
Hair Dyes and Cancer Risk

- [Types of hair dyes](#)
- [How are people exposed to hair dyes?](#)
- [Do hair dyes cause cancer?](#)
- [Are hair dyes regulated?](#)
- [Should I avoid or limit my exposure to hair dye?](#)

Many people use hair dyes, which can contain different types of chemicals. Studies have looked at hair dyes as a possible risk factor for various types of cancer. Here is what the research shows so that you can make choices that are comfortable for you.

Types of hair dyes

Hair dyes vary greatly in their chemical make-up. There are 3 main types of hair dyes:

- **Temporary:** Temporary dyes cover the surface of the hair but don't penetrate into the hair shaft. They generally last for 1 to 2 washings.
- **Semi-permanent:** Semi-permanent dyes do penetrate into the hair shaft. They typically last for 5 to 10 washings.
- **Permanent (oxidative):** Permanent dyes cause lasting chemical changes in the hair shaft. They are the most popular types of hair dyes, because the color changes last until the hair is replaced by new growth. These dyes are sometimes referred to as **coal-tar dyes** because of some of the ingredients in them. They contain colorless substances such as aromatic amines and phenols. In the presence of hydrogen peroxide, these substances go through chemical reactions to become dyes. Darker hair dyes tend to use more of these coloring agents.

Most of the concern about cancer risk has been with the semi-permanent and permanent dyes. Because darker dyes have more of some chemicals that may cause cancer, these products are of greatest potential concern.

How are people exposed to hair dyes?

When people dye their hair or have it dyed, some chemicals in the hair dyes can be absorbed in small amounts through the skin or inhaled from fumes in the air.

People who work around hair dyes regularly as part of their jobs, such as hairdressers, stylists, and barbers, are likely to be exposed more than people who just dye their hair on occasion. Many of the concerns about hair dyes possibly causing cancer have focused on people who work with them.

Do hair dyes cause cancer?

Researchers have been studying a possible link between hair dye use and cancer for many years. Studies have looked most closely at the risks of blood cancers (leukemias and lymphomas), bladder cancer, and breast cancer.

What do studies show?

Researchers use 2 main types of studies to try to figure out if a substance can cause cancer. A substance that causes cancer or helps cancer grow is called a **carcinogen**.

- **Lab studies** (studies done using lab animals or cells in lab dishes)
- **Studies in people** (epidemiologic studies)

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

Studying hair dyes can be hard because not all hair dyes are the same – they can contain any of thousands of different chemicals. On top of this, the ingredients in hair dyes have changed over time. Early hair dyes contained chemicals, including some aromatic amines, which were found in the late 1970s to cause cancer in lab animals, so hair dye manufacturers changed some of them in their products. Studying exposure to hair dyes from decades ago may not be the same as studying current exposures. In fact, many studies classify personal hair dye use based on whether it took place before or after 1980.

Studies done in the lab

Some of the ingredients used in hair dyes (including certain aromatic amines) have been shown to cause cancer in lab animals, usually when the animals were given large amounts of the dyes over a long period of time. Although studies have shown that some of the dye applied to an animal's skin is absorbed into the bloodstream, most have not found a link between skin application and cancer risk.

It's not clear how these results might relate to people's use of hair dyes.

Studies in people

Most of the studies looking at whether hair dye products increase the risk of cancer have focused on certain cancers such as bladder cancer, non-Hodgkin lymphoma, leukemia, and breast cancer. These studies have looked at 2 groups of people:

- People who use hair dyes regularly
- People who are exposed to them at work

Bladder cancer: Most studies of people exposed to hair dyes at work, such as hairdressers and barbers, have found a small but fairly consistent increased risk of bladder cancer. However, studies looking at people who have their hair dyed have not found a consistent increase in bladder cancer risk.

Leukemias and lymphomas: Studies looking at a possible link between personal hair dye use and the risk of blood-related cancers such as leukemia and lymphoma have had mixed results. For example, some studies have found an increased risk of certain types of non-Hodgkin lymphoma (but not others) in women who use hair dyes, especially if they began use before 1980 and/or use darker colors. The same types of results have been found in some studies of leukemia risk. However, other studies have not found an increased risk.

Breast cancer: Results of studies looking at a possible link between personal hair dye use and breast cancer have been mixed. Many studies have not found an increase in risk, although some more recent studies have. Some studies have also suggested possible links with certain subtypes of breast cancer but not with others.

Other cancers: For other types of cancer, too few studies have been done to be able to draw any firm conclusions.

Many people use or work with hair dyes, so it is important that more studies are done to

get a better idea if these dyes increase cancer risk.

What expert agencies say

Several national and international agencies study substances in the environment to determine if they can cause cancer. **The American Cancer Society looks to these organizations to evaluate the risks based on the available evidence.**

Based on studies in people and studies done in the lab, some of these expert agencies have classified hair dyes or their ingredients as to whether they can cause cancer.

The **International Agency for Research on Cancer (IARC)** is part of the World Health Organization (WHO). One of its major goals is to identify causes of cancer. IARC has concluded that workplace exposure as a hairdresser or barber is “probably carcinogenic to humans,” based on the data regarding bladder cancer. (The evidence for other types of cancer is considered mixed or inadequate.) But IARC considers personal hair dye use to be “not classifiable as to its carcinogenicity to humans,” based on a lack of evidence from studies in people.

The **US National Toxicology Program (NTP)** is an interagency program of 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 classified the potential of hair dyes to cause cancer. However, it has classified some chemicals that are or were used in hair dyes as “reasonably anticipated to be human carcinogens.”

(For more information on the classification systems used by these agencies, see [Determining if Something Is a Carcinogen¹](#) and [Known and Probable Human Carcinogens²](#).)

Are hair dyes regulated?

In the United States, the Food and Drug Administration (FDA) regulates the safety of cosmetics, including hair dyes, but by law there are limits on what the FDA can do. For example, the FDA does not approve each ingredient used in hair dyes before it goes on the market, and in general the responsibility for the safety of products and ingredients falls to the manufacturers.

The FDA can take action if any cosmetics are found to be harmful or in violation of the law (such as being mislabeled). This includes any new ingredients to be used in hair dyes. However, many of the older ingredients in hair dyes (some of which are still in use) were excluded when the FDA was initially given the power to regulate these

products back in the 1930s.

If cosmetics (including hair dyes) or their ingredients are found to be unsafe, the FDA can request that the company recall the product, although it can't require a recall. The FDA can, however, take further steps if needed, such as getting a federal court order to stop sales, requesting that US marshals seize the product, or initiating criminal action.

Should I avoid or limit my exposure to hair dye?

It's not clear how much personal hair dye use might raise cancer risk, if at all. So far, most studies have not found a strong link between hair dye use and cancer, but more research is needed to help clarify this issue.

Other than recommendations that apply to everyone (such as not smoking, eating a healthy diet, being physically active, and getting routine screening exams), there is no specific medical advice for current or former hair dye users. Smoking is a known risk factor for bladder cancer and some types of leukemia (as well as many other cancers and other diseases), and quitting smoking can improve your health, regardless of whether or not you use hair dyes.

Some people might want to avoid or limit their exposure to hair dyes for other reasons. For example:

- Some of the ingredients in hair dyes can cause serious allergic reactions in some people.
- Hair dyes can cause hair loss in some people.
- Some doctors advise women to avoid having their hair dyed during pregnancy (or at least until after the first trimester). Not enough is known about hair dye use during pregnancy to know for sure if this is a problem, but doctors might recommend this just to be safe.

For people who want to dye their hair but are concerned about safety, the FDA has some guidelines:

- Follow the directions in the package. Pay attention to all "Caution" and "Warning" statements.
- Be sure to do a patch test for allergic reactions on your skin before putting the dye in your hair. Do a patch test before every use. (Some people become more allergic to certain ingredients the more they are exposed. You may not have an allergic reaction the first time you use a product but you may the second or even third time,

so it's important to keep checking.)

- Wear gloves when applying hair dye.
- Don't leave the dye on your head any longer than the directions say you should.
- Rinse your scalp thoroughly with water after use.
- Never use hair dye to dye your eyebrows or eyelashes. This can hurt your eyes. You might even go blind. The FDA **does not allow** hair dyes to be used for eyelashes and eyebrows.
- Keep hair dyes out of the reach of children.
- Do not scratch or brush your scalp for three days before using hair dyes.
- Do not dye your hair if your scalp is irritated, sunburned, or damaged.
- Wait at least 14 days after bleaching, relaxing, or perming your hair before using dye.

Some hair dye products are vegetable based. These products may have some drawbacks, such as not being able to change hair color drastically or having the color fade sooner than is seen with permanent dyes (unless they contain some of the same ingredients as the permanent dyes). But they could be another option for those people concerned about hair dye safety.

Hyperlinks

1. www.cancer.org/cancer/risk-prevention/understanding-cancer-risk/determining-if-something-is-a-carcinogen.html
2. www.cancer.org/cancer/risk-prevention/understanding-cancer-risk/known-and-probable-human-carcinogens.html
3. www.fda.gov/
4. www.fda.gov/cosmetics/cosmetic-products/hair-dyes
5. www.cancer.gov/
6. www.cancer.gov/about-cancer/causes-prevention/risk/myths/hair-dyes-fact-sheet

Additional resources

In addition to the American Cancer Society, other sources of information and support include*:

Food and Drug Administration (FDA) Website: www.fda.gov³ Hair Dyes: www.fda.gov/cosmetics/cosmetic-products/hair-dyes⁴

National Cancer Institute (NCI) Toll-free number: 1-800-422-6237 (1-800-4-CANCER)
Website: www.cancer.gov⁵ Hair Dyes and Cancer Risk: www.cancer.gov/about-cancer/causes-prevention/risk/myths/hair-dyes-fact-sheet⁶

**Inclusion on this list does not imply endorsement by the American Cancer Society.*

References

Altekruse SF, Henley SJ, Thun MJ. Deaths from hematopoietic and other cancers in relation to permanent hair dye use in a large prospective cohort study. *Cancer Causes Control*. 1999;10:617-625.

Eberle CE, Sandler DP, Taylor KW, White AJ. Hair dye and chemical straightener use and breast cancer risk in a large US population of black and white women. *Int J Cancer*. 2020 Jul 15;147(2):383-391; doi:10.1002/ijc.32738.

International Agency for Research on Cancer. *IARC Monographs on the Evaluation of Carcinogenic Risks to Humans. Volume 99: Some Aromatic Amines, Organic Dyes, and Related Exposures*. 2010. Accessed at <https://publications.iarc.fr/117> on November 18, 2022.

Kelsh MA, Alexander DD, Kalmes RM, Buffler PA. Personal use of hair dyes and risk of bladder cancer: A meta-analysis of epidemiologic data. *Cancer Causes Control*. 2008;19:549–558.

Koutros S, Silverman DT, Baris D, et al. Hair dye use and risk of bladder cancer in the New England bladder cancer study. *Int J Cancer*. 2011;129:2894-2904.

Lim JE, Huang J, Mnnist S, Weinstein SJ, Albanes D. Hair dye use and prostate cancer risk: A prospective analysis in the Alpha-Tocopherol, Beta-Carotene Cancer Prevention Study cohort. *Cancer*. 2022;128(6):1260-1266.

Llanos AAM, Rabkin A, Bandera EV, et al. Hair product use and breast cancer risk among African American and White women. *Carcinogenesis*. 2017;38(9):883-892.

National Cancer Institute. Hair Dyes and Cancer Risk. 2016. Accessed at <https://www.cancer.gov/about-cancer/causes-prevention/risk/myths/hair-dyes-fact-sheet> on November 18, 2022.

Rollinson DE, Helzlsouer KJ, Pinney SM. Personal hair dye use and cancer: A systematic literature review and evaluation of exposure assessment in studies

published since 1992. *J Toxicol Environ Health B Crit Rev*. 2006;9:413-439.

Takkouche B, Etminan M, Montes-Martinez A. Personal use of hair dyes and risk of cancer: A meta-analysis. *JAMA*. 2005;293:2516-2525.

US Department of Health and Human Services. Public Health Service, National Toxicology Program. 15th Report on Carcinogens. 2021. Accessed at <https://ntp.niehs.nih.gov/whatwestudy/assessments/cancer/roc/index.html> on November 21, 2022.

US Food and Drug Administration. FDA Authority Over Cosmetics: How Cosmetics Are Not FDA-Approved, but Are FDA-Regulated. 2022. Accessed at <https://www.fda.gov/cosmetics/cosmetics-laws-regulations/fda-authority-over-cosmetics-how-cosmetics-are-not-fda-approved-are-fda-regulated> on November 21, 2022.

US Food and Drug Administration. Hair Dyes and Relaxers. 2015. Accessed at <https://www.fda.gov/media/92917/download> on November 21, 2022.

US Food and Drug Administration. Hair Dyes. 2022. Accessed at <https://www.fda.gov/cosmetics/cosmetic-products/hair-dyes> on November 21, 2022.

Xu S, Wang H, Liu Y, et al. Hair chemicals may increase breast cancer risk: A meta-analysis of 210319 subjects from 14 studies. *PLoS One*. 2021 Feb 4;16(2):e0243792.

Zhang Y, Birmann BM, Han J, et al. Personal use of permanent hair dyes and cancer risk and mortality in US women: Prospective cohort study. *BMJ*. 2020;370:m2942. Published 2020 Sep 2. doi:10.1136/bmj.m2942.

Zhang Y, Sanjose S, Bracci PM, et al. Personal use of hair dye and the risk of certain subtypes of non-Hodgkin lymphoma. *Am J Epidemiol*. 2008;167:1321–1331.

Last Revised: November 22, 2022

Written by

The American Cancer Society medical and editorial content team
(<https://www.cancer.org/cancer/acs-medical-content-and-news-staff.html>)

Our team is made up of doctors and oncology certified nurses with deep knowledge of cancer care as well as journalists, editors, and translators with extensive experience in medical writing.

American Cancer Society medical information is copyrighted material. For reprint requests, please see our Content Usage Policy (www.cancer.org/about-us/policies/content-usage.html).

cancer.org | 1.800.227.2345