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Hair Dye Dilemmas

(See [updated information on Hair Dyes and Straighteners](#))

by Margie Patlak

Many graying baby boomers find themselves lingering in the hair dye aisles of drugstores, wistfully eyeing boxes displaying the colors their hair once was.

Members of the 40-plus generation are not the only ones who change their hair color. The Cosmetic, Toiletry, and Fragrance Association estimates that close to two out of every five American women and a smaller number of men dye their hair.

The decision to change hair color has recently become more complicated because some recent studies have linked hair coloring with an increased risk of contracting certain cancers. To make matters more confusing other studies do not support those findings. Most hair dyes also don't have to go through pre-market testing for safety that other cosmetic color additives do before hitting store shelves. Consumers are often on their own consequently, when deciding whether hair dyes are safe.

FDA is responsible for overseeing the safety of cosmetics sold in this country and can prohibit the sale of any cosmetics found harmful--except most hair dyes. Although the adulteration provision of the Food, Drug, and Cosmetic Act enables FDA to seek removal of a cosmetic from the market if it is shown to be harmful under conditions of use, hair coloring made from coal-tar were given special exemption from bans when the act was passed in 1938.

The main ingredient in the coal-tar hair dyes manufactured at the time prompted an allergic reaction in some susceptible individuals. Fearing FDA would ban the sale of hair dyes because some users might develop a rash or have other allergic reactions, the industry successfully lobbied before the act passed to get coal-tar hair dyes exempted from the adulteration provision. Manufacturers were required, however, to include a warning in the labels that the products can cause skin irritation in certain allergic individuals. Most hair dyes in use today derive their ingredients from petroleum sources, but have been considered coal-tar dyes by FDA because they contain some of the same compounds found in these older dyes.

CANCER IN ANIMALS

In 1978, FDA proposed to require a warning on the labels of hair dyes containing the compounds 4-methoxy-m-phenylenediamine (4MMPD) or 4-methoxy-m-phenylenediamine sulfate (4MMPD sulfate), two coal-tar ingredients. This followed findings by researchers at the National Cancer Institute in Bethesda, MD., that rodents fed either of the chemicals were more likely to develop cancer than animals not fed the substances.

The researchers put the compounds in the animals' feed rather than on the animals' skin because they were trying to assess the effects of hair dye ingredients inside the body. (Other studies have shown that a small percentage of hair dye is absorbed from the scalp and passed into the bloodstream where it can travel to other organs and tissues.) To detect a cancer-causing effect of the compounds in a short period in a limited number of animals researchers fed the animals large doses of the hair dye ingredients.

Some researchers say that extrapolating results from ingested hair dye studies to absorbed hair dye use cannot accurately assess cancer risk because the compounds being tested are altered or are absorbed differently in the gut than they are when applied to the scalp. Moreover, tests of individual hair dye ingredients don't measure the health hazards of the highly reactive compounds that are formed when the various ingredients in a specific hair dye are mixed together and applied to hair.

In other studies, when investigators painted 4MMPD on the skin of rodents, there was no evidence that the compounds caused cancer in the animals. But critics claim that not enough of the chemical penetrates the skin from the small areas on which it's applied to accurately assess the compound's ability to prompt cancers in a limited number of animals.

After FDA adopted the requirement of a warning about 4MMPD and 4MMPD sulfate, manufacturers stopped using the chemicals in their hair dyes. In addition, the hair dye industry has stopped using several other ingredients found to cause cancer in animals. But some of the cancer-causing compounds have been replaced by similarly structured chemicals. However, some scientists feel that the similar structure of these ingredients makes it likely that their cancer-causing potential won't differ much from the chemicals they're replacing. The agency continues to monitor the situation and review studies as they are completed.

CANCER IN PEOPLE

Several studies have tried to pinpoint the risk of various cancers to hair dye users by calculating the difference in frequency of cancer in people who color their hair and those who don't.

Some of these studies found an increased risk of cancer associated with hair dye use, but failed to consider the effects of other cancer-causing agents, such as cigarette smoke when comparing the two groups. In other studies the numbers of people included were too small to lend much statistical credence to the findings.

To minimize the chance of allergic reactions, before dyeing your hair, test the product by dabbing a bit behind your ear. Don't wash it off for two days. If itching, burning, redness, or rash occur, don't use the product.

Several studies found no risk of cancer. Few studies looked at long-term use of hair dyes (greater than 20 years).

The findings so far are inconclusive, to chemist John Bailey, Ph.D., Director of FDA's colors and cosmetics program. "The studies raise some questions about the safety of hair dyes," he says, "but at this point there's no basis for us to say that hair dyes pose a definitive risk of cancer. In the final analysis, consumers will need to consider the lack of demonstrated safety when they choose to use hair dyes."

HAIR DYE PRECAUTIONS

The less hair dye used over a lifetime, the less likely a person will be exposed to enough dye to cause cancer, according to Bailey. "My personal recommendation is that consumers use good judgment and exercise

moderation," he says. "You may reduce the risk of cancer by exposing yourself to less hair dye--you probably shouldn't change your hair color every week, for example." People can also reduce their risk by delaying dyeing their hair until later in life when it starts to turn gray, he adds.

Consumers might also want to consider using henna, which is largely plant-derived, or hair dyes that are lead acetate-based. These colorings don't fall into the coal-tar dye category and therefore any additive ingredients they contain have been tested for safety before marketing, in accordance with FDA requirements. Henna products on the market can give a range of colors, from dark brown through various reddish-brown and lighter red to reddish-blond shades. They cannot, however, lighten hair. Lead acetate dyes gradually darken hair and are commonly used in progressive type hair colorings, such as those advertised as being for men. None of these colors may be used on eye-lashes or eyebrows.

People who dye their hair should follow these safety precautions:

- Don't leave the dye on your head any longer than necessary.
- Rinse your scalp thoroughly with water after use.
- Wear gloves when applying hair dye.
- Carefully follow the directions in the hair dye package.
- Never mix different hair dye products, because you can induce potentially harmful reactions (if not an unappealing hair color).

Be sure to do a patch test for allergic reactions before applying the dye to your hair. Almost all hair dye products include instructions for conducting a patch test, and it's important to perform the test each time you dye your hair. (Salons should also perform the patch test before dyeing the hair of their patrons.) To test, put a dab of hair dye behind your ear, and don't wash it off for two days. If no itching, burning, redness, or other signs of allergic reaction develop at the test spot during this time, you can be relatively sure that you won't develop a reaction to the dye applied to your hair. If you do react to the patch test do the same test with different brands or colors until you find one to which you're not allergic.

[\(Updated information on Lead Acetate in Hair Dye Products.\)](#)

Never dye your eyebrows or eyelashes. An allergic reaction to dye could prompt swelling, inflammation and susceptibility to infection in the eye area. These reactions can severely harm the eye and even cause blindness. (Inadvertently spilling dye into eye could also cause permanent damage.) FDA prohibits the use of hair dyes for eyelash and eyebrow tinting or dyeing even in beauty salons or other establishments.

Researchers continue to study the cancer-causing potential of hair dye ingredients, and FDA continues to keep abreast of such findings. Until definitive evidence come in consumers may want to proceed with caution when selecting a hair dye.

COLORING CHOICES

Consumers considering changing their hair color have a choice of four main types of coloring agents to use. What distinguishes them is how long they last and how they color hair. Coal-tar ingredients are found in some products in all categories except gradual dyes.

Temporary hair colors are applied in the form of rinses, gels, mousses, and sprays. These products merely sit on the surface of the hair and are usually washed out with the next shampoo although some may last two to three washings. If the hair gets wet, during a rainstorm for example, the color can run from the hair onto clothing or the face.

Semi-permanent dyes penetrate into the hair shaft and do not rinse off with water like temporary colorings. They do wash out of the hair, however, after about five to ten shampoos. Semi-permanent dyes come in liquid, gel or aerosol foam forms. After applying the product to the hair the user waits 20 to 40 minutes before working it in like a shampoo and then thoroughly rinsing with water.

Permanent dyes require a bit more work, pay-off is hair color that lasts until the new hair--"roots"--grows in. Because permanent dyes contain hydrogen peroxide, they cover gray hair more effectively and can be used to lighten hair color, unlike other dyes.

To apply permanent dyes the user mixes together a hydrogen peroxide liquid with another liquid, works the mixture into the hair, and after about a half an hour rinses the dye out with water. Permanent dyes not only penetrate deeply into the hair shaft, but get locked within it due to a series of chemical reactions that occur while the dye is applied. Consequently, permanent dyes can't be washed out with shampoo.

A fourth type of hair dye is known as a gradual or progressive dye. This dye, in the form of a rinse, slightly darkens hair by binding to compounds on the hair's surface. Gradual dyes are usually applied daily until a dark enough shade is achieved, after which it may be used less often to maintain the color. Unlike temporary dyes, gradual dyes don't wash off readily or run when the hair gets wet.

Compounds suspected of causing cancer are found in temporary, semi-permanent and permanent dyes.

PERMANENT EYELINER

The attempt to achieve a socially determined level of cosmetic perfection is not limited to changing hair color. Women who want their eyes to be enhanced by eyeliner, but don't have the time to put it on everyday or are allergic to make-up are having permanent eyeliner tattooed onto their eyelids.

Introduced to this country from the Orient more than 10 years ago, permanent eyelining is now offered in many beauty salons. Using disposable needles, pigment is implanted into the skin at the base of the upper or lower eyelashes. The pigments used are derived from vegetable products. A local anesthetic is often given to relieve pain during the tattooing, which takes from 20 minutes to an hour. Some swelling may follow the procedure. Scabs that form in the treated area fall off within a week.

But "we can't vouch for the safety of permanent eyelining," points out chemist John Bailey, Ph.D., Director of FDA's colors and cosmetics program, because the procedure hasn't undergone any formal safety testing. FDA is currently considering requiring safety testing for tattooed eyeliner. If such testing finds permanent eyelining unsafe, FDA could ban the procedure because it uses colors that are under the agency's jurisdiction.

Although FDA has received no reports that this permanent make-up causes harm there's concern that tattooed eyelining could induce an allergic reaction that might permanently damage the eyes and eyelids. If such a reaction did occur, it would be difficult to treat, and surgery might be required to remove the pigment in the tattoo. Such surgery might harm the eye or cause unsightly scarring.

"There's a misperception on the part of the public that tattooed eyelining is a risk-free procedure," says Bailey.

- *M.P.*

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(See [updated information on Hair Dyes and Straighteners](#))

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