

# PULMONARY HEMORRHAGE AND HEMOSIDEROSIS IN INFANTS

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Pediatric Pulmonary  
Dorr G. Dearborn, Ph.D., M.D.  
Michael D. Infeld, M.D.

Pediatric Critical Care  
Paul G. Smith, D.O.

Environmental Hygiene  
Terrence M. Allan, M.P.H.  
Cuyahoga County Board of Health

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Stachybotrys (dark area) as found on drywall.

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## Introduction

Over the past several years, there have been a number of young infants (most under 6 months old), in the eastern neighborhoods of Cleveland, who have been coughing up blood due to bleeding in their lungs. Some infants have died and more infants continue to get ill. This bleeding, a disorder called Pulmonary Hemorrhage appears to be caused by something in their home environments, most likely toxins produced by an unusual fungus called *Stachybotrys chartarum* or similar fungi.

### What is Pulmonary Hemosiderosis?

Bleeding in the lungs.

### What Are The Symptoms?

Severe bleeding can cause coughing up blood or nose bleeds. This is particularly concerning in infants under 6 months old. Chronic, low grade bleeding can cause chronic cough and congestion with anemia.

### What Causes The Bleeding?

Most likely, toxins made by an unusual fungus or mold *Stachybotrys*. When infants breathe in the toxins, the blood vessels in their lungs may become fragile. The weak vessels may

be bothered by cigarette smoke or stresses from other illnesses and start to bleed. You cannot see the toxins in the air rather they are carried in the microscopic fungal spores.

### How Do I Know If The Fungus Or Mold Is In My House?

This fungus or mold grows only on wood or paper that have gotten very wet for more than a few days or so. (It does **NOT** grow on plastic, vinyl, concrete products, or ceramic tiles). If the wood/paper gets wet and is not cleaned up and dried, the fungus may grow and spread. The fungus is black and slimy when wet. It is **NOT** found in the green mold on bread or the black mold on the shower tiles (but the shower tiles should be kept clean too). If you have had plumbing leaks, roof leaks, flooding in the basement (even if you don't use the basement), or sewer backup in the past year, look for mold or a musty odor.

### Common Areas for This Mold Growth:

Water soaked wood, ceiling tiles, wall paneling, unpainted plaster board surfaces, cotton items, cardboard boxes, and stacks of newspapers. If these areas have been very wet, usually for longer than one week, check for mold. After the area dries, the fungus will not continue to grow, but the black dust caused by the fungus can be sucked up by the furnace blower and spread throughout the house. Be sure and check your basement for the black mold. If you do not have access to the basement, ask your landlord for assistance. **Note: not all black mold is *Stachybotrys*, but moldy homes are not healthy homes.**

### Heating Systems:

If you have mold in your basement, check to see if there is any way that your forced air furnace can send the mold dust up to the living spaces. Is there ductwork connecting the cold air returns to your furnace or does your furnace pull air from the basement? The latter is the case if you can see the furnace filter face on (rather than just the edge).

### How To Clean-up Fungal Growth:

[Click here for more detailed instructions on how to clean-up the mold.](#) If you have more than two square feet of mold growth you should seek professional advice on how to perform the clean-up.

- The source of the water problem must first be corrected. All roof or plumbing leaks/flooding must be fixed.
- All moldy surfaces should be cleaned with a household bleach (like Clorox) and **water mix = 1 cup of bleach mixed in 1 gallon of water**. You can add a little dish soap to the bleach water to cut dirt and oil on the wall that can hold mold. With good ventilation, apply the bleach water mix to the surface with a sponge, let it sit for 15 minutes, then thoroughly dry the surface. **Be sure to wear a dust mask, rubber gloves and open lots of windows when cleaning with bleach water.**
- If the area cannot be cleaned (like some wet broken ceiling tiles), is too damaged, or is disposable (like cardboard boxes) discard them and replace with new ones.
- It may be necessary to do more clean up in the home (carpets, crawl spaces, heating ducts) if you have a bad mold problem.

**Call your city or county health department if you have questions or need assistance.**

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## THE CLEVELAND OUTBREAK

Over the past seven years in the Cleveland, Ohio area there have been 45 cases of pulmonary hemorrhage (PH) in young infants. Sixteen of the infants have died. Thirty-two of the infants have been African American. Most of these cases have occurred within ten contiguous zip codes area in the eastern portion of the metropolitan area. In November/December, 1994, the Centers for Disease Control and Prevention (CDC) lead a case-control investigation on the first ten cases. This study found an epidemiological association of PH in these infants with water-damaged homes containing the toxic fungi, predominantly *Stachybotrys*. Several lines of evidence suggest that the most likely causal agents are fungal toxins from a fungus called *Stachybotrys atra*. This somewhat unusual fungus was found in high quantity in the home environments of the affected infants but also to a lesser degree in some of the comparison homes. *Stachybotrys* requires water soaked cellulose to grow, and was found in homes where there had been water damage from flooding, plumbing leaks or roof leaks involving wood or paper products (e.g. insulation, gypsum board, ceiling tile). The spores of this fungus contain very potent mycotoxins which appear to be particularly toxic to the rapidly growing lungs of young infants. The linkage of *Stachybotrys* to PH in infants is on the basis of epidemiological data and has not been conclusively demonstrated. Other factors such as environmental tobacco smoke appear to be important triggers in precipitating overt pulmonary hemorrhage.

More cases continue to occur, a few infants having had only very subtle initial symptoms such as nose bleeds and chest congestion. Concern that there may be a larger number of undetected young infants with this disorder, led to the examination of all infant coroner cases over a three year period, 1993-1995. This revealed seven "SIDS" (sudden infant death syndrome) cases with evidence of preexisting major pulmonary bleeding. All but one of these infants had lived in the ten zip code cluster area.

This disorder is likely to extend beyond Cleveland since an informal national survey of all pediatric pulmonary centers and continued reporting has identified over 100 similar cases of pulmonary hemorrhage in infants across the country over the last seven years.

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## IS MY MOLD STACHYBOTRYS?

While *Stachybotrys chartarum (atra)* occurs widely in North America, it is probably rather uncommon to find it in homes. It requires water soaked cellulose (wood, paper, and cotton products) to grow. While wet it looks black and slimy perhaps with the edges white, and when dry it looks less shiny. **It is not the only or the most common black mold to be found in these conditions.** If your clean-up is not simple, i.e. your water damage and mold growth is extensive and/or involves structural materials, contact your city or county health department for assistance in assessing the problem. They can put you in contact with environmental laboratories capable of identifying *Stachybotrys* and with abatement

contractors familiar with the precautions and other specifics important for extensive clean-up. If you have a large area of mold growth (greater than two square feet or so), seek professional assistance in the clean-up. You can get quite ill yourself if you inhale a large quantity of the fungal dust or get it on your skin.

### Testing for Mold

For a more detailed discussion on the assessment and remediation of *Stachybotrys* in indoor environments, please refer to The Proceedings of the International Conference held on October 6-7, 1994 in Sarasota Springs, NY entitled "*Fungi and Bacteria in Indoor Environments*", pages 201-207, published by the Eastern New York Occupational Health Program [(518)436-5511].

In cases of minor mold contamination, small isolated areas (2 to 10 sq.ft.), testing is usually not necessary. In most of these cases, the area can be addressed by using the clean-up recommendations given elsewhere on this home page.

In cases of more extensive contamination, testing may be necessary. Some private environmental consulting firms may have the ability to conduct home assessments and sample for mold identification. Please refer to the section of your yellow pages entitled "Environmental Consultants" to find a company in your area that might be capable of performing these tasks effectively. Ask if the company has experience with mold testing; it is recommended that several price quotes be obtained for field work and analysis. Consulting firms should be familiar with the American Industrial Hygiene Association (AIHA) document entitled "*Field Guide for the Determination of Biological Contaminants in Environmental Samples*". This document provides guidelines for the sampling of mold in indoor environments. For a list of accredited labs, please see the [AIHA web site](#).

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## DOES MY INFANT OR CHILD HAVE PULMONARY HEMOSIDEROSIS?

Pulmonary hemosiderosis is a rare lung disorder which can also occur as part of other medical conditions. If your infant or child is coughing blood, you need to seek medical attention immediately. If your young infant (<6 months old) is having nose bleeds without any injury, you should seek medical attention right away. If your infant or child has chronic cough and chest congestion and is anemic, ask your physician to consider the possibility of pulmonary hemosiderosis among all the other more common diagnostic possibilities.

If your physician would like more information about looking for pulmonary hemosiderosis, have them contact:

Dorr G. Dearborn, Ph.D., M.D.  
Pediatric Pulmonary Division  
Rainbow Babies & Childrens Hospital  
11100 Euclid Avenue  
Cleveland, Ohio 44106  
FAX (216) 844-5916

If your physician would like consultation regarding pulmonary hemosiderosis have them contact the nearest Pediatric PulmonaryCenter. The local chapter of the American Lung Association can be of assistance if necessary.

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## REPORTING A CASE

If you are a physician and have had an **infant** with idiopathic pulmonary hemorrhage or hemosiderosis in the past five years, Dr. Dearborn would appreciate your reporting it to us. Reporting forms can be obtained by calling (216) 368-4369.

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## IDIOPATHIC PULMONARY HEMOSIDEROSIS: NATIONAL ORGANIZATION

Some parents of children with the rare disorder Idiopathic Pulmonary Hemosiderosis have expressed an interest in establishing a national organization. The problem described here with young infants is a form of this disorder but older children can also have IPH from other unknown causes or even an allergy to cow's milk (Heiner's Syndrome). The national organization would primarily be a parental group interested in communication and optimizing the medical care for their children.

If you would be interested in participating in this new organization, contact:

Dorr G. Dearborn, Ph.D., M.D.  
Pediatric Pulmonary Division  
Case Western Reserve University, School of Medicine  
10900 Euclid Avenue, BRB 824  
Cleveland, Ohio 44106-4948

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## ADULT HEALTH CONCERNS

If you have concerns about the health of adults who have been exposed to Stachybotrys, contact the Occupational Medicine physician listed below:

**Eckardt Johanning, MD, MSc**

[Eastern New York Occupational Health Program](#)

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## ADDITIONAL INFORMATION

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Elidemir, O., Colasurdo, G.N., Rossmann, S.N., and Fan, L.L., Isolation of *Stachybotrys* from the lung of a child with pulmonary hemosiderosis, *Pediatrics*, 104:964-966, 1999.

Flappan, S.M., Portnoy, J., Jones, P., and Barnes, C., Infant pulmonary hemorrhage in a suburban home with water damage and mold (*Stachybotrys atra*), *Environ Health Perspect*, 107:927-930, 1999.

Fact sheets and other indoor air quality related publications including "Biological Pollutants in Your Home" and "Flood Cleanup: Avoiding Indoor Air Quality Problems" are available from:

Indoor Air Quality Information Clearinghouse

P.O. Box 37133

Washington, D.C. 20013-7133

(800) 438-4318 or (202) 484-1307

[Should You Have the Air Ducts in Your Home Cleaned?](#)

Also visit the web site of U.S. Environmental Protection Agency, Indoor Environments Division

<http://www.epa.gov/iaq/>

[US Dept of Energy's "Hazard Identification and Mitigation Workshop Manual"](#)

[Minnesota Health Department Mold Fact Sheet](#)

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Questions about stachybotrys or any topic mentioned on this home page should be directed to [stachy@po.cwru.edu](mailto:stachy@po.cwru.edu).

This page is maintained by Sheree Hemphill, [sah18@po.cwru.edu](mailto:sah18@po.cwru.edu).

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