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Insanitary Conditions in the Preparation, Packing, and Holding of Tattoo Inks and the Risk of Microbial Contamination: Guidance for Industry

Draft Guidance

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For questions regarding this draft document contact the Center for Food Safety and Applied Nutrition (CFSAN) at 240-402-1130.

U.S. Department of Health and Human Services
Food and Drug Administration
Center for Food Safety and Applied Nutrition

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Insanitary Conditions in the Preparation, Packing, and Holding of Tattoo Inks and the Risk of Microbial Contamination: Guidance for Industry[1]

This draft guidance, when finalized, will represent the current thinking of the Food and Drug Administration (FDA or we) on this topic. It does not establish any rights for any person and is not binding on FDA or the public. You can use an alternative approach if it satisfies the requirements of the applicable statutes and regulations. To discuss an alternative approach, contact the FDA staff responsible for this guidance as listed on the title page.

I. Introduction

Under section 601(c) of the Federal Food, Drug, and Cosmetic Act (FD&C Act) (21 U.S.C. 361(c)), a cosmetic is deemed to be adulterated if it "has been prepared, packed, or held under insanitary conditions whereby it may have become contaminated with filth, or whereby it may have been rendered injurious to health." Cosmetic products prepared, packed, or held under insanitary conditions could become contaminated and cause serious adverse events. The risk of such adverse events is even greater in products such as tattoo inks, which are introduced through the skin.

Tattooing has become increasingly popular in the United States. Polling and data suggest that about 30 percent of all Americans, and 40 percent of those aged 18-34, have at least one tattoo (Refs. 1 and 2). State and local jurisdictions generally regulate the practice of intradermal tattooing, including permanent makeup. FDA regulates, among other things, the inks used in that practice.[2] Tattoo inks are cosmetics as defined by section 201(i) of the Federal Food, Drug, and Cosmetic Act (the FD&C Act) (21 U.S.C. 321(i)) because they are articles intended to be introduced into or otherwise applied to the human body for beautifying, promoting attractiveness, or altering the appearance.

FDA is issuing this guidance to help tattoo ink manufacturers and distributors recognize situations in which a tattoo ink may become contaminated with microorganisms, and thus, be potentially injurious to health. This guidance also recommends certain steps that manufacturers and distributors could take to help prevent the occurrence of these conditions, or to identify and remediate insanitary conditions that already exist during manufacturing and distribution.

[1] This guidance has been prepared by the Office of Cosmetics and Colors and the Office of Regulations and Policy in the Center for Food Safety and Applied Nutrition at the U.S. Food and Drug Administration.

[2] Pigments, which are color additives regulated by FDA, are a component of finished tattoo inks. This guidance focuses on microbial contamination of finished inks.

FDA's guidance documents, including this guidance, do not establish legally enforceable responsibilities. Instead, guidances describe our current thinking on a topic and should be viewed only as recommendations, unless specific regulatory or statutory requirements are cited. The use of the word *should* in FDA guidances means that something is suggested or recommended, but not required.

II. Background

Human skin is composed of multiple layers, including the epidermis, or outermost skin layer that serves as the body's primary physical barrier against pathogens and other harms; and the dermis, or deeper layer that contains, among other things, blood and lymphatic vessels. Microorganisms are normally present on the epidermis, but not in deeper skin layers, such as the dermis. Microorganisms normally regarded as nonpathogenic when applied topically may become opportunistically pathogenic and virulent when introduced in other ways (e.g., in wounds or via cosmetics introduced into or through the skin).[3] The presence of microorganisms in deeper skin layers may give rise to infection and inflammation.

Tattooing involves puncturing the epidermis about 100 times per second with needles and depositing ink 1.5 to 2 millimeters below the surface of the skin, deep into the dermis (Ref. 3). It generally causes bleeding because the needles pierce the blood vessels (Refs. 4 and 5). Contaminated tattoo ink can cause infections and serious injuries. Because these inks are injected, pathogens or other harmful substances in these inks can travel from the injection site through the blood and lymphatic systems to other parts of the body. Commonly reported symptoms of tattoo ink-associated infections include injection-site rashes and other lesions, including blisters and granulomas, some of which have resulted in permanent scarring. Tattoo-associated microbiological infections can also include impetigo,[4] erysipelas,[5] cellulitis,[6] and systemic infections that can cause life-threatening complications such as endocarditis, septic shock, and multi-organ failure (Ref. 8). Indications of an infection can be difficult to recognize, as other conditions (e.g., allergic reactions or other sources of inflammation) may initially have similar signs and symptoms, leading to misdiagnosis and ineffective treatments.

We have received multiple reports of illness caused by microbially contaminated tattoo inks, and subsequent testing has found many sealed tattoo inks in the United States with microbial contamination. For instance, in 2012, contaminated tattoo inks caused a multi-state outbreak of nontuberculous mycobacterial skin infections (Ref. 9). Nontuberculous mycobacterial skin infections can produce a range of symptoms, from mild inflammation (e.g., rash, papules,

[3] See Subpart J, "Microbiological Findings," in Bacteriological Analytical Manual, Chapter 23: Methods for Cosmetics, available at https://www.fda.gov/food/laboratory-methods-food/bam-chapter-23-methods-cosmetics (accessed January 5, 2022).

[4] Impetigo is a contagious superficial pus-forming bacterial infection which begins with a superficial blister that ruptures and forms a yellowish crust (Ref. 6).

[5] Erysipelas is a specific, acute, superficial infection of the skin caused by bacterium and characterized by hot, red, swollen, thickened, and sharply defined eruptions (Ref. 6).

[6] Cellulitis is a common bacterial skin infection that causes redness, swelling, and pain in the infected area of the skin. If untreated, it can spread and cause serious health problems (Ref. 7).

nodules) to severe abscesses requiring extensive and multiple surgical debridements[7] and antimicrobial therapies. Between 2003 and 2019, tattoo ink firms conducted 15 voluntary ink recalls, 14 of which resulted from findings of microbial contamination. Eight of these recalls (Refs. 11-16) occurred after FDA conducted multiple surveys of tattoo inks available in the U.S. market and tested them for microbial contamination. Many of these inks were heavily contaminated with a variety of microorganisms, some of which (such as *Pseudomonas aeruginosa* and *Bacillus cereus*) can cause serious infections (Refs. 16 and 17). In 2018, an article in the *Journal of Applied Microbiology* reported that 49 percent of the surveyed tattoo inks on the U.S. market were contaminated with microorganisms (Ref. 17). In 2019, we alerted consumers, tattoo artists, and retailers of the potential for serious injury from use of certain tattoo inks contaminated with bacteria, and we worked with manufacturers and retailers to remove the products from the market (Ref. 16).[8]

Facilities where tattoo inks are prepared, packed, or held are responsible for ensuring that the tattoo inks are not prepared, packed, or held under insanitary conditions whereby the tattoo ink may become contaminated with filth, or whereby it may have been rendered injurious to health. Tattoo inks prepared, packed, or held under such conditions are adulterated under the FD&C Act. Therefore, upon identification, such insanitary conditions would need to be remediated.

III. Discussion

A. General Considerations

In evaluating whether tattoo inks are adulterated because they have been prepared, packed, or held under insanitary conditions whereby they may have been contaminated with filth, or whereby they may have been rendered injurious to health, we generally consider the following factors:

- Tattoo inks are used by a wide variety of consumers. Therefore, when evaluating the potential harms associated with tattoo inks, we consider use by any person, including anyone who may be immunocompromised or have other relevant underlying medical conditions.

- Tattoo inks bypass the body's primary physical barrier against pathogens, because they are inserted below the epidermis.

- Pathogens that may cause no harm in a topical product may cause harm when inserted below the epidermis because of their type or amount.

[7] Debridement is the removal, usually via surgery, of torn, dead, or contaminated tissue (Ref. 10).

[8] Note that the Modernization of Cosmetics Regulation Act of 2022 (Consolidated Appropriations Act, 2023, Pub. L. No. 117-328, § 3502 (2022)) establishes new requirements for the reporting to FDA of serious adverse events associated with the use of cosmetic products.

B. Examples of Insanitary Conditions

The following insanitary conditions during manufacturing and distribution could render a tattoo ink injurious to health:

- Preparing or packing of tattoo inks in facilities not suitable for such activities (e.g., spaces that are difficult to clean and sanitize, such as carpeted areas);

- Ink, ink components (e.g., pigments, water, solvents), and primary packaging containers held uncovered, especially near open air ducts, potentially exposing them to airborne microbial contaminants and filth;

- The presence of ink and ink components (e.g., pigments, water, other solvents) contaminated with microorganisms;

- Ink and ink components (e.g., pigments, water, other solvents) held in containers that have not been cleaned and sanitized;

- Insanitary mixing of tattoo inks, including:

    - The use of containers and utensils that are not cleaned and sanitized; and
    - The use of containers without covers that expose in-process inks to microbial contaminants from the air;

- Lack of appropriate attire by personnel during manufacturing, including the failure to use hairnets, lab coats, aprons, gowns, masks, or gloves;

- Failure to equip employee restrooms with soap and water, or the lack of signage directing employees to wash their hands;

- Disposal of used personal protection clothing (e.g., gloves, masks, gowns) in the production area; and

- Storage of packaged products in locations that render them susceptible to contamination (e.g., around heavy buildup of dust and debris).

C. Recommendations

Manufacturers can take measures to help ensure that tattoo inks are not prepared, packed, or held under insanitary conditions whereby they may be contaminated with microorganisms, including:

- Test ink and ink components (e.g., pigments, water, other solvents) for microbial contamination or purchase these materials from suppliers that test for microbial contamination. Discard any materials that contain microorganisms of a type or at a level that may harm any consumer if present in the finished product;

- Ensure that the manufacturing process itself does not introduce microbial contamination (e.g., by conducting adequate cleaning and sanitization of manufacturing equipment, providing personal protective equipment to employees);

- Ensure that any sterilization method used is validated. For example, if products are intended to be "sterile," perform appropriate validated sterilization of the finished product;

- Ensure that any cleaning or sterilization method used does not adulterate the finished product (e.g., that irradiation causes no byproducts in the ink that could create poisonous or deleterious substances in the ink which may render it injurious to users under expected conditions of use); and

- Take corrective measures to prevent the release of any final product that microbiological testing shows contains microorganisms of a type or at a level that may harm any consumer and reexamine manufacturing and validation procedures to determine the cause of final product contamination.

We also suggest examining and, where appropriate, establishing good manufacturing practices (GMPs) or applying GMPs that pertain to cosmetics generally (see, for example, International Organization for Standardization (ISO) standard pertaining to cosmetics, ISO 22716, titled "Cosmetics – Good Manufacturing Practices (GMP) – Guidelines on Good Manufacturing Practices" (Ref. 18)).[9] We note that we intend to conduct rulemaking to establish good manufacturing practice regulations as part of the implementation of the Modernization of Cosmetics Regulation Act of 2022, which requires FDA to establish good manufacturing practice regulations that, to the extent practicable and appropriate, are consistent with national and international standards.[10]

IV. References

The following references marked with an asterisk (*) are on display at the Dockets Management Staff (see ADDRESSES) and are available for viewing by interested persons between 9 a.m. and 4 p.m., Monday through Friday; they also are available electronically at https://www.regulations.gov. References without asterisks are not on public display at https://www.regulations.gov because they have copyright restriction. Some may be available at the website address, if listed. References without asterisks are available for viewing only at the Dockets Management Staff. FDA has verified the website addresses, as of the date this document publishes in the *Federal Register*, but websites are subject to change over time.

[9] FDA has published a draft guidance entitled "Cosmetic Good Manufacturing Practices" (June 2013) (available at https://www.fda.gov/regulatory-information/search-fda-guidance-documents/draft-guidance-industry-cosmetic-good-manufacturing-practices (accessed December 19, 2022)).

[10] See Consolidated Appropriations Act, 2023, Pub. L. No. 117-328, § 3502 (2022).

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*12. Food and Drug Administration, "Radiant Colors": Recall, posted December 21, 2017; available at https://www.accessdata.fda.gov/scripts/ires/index.cfm?Product=160130 (accessed January 19, 2023).

*13. Food and Drug Administration, "Solid Ink": Recall, posted June 20, 2018; available at https://www.accessdata.fda.gov/scripts/ires/index.cfm?Product=164628 (accessed January 19, 2023).

*14. Food and Drug Administration, "Intenze Ink": Recall, posted July 31, 2018; available at https://www.accessdata.fda.gov/scripts/ires/index.cfm?Product=165649 (accessed January 19, 2023).

*15. Food and Drug Administration, "Eternal Ink": Recall, posted October 24, 2018; available at https://www.accessdata.fda.gov/scripts/ires/index.cfm?Product=167698 (accessed January 19, 2023).

*16. Food and Drug Administration, "FDA Advises Consumers, Tattoo Artists, and Retailers to Avoid Using or Selling Certain Tattoo Inks Contaminated with Microorganisms"; available at https://www.fda.gov/cosmetics/cosmetics-recalls-alerts/fda-advises-consumers-tattoo-artists-and-retailers-avoid-using-or-selling-certain-tattoo-inks (accessed January 19, 2023).

*17. Nho, S.W., S-J. Kim, O. Kweon, et al. "Microbiological Survey of Commercial Tattoo and Permanent Makeup Inks Available in the United States." *Journal of Applied Microbiology,* 124: 1294-1302 (2018).

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