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## Mixed news on hair dyes and cancer risk

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In this era of cancer scares at every turn, a new study offers women mostly reassuring news about the cancer risk of hair dyes.

The large study finds that most women who use permanent hair coloring do not face an increased risk of fatal cancers. The research does, however, uncover a link between very prolonged use of black hair dye and two immune system cancers.

Hair colorings contain substances similar to the chemicals in coal tar that cause cancer in laboratory animals. Yet studies of the link between hair dyes and human cancer have proved inconclusive.

Most previous research efforts involved asking volunteers who already had cancer about their hair-coloring habits, a retrospective approach that can skew findings. Furthermore, past studies often focused on a small number of participants and thus lacked the statistical muscle to pick up an association between hair coloring products and malignant tumors in a specific subgroup.

To help get a clearer idea of cancer risk, Michael J. Thun of the Atlanta-based American Cancer Society and his colleagues embarked on a large-scale prospective study that queried healthy women about their use of permanent hair dye. The researchers collected information on 573,369 women enrolled in a study of cancer mortality. About one-third of the women used permanent hair dye, the investigators reported in the Feb. 2 *JOURNAL OF THE NATIONAL CANCER INSTITUTE*.

A statistical analysis revealed that women who reported any use of permanent hair-coloring products actually showed a slightly lower risk of all fatal cancers than women who had never used such dyes. That finding underscores the belief that such products generally do not increase the risk of cancer, Thun says.

"I think we can rule out hair dyes as a major [cancer] concern," adds epidemiologist Graham A. Colditz of the Harvard Medical School and Brigham and Women's Hospital in Boston. Colditz wrote an editorial accompanying the new study.

These data are "reassuring," comments epidemiologist Shelia Hoar Zahm of the National Cancer Institute in Bethesda, Md. However, Zahm is quick to point out that this new study does add to evidence suggesting that hair colorings can pose specific cancer risks to a select group of women.

For example, Thun and his colleagues found that, compared to women who didn't color their hair, women who used permanent black hair dye for 20 years or longer ran about a four times greater risk of dying from non-Hodgkin's lymphoma, a cancer of the lymph tissue, or multiple myeloma, a malignancy of the bone mar-

row cells that produce antibodies.

That finding is consistent with an earlier study by Zahm and her colleagues. The team found that using hair-coloring products (particularly the darker colors) heightened a woman's risk of developing non-Hodgkin's lymphoma and multiple myeloma. That study, in the July 1992 *AMERICAN JOURNAL OF PUBLIC HEALTH*, revealed that semipermanent hair coloring products also raise the risk of such immune system cancers.

It could be that dark hair dyes contain higher concentrations of mutagenic chemicals and thus are associated with a greater risk of these specific cancers, Zahm notes. The skin absorbs the chemicals in hair colorings during the application process, she adds.

Another hint that hair-coloring products may lead to non-Hodgkin's lymphoma — and certain other cancers — comes from a study of hairdressers con-

ducted by epidemiologist Paolo Boffetta of the International Agency for Research on Cancer in Lyon, France.

Boffetta's team studied the incidence of non-Hodgkin's lymphoma and ovarian cancer among women who worked as hairdressers in four European countries. The team discovered no overall pattern of risk; however, Danish hairdressers had an increased risk of both ovarian cancer and non-Hodgkin's lymphoma. Boffetta and his co-workers report their findings in the January *JOURNAL OF OCCUPATIONAL MEDICINE*.

Still, the evidence that on-the-job exposure to hair dye boosts the risk of such cancers remains far from conclusive, Boffetta says.

The full story of cancer risk and hair-coloring products remains of considerable importance to people who work in beauty salons and to women who rely on such products, Zahm says. "We have an exposure here that we know is carcinogenic in animals," she says. "We need further research." — *K.A. Fackelmann*

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## Atlantic current gives climate the shakes

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The mammoth ocean current that keeps Europe warm in today's world may have sped up and stalled repeatedly 130,000 years ago, sending the planet through a malaria-like series of alternating fevers and chills. These conclusions, drawn from computer simulations of the ocean, suggest that global warming could prompt similar rapid current fluctuations that would destabilize the climate.

Oceanographers describe the North Atlantic Deep Water current as a conveyor belt that transports heat around the globe. The current carries warmth from the tropics north toward Iceland. There the water cools and sinks, releasing tremendous amounts of energy that keep Northern Europe much warmer than land at the same latitude elsewhere. The cold water formed this way then travels south and eventually into the Pacific.

Andrew J. Weaver and Tertia M.C. Hughes of the University of Victoria in British Columbia used a model of the world's oceans to study how shifts in climate affect the strength of the North Atlantic conveyor, which today has a flow rate roughly 50 times that of the Amazon, the world's largest river.

Weaver and Hughes found that the conveyor can run at three different speeds: extremely slow, fast, and at its present rate, which falls in the middle. Under today's conditions, the modeled current displays stable behavior because it does not jump between different speeds when scientists tweak the climate slightly.

But when Weaver and Hughes simulated a warmer climate, the stable system broke down. To mimic balmier global conditions, the researchers increased the rates of evaporation and

rainfall in the model and allowed these processes to fluctuate. Such changes in the water cycle caused the conveyor current to switch wildly between slow, medium, and high speeds, they report in the Feb. 3 *NATURE*.

These results are important because they offer a potential explanation for rapid climate flip-flops that researchers believe happened during the Eemian stage — the period preceding the most recent ice age. In general, the Eemian climate was warmer than today's. But scientists studying ice cores drilled in Greenland recently found evidence that the Eemian climate was unstable, with temperatures swinging up and down by as much as 14°C in the span of a few decades.

In the past, researchers studying the ice ages have suspected that the large ice sheets in North America and Europe helped drive rapid climate shifts. But the glacial sheets did not exist during the warm Eemian, so experts have had to look elsewhere to explain the fast changes then. Weaver and Hughes suggest ocean currents can provide the answer.

In the same issue of *NATURE*, Wallace E. Broecker of the Lamont-Doherty Earth Observatory in Palisades, N.Y., urges further study of instabilities in the conveyor current because global warming threatens to push temperatures into the same range as during the Eemian.

But Broecker also cautions that the story may be more complex than first appears. Recently, a second research group working in Greenland has questioned the evidence for climate instability during the Eemian, raising the possibility that temperatures did not fluctuate wildly during this period (SN: 12/11/93, p.390).