Can Tattoos Cause Cancer?

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Myth: Tattooing has risen in popularity, but can this body art increase the risk of cancer?

Answer: Tattoos and body piercings have been prevalent for thousands of years in many cultures. Tattooed mummies from Egypt, Peru, and the Philippines have been radiocarbon dated to 2000 BC. The word *tattoo* is derived from the Tahitian word *ta-tau*, which means "the result of tapping." Modern artists use an electrically powered instrument to inject tattoo pigment 50–3,000 times per minute to a depth of about a 64th to a 16th of an inch into the dermis (Armstrong & Murphy, 1997). The instruments use sets of one to 14 vibrating needles (Sperry, 1992).

Does the tattoo artist
- Have a current state license?
- Thoroughly wash his or her hands with antibacterial solution immediately before and after each tattoo application?
- Wear latex gloves during the procedure?
- Use single-use materials and equipment (i.e., each needle and tube set is individually packaged, dated, sealed, and autoclave sterilized) and set up and open them in front of the client?
- Use sterile disposable needles?
- Have a U.S. Food and Drug Administration–regulated autoclave on site?
- Sanitize his or her work space with an Environmental Protection Agency–approved viricidal disinfectant, preferably one that kills tuberculosis, before and after each client?
- Thoroughly rinse tube and needle sets from the tattoo machine with an ultrasonic tank before discarding?
- Properly dispose of contaminated material?

Figure 1. Tattoo Artist Safety Guidelines

Note. Based on information from Centers for Disease Control and Prevention, 2008.

Tattoo Procedures and Regulations

Tattooing is an invasive procedure. Although licensed artists use sterile, disposable needles, tattooing sometimes is performed in unsterile environments, such as commercial studios, flea markets, rock concerts, and fraternity parties. As a result, tattooing can cause infections, including hepatitis and AIDS. Depending on the skill of the artist and choice of pigment and diluents, allergic reactions and poor cosmetic results may be potential outcomes and should be a consideration for risk. Vegetable dyes and carbon have been used for tattoo pigment in the past; current colorants include azo pigments (which are used in automobile paints and silk screening), vegetable dyes, minerals, metals, and plastics. Solvents that liquefy powdered pigments (ethyl alcohol, denatured alcohol, or distilled water) are used at artists' discretion (Helmenstine, 2002).

Impurities in pigments may cause adverse skin reactions. Colorants also may be transported to other parts of the body, such as the lymph nodes (Moehrle, Blaheta, & Ruck, 2001), which can present clinical challenges when specimens are dyed for pathology tests. Tattoo pigment has been mistaken for melanoma in lymph nodes (Chikkamuniyappa, Sjuve-Scott, Lancaster-Weiss, Miller, & Yeh, 2005).

The U.S. Food and Drug Administration (FDA) considers tattoo ink and permanent makeup to be cosmetics, and the pigments for color additives require approval under the Federal Food, Drug, and Cosmetic Act. However, no standards exist for the usage of tattoo inks, their contents, or the amount used on any particular area of the body (FDA, 2009). To date, the practice of tattooing is regulated by state jurisdiction. Nurses should advise patients to screen tattoo artists for safety procedures (see Figure 1).

The FDA is aware of more than 150 reports of adverse skin reactions (e.g., rashes, blistering, swelling) in consumers and continues to evaluate the extent and severity of events believed to be associated with tattooing. The FDA is conducting research on tattoo inks to examine ink metabolism, chemical composition, safety, and short- and long-term effects (2009).

Pigments and Cancer Risk

Evidence has indicated that m'-methyl-p-dimethylaminoazobenzene, or red azo dye (also known as red 22 or PR22), produced liver cancer in rats when used as a food coloring (Cook, Griffin, & Luck, 1949). The administration of azo dye decreased the amount of riboflavin present in the rats' livers. However, increasing riboflavin within the rats' livers appeared to partially protect the liver from the carcinogenic effects of azo dye. Liver cirrhosis was detected in the rats after four weeks of azo administration. The measurable amount of dye diminished at 20 weeks, even though the dye was ingested continually (Rusch, Baumann, Miller, & Kline, 1945).

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