



214 East 3<sup>rd</sup> Street Libby, Montana 59923 (406)293-9274 fax:(406)293-9280

## Understanding Libby Amphibole Asbestos Related Diseases

When we talk about asbestos related diseases (ARD) related to Libby amphibole asbestos, we need to remember that it is a unique type of asbestos fiber that is structurally and chemically different than many other types of asbestos. Because of the unique mineralogy, diseases associated with it also present differently than the asbestos related diseases associated with the more commonly used commercial asbestos called chrysotile.

To get a complete understanding of Libby amphibole asbestos related diseases, we need to cover three topics: important medical terms, the two categories of asbestos diseases, and the difficulty of diagnosing the unique presentation of Libby amphibole asbestos disease.

### Terms to Understand:

**Pleural Lining:** A lining that surrounds the lungs that stretches and expands like a balloon when breathing

**Fibrosis:** scarring

**Pleural fibrosis:** scarring of the pleural lining of the lungs

**Pleural Plaque:** a spot of scarring on the pleural lining

**Pleural Thickening:** when the lining around the lungs becomes thicker due to the formation scar tissue along the pleural lining

**Bilateral:** occurring on both sides

**Diffuse:** scattered throughout the lung fields

**Non-calcified plaques:** consist of scar tissue only

**Calcified plaques:** have deposits of calcium in the scar tissue

**Parenchyma:** the main part of an organ that contains the functioning cells. In this situation it refers to the lungs.

**Interstitial:** the tissue between the air sacs that are within the lungs. Thus this refers to tissue inside the lungs (also know as the interstitium)

**Asbestosis:** Scarring of the actual lung tissues (not the pleural tissue which is outside of the actual lung tissue).

**Pneumoconiosis:** Disease of the respiratory tract due to inhalation of dust particles

## Two Categories of Asbestos Related Diseases

### **Pleural Fibrosis**

The majority of people exposed to Libby amphibole asbestos who develop an asbestos related disease, develop some kind of pleural fibrosis. Based on the mineralogical features of Libby amphibole asbestos, the pleural lining is most commonly impacted by the fibers. The fibers migrate out of the lungs through tissue and/or travel in body fluids invading the pleural lining and causing disease.

It is important to remember that pleural fibrosis occurs on a continuum from localized pleural plaques to diffuse pleural thickening. All types of pleural fibrosis reduce the flexibility of the pleural lining which can limit a person's ability to breathe deeply. This restrictive disease is similar to a tight rubber band that will restrict or not allow the lungs to expand. Different people experience different severities of fibrosis and it does not always correlate with the level of asbestos exposure the person experienced.

Just as the degree of fibrosis occurs on a continuum, so do the symptoms people experience. Symptoms can include shortness of breath, a chronic cough, lots of phlegm, and chest pain. Some people experience severe symptoms that greatly impact their daily life and can become a debilitating and/or terminal condition while other people may have very few symptoms. Therefore, it is very important for people to work closely with their doctor to receive ongoing medical care and evaluation.

### **Interstitial Disease**

The second category of asbestos related disease, that is much less common in Libby but still seen in some people, is when the scarring occurs inside or on the lungs themselves. This has many names. It can be referred to as parenchymal fibrosis, interstitial disease, interstitial fibrosis, or asbestosis. The term asbestosis is mainly used in reference to scarring of the lung tissue itself. Historically, asbestosis was the common presentation of asbestos related disease, although it is noteworthy that it was typically seen with the more common commercial type of asbestos, chrysotile.

Since Libby amphibole disease frequently causes fibrosis on the outside lining around the lungs (pleural lining) rather than inside or on the actual lung tissue, the person technically has pleural fibrosis (resulting from asbestos). The person does not have asbestosis. It is also possible for people to have any range of pleural fibrosis and asbestosis at the same time.

### **The Difficulty of Diagnosing**

Diagnosing asbestos related disease associated with Libby amphibole asbestos is difficult as it is a new presentation of an old disease. The initial changes appear more subtly and are not as easily recognized on diagnostic images (x-ray/CT) in the early stages. It is important to remember that with Libby amphibole asbestos diseases the changes are frequently on the outside lining around the lungs (the pleura lining) rather than inside the lungs. It is also a significantly more progressive disease in nature. These unique characteristics make proper diagnosis difficult for those not experienced with this particular type of asbestos disease.

It is not uncommon for Libby amphibole asbestos disease to go unrecognized or misdiagnosed by medical providers not familiar with the disease. People who are experiencing symptoms have frequently had their radiographic changes read as "shadows" or "fat" when really they are the very early changes of Libby amphibole asbestos disease. It is easy for Dr. Black and Dr. Whitehouse to identify these changes because they read 1,000s of x-rays and CT's every year with these particular types of changes. A good analogy is related to those pictures where you are supposed to find 8 animals hidden in the picture. If you know one is a lion, a hippo, a giraffe, etc; it is much easier to look for and find the animals. Same goes with radiographic changes associated with Libby amphibole asbestos diseases. Although it is important to know how to read the radiography for this particular type of disease, the most important thing is a face to face evaluation with a treating physician who can correlate clinical symptomatology with diagnostic findings.

## **The Mineralogy of Libby Amphibole Asbestos**

Asbestos is a general term used to describe several different types of fibers. In efforts to point out that our fiber is unique, many people originally used the word tremolite. This also seems not to be the best term as there is actually very little tremolite in our fiber. Therefore, the best term is Libby amphibole asbestos. Libby amphibole asbestos fibers have no odor, smell, or taste. They are not flammable and they do not evaporate into air, dissolve in water, or breakdown in dirt. Because of the unique chemical and structural properties of our fiber the associated Libby amphibole asbestos diseases also have a unique presentation.

### **Libby Amphibole Asbestos is a Solid Solution**

This means that a single fiber of Libby amphibole asbestos is a mixture of up to 5 different, yet similar, fibers. Libby amphibole asbestos mostly includes Winchite (84%), Richterite (10%), and Tremolite (5%).

To understand how a single fiber of Libby amphibole asbestos can be a solid solution, imagine a glass of water. You pour in six teaspoons of yellow water, two teaspoons of green water, and a teaspoon of blue water. The water is then a new color. If you were to freeze that glass of water, it would be a solid solution. It can be difficult to look at the frozen block and determine how much of each color is in the solution just like it is difficult to determine what the chemical makeup of Libby amphibole asbestos is.

### **Libby Amphibole Asbestos is a Transitional Fiber**

This means that since Libby amphibole asbestos fibers are made up of 3-5 chemically different fibers, the chemical composition often changes from one end of the amphibole fiber to the other. Just like the frozen block of colored water can be mostly green on one end and mostly blue on the other end.

### **Cleavage Frequently Occurs with Libby Amphibole Asbestos**

Remember that asbestos fibers are very fragile. Cleavage is the mechanical breaking apart of the mineral when it is disturbed, whether by processing it or playing with it. Some people question if the cleavage process continues while the fibers are in the lungs and/or the body. This idea is not a fact, rather it is just a question that needs further research to determine if it is true. The bottom line is that the more you disturb the fibers, the more fibers you get. Cleavage does not always occur in a chaotic or random manner; rather it occurs in a parallel way, which eventually reduces some of the larger pieces and particles to thin, needlelike forms that can cause health problems.

