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Research Paper

### Mercury in Beauty Products

Mercury is a naturally-occurring chemical element found in rock in the earth's crust, including in deposits of coal. It has the symbol "Hg" and its atomic number is 80 on the periodic table. It exists in several forms such as elemental (metallic) mercury, inorganic mercury compounds, methylmercury and other organic compounds. Elemental is a shiny, silver-white metal, historically referred to as quicksilver, and transforms into liquid at room temperature. It is used in older thermometers, fluorescent light bulbs and some electrical switches. When elemental mercury is dropped, it breaks into smaller droplets which can go through small cracks or become strongly attached to certain materials. Exposed elemental mercury can evaporate to become an invisible, odorless toxic vapor at room temperature. If heated, it is a colorless, odorless gas. When mercury reacts with another substance, it forms a compound, such as inorganic mercury salts or methylmercury. Mercury becomes an issue for the environment when it is released from rock and ends up in the atmosphere and in water. Volcanoes and forest fires are able to send mercury into the atmosphere. Although, human activities can be responsible for much of the mercury that is released into the environment. Some examples of these can be the burning of coal, oil and wood as fuel, which can all cause mercury to become airborne, as can burning wastes that contain mercury. Airborne mercury can fall to the ground in raindrops, in dust, or simply due to gravity. The amount of mercury deposited in an area depends on how much mercury is released from local, regional, national, and international sources.

All Mercury is toxic. Some inorganic mercury can enter your body through the skin, but only a small amount will pass through your skin compared to the amount that gets into your body from swallowing inorganic mercury. Once inorganic mercury enters the body and gets into the bloodstream, it moves to many different tissues. Exposures to mercury can damage the nervous system, kidneys, liver and immune system/ can damage the brain. Damages the skin, causes rashes and blotchy spots, and gives the skin a grayish color. The longer and more often products containing mercury are used, the greater the health risk. High levels of methylmercury in the bloodstream of babies developing in the womb and young children may harm their developing nervous systems, affecting their ability to think and learn. One of the main ways that people become exposed to mercury is by eating fish and shellfish that contain high levels of methylmercury in their tissues. It is less likely for people to get exposed to mercury by breathing in mercury vapor (EPA, 2023b). This can happen when mercury is released from a container, or from a product or device that breaks. If it is not immediately contained or cleaned up, it can evaporate, becoming an invisible, odorless, and toxic vapor. Exposure to mercury may include irritation to the eyes, skin, stomach, chest pain, difficulty breathing, insomnia, irritability, headache, exhaustion, and weight loss (CDC, 2019).

Around 4000 BCE., people in ancient Greece and Rome began wearing makeup. They hoped to achieve a natural look with the makeup they used. Women were encouraged to wear light touches of color on the cheeks and lips (Teens, 2021). This was done by mixing plants or fruits with lead-based dyes and mercury. Wearing little to no makeup has always been seen as more attractive. Light makeup gives the impression of natural femininity and softness to others. Because of existing beauty standards, people go through processes in order to get lighter skin

complexions. To be closer to a white skin complexion it to be more right while being of a darker skin complexion causes a negative connotation.

Mercury is used in cosmetics as a skin lightening agent and preservative. They are often marketed as skin lightening creams and anti-aging treatments that remove age spots, freckles, blemishes and wrinkles (Department of Health, 2023). Adolescents sometimes use these products as acne treatments. Skin lightening products (also called skin brightening or fade products) are used by both dark and light-skinned individuals to lighten skin tone, fade freckles, or get rid of age spots. These products can be purchased in a broad range of stores across Minnesota including those serving African, Asian, Middle Eastern and Latino communities. The U.S. Food and Drug Administration cautions that you should avoid skin creams, beauty and antiseptic soaps, and lotions that contain mercury. The FDA banned the use of mercury in most cosmetics at levels higher than 1 ppm in 1973. In May 2011 the Minnesota Department of Health tested a random sample of skin lightening products and found that some of them contain mercury at levels much higher than what the U.S. Food and Drug Administration allows in cosmetic products. With the Toxic Free Cosmetics Act, in September 2020, California was the first state to ban 24 ingredients, including mercury, from personal care products. In 2021, Maryland also banned mercury from cosmetics.

Other than cosmetics, mercury could be found in some antiques such as barometers, clock pendulums, mirrors, and vases. Older model electric appliances such as chest freezers, space heaters, clothes dryers, clothes irons and washing machines may contain mercury switches that turn the device on or off, or turn a light on or off. Gas-fired appliances, including ovens, water heaters, furnaces, pool heaters, and appliances in some recreational vehicles, may contain

mercury. Older models may have pilot light sensors containing mercury (EPA, 2023a). This is why it is crucial that when disposing of these appliances, they are done correctly.

If the words “mercurous chloride”, “calomel”, “mercuric”, “mercurio”, or “mercury” are listed on the label, mercury is in it. These products usually are manufactured abroad and sold illegally in the United States, often in shops catering to the Latino, Asian, African, or Middle Eastern communities. These products are promoted online on social media sites that are sold through mobile apps. The consumers may also have bought them in another country and brought them back to the U.S. for personal use. One should not assume the product is trustworthy if the ingredients aren’t listed and there is no product label. By federal law, it requires that ingredients be listed on the label of any cosmetic or nonprescription drug. It is also recommended not to use drugs or cosmetics labeled in languages other than English unless English labeling is also provided. This is because it could be a sign that the product may have been marketed illegally. Although the products are often promoted as cosmetics, under the law, they also may be unapproved new drugs. The FDA does not allow mercury in drugs nor in cosmetics, except under very specific conditions where there are no other safe and effective preservatives available. In the past few years, FDA and state health officials have discovered numerous products that contain mercury, and there have been cases in which people exposed to such products have had mercury poisoning or elevated levels of mercury in their bodies. Sellers and distributors who market mercury-containing skin whitening or lightening creams in the U.S. may be subject to enforcement action, including seizure of products, injunctions, and sometimes even criminal prosecution.

Over the years, California has had over 60 poisonings linked to foreign brand, unlabeled, and/or homemade skin creams that contained the less toxic form of mercury, mercurous chloride

or calomel. (Department of Health Services, 2023) One should avoid handmade or unlabeled creams and other brand-name containers that are not sealed when purchased. These unsealed products could have been tampered with and may contain mercury. In earlier poisonings linked with imported skin cream, several children and babies who were not cream users became very sick from contact with mercury contamination in their homes or through contact with family members who used the products. Children and pregnant women are the most sensitive to the toxic effects of mercury. Most times, these products can contain more than 200,000 times the legal limit of mercury. Below are some products found to contain Mercury and/or Hydroquinone with the year it was tested and the Mercury content (parts per million) according to the FDA:

- CCM Special Cream Turmeric, 2022, 8,088 ppm
- CCM Perfect 365 White Cream, 2022, 4,322 ppm
- Be Be Special Cream CCM/Yellow, 2022, 8,909 ppm
- Be Be Special Cream, 2022, 3,110 ppm
- La Tia Mana Crema Limpiadora y Curativa, 2022, 5,432 ppm
- Ling Zhi BB Whitening Cream, 2022, 1,393 ppm
- Skin care & Cosmetic MSSII Whitening Peeling, 2022, 1,581 ppm
- Collagen Plus - Vit E Cream, Night Cream, 2022, 3,670 ppm
- Aneeza Gold Beauty Face Cream, 2022, 12,400 ppm
- Kim Whitening Pearl and Snowlotus Cream, 2019, 47 ppm
- Golden Pearl Beauty Cream, 2019, 12,000 ppm

In recent years, we have seen how having perfect skin has become more popular. Everyone is getting recommendations from friends, family, and even social media about the latest best skincare routines and skincare products. Some prefer for their skincare routine to be fast and easy with only using 3-4 products while others might enjoy buying more products for the routines. In ancient Egypt, beauty was significant for both men and women. Their social status was often reflected in the amount of makeup they wore. Statues of the Egyptian gods were adorned with the same cosmetic styles which indicated how beauty may have been associated with holiness. Not only was cleanliness and taking care of the body important for good health and warding off evil, but it was also a sign of humility (Hagele, 2023). The beauty rituals that were practiced in ancient Egypt were important for spiritual and social lives. One of the most famous ancient Egyptian beauty secrets was the use of milk baths as a skincare treatment. Cleopatra would bathe in sour donkey's milk, as the lactic acid could exfoliate and rejuvenate the skin. Dead Sea salts were also added into baths to remove impurities. For hydrated skin, a mixture of milk and honey was applied weekly. The use of almond, moringa, and castor oils all over the body was a common way for keeping skin soft, smooth, and wrinkle-free (Elsayad, 2023).

As for makeup, Kohl was used around the eyes by both men and women from all social classes. This was created by mixing soot with galena, which was a blue-gray colored natural mineral form of lead sulfide. Kohl was one of the most common beauty secrets in ancient Egypt. It had an aesthetic appeal, but it also helped eyes against the sun, and it also became a deterrent to flies. The ancient Egyptians also cared about wrinkles and spots just like people today. They used an ointment made from a mixture of honey, red natron, lower Egyptian salt, and alabaster flour in order to restore wrinkles and spots. The Japanese create an elixir by soaking rice in water

and using the resulting liquid as a toner. This contains antioxidants and vitamins, and by using the rice water tone, pores are tightened, and one's complexion is brightened which also helps diminish the appearance of fine lines and wrinkles. The Chinese believe that a diet rich in collagen and healthy fats can help to prevent wrinkles and fine lines. Foods like braised sea cucumber, braised pork knuckle, and peach gum jelly are high in collagen and thus consume them to improve skin and joint health. White fungus, an ingredient commonly used in Chinese desserts, also helps improve skin complexion. Herbs such as Huang Qi and Bai Zhu can also be added into soups and porridge for an age-defying complexion. One of the most common but not thought of ways that one can cause wrinkles to their face is by prolonged screen time and by not getting enough sleep which would cause one to squint unconsciously (Oriental Remedies Group, 2023).

Beauty and youth have and always will go hand and hand throughout history. Unfortunately, in today's society, there is an obsession with looking too young. Many do not feel comfortable demonstrating any signs of aging on their face. Because of this, brands have taken advantage of the consumers' needs for a product that will take away these issues for them, and although most are considered safe to sell, others are still marketed that aren't safe for one's health. Although health is a priority for some, beauty has become a priority for others. As one has learned from the ancient Egyptians and other cultures, there are many ways to achieve these goals of having a brighter complexion, no wrinkles or dark spots. One could still use these remedies instead of running to options that might help problems with one's face temporarily, but are toxic for their overall health.

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