



# *Neospora caninum* Dubey et al.

50845™

## Description

**Strain designation:** Nc-LIV [NC-Liverpool]

**Deposited As:** *Neospora caninum* Dubey et al.

**Type strain:** No

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## Storage Conditions

**Product format:** Frozen

**Storage conditions:** -80°C or colder for 1 week, vapor phase of liquid nitrogen for long-term storage

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## Intended Use

This product is intended for laboratory research use only. It is not intended for any animal or human therapeutic use, any human or animal consumption, or any diagnostic use.

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## BSL 2

ATCC determines the biosafety level of a material based on our risk assessment as guided by the current edition of *Biosafety in Microbiological and Biomedical Laboratories (BMBL)*, U.S. Department of Health and Human Services. It is your responsibility to understand the hazards associated with the material per your organization's policies and procedures as well as any other applicable regulations as enforced by your local or national agencies.

ATCC highly recommends that appropriate personal protective equipment is always used when handling vials. For cultures that require storage in liquid nitrogen, it is important to note that some vials may leak when submerged in liquid nitrogen and will slowly fill with liquid nitrogen. Upon thawing, the conversion of the liquid nitrogen back to its gas phase may result in the vial exploding or blowing off its cap with dangerous force creating flying debris. Unless necessary, ATCC recommends that these cultures be stored in the vapor phase of liquid nitrogen rather than submerged in liquid nitrogen.

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## Certificate of Analysis

For batch-specific test results, refer to the applicable certificate of analysis that can be found at [www.atcc.org](http://www.atcc.org).

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## Growth Conditions

**Host:** Vero (ATCC CCL-81)

**Instructions for complete medium:** Minimum essential medium (Eagle) (EMEM) (ATCC<sup>®</sup> cat. 30-2003) supplemented with 10% fetal bovine serum (ATCC<sup>®</sup> cat. 30-2020)

**Temperature:** 35°C

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## Handling Procedures

### Cell Line Maintenance

1. To establish a cell culture from the frozen state place an ampule in a water bath set at 35°C (2-3 min). Immerse the vial just sufficient to cover the frozen material. Do not agitate the vial.
2. Immediately after thawing, aseptically remove the contents of the ampule and

inoculate into 10.0 mL of fresh ATCC<sup>®</sup> 30-2003 with 10% (v/v) Heat-Inactivated Fetal Bovine Serum (HIFBS)\* in a T-25 tissue culture flask.

3. Outgas the flask for 10 seconds with a 95% air, 5% CO<sub>2</sub> gas mixture.
4. Incubate in a 35°C CO<sub>2</sub> incubator with the caps screwed on tightly.
5. Change the medium 1-2 times per week.

\*Fetal bovine serum is available from ATCC (catalog number 30-2020). Serum is heat-inactivated by exposure to 56°C for 30 minutes. This treatment will inactivate proteins of the complement pathway. Remove the serum from the refrigerator and aseptically distribute in 100 mL aliquots to sterile 125 mL screw-capped bottles. Immerse bottles in a 35°C water bath for 5 minutes. Do not directly transfer bottles from the refrigerator to 56°C. Transfer the bottles to a 56°C water bath and begin timing for 30 minutes. To avoid contamination, do not allow the level of the water in the bath to come in contact with the lip of the screw cap. It is best to leave one inch between the serum level in the bottle and the lip of the cap and to fill the water bath to a level just slightly above the level of the serum. To assure even heating of the serum, swirl the bottle(s) every ten minutes. **Note:** Some suppliers provide serum already heat-inactivated.

### Transferring the Cell Line

1. When the cell line forms a confluent layer, remove all the medium and replace it with 3 mL of Phosphate Buffered Saline (PBS) (ATCC<sup>®</sup> cat. 30-2200). Incubate flask at 35°C for 25-30 min.
2. Remove all the PBS and replace it with 2 mL of 0.25% (w/v) trypsin dissolved in Hank's Balanced Salt Solution.
3. Gently distribute the trypsin over the monolayer, remove the trypsin, and place the flask at 35°C for 10 min.
4. Add 2 mL of ATCC<sup>®</sup> 30-2003 with 10% (v/v) HIFBS and detach any cells still adherent by alternately aspirating the medium into a pipette and discharging the contents over the monolayer.
5. Distribute the cell suspension in 0.5 mL aliquots to 4 T-25 flasks containing 10 mL fresh ATCC 30-2003 with 10% (v/v) HIFBS.
6. Outgas the flask for 10 seconds with a 95% air, 5% CO<sub>2</sub> gas mixture.
7. Incubate in a 35°C CO<sub>2</sub> incubator with the caps screwed on tightly.

### Storage and Culture Initiation of *Neospora*

Frozen ampules packed in dry ice should either be thawed immediately or stored in

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liquid nitrogen. If liquid nitrogen storage facilities are not available, frozen ampoules may be stored at or below  $-70^{\circ}\text{C}$  for approximately one week. Do not under any circumstance store frozen ampoules at refrigerator freezer temperatures (generally  $-20^{\circ}\text{C}$ ). Storage of frozen material at this temperature will result in the death of the culture.

1. To thaw a frozen ampule, place it in a  $35^{\circ}\text{C}$  water bath such that the lip of the ampule remains above the water line. Thawing time is approximately 2 to 3 minutes. Do not agitate the ampule. Do not leave ampule in water bath after it is thawed.
2. Immediately after thawing, aseptically transfer contents to a T-25 tissue culture flask containing a fresh monolayer of ATCC<sup>®</sup> CCL-81™ cells and 10 mL ATCC<sup>®</sup> 30-2003 with 3% (v/v) HIFBS.
3. Outgas the flask for 10 seconds with a 95% air, 5%  $\text{CO}_2$  gas mixture.
4. Incubate in a  $35^{\circ}\text{C}$   $\text{CO}_2$  incubator with the caps screwed on tightly.

**Culture maintenance:**

1. Remove the medium from a fresh confluent monolayer of CCL-81 cells in a T-25 tissue culture flask and replace it with 10 mL of ATCC<sup>®</sup> 30-2003 with 3% (v/v) HIFBS.
2. To transfer the culture, remove the old medium containing the organism and centrifuge at  $1300 \times g$  for 10 min.
3. Remove the supernatant and resuspend the cell pellet. Transfer the resuspended pellet to the fresh flask of CCL-81 cells.
4. Outgas the flask for 10 seconds with a 95% air, 5%  $\text{CO}_2$  gas mixture.
5. Incubate in a  $35^{\circ}\text{C}$   $\text{CO}_2$  incubator with the caps screwed on tightly.

**Cryopreservation:**

1. Harvest the culture by gently agitating the contents of each flask. Transfer all but approximately 1 mL of the culture medium to 15 mL plastic centrifuge tubes. Detach the remaining tissue culture cells (infected and uninfected) by scraping the surface of the flask with a cell scraper. Pass the resulting cell suspension through a syringe equipped with a 27 gauge 1/2 in needle and pool this suspension with the culture fluid.
2. Spin the cell suspensions at approximately  $50 \times g$  for 3 min, to remove the cellular debris.
3. Transfer the spore suspensions (supernatants) to new 15 mL plastic centrifuge tubes. Centrifuge at  $1300 \times g$  for 10 min.
4. Pool the spore pellets and adjust the concentration to  $2.0 - 4.0 \times 10^7$  cells/mL with a fresh solution of Hank's Balanced Salt Solution.

\*If the concentration is too low centrifuge at 1300 x g for 10 min and resuspend in the volume of Hank's Balanced Salt Solution required to yield the desired concentration.

5. Mix the spore preparation and 20% (v/v) DMSO in equal portions. The final concentration will be  $1.0 - 2.0 \times 10^7$  cells/mL and 10% DMSO. The time from the mixing of the cell preparation and cryoprotective solution to the start of the freezing process should be no less than 15 min. and no more than 30 min.
6. Dispense in 0.5 mL aliquots to 1.0-2.0 mL sterile plastic screw-capped cryules (special plastic vials for cryopreservation).
7. Place the vials in a controlled rate freezing unit. From room temperature cool 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 the heat of fusion. At  $-40^\circ\text{C}$  plunge into liquid nitrogen. Alternatively, place the vials in a Nalgene  $1^\circ\text{C}$  freezing apparatus. Place the apparatus at  $-80^\circ\text{C}$  for 1.5 to 2 hours and then plunge ampules into liquid nitrogen. (The cooling rate in this apparatus is approximately  $-1^\circ\text{C}/\text{min}$ .)
8. Store in either the vapor or liquid phase of a nitrogen refrigerator.
9. To thaw a frozen ampule, place it in a  $35^\circ\text{C}$  water bath such that the lip of the ampule remains above the water line. Thawing time is approximately 2 to 3 minutes. Do not agitate the ampule. Do not leave ampule in water bath after thawed.
10. Immediately after thawing, aseptically transfer contents to a T-25 tissue culture flask containing a fresh monolayer of ATCC CCL-81 cells and 10 mL ATCC 30-2003 with 3% (v/v) HIFBS.
11. Outgas the flask for 10 seconds with a 95% air, 5%  $\text{CO}_2$  gas mixture.
12. Incubate in a  $35^\circ\text{C}$   $\text{CO}_2$  incubator with the caps screwed on tightly.

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## Notes

Mycoplasma-free based on PCR-based testing conducted at ATCC.

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## Material Citation

If use of this material results in a scientific publication, please cite the material in the following manner: *Neospora caninum* Dubey et al. (ATCC 50845)

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## References

References and other information relating to this material are available at [www.atcc.org](http://www.atcc.org).

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