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Review Article

HARMFUL EFFECTS OF TALC AND ASBESTOS-A REVIEW

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Pallickal PO, Kayamkulam**Abstract:**

Talcum powder is the refined, powdery form of the softest mineral on earth: talc. Talc is an “inert” ingredient, meaning it does not generate a chemical reaction when ingested or used on the skin. People have taken advantage of its natural smoothness, safety and absorbency since ancient Egyptian times. Clinical evidence and over 40 years of studies by medical experts around the world continue to support the safety of cosmetic talc. Health authorities around the world have reviewed the data on talc, and it is used widely across the globe. Even with talc’s long history of safe use in consumer products, some have questioned whether using talcum powder can increase a person’s risk of developing cancer. It is not clear if consumer products containing talcum powder increase cancer risk. Studies of personal use of talcum powder have had mixed results, although there is some suggestion of a possible increase in ovarian cancer risk. There is very little evidence at this time that any other forms of cancer are linked with consumer use of talcum powder. Until more information is available, people concerned about using talcum powder may want to avoid or limit their use of consumer products that contain it.

KEY WORDS: Powder, Talcum powder, Asbestos, Asbestiform, Mesothelioma, Erionite, Ovarian cancer, lung cancer

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INTRODUCTION:

A **powder** is a dry, bulk solid composed of many very fine particles that may flow freely when shaken or tilted. Powders are a special sub-class of granular materials, although the terms *powder* and *granular* are sometimes used to distinguish separate classes of material. In particular, *powders* refer to those granular materials that have the finer grain sizes, and that therefore have a greater tendency to form clumps when flowing. *Granulars* refers to the coarser granular materials that do not tend to form clumps except when wet.¹

In ancient times, after threshing the harvest to loosen the edible part of the grain from the husk (or chaff), farmers would toss the grain into the air and the wind would separate the light chaff from the heavier grain. Today this process, called winnowing, is typically done by a combine machine that reaps, threshes, and winnows the grain in a single step in the field. Whatever the method, winnowing is a form of classification, or separating particles based on their physical characteristics (most commonly particle size or density). Modern manufacturers often require classification of bulk solid materials to make specific products or improve the characteristics or performance of materials.

Bulk solids classifying machines operate based on a variety of different technologies, and their specification and effectiveness typically depend on the characteristics of the material being classified, the target particle size of the end product, and how the material is to be used. For example, salt requires very different particle characteristics if it's going to be used to melt snow and ice on wintry roads than if it's going to be used to season your dinner. Some of the most common classifier types are vibratory and rotary screeners, which classify materials by particle size, and cyclones, elutriation classifiers, and dynamic air classifiers, which classify materials by particle density or mass.²

Properties of Powders

The word "powder" refers to a chemical or mixture that is solid in physical state. In compounding, "powder" refers to a dosage formulation that is solid in physical state. But the formulation may be composed of only the active drug or may be a mixture of the active drug and other ingredients.

Powders offer some unique advantages:

- each dose can contain a different amount of active drug

- can be administered easily to infants and young children who cannot swallow tablets or capsules
- drug will have a rapid onset of action since disintegration is not required
- can be applied to many body cavities such as ears, nose, tooth socket, throat
- drugs tend to most stable as a solid
- can be made into many different dosage formulations (capsules, tablets, powders for reconstitution, dusting powders, bulk powders, powders for inhalation, etc.)

Pharmaceutical powders are formulated to be exist as fine particles. The powders are then smooth to the touch and nonirritating to the skin. Powders generally range from 0.1 to 10 micron in size. The size of the particles are often expressed as a number which corresponds to the mesh screen size of a sieve. The screen size indicates the number of openings in the mesh screen per inch. For example, a # 40 sieve has 40 openings per inch in the screen mesh. Particles that can sift through that mesh are said to be "40 mesh" size.

Below is a list of mesh sizes and the size of the mesh opening in millimeters (1/1000 of a meter) or microns (1/1,000,000) of a meter. Of course there is a correlation between the size of the mesh opening and the particle size of the sifted powder. As the opening becomes smaller, so will be resulting particle size. Most of the particles of a sifted powder will have approximately the size as the mesh opening.

A good powder formulation has an uniform particle size distribution. If the particle size distribution is not uniform, the powder can segregate according to the different particle sizes which may result in inaccurate dosing or inconsistent performance. A uniform particle size distribution insures an uniform dissolution rate if the powder is to dissolve, an uniform sedimentation rate if the powder is used in a suspension, and minimizes stratification when powders are stored or transported. Reducing the particle size of a powder will result in an uniform distribution of particle sizes. The process of reducing the particle size is called comminution. In extemporaneous compounding, there are three methods of comminution:

- **Trituration** is the continuous rubbing or grinding of the powder in a mortar with a pestle. This method is used when working with hard, fracturable powders.
- **Pulverization by Intervention** is used with hard crystalline powders that do not crush or triturate

easily, or gummy-type substances. The first step is to use an "intervening" solvent (such as alcohol or acetone) that will dissolve the compound. The dissolved powder is then mixed in a mortar or spread on an ointment slab to enhance the evaporation of the solvent. As the solvent evaporates, the powder will recrystallize out of solution as fine particles.

- **Levigation** reduces the particle size by triturating it in a mortar or spatulating it on an ointment slab or pad with a small amount of a liquid in which the solid is not soluble. The solvent should be somewhat viscous such as mineral oil or glycerin. This method is also used to reduce the particle size of insoluble materials when compounding ointments and suspensions.³

Advantages of powders:

- Powder form is the most versatile and convenient to prescribe, compound and administer.
- A physician has the option to deviate from the conventional dose of a medicament according to the requirement of the patient.
- Powders are stable and do not enter into reaction in solid state, lesser difficulties are experienced in compounding them together,

Disadvantages of Powder

- As compared to other dosage forms, powders are time consuming to compound.
- Volatile, hygroscopic, oxidizing and deliquescent drugs create obvious difficulties when dispensed as powders.
- Dose inaccuracy.⁴

Talc a mineral substance that's either mined or produced industrially is used in various cosmetic and beauty products, from baby powders to eye shadows, in order to absorb moisture, or as a softening or anti-caking agent. It can sometimes be contaminated with asbestos. And it's why an ever-increasing panoply of talc-free powders has been become available, typically with alternative ingredients such as cornstarch, silk powders, and finely milled oats.⁵

TALC AND ASBESTOS

Talc is a mineral in clay mined from underground deposits. It's the softest mineral known to man and that makes it useful in a wide range of consumer and industrial products. Asbestos is also found underground, and veins of it can often be found in talc deposits, leading to a risk of cross-contamination, geologists say. Talc is used in many cosmetics: lipstick, mascara, face powder, blush, eye shadow, foundation and even children's makeup. In the list of ingredients, it can be listed as talc, talcum or talcum

powder, cosmetic talc or magnesium silicate. Talc is added to cosmetics to create a silky feel and absorb moisture. Some brands make talc-free cosmetics. Talc is also used in food processing, and to make some supplements, pharmaceutical pills, chewing gum and polished rice. Consumer groups have also found it in crayons and children's toys, like crime-scene fingerprint kits. Talc was routinely applied to surgical gloves and condoms until the 1990s, when the Food and Drug Administration told manufacturers to stop using it because of health concerns⁶.

ASBESTOS

Asbestos is the name given to six minerals that occur naturally in the environment as bundles of fibers that can be separated into thin, durable threads for use in commercial and industrial applications. These fibers are resistant to heat, fire, and chemicals and do not conduct electricity. For these reasons, asbestos has been used widely in many industries. Additional asbestos-like minerals are found in the natural environment, including erionite. Chemically, asbestos minerals are silicate compounds, meaning they contain atoms of silicon and oxygen in their molecular structure. Asbestos minerals are divided into two major groups: Serpentine asbestos and amphibole asbestos. Serpentine asbestos includes the mineral chrysotile, which has long, curly fibers that can be woven. Chrysotile asbestos is the form that has been used most widely in commercial applications. Amphibole asbestos includes the minerals actinolite, tremolite, anthophyllite, crocidolite, and amosite. Amphibole asbestos has straight, needle-like fibers that are more brittle than those of serpentine asbestos and are more limited in their ability to be fabricated .

USES OF ASBESTOS

- Asbestos has been used in many industries. For example, the building and construction industries have used it for strengthening cement and plastics as well as for insulation, roofing, fireproofing, and sound absorption.
- The shipbuilding industry has used asbestos to insulate boilers, steam pipes, and hot water pipes. The automotive industry uses asbestos in vehicle brake shoes and clutch pads.
- Asbestos has also been used in ceiling and floor tiles; paints, coatings, and adhesives; and plastics. In addition, asbestos has been found in vermiculite-containing garden products and some talc-containing crayons.
- the U.S. Consumer Product Safety Commission (CPSC) banned the use of asbestos in wallboard patching compounds and gas fireplaces because

the asbestos fibers in these products could be released into the environment during use.

HEALTH HAZARDS OF ASBESTOS

People may be exposed to asbestos in their workplace, their communities, or their homes. If products containing asbestos are disturbed, tiny asbestos fibers are released into the air. When asbestos fibers are breathed in, they may get trapped in the lungs and remain there for a long time. Over time, these fibers can accumulate and cause scarring and inflammation, which can affect breathing and lead to serious health problems. Asbestos has been classified as a known human carcinogen (a substance that causes cancer) by the U.S. Department of Health and Human Services (HHS), the U.S. Environmental Protection Agency (EPA), and the International Agency for Research on Cancer (IARC). According to IARC, there is sufficient evidence that asbestos causes mesothelioma (a relatively rare cancer of the thin membranes that line the chest and abdomen), and cancers of the lung, larynx, and ovary. Although rare, mesothelioma is the most common form of cancer associated with asbestos exposure. There is limited evidence that asbestos exposure is linked to increased risks of cancers of the stomach, pharynx, and colorectum. Asbestos exposure may also increase the risk of asbestosis (an inflammatory condition affecting the lungs that can cause shortness of breath, coughing, and permanent lung damage) and other nonmalignant lung and pleural disorders, including pleural plaques (changes in the membranes surrounding the lung), pleural thickening, and benign pleural effusions (abnormal collections of fluid between the thin layers of tissue lining the lungs and the wall of the chest cavity). Although pleural plaques are not precursors to lung cancer, evidence suggests that people with pleural disease caused by exposure to asbestos may be at increased risk for lung cancer. Erionite has also been classified as a known human carcinogen by IARC and by HHS. It is not currently regulated by the EPA.

ASBESTOS RELATED DISEASE

Everyone is exposed to asbestos at some time during their life. Low levels of asbestos are present in the air, water, and soil. However, most people do not become ill from their exposure. People who become ill from asbestos are usually those who are exposed to it on a regular basis, most often in a job where they work directly with the material or through substantial environmental contact. Since the early 1940s, millions of American workers have been exposed to asbestos. Health hazards from asbestos fibers have been recognized in workers exposed in the shipbuilding

trades, asbestos mining and milling, manufacturing of asbestos textiles and other asbestos products, insulation work in the construction and building trades, and a variety of other trades. Demolition workers, drywall removers, asbestos removal workers, firefighters, and automobile workers also may be exposed to asbestos fibers. Studies evaluating the cancer risk experienced by automobile mechanics exposed to asbestos through brake repair are limited, but the overall evidence suggests there is no safe level of asbestos exposure. As a result of government regulations and improved work practices, today's workers (those without previous exposure) are likely to face smaller risks than did those exposed in the past. Individuals involved in the rescue, recovery, and cleanup at the site of the September 11, 2001, attacks on the World Trade Center (WTC) in New York City are another group at risk of developing an asbestos-related disease. Because asbestos was used in the construction of the North Tower of the WTC, when the building was attacked, hundreds of tons of asbestos were released into the atmosphere. Those at greatest risk include firefighters, police officers, paramedics, construction workers, and volunteers who worked in the rubble at Ground Zero. Others at risk include residents in close proximity to the WTC towers and those who attended schools nearby. These individuals will need to be followed to determine the long-term health consequences of their exposure. However, it is important to note that any symptoms these individuals experience may be related to exposure to debris components other than asbestos. Although it is clear that the health risks from asbestos exposure increase with heavier exposure and longer exposure time, investigators have found asbestos-related diseases in individuals with only brief exposures. Generally, those who develop asbestos-related diseases show no signs of illness for a long time after exposure. It can take from 10 to 40 years or more for symptoms of an asbestos-related condition to appear. There is some evidence that family members of workers heavily exposed to asbestos face an increased risk of developing mesothelioma. This risk is thought to result from exposure to asbestos fibers brought into the home on the shoes, clothing, skin, and hair of workers. To decrease these exposures, Federal law regulates workplace practices to limit the possibility of asbestos being brought home in this way. Some employees may be required to shower and change their clothes before they leave work, store their street clothes in a separate area of the workplace, or wash their work clothes at home separately from other clothes. Cases of mesothelioma have also been seen in individuals without

occupational asbestos exposure who live close to asbestos mines .

FACTORS AFFECTING THE RISK OF DEVELOPING AN ASBESTOS-RELATED DISEASE

Several factors can help to determine how asbestos exposure affects an individual, including:

- Dose (how much asbestos an individual was exposed to)
- Duration (how long an individual was exposed)
- Size, shape, and chemical makeup of the asbestos fibers
- Source of the exposure
- Individual risk factors, such as smoking and pre-existing lung disease
- Genetic factors, such as having a germline mutation in *BAP1* .

Although all forms of asbestos are considered hazardous, different types of asbestos fibers may be associated with different health risks. For example, the results of several studies suggest that amphibole forms of asbestos may be more harmful than chrysotile, particularly for mesothelioma risk, because they tend to stay in the lungs for a longer period of time .Talc is the softest mineral on earth. It is used in industrial products and consumer products. The most widely used consumer talc product is talcum powder.Finely crushed talcum powder is valued for its ability to absorb moisture and provide lubrication at the same time. People have used talcum powder products to dry, protect and perfume their skin for more than a century.Industrial talc is used in the production of ceramics, plastics, paper, roofing, flooring and rubber.But in modern times, controversies over talc's safety have marred its reputation.There is an ongoing debate over whether pure talc is associated with health risks. Researchers agree to breathe the dust from talc mines and processing facilities is unhealthy, but so far, studies on the link between exposure to talc and cancer have been inconclusive.On the other hand, there is no doubt asbestos exposure through contaminated talc products can cause cancer. In this case, the controversy arises over which industrial talc products and brands of talcum powder were contaminated with asbestos.The controversy extends to which companies are now liable when people develop asbestos-related cancers such as mesothelioma. In recent years, asbestos talc lawsuits have resulted in several multimillion-dollar verdicts and settlements.

TALC AND MESOTHELIOMA

Current research indicates that pure talc does not cause mesothelioma. But talc that is contaminated with asbestos and asbestiform minerals has led to the development of mesothelioma.In 2019, a study published in the Journal of Occupational and Environmental Medicine presented case studies of 33 people with mesothelioma whose only exposure to asbestos was through the use of asbestos-contaminated talcum powder.The term “asbestos” refers to six different minerals. The term “asbestiform” refers to minerals with a crystal-like structure that resembles asbestos and shares properties with asbestos. Examples of asbestiform minerals include erionite, richterite, winchite and taconite.Geologically, talc and asbestos can naturally form alongside each other. Not every talc deposit is contaminated with asbestos. The ones that are contaminated tend to contain tremolite or anthophyllite, both forms of amphibole asbestos, rather than chrysotile, which is the serpentine form of asbestos.

Like talc, the mineral vermiculite commonly forms alongside asbestos and asbestiform minerals. The infamous vermiculite mine in Libby, Montana, was contaminated with tremolite asbestos and the asbestiform minerals richterite and winchite.Whether a particular talc product contains asbestos has everything to do with its geologic source. If the talc deposit contains asbestos or asbestiform minerals, the products made with that talc are likely contaminated with asbestos.Different grades of talc may contain varying degrees of asbestos contamination. Medical-grade talc is around 99 percent talc and is used in a procedure called talc pleurodesis to treat pleural effusion caused by mesothelioma. Talc used in medicine is a special grade of talc, reportedly asbestos-free, that is sterilized before use.Cosmetic-grade talc is approximately 98 percent pure talc.Industrial-grade talc contains a variety of other minerals in varying quantities depending upon the geologic source. For example, the industrial talc product known as Nyal 100 contains 30 percent talc, 40 percent tremolite, 20 percent serpentine and 10 percent anthophyllite.

INDUSTRIAL TALC

Industrial talc is used in a variety of industries to manufacture many modern products.The agricultural industry uses it as an anti-caking agent in animal feed. The ceramics industry uses it to make ceramic tiles, artware and finishing glazes. Industrial talc is added to coatings, such as paint and glazes, to improve texture, enhance matting and paint

adhesion. The paper industry uses talc to improve printability and reduce surface friction. The plastics and rubber industries use talc as filler and to improve molding ability. Industrial talc is even used in wastewater treatment plants to purify water. The workers who use industrial talc to manufacture these products are at risk of handling talc contaminated with asbestos. The miners and millers who work with raw talc ore are also at risk of asbestos exposure. Several scientific studies have shown that mining and milling asbestos-contaminated talc causes asbestos-related diseases and talcosis, which is a pulmonary disorder similar to asbestosis and silicosis. A 2002 exposure study published in the *Annals of Work Exposures and Health* found excess cases of mesothelioma and other asbestos-related lung diseases among talc miners in upstate New York. The mines involved in the study are located in the counties of St. Lawrence and Jefferson, the hub of which was a town called Gouverneur, where R.T. Vanderbilt Company Inc. operated a talc mine. Researchers say the talc mines in this area contain asbestos and asbestiform minerals. Vanderbilt is known for a particular industrial talc product called Nytal, which is used by many industries, including the painting and plumbing industries, to make a variety of products. It was widely used in the art industry to make pottery, ceramic wall tiles and artware. There is much controversy around whether Nytal contains asbestos. Numerous scientists claim it does contain asbestos and other asbestiform minerals. Vanderbilt and its scientists claim Nytal contains fibers that may look similar to asbestos but are not a harmful form of asbestos. Vanderbilt stopped selling Nytal in 2008 because of the controversy. They also shut down their talc mining operations in New York in 2008. Several courts have held Vanderbilt liable for cases of mesothelioma that developed among people who worked with Nytal.

TALC IN COSMETICS

Talc used in cosmetics also has a history of asbestos contamination. The contamination has primarily involved talcum powder products. Several cases of contamination have involved children's makeup sold by national retailers Justice and Claire's. In 2017, Justice and Claire's recalled the children's makeup products that were found contaminated. An additional three Claire's products tested positive for asbestos in a March 2018 report from U.S. PIRG, a consumer and public interest research group. On March 19, 2018, Claire's filed for bankruptcy, citing \$2 billion in debt as the reason for filing. A year later, the FDA confirmed the asbestos contamination in the three of Claire's products listed in the U.S. PIRG report. The retailer announced a recall of the products soon

after. "Out of an abundance of caution, we have removed the three products identified by the FDA from our stores, and are also removing any remaining talc-based cosmetic products," the retailer said.

ASBESTOS IN TALCUM POWDER

Companies began selling talcum powder in the late 1800s to alleviate and prevent skin irritations such as chafing and diaper rash. Pulverized talc became known by many names, including "medicated powder" and "foot powder." But its most famous branding came with the introduction of Johnson's Baby Powder in 1893. As generations of Americans grew up with talcum powder in their nurseries, talc companies took advantage of the powder's low cost and good reputation by marketing a wide range of talcum powder products for adults.

Numerous companies sold perfumed talcum powder as a face-dusting powder for women and after-shave powder for men. Johnson & Johnson maintained its prime position in the industry with its Shower to Shower line of body powder products. During the first half of the 20th century, asbestos also had a positive reputation with the American public — because of the industry cover-up of the mineral's terrible health effects. The asbestos industry spent decades denying the mineral's toxicity, giving talcum powder manufacturers no reason to think asbestos-contaminated talc was a problem. Unfortunately, talc and asbestos often occur in the same geological formations. Many companies sourced their talc from asbestos-contaminated mines, including sites in North Carolina, Alabama, Vermont and northern Italy. In the 1970s, mounting medical evidence began to turn the tide of opinion against asbestos. Then in 1976, researchers at Mount Sinai Hospital examined 19 samples of American talcum powder products and found asbestos in 10 of them, with the asbestos content ranging from 2 percent to as much as 20 percent, depending on the brand. Because of the long latency period associated with asbestos-related diseases, though, many people who routinely used contaminated talcum powder in the 1960s may only just now develop symptoms.⁸

REGULAR TESTING FOR ASBESTOS

The FDA does not require safety testing for personal care products and cosmetics before they are marketed and tests products only occasionally, usually after complaints by consumers or advocacy groups. The agency considered - and soon abandoned - a plan to monitor talcum products for asbestos in the 1970s, when concern about asbestos in household products captured the public's attention. The FDA

commissioned tests of powders back then, and the company successfully challenged their validity. This year, after consumer tests found asbestos in makeup kits for children sold at Claire's, the FDA followed up with its own tests. It detected the carcinogen in half of 20 products, including Claire's eye shadow and compact powder, JoJo Siwa makeup sold at Claire's, and bronzers, blush and other makeup made by Beauty Plus Global City Color Cosmetics and sold in retail outlets. The products were eventually recalled. The agency plans to test 30 more products containing talcum powder, including those popular on social media and others marketed to children, Sanchez-Contreras said. The products are a tiny percentage of the thousands of personal care products available for sale.⁹

TALCUM POWDER-CANCER

When talking about whether or not talcum powder is linked to cancer, it is important to distinguish between talc that contains asbestos and talc that is asbestos-free. Talc that has asbestos is generally accepted as being able to cause cancer if it is inhaled. The evidence about asbestos-free talc is less clear. Researchers use 2 main types of studies to try to figure out if a substance or exposure causes cancer.

Lab studies: In studies done in the lab, animals are exposed to a substance (often in very large doses) to see if it causes tumors or other health problems. Researchers might also expose normal cells in a lab dish to the substance to see if it causes the types of changes that are seen in cancer cells. It's not always clear if the results from these types of studies will apply to humans, but lab studies are a good way to find out if a substance might possibly cause cancer.

Studies in people: Another type of study looks at cancer rates in different groups of people. Such a study might compare the cancer rate in a group exposed to a substance to the rate in a group not exposed to it, or compare it to what the expected cancer rate would be in the general population. But sometimes it can be hard to know what the results of these studies mean, because many other factors might affect the results.

In most cases neither type of study provides enough evidence on its own, so researchers usually look at both lab-based and human and studies when trying to figure out if something causes cancer.

STUDIES IN LAB

Studies that exposed lab animals (rats, mice, and hamsters) to asbestos-free talc in various ways have had mixed results, with some showing tumor formation and others not finding any.

STUDIES IN PEOPLE

Ovarian cancer

It has been suggested that talcum powder might cause cancer in the ovaries if the powder particles (applied to the genital area or on sanitary napkins, diaphragms, or condoms) were to travel through the vagina, uterus, and fallopian tubes to the ovary. Many studies in women have looked at the possible link between talcum powder and cancer of the ovary. Findings have been mixed, with some studies reporting a slightly increased risk and some reporting no increase. Many case-control studies have found a small increase in risk. But these types of studies can be biased because they often rely on a person's memory of talc use many years earlier. One prospective cohort study, which would not have the same type of potential bias, has not found an increased risk. A second found a modest increase in risk of one type of ovarian cancer. For any individual woman, if there is an increased risk, the overall increase is likely to very be small. Still, talc is widely used in many products, so it is important to determine if the increased risk is real. Research in this area continues.

Lung cancer

Some studies of talc miners and millers have suggested an increased risk of lung cancer and other respiratory diseases, while others have found no increase in lung cancer risk. These studies have been complicated by the fact that talc in its natural form can contain varying amounts of asbestos and other minerals, unlike the purified talc in consumer products. When working underground, miners can also be exposed to other substances that might affect lung cancer risk, such as radon. No increased risk of lung cancer has been reported with the use of cosmetic talcum powder.

Other cancers

Talc use has not been strongly linked to other cancers, although not all possible links with other cancers have been studied extensively. One study suggested genital talcum powder use may slightly increase the risk of endometrial (uterine) cancer in women who are past menopause. But other studies have not found such a link. Further studies are needed to explore this topic.

Some limited research has also looked at a possible link between inhaled talc exposure at work and other cancers, such as stomach cancer. But there is no strong evidence of such links at this time.

EXPERT AGENCY SAYS..

Several national and international agencies study substances in the environment to determine if they can cause cancer. (A substance that causes cancer or helps cancer grow is called a *carcinogen*.) The American Cancer Society looks to these organizations to evaluate the risks based on evidence from laboratory, animal, and human research studies.

The **International Agency for Research on Cancer (IARC)** is part of the World Health Organization (WHO). Its major goal is to identify causes of cancer.

- IARC classifies talc that contains asbestos as “carcinogenic to humans.”
- Based on the lack of data from human studies and on limited data in lab animal studies, IARC classifies inhaled talc *not* containing asbestos as “not classifiable as to carcinogenicity in humans.”
- Based on limited evidence from human studies of a link to ovarian cancer, IARC classifies the perineal (genital) use of talc-based body powder as “possibly carcinogenic to humans.”

The **US National Toxicology Program (NTP)** is formed from parts of several different government agencies, including the National Institutes of Health (NIH), the Centers for Disease Control and Prevention (CDC), and the Food and Drug Administration (FDA). The NTP has not fully reviewed talc (with or without asbestos) as a possible carcinogen.¹⁰

CONCLUSION:

Asbestos is also a naturally occurring silicate mineral, but with a different crystal structure. Both talc and asbestos are naturally occurring minerals that may be found in close proximity in the earth. Unlike talc, however, asbestos is a known carcinogen. There is the potential for contamination of talc with asbestos and therefore, it is important to select talc mining sites carefully and take steps to test the ore sufficiently.

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