



[cancer.org](https://www.cancer.org) | 1.800.227.2345

Hair Dyes

Many American women, as well as a small but increasing number of men, use hair dyes. You may have heard rumors about a link between using hair dye and getting cancer. Many studies have looked at hair dyes as a possible risk factor for various types of cancer. Here we will discuss 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. People are exposed to the chemicals in hair dyes through skin contact. There are 3 main types of hair dyes:

- **Temporary dyes:** These 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 dyes:** These dyes do penetrate into the hair shaft. They typically last for 5 to 10 washings.
- **Permanent (oxidative) hair dyes:** These 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.

Concern about cancer risk is largely limited to 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?

The most common way to be exposed is to dye your hair or have it dyed. Some chemicals in 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) and bladder cancer. While some studies have suggested possible links, others have not.

What do studies show?

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

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 may 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. In lab studies, researchers can control many of the other factors that might affect the results. Still, it's not always clear if the results in lab dishes or animals would be the same in humans, for a number of reasons.

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 that might affect the results are hard to account for.

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 something like hair dyes can be even more complex 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 the years. 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 the chemicals 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 fed 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. If there is an effect of hair dye use on blood-related cancers, it is likely to be small.

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.

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

Many people use hair dyes, so it is important that more studies are done to get a better idea if these dyes affect 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 evidence from laboratory, animal, and human research studies.

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). Its major goal 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 **National Toxicology Program (NTP)** is formed from parts of several different US 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 classified exposure to hair dyes as to its potential 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 [Known and Probable Human Carcinogens¹](#).)

Are hair dyes regulated?

In the United States, the Food and Drug Administration (FDA) regulates the safety of

cosmetics, including hair dyes, but there are limits on what the FDA can do. 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 limit my exposure to hair dye?

It's not clear how much personal hair dye use might raise cancer risk, if at all. Most studies done so far have not found a strong link, but more studies are needed to help clarify this issue.

Other than recommendations that apply to everyone (not smoking, eating a healthy diet, being physically active, getting routine screening exams, etc.), 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 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 also actually 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 often recommend this just to be safe.

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

- Follow the directions in the package. Pay attention to all "Caution" and "Warning" statements.

- Be sure to do a patch test for allergic reactions 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 is 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 mix different hair dye products. This can hurt your hair and scalp.
- 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 using hair dyes on eyelashes and eyebrows.

Some newer 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 may be another option for some people concerned about hair dye safety.

Hyperlinks

1. www.cancer.org/cancer/cancer-causes/general-info/known-and-probable-human-carcinogens.html
2. <http://www.fda.gov/>
3. <http://www.fda.gov/Cosmetics/ResourcesForYou/Consumers/ucm2005206.htm>
4. <http://www.cancer.gov/>
5. <http://www.cancer.gov/cancertopics/factsheet/Risk/hair-dyes>
6. <http://www.fda.gov/>
7. <http://www.fda.gov/Cosmetics/ResourcesForYou/Consumers/ucm2005206.htm>
8. <http://www.cancer.gov/>
9. <http://www.cancer.gov/cancertopics/factsheet/Risk/hair-dyes>

Additional resources

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

Food and Drug Administration (FDA) Website: www.fda.gov (<http://www.fda.gov/>)²
Cosmetics
FAQs: www.fda.gov/Cosmetics/ResourcesForYou/Consumers/ucm2005206.htm
(<http://www.fda.gov/Cosmetics/ResourcesForYou/Consumers/ucm2005206.htm>)³

National Cancer Institute (NCI) Toll-free number: 1-800-422-6237 (1-800-4-CANCER)
Website: www.cancer.gov (<http://www.cancer.gov/>)⁴ Hair dyes and cancer
risk: www.cancer.gov/cancertopics/factsheet/Risk/hair-dyes
(<http://www.cancer.gov/cancertopics/factsheet/Risk/hair-dyes>)⁵

**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*. 2019; doi:10.1002/ijc.32738. Accessed at <https://onlinelibrary.wiley.com/doi/abs/10.1002/ijc.32738> on December 6, 2019.

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 <http://monographs.iarc.fr/ENG/Monographs/vol99/index.php> on April 15, 2014.

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.

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. 2011. Accessed at www.cancer.gov/cancertopics/factsheet/Risk/hair-dyes on April 14, 2014.

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. Report on Carcinogens, Twelfth Edition. 2011. Accessed at <http://ntp.niehs.nih.gov/ntp/roc/twelfth/roc12.pdf> on April 15, 2014.

US Food and Drug Administration. Cosmetics safety Q&A: Hair dyes. 2014. Accessed at www.fda.gov/cosmetics/resourcesforyou/consumers/ucm167436.htm on April 16, 2014.

US Food and Drug Administration. Hair dye and hair relaxers. 2013. Accessed at www.fda.gov/ForConsumers/ByAudience/ForWomen/ucm118527.htm on April 16, 2014.

US Food and Drug Administration. Hair dyes: Fact sheet. 2014. Accessed at www.fda.gov/cosmetics/productsingredients/products/ucm143066.htm on April 16, 2014.

US Food and Drug Administration. How FDA evaluates regulated products: Cosmetics. Accessed at www.fda.gov/AboutFDA/Transparency/Basics/ucm262353.htm on April 16, 2014.

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 Medical Review: May 27, 2014 Last Revised: September 8, 2020

Written by

The American Cancer Society medical and editorial content team
(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