

Scientists Warn That UV Nail Drying Devices Damage DNA

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✓ Fact Checked

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STORY AT-A-GLANCE

- › Ultraviolet (UV) light nail polish dryers used by nail salons to set nail gel commonly emit UVA light. Researchers have found consistent exposure can increase the risk of developing skin cancer on your fingers
- › One 20-minute session under UVA light damages 20% to 30% of DNA, much of which does not repair, and causes mitochondrial dysfunction. Three consecutive 20-minute exposures resulted in 65% to 70% of cell death
- › Personal care products are poorly regulated, and laws have remained unchanged since 1938. Popular hair straightening product is linked to an increased risk of uterine cancers
- › Sunscreens are another product with ingredients that can accumulate in your body at unhealthy levels. The FDA confirms there is an additive effect to the exposure to benzene, avobenzene, oxybenzone, octocrylene and octinoxate, to name a few
- › Very few chemicals are safety tested and even then may not be safe as they are tested individually under lab conditions and you use them in combination in real-world scenarios

In 2021, the global beauty and personal care market was valued at \$482.8 billion¹ and is expected to grow at a rate of 7.7% through 2030. Personal care products include skin care, hair care, color cosmetics and daily grooming tools, which have become the primary driving factor in market expansion.

A 2023 study² published in Nature Communications has found that the ultraviolet (UV) light devices used to cure gel nail polish lead to DNA damage and permanent mutations. As the Environmental Working Group (EWG) reports,³ federal laws that regulate personal care product safety have remained unchanged since 1938.

On average, men use six personal care products every day, which exposes them to 85 different chemicals. However, women have greater exposure, using 12 personal care products on average each day, which exposes them to 168 chemical ingredients.

UV Nail Polish Dryers Damage DNA

Researchers were interested in whether long-term exposure to ultraviolet A (UVA) light from nail polish dryers that are a common fixture in nail salons could increase the risk of developing skin cancer.⁴ The light is used to cure chemicals in gel manicures in the spectrum of 340 to 395 nanometers.

Ludmil Alexandrov, corresponding author of the study and professor of bioengineering and cellular molecular medicine at UC San Diego, said that these devices are often marketed as being safe for the consumer, yet the researchers could not find a study on how they affect human cells at the molecular level.⁵

The scientists used three different cell lines, including adult human skin keratinocytes, human foreskin fibroblasts and mouse embryonic fibroblasts. In just one 20-minute session, between 20% and 30% of the exposed cells had died. After three consecutive 20-minute exposures, the researchers noted from 65% to 70% of the cells exposed to the UVA light had died.⁶

Alexandrov was waiting at his dentist's office when he read an article about a beauty pageant contestant diagnosed with a rare form of skin cancer on her finger. This sparked his curiosity about the type of exposure that may have caused that damage. From there, Alexandrov noted case reports of people who got gel manicures frequently with rare cases of cancer on their fingers.

This suggested to him that the manicures may have something to do with cancer. “And what we saw was that there was zero molecular understanding of what these devices were doing to human cells,” he said. The study does not answer the question of whether a once-yearly manicure is a cause for concern or if those getting gel manicures on a regular basis should stop.

They acknowledge that further studies are needed to understand the frequency of use and increased risk associated with these devices. However, after seeing the results firsthand, Maria Zhivagui, a postdoctoral scholar in the Alexandrov Lab and first author of the study, has sworn off gel manicures, explaining:⁷

“When I was doing my Ph.D., I started hearing about gel manicures, which last longer than normal polish. I was interested in trying out gel nail polish, particularly in the setting of working in an experimental lab where I frequently put gloves on and off, to maintain a presentable appearance. So I started using gel manicures periodically for several years.

Once I saw the effect of radiation emitted by the gel polish drying device on cell death and that it actually mutates cells even after just one 20-minute session, I was surprised. I found this to be very alarming and decided to stop using it.”

The researchers wrote that while data strongly suggest that UV light emitted from nail polish dryers may trigger skin cancer, “Nevertheless, future large-scale epidemiological studies are warranted to accurately quantify the risk for skin cancer of the hand in people regularly using UV-nail polish dryers. It is likely that such studies will take at least a decade to complete and to subsequently inform the general public.”⁸

Mitochondrial Dysfunction May Lead to More Damage

The researchers noted that the first thing damaged was DNA and some of it was not repaired over time. They also saw that exposure could “cause mitochondrial dysfunction, which may also result in additional mutations. We looked at patients with

skin cancers, and we see the exact same patterns of mutations in these patients that were seen in the irradiated cells,” said Alexandrov.⁹

Your mitochondria are tiny organelles inside your cells that generate a vast majority of the energy in your body. As you age, mitochondrial function declines. This is a hallmark of aging and chronic disease. Mitochondrial dysfunction in the featured study was noted in the area localized to UVA light exposure.

However, it is worth noting that several environmental stressors can have an impact on mitochondrial function, so paying attention to strategies that protect your mitochondria is important to your overall health. Dr. Frank Shallenberger has been a natural medicine physician for nearly five decades.

In my interview with Shallenberger,¹⁰ we talked about the system he developed in 2004 that gives a quantitative measure of how well your mitochondria are working. What he found was that even asymptomatic people in their 30s can have a significant decline in mitochondrial function and early onset is indicative of premature aging.

After years of testing and experimenting, Shallenberger found only two substances that really move the needle to **optimize mitochondrial function – B vitamins and ozone treatment**:

“B vitamins are absolutely critical for mitochondrial function – especially niacin, riboflavin and folate. Orally speaking, with niacin, I typically start them at 100 to 200 milligrams a day [but] you can go up to 2,000 mg easy on some patients. I use a B complex because I like to balance it out, but I’m focusing primarily on niacin, folate and riboflavin.

I have literally seen patients have great mitochondrial function, be under stress for two months, and have their mitochondria wiped out just from emotional stress.”

Hair Straightening Product Increases Risk of Uterine Disease

Another popular cosmetic treatment is hair straightening products. These contain toxic chemicals that can increase the risk of uterine disease. A study led by the National Institutes of Health¹¹ found women who use hair straighteners may have double the risk of uterine cancer.

The study engaged 33,497 women from the ages of 35 to 74 years who were part of the Sister Study cohort.¹² This was a separate research initiative to identify risk factors for breast cancer and other health conditions. After 10.9 years, data showed those who used hair straightening products in the last 12 months had a higher rate than those who had never used the products.

This was also a dose-dependent response. In other words, the women who used hair straightening products more frequently had a greater risk. This factor was quantified and revealed that those who used hair straighteners more than four times in 12 months had more than twice the risk of developing uterine cancer as those who didn't use any hair straightening products.

The study's lead author, Alexandra White, Ph.D., head of the NIEHS Environment and Cancer Epidemiology group, said in a news release:¹³

"We estimated that 1.64% of women who never used hair straighteners would go on to develop uterine cancer by the age of 70; but for frequent users, that risk goes up to 4.05%. This doubling rate is concerning. However, it is important to put this information into context – uterine cancer is a relatively rare type of cancer."

Incidence rates for uterine cancer have risen in recent years, particularly for aggressive subtypes and particularly among black women.¹⁴ According to a 2019 study,¹⁵ these trends of nonendometrial uterine cancers in black women exceed those of white women and black women have a lower survival rate for all uterine cancers.

The use of hair straightening products could be one precipitating factor. The 2022 study found that among participants who had ever used hair straighteners, 59.9% were Black.¹⁶ While the study didn't find racial differences in the association between

straightener use and uterine cancer incidence, it's possible that risks are higher for Black women due to more frequent, and younger, use.

According to study author Che-Jung Chang, Ph.D., "Because Black women use hair straightening or relaxer products more frequently and tend to initiate use at earlier ages than other races and ethnicities, these findings may be even more relevant for them."¹⁷

Read Sunscreen Ingredients and Watch Recalls

Unfortunately, people have been made to fear the sun so much that vitamin D deficiencies have become a serious health concern,¹⁸ as was demonstrated during the COVID-19 outbreak.¹⁹ Evidence suggests that inadequate sun exposure can also be correlated with "specific cancers, multiple sclerosis, diabetes, cardiovascular disease, autism, Alzheimer's disease and age-related macular degeneration."²⁰

Many people turn to sunscreens to reduce their exposure. Yet, these may be more dangerous. In mid-2022,²¹ one company voluntarily recalled two brands after benzene was found in the products. Benzene is a colorless, flammable liquid that is a known carcinogen in animals and people.²²

Although it's known that benzene is a carcinogen, it is also among the top 20 most widely used chemicals in the U.S. In other words, despite the FDA and EPA knowing that benzene causes cancer, the government continues to allow it to be used in products. In fact, in March 2020, the FDA issued temporary guidance that allowed hand sanitizers to contain benzene at levels up to two parts per million.²³

Two FDA studies have confirmed there is an additive effect from exposure to benzene. The studies were published in 2019²⁴ and 2020,²⁵ showing other ingredients in sunscreen could also build up in the body at unhealthy levels. The FDA studies included avobenzene, oxybenzone, octocrylene, homosalate, octisalate and octinoxate.²⁶

Since the FDA's own data²⁷ revealed that some of these chemicals accumulated at levels higher than would be considered safe, it begs the question of why the FDA considers these products safe. The study found chemicals accumulated above safety levels after

just seven days of using sunscreen.²⁸ It's important to read ingredient labels and watch for product recalls.

Health Risks Associated With Personal Care Products

As the featured study demonstrates, it's not always chemicals that can damage your health, DNA and mitochondria. However, a global inventory taken in 2020 listed more than 350,000 chemicals and mixtures found in commercial products, which was up to three times more than is commonly estimated.

Some of these chemicals are endocrine-disrupting chemicals (EDCs), which are similar in structure to natural hormones including thyroid hormones, the female sex hormone estrogen and the male sex hormone androgen. EDCs interfere with development, reproduction, neurological functioning, metabolism, satiety, immune system functioning and more.

There is no safe level of exposure for many EDCs. While the list is extensive, and the list of possible EDCs even longer, the EWG identified 12 of the worst and most widely used ones. These include:²⁹

Bisphenol-A (BPA)	Dioxin
Atrazine	Phthalates
Perchlorate	Fire retardants (polybrominated diethyl ethers or PBDEs)
Lead	Mercury
Arsenic	Perfluorinated chemicals (PFCs)
Organophosphate pesticides	Glycol ethers

According to the Endocrine Society,³⁰ there is an estimated 1,000 man-made EDCs on the market. Some common routes of exposure include personal care products, drinking water, conventionally grown produce and CAFO meat, kitchenware, cleaning products and cash register receipts.

Personal care products often contain phthalates, parabens and the neurotoxin toluene. As the EWG pointed out, very few chemicals are tested for safety, and even then, they aren't necessarily safe. One of the reasons is that safety testing is typically done on one chemical at a time and under laboratory conditions.

Yet you are exposed to chemicals in combination and under countless different real-world scenarios. This could increase their toxicity exponentially. To avoid exposure, simplify your personal care routine and make your own products using safe ingredients like coconut oil, essential oils, and mild soap.

You can also consult EWG's Skin Deep Cosmetics Database³¹ where you can enter the name of your product or product type and get a safety report. For more ways to lower your exposure to toxins, see my article, "[10 Things That You Can Eliminate for Better Health.](#)"

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