

## BASICS


Salamander chytridiomycosis is an infectious disease caused by the fungus *Batrachochytrium salamandrivorans* (*Bsa*). The fungus is a close relative of *B. dendrobatidis* (*Bd*), which was described more than two decades ago and is responsible for the **DECLINE OR EXTINCTION** of over 200 species of frogs and toads. Salamander chytridiomycosis, and the fungus that causes it, were only recently discovered.

Once introduced the **FUNGUS** is capable of surviving in the environment, in the leaf litter and small water bodies, even in the absence of salamanders.

**CLINICAL SIGNS** of infected skin, may show reddening and ulceration, and infection is often followed by secondary bacterial infection. **SKIN LESIONS** are not always obvious, however, and some animals may carry the fungus without clinical signs. In some cases all that is observed is severe lethargy, sometimes weight loss, followed by a quick death.

Chytrid fungi can be **TRANSMITTED** through contact with water or organic matter (mud, leaf litter, etc.), or by **DIRECT CONTACT** with an infected salamander.

To **DIAGNOSE** the disease chytridiomycosis it is necessary to confirm the presence of both skin lesions and fungus. Detection of the fungus can be done with a DNA (PCR) test, usually from a **SKIN SWAB**.



**CONTACT  
WITH INFECTED  
SALAMANDER,  
WATER, OR  
ORGANIC  
MATTER**

**ALL  
SALAMANDERS**

## DETAILS

The first cases occurred in The Netherlands, as outbreaks in native fire salamanders, *Salamandra salamandra*. Further work discovered that the fungus is present in Thailand, Vietnam and Japan, and originated in native Eastern Asian salamanders without causing significant disease. Evidence suggests that the **FUNGUS** was introduced to Europe in the last decade or so, probably through imported pet salamanders that can act as carriers.

Little is known about the **SUSCEPTIBILITY** of most North American salamanders but, based on experimental trials, at least two species, the Eastern newt (*Notophthalmus viridescens*) and the rough-skinned newt (*Taricha granulosa*), are highly susceptible to the fungus and could experience similar **HIGH MORTALITIES**. Several hundred species may be sensitive to this disease.

If *B. salamandrivorans* is introduced into North America, it will likely become permanently **ESTABLISHED** and, based on experience with frog chytridiomycosis, impossible to **ERADICATE**.

The disease is **NOT CONFIRMED** in North America, but an introduction of the fungus into native salamander populations could have devastating effects. North America has the greatest diversity of salamander species in the world. In Europe, the fire salamander population where the disease was first discovered is at the brink of extirpation, with over 96% mortality recorded during outbreaks.

**TRANSMISSION** The fungus produces motile zoospores, capable not only of surviving in water and moist environments, but also of short distance dispersal through **ACTIVE SWIMMING**. Because the fungus and its infectious zoospores can survive in the absence of an infected host, transmission from an outbreak site to adjacent areas can occur both through dispersal of infected salamanders and through **HUMAN ACTIVITIES**, such as movement of soil, water or even fishing bait.

**DIAGNOSIS** Infection (presence of the fungus in a host) and disease (ill effects on the host) are not the

same thing. Some species of salamanders, the Asian carriers for instance, can be infected but **DO NOT DEVELOP** disease. Confirmation of the fungus in skin sections, along with evidence of skin damage, is necessary to confirm disease.

**TREATMENT** Research specific to treatment of *B. salamandrivorans* has only begun. **ANTIFUNGAL DRUGS** could prove effective against the salamander chytrid fungus in captive individuals.

**PREVENTION** As with frog chytrid fungus, salamander chytridiomycosis could be spread during anthropogenic activities. Boots, clothes, and all field equipment should be **CLEANED** with a 10% bleach-water mixture before moving between sites. Pet salamanders should never be released to the wild. Water used in captive enclosures should never be dumped outside on the ground.

**WILD AMPHIBIANS** should not be moved between habitats, and captive animals should not be used as fishing bait.

All newly acquired captive amphibians should be initially **QUARANTINED** from other amphibians until it has been confirmed that they are disease free.

**SUSPICIOUS DEATHS** of salamanders both in the wild and in captivity should be reported to enable early detection of this disease.

