

Tattooing has been practiced for centuries around the world. These permanent designs have served as status symbols, declarations of love, amulets, religious beliefs, and even sometimes forms of punishment. However, studies are now finding that the nano particles in modern tattoo ink, can end up in a person's lymph nodes—a crucial part of a functioning immune system that acts as filters for foreign particles and cancer cells.

These tiny particles are measured at a few millionths to a few billionths of a centimeter. Even though most tattoo inks contain organic pigments, they also contain preservatives and contaminants such as nickel, chromium, manganese, and cobalt.

Besides carbon black, the second most common ingredient used in tattoo inks is titanium dioxide (TiO<sub>2</sub>)—a white pigment usually applied to create certain shades when mixed with colorants. TiO<sub>2</sub> tends to cause tattoos to have delayed healing, skin elevation, and itching. It is also commonly used in food additives, sun screens, and paints.

Bernhard Hesse, one of the authors of the study conducted by the [German Federal Institute for Risk Assessment](#) and the [European Synchrotron](#), said, “We already knew that pigments from tattoos would travel to the lymph nodes because of visual evidence. The lymph nodes become tinted with the color of the tattoo. It is the response of the body to clean the site of entrance of the tattoo. What we didn't know is that they do it in a nano form, which implies that they may not have the same behavior as the particles at a micro level. And that is the problem, we don't know how nanoparticles react.”

Researchers found a broad range of particles with up to several micrometers in size in human skin, but only smaller nano particles were transported to the lymph nodes. This is believed to lead to the chronic enlargement of lymph nodes and lifelong exposure.

The study found convincing evidence for both migration and long-term deposition of toxic elements and tattoo pigments, as well as alterations of biomolecules that can be linked to cutaneous dangers from tattooing.

Researchers will continue their observations through studying samples of patients with adverse effects in their tattoos to find links with chemical and structural properties of the pigments used.

This study is not alone in that modern ink has been under scrutiny due to health concerns related to the purity of its contents for many years.

Formed during ink production, [polycyclic aromatic hydrocarbons \(PAHs\)](#) are listed as human carcinogens by the International Agency of Research on Cancer (IARC). Additionally, tattoo ink contains azo dyes that can form byproducts or break down into hazardous substances that cause allergic reactions or hypersensitivity. Black and red dyes are usually polyaromatic azo dyes, which can break down into individual polyaromatic amines.

Phenomenex wanted to explore which [HPLC methods](#) would be best for the testing of impurities in tattoo ink. We started with exploring techniques for preparation and extraction of analytes from tattoo dye, followed by analysis using GC-MS.

To find out more about our study, click here for the technical note: [Polycyclic Aromatic Hydrocarbons \(PAHs\) in Tattoo Ink](#)

[Want to learn more about PAHs or have any method development questions? Reach out to our Technical Experts—available nearly 24/7!](#)

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## Summary



Article Name

The Dangers of Tattoo Ink - SCIENCE UNFILTERED

#### Description

A recent study revealed that modern tattoo ink has more dangers than originally thought due to nano particles ability to travel to lymph nodes.