

Treating *Batrachochytrium dendrobatidis* (Bd)/Chytrid

By: Jason Juchems of Poisonfrogs.net

Batrachochytrium dendrobatidis (Bd) is a type of chytrid fungus that infects the skin of amphibians and is easily transmitted through spores. The spread of Bd is one of the largest environmental crises contributing to the decline of the amphibian population. Diagnosis is typically made through a polymerase chain reaction (PCR) test performed in a laboratory, although visible symptoms can include discolored skin, excessive shedding, abnormal posture, or unusual behaviors (such as nocturnal species active during the day).

How to diagnose:

Testing and treatment are crucial.

Materials: Essential items for testing for chytrid include powder-free nitrile/latex gloves, sterile swabs, and sample containers or plastic test tubes.

Procedure: Wear gloves and use a single sterile swab, gently swab the ventral (bottom) surfaces of the animal's skin. Swab each area 5 times: left side, belly, right side, left thigh, right thigh, left foot and webbing, and right foot and webbing. After swabbing all areas, place the swab in a test tube and cap it (you may need to cut the handle to make it fit the tube). Label each sample clearly. I send my samples to the Research Associates Laboratory (www.vetdna.com) for analysis. I also have them test for Ranavirus, an incurable infection. While Bd is only transmitted to other amphibians, Ranavirus can affect both amphibians and chelonians. If you receive positive test results, chytrid can be treated with a bath/soak.

Over the Counter Treatments:

Option 1: Lamasil AT® *Terbinafine hydrochloride* 1% (Discontinued product)

The over-the-counter anti-fungal Lamasil AT® spray has shown successful treatment. The active ingredient in Lamasil AT®, *Terbinafine hydrochloride*, has been shown to treat chytrid. Dilutions at 0.05-0.10 mL of the anti-fungal *Terbinafine hydrochloride* can be used to soak a frog for 5 minutes a day over 7 days.

1. Prepare a Treatment Solution

- **Dilution for chytrid treatment:** 1mL of Lamasil AT® *Terbinafine hydrochloride* 1% to 200mL of amphibian safe water.

2. Soak the Frog

- Place the frog in a shallow container filled with the solution. The container should be large enough for the frog to move freely but not so large that the solution no longer touches the frog.
- Gently submerge the frog in the solution, ensuring it can breathe easily. Disposal or glass pipettes may be needed to continually apply the solution to the frog. Soaking for 5 **minutes** is usually effective.

Frequency: Soaking should be done **once a day for 7 days**.

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Notes: While discontinued from production, compounding pharmacies can make a *Terbinafine hydrochloride* 1% spray solution. The same solution and durations have been used to treat tadpoles.

Option 2: F10SC

F10SC (also known as **F10 Super Concentrate**) is a veterinary disinfectant and cleaner commonly used to clean kennels, cages, and terrariums. It is also a general cleaner for veterinary practices. It has antifungal, antibacterial, and antiviral properties, making it effective for treating chytrid fungus (*Batrachochytrium dendrobatidis*, or Bd) in frogs. Research has found that a 1:3000 dilution 10-minute soak over 9-10 days is an effective treatment.

1. Prepare a Treatment Solution

- F10SC is highly concentrated, **so it needs to be diluted before use.** See the instructions on the bottle.
- Dilute 1mL F10 to 3 liters of amphibian-safe water.

2. Soak the Frog

- Place the frog in a shallow container filled with the solution. The container should be large enough for the frog to move freely but not so large that the solution no longer touches the frog.
- Gently submerge the frog in the solution, ensuring that it can breathe easily. Disposal or glass pipettes may be needed to continually apply the solution to the frog. Soaking for **10 minutes** is usually effective.

Frequency: Soaking should be done **once a day for 9-10 days.**

Notes: F10 can be used to treat tadpoles at a dilution of 0.5mL to 5 liters of water, in 10-minute soaks over 9 consecutive days.

Housing Frogs:

Since chytrid fungus can survive in the environment, it's crucial to disinfect the frog's habitat. If the frog has already been in an established terrarium, everything will need to be broken down and cleaned using F10SC or a bleach solution. Botanicals and substrate will not be salvageable. During treatment time, frogs should be housed in a quarantine set-up. Critter Keepers, large deli cups, or large food storage containers can be used with a substrate of a damp paper towel. Containers are broken down and sanitized daily, with frogs returning to a clean, fresh container after each treatment.

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Suggested Reading

Amphibian Husbandry Resource Guide (2.0 ed.). (2012). San Diego, CA: Association of Zoos and Aquariums. (<http://www.amphibianark.org/pdf/AZAAmphibianHusbandryResourceGuide.pdf>)

Pessier, A., & Mendelson, J. (2010). *A Manual For Control of Infectious Diseases in Amphibian Survival Assurance Colonies and Reintroduction Programs*. Apple Valley, MN: IUCN/SSC Conservation Breeding Specialist Group. (http://amphibianark.org/pdf/Amphibian_Disease_Manual.pdf)

Sources

Bowerman, J., Rombough, C., Weinstock, S., & Padgett-Flohr, G. (2010). Terbinafine Hydrochloride in Ethanol Effectively Clears *Batrachochytrium dendrobatidis* in Amphibians. *Journal of Herpetological Medicine and Surgery*, 20(1), 24-28.

Temperley, John. (2015) F10 treatment of chytridiomycosis. *F10 Products Technical Bulletin*

Jong, M., van Dyk, R., and Weldon, C., (2018). *Antifungal efficacy of F10FC veterinary disinfectant against *Batrachochytrium dendrobatidis**. *Medical Mycology*, 56, 60-68.



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