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Thank you for giving us your time and attention this morning. My name is Dr. Ami Zota, and I am an Assistant Professor of Environmental and Occupational Health at the George Washington University Milken Institute School of Public Health. As a scientist, educator, and parent, I am concerned about the public's widespread and involuntary exposures to toxic chemicals. And I am not alone. There is growing scientific consensus around the public health impacts of toxic chemicals. These chemicals enter our bodies through the air we breathe, the water we drink, the food we eat, and the products we use. They can lead to a myriad of health problems early in life, later in life, or even across generations. Indeed, the World Health Organization estimates that as much as 24% of global disease is caused by environmental exposures that can be averted [1].

While we may never be able to eliminate all sources of toxic chemicals, we can reduce our nation's body burden of toxic chemicals by increasing regulation and oversight of the cosmetic industry since nearly everyone uses some forms of cosmetics nearly every day. There are thousands of chemicals used in making cosmetics, and for the vast majority, we have no idea where they are used and what they might do to our health. What we do know is disturbing. Some of the same chemicals used in cosmetics are also commonly found at hazardous waste sites. They are known or suspected to cause cancer, developmental birth defects, damage to the reproductive system, and harm to the developing brain in young children.

For example, lead is an impurity found in many color cosmetics, including lipstick [2]. There is currently no safe blood lead level for children [3] because even low levels of lead in blood have been shown to affect IQ, ability to pay attention, and academic achievement [4, 5].

These effects are irreversible and cannot be corrected. Lead exposure can begin in the womb since it passes from mother to baby via the placenta. Lead can also lead to harm in adults by increasing risks of hormone disruption, pregnancy complications, and cardiovascular disease [3].

Mercury is another toxic chemical most commonly associated with coal-fired power plants but can also be found in skin care used to lighten skin or treat acne. Mercury is especially dangerous to the developing brain and kidneys [6]. Pregnant women may be particularly vulnerable since mercury can cross the placenta and even accumulate in the fetus [7]. Indeed, peer-reviewed studies have shown that women who use mercury-containing skin creams give birth to babies with high levels of mercury [8]. Creams that contain mercury can be dangerous for the primary user as well as anyone living in the home where they are used [9]. The mercury spreads from the hands of anyone using the cream to other surfaces that they touch. Mercury then gets into the air and anyone in the home can breathe it or accidentally ingest it. Acute, short-term symptoms have been documented in both skin users and their family members exposed at high levels including hypertension, headaches, depression and anxiety, and numbness in the limbs [10]. Mercury-containing creams continue to be available on store shelves in U.S. cities as well as through online retailers.

Formaldehyde is a colorless, odorless gas that is a known human carcinogen [11]. Formaldehyde and its precursors are also found in nail polish, cosmetic glues, and even baby shampoo. Peer-reviewed studies demonstrate that peak formaldehyde concentrations in the breathing zone of stylists performing hair-straightening procedures, such as the Brazilian Blowout, exceed health-protective guidelines established by National Institute of Occupational Safety and Health, putting both hair salon workers and customers at risk [12, 13]. Even though formaldehyde is regulated as a hazardous air pollutant by the U.S. Environmental Protection Agency, there is little oversight of its use in cosmetics. Indeed, several human studies find a positive relationship between the concentration of formaldehyde in the breathing zone of hair stylists during hair straightening procedures and the frequency of DNA damage in their blood – a biological indicator of early carcinogenic effects [14, 15]. Formaldehyde is a well-known contact sensitizer. Low-level exposures to formaldehyde in personal care products can cause allergic contact dermatitis, or a form of skin disease that triggers the immune system [16-18]. According to the NACDG (North American Contact Dermatitis Group), formaldehyde is the ninth most common allergen for allergic contact dermatitis.

Phthalates and parabens are two classes of industrial chemicals commonly found in beauty products, skin care, hair care products, and nail polish [19, 20]. These chemicals can enter our body through our skin, they may wind up in the air we breathe, or they may settle into our house dust, which we can accidentally ingest [21]. Consequently, virtually all Americans have phthalate and paraben byproducts in their bodies [22]. Phthalate exposures are linked to hormone disruption, and reproductive and developmental toxicity in both animals and humans. For example, large, epidemiologic human studies show that higher exposures to certain phthalates, such as DEHP, can interfere with a women's ability to become pregnant [23] and can increase the risk of reproductive problems in male offspring who face higher exposures in utero [21, 24-26]. There is also concern that these chemicals may play a role in chronic disease risks including obesity [27], type 2 diabetes [28], and even cancer [29]. Parabens are also endocrine disrupters, since they can alter the way that estrogen behaves in our bodies even at low levels [30]. Experimental studies suggest certain parabens can interfere with male reproductive development and act as mammary gland carcinogens [31].

While this is a widespread problem, certain populations, such as women of childbearing age, may be particularly vulnerable since they are the primary consumers of personal care products [32]. Minority women from underrepresented groups may also disproportionately be impacted by unregulated chemical use in cosmetics. Compared to White women, women of color have higher levels of beauty product-related environmental chemicals in their bodies, and these differences are not explained by differences in income [33-36]. In 2014, Black women spent upwards of 5 billion dollars on beauty products and services, twice as much as any other ethnic group [37, 38]. Minority women not only use more types of personal care products but the products marketed to them often contain more toxic chemicals [39]. Indeed, my own research has shown that the elevated levels of phthalates among black women is in part explained by their increased use of vaginal douches [35], one common type of feminine care product that was historically marketed to African American women and is now discouraged by doctors due to health risks.

Lastly, those who work with cosmetics - including hair stylists and nail salon workers - may be more vulnerable to the adverse health effects posed by these products because they handle greater quantities of cosmetics with greater frequency [40-42]. Workers in the beauty industry are often reproductive-aged women from underrepresented groups so they may be facing higher cumulative exposures from multiple sources in the home, neighborhood, and workplace [43-46]. Elevated exposures to beauty-product related chemicals found in women of color may be contributing to the stark racial/ethnic disparities in health outcomes in the US. African American women face higher rates of obesity, preterm birth, early puberty, uterine fibroids, and cervical cancer – all of which have been linked to chemicals in beauty product use [39].

Certain populations may also at higher risk because of their life stage. Pregnant women, developing fetuses, children, and teenagers are especially vulnerable. Being exposed to even small amounts of toxic substances during important times of development can affect the very earliest steps of development and lead to lifelong health problems that can persist across generations. The International Federation of Gynecology and Obstetrics, the leading global voice of reproductive health professionals and scientists, issued a groundbreaking policy statement on environmental health in 2015. They warned that the links between prenatal exposure to chemicals and poor health outcomes is increasingly evident even at low doses and there is an urgent need to prevent exposures to toxic chemicals globally [47].

The health impacts of toxic chemicals have likely been underestimated since most studies focus on the effects of one chemical at a time even though people come into contact with multiple chemicals every day through consumer products. For example, the average pregnant woman in the US is simultaneously exposed to at least 40 chemicals [48, 49]. Understanding how mixtures of chemicals may affect a person's potential cancer risk or ability to have a healthy pregnancy is an area of growing scientific inquiry and one of the strategic goals of the National Institutes of Health. The few studies that account for mixtures are finding harmful effects at lower doses than previously recognized. For example, a peer-reviewed study published in February 2018 in an NIH-affiliated journal found that frequent use of beauty and skin care products was linked to higher breast cancer risks [50]. Other studies show the U.S. population, including women and children, are exposed to multiple phthalates simultaneously [49, 51, 52]. Animal studies demonstrate that exposure to phthalate mixtures results in higher male reproductive risk than exposure to individual phthalates, especially during fetal development [53]. Human studies also find that compared with individual exposure, accounting for multiple phthalates exposure during pregnancy results in greater risk of male reproductive harm, including markers of feminization in male offspring [24, 54].

I want to conclude by talking about what we can do to address the problem. Science is very good at characterizing problems, but it can also be used to steer prevention efforts. A study published by University of California Berkeley scientists found that choosing safer personal care products based on the label does make a difference [45]. The researchers measured levels of 4 endocrine-disrupting chemicals in the bodies of Latina teenagers before and after they began to use off-the shelf products labeled as free of these ingredients. They found that in just 3 days, some of the chemical levels in teenagers declined by 30-50%. My 2014 study in Environmental Health Perspectives, the top environmental peer-reviewed journal, showed that when the government and the market-place act, people's exposures change [55]. The study showed that Americans' exposure to certain phthalates – such as di(2-ethyl hexyl) phthalate and di-n-butyl phthalate decreased after they were banned from children's articles in 2008. Some phthalates that were the focus of Campaign for Safe Cosmetics also went down in Americans. But exposures to these phthalates continue to persist due to their unregulated use in other products. Collectively, the science suggests that changes at the individual and policy level can lead to measurable reductions in toxic chemical exposures and improved public health.

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