7.5% DMSO). Please see Appendix I for cryopreservation instructions.

**Packaging/Storage:**

NR-46466 was packaged aseptically in screw-capped plastic cryovials and is provided frozen on dry ice. The product

should be stored at cryogenic temperature (-130°C or colder), preferably in the vapor phase of a liquid nitrogen freezer. If liquid nitrogen storage facilities are not available, frozen cryovials may be stored at -70°C or colder for approximately one week. Note: Do not under any circumstances store vials at temperatures warmer than -70°C. Storage under these conditions will result in the death of the culture.

To insure the highest level of viability, the culture should be initiated immediately upon receipt. Any warming of the product during shipping and transfer must be avoided, as this will adversely affect the viability of the product. For transfer between freezers and for shipping, the product may be placed on dry ice for brief periods, although use of a portable liquid nitrogen carrier is preferred. Please read the following recommendations prior to using this material.

**Growth Conditions:**

Peptone Yeast Glucose (PYG) medium (ATCC® medium 712) (Appendix II)

Incubation:

Temperature: 25°C

Atmosphere: Aerobic

Propagation:

1. Place the frozen vial in a 35°C to 37°C water bath and thaw for approximately 2 to 3 minutes. Do not agitate the vial. Do not leave the vial in the water bath after it is thawed.
3. Immediately after thawing, aseptically transfer the contents of the vial to a T-25 tissue culture flask containing 5 to 10 mL PYG medium.
4. Screw the cap on tightly and incubate the tube or flask at 25°C.

Maintenance:

1. When the culture is at or near peak density, vigorously agitate or scrape the surface of the flask to detach adherent cells.
2. Transfer approximately 0.25 mL to a fresh flask containing 5 to 10 mL fresh PYG medium.
3. Screw the caps on tightly and incubate at 25°C.
4. The amoeba will form an almost continuous sheet of cells on the bottom surface of the flask. Repeat steps 1 through 3 every 7 to 10 days.

**Citation:**

Acknowledgment for publications should read "The following reagent was obtained through the BEI Resources, NIAID, NIH: *Acanthamoeba* sp., Strain CDC:V313, NR-46466."

**Biosafety Level: 2**

Appropriate safety procedures should always be used with this material. Laboratory safety is discussed in the following publication: U.S. Department of Health and Human Services, Public Health Service, Centers for Disease Control and Prevention, and National Institutes of Health. Biosafety in Microbiological and Biomedical Laboratories. 5th ed. Washington, DC: U.S. Government Printing Office, 2009; see [www.cdc.gov/biosafety/publications/bmb15/index.htm](http://www.cdc.gov/biosafety/publications/bmb15/index.htm).

**Disclaimers:**

You are authorized to use this product for research use only. It is not intended for human use.

Use of this product is subject to the terms and conditions of the BEI Resources Material Transfer Agreement (MTA). The MTA is available on our Web site at [www.beiresources.org](http://www.beiresources.org).

While BEI Resources uses reasonable efforts to include accurate and up-to-date information on this product sheet, neither ATCC® nor the U.S. Government makes any warranties or representations as to its accuracy. Citations from scientific literature and patents are provided for informational purposes only. Neither ATCC® nor the U.S. Government warrants that such information has been confirmed to be accurate.

This product is sent with the condition that you are responsible for its safe storage, handling, use and disposal. ATCC® and the U.S. Government are not liable for any damages or injuries arising from receipt and/or use of this product. While reasonable effort is made to ensure authenticity and reliability of materials on deposit, the U.S. Government, ATCC®, their suppliers and contributors to BEI Resources are not liable for damages arising from the misidentification or misrepresentation of products.

**Use Restrictions:**

**This material is distributed for internal research, non-commercial purposes only.** This material, its product or its derivatives may not be distributed to third parties. Except as performed under a U.S. Government contract, individuals contemplating commercial use of the material, its products or its derivatives must contact the contributor to determine if a license is required. U.S. Government contractors may need a license before first commercial sale.

**References:**

1. Visvesvara, G. S., Personal Communication.
2. Sriram, R., et al. "Survival of *Acanthamoeba* Cysts after Dessication for more than 20 Years." J. Clin. Microbiol. 46 (2008): 4045-4048. PubMed: 18923013.
3. Booton, G. C., et al. "Identification and Distribution of *Acanthamoeba* Species Genotypes Associated with Nonkeratitis Infections." J. Clin. Microbiol. 43 (2005): 1689-1693. PubMed: 15814986.
4. Marciano-Cabral, F. and G. Cabral. "*Acanthamoeba* spp. as Agents of Disease in Humans." Clin. Microbiol. Rev. 16 (2003): 273-307. PubMed: 12692099.
5. Visvesvara, G. S. "Amebic Meningoencephalitides and Keratitis: Challenges in Diagnosis and Treatment." Curr. Opin. Infect. Dis. 23 (2010): 590-594. PubMed: 20802332.
6. Clarke, D. W. and J. Y. Niederkorn. "The Pathophysiology of *Acanthamoeba* Keratitis." Trends Parasitol. 4 (2006): 175-180. PubMed: 16500148.
7. Walochnik, J., et al. "Discrimination between Clinically Relevant and Nonrelevant *Acanthamoeba* Strains Isolated from Contact Lens-Wearing Keratitis Patients in

Austria." J. Clin. Microbiol. 38 (2000): 3932-3936. PubMed: 11060047.

8. Schroeder, J. M., et al. "Use of Subgenic 18S Ribosomal DNA PCR and Sequencing for Genus and Genotype Identification of *Acanthamoeba* from Humans with Keratitis and from Sewage Sludge." J. Clin. Microbiol. 39 (2001): 1903-1911. PubMed: 11326011.

ATCC® is a trademark of the American Type Culture Collection.



**APPENDIX I: CRYOPRESERVATION**

1. Harvest *Acanthamoeba* from multiple agar plates by scraping the surface of the flask with a cell scraper to detach adhering trophozoites.
2. Transfer the cell suspensions to 15 mL or 50 mL plastic centrifuge tubes.
3. Adjust the cell concentration to  $1.0 \times 10^6$  to  $2 \times 10^7$  cells/mL with fresh PYG medium.  
Note: If the concentration of cells is too low, centrifuge at 1300 x g for 10 minutes and resuspend in a smaller volume of fresh medium to yield the desired cell concentration.
4. Mix equal volumes of cell suspension and fresh medium containing 15% DMSO to yield a final concentration of  $1.0 \times 10^6$  to  $2 \times 10^7$  cells/mL in 7.5% DMSO. The freezing process should start 15 to 30 minutes following the addition of cryoprotective solution to the cell suspension.
5. Dispense 0.5 mL aliquots into 1 to 2 mL sterile plastic screw-capped vials for cryopreservation.
6. Place the vials in a controlled rate freezing unit. From room temperature cool the vials at  $-1^\circ\text{C}/\text{min}$  to  $-40^\circ\text{C}$ . If the freezing unit can compensate for the heat of fusion, maintain rate at  $-1^\circ\text{C}/\text{min}$  through this phase. At  $-40^\circ\text{C}$ , plunge vials into liquid nitrogen. Alternatively, place the vials in a Nalgene  $1^\circ\text{C}$  freezing container. Place the container at  $-80^\circ\text{C}$  for 1.5 to 2 hours and then plunge vials into liquid nitrogen.
7. Store in either the vapor or liquid phase of a nitrogen refrigerator ( $-130^\circ\text{C}$  or colder).

**APPENDIX II: Peptone Yeast Glucose (PYG) MEDIUM (ATCC® MEDIUM 712)**

1. Prepare the Basal medium (see recipe below), autoclave for 20 minutes at  $121^\circ\text{C}$ , and allow to cool.
2. Prepare each of the five inorganic stock solutions (listed below), autoclave for 20 minutes at  $121^\circ\text{C}$ , and allow to cool.
3. Prepare the 2 M glucose stock solution (see recipe below) and filter sterilize.

Basal Medium

Proteose Peptone	20.0 g
Yeast Extract	1.0 g
Distilled water	900.0 L

Inorganic Stock Solutions

0.4 M $\text{MgSO}_4 \cdot 7\text{H}_2\text{O}$
0.05 M $\text{CaCl}_2$
0.005 M $\text{Fe}(\text{NH}_4)_2(\text{SO}_4)_2 \cdot 6\text{H}_2\text{O}$
0.25 M $\text{Na}_2\text{HPO}_4 \cdot 7\text{H}_2\text{O}$
0.25 M $\text{KH}_2\text{PO}_4$

2 M Glucose Stock Solution

Glucose	18.0 g
Sodium Citrate- $2\text{H}_2\text{O}$	1.0 g
Distilled Water	50.0 mL

4. Aseptically prepare the PYG Medium by adding the components listed below to the Basal Medium in the following order:

Basal medium	900.0 mL
0.4 M $\text{MgSO}_4 \cdot 7\text{H}_2\text{O}$	10.0 mL
0.05 M $\text{CaCl}_2$	8.0 mL
0.005 M $\text{Fe}(\text{NH}_4)_2(\text{SO}_4)_2 \cdot 6\text{H}_2\text{O}$	10.0 mL
0.25 $\text{Na}_2\text{HPO}_4 \cdot 7\text{H}_2\text{O}$	10.0 mL
0.25 M $\text{KH}_2\text{PO}_4$	10.0 mL
2 M glucose stock solution	50.0 mL

5. Adjust the pH of the complete medium to 6.5 with sterile solutions of 1N HCL or 1N NaOH.
6. Bring the final volume up to 1 L with sterile distilled water.