



**Friends of  
the Earth  
Australia**

**Scarred For Life – Tattoo Inks and Your Health  
August 2012 (updated October 2013)**

anthonyamis@hotmail.com

Most people concerned about tattoos and their health are usually worried about whether or not tattoo parlour needles have been properly sterilised. Needles that haven't gone through the autoclave process could expose a person to hepatitis B or C, tuberculosis, bacterial infection, syphilis, malaria, HIV and even leprosy. Allergies, chronic skin reactions, infection and inflammation from sun exposure have also been linked to tattoos. However how many people ask questions about the inks that are injected into the skin via the tattooing process?

Recent information collated from Europe, North America and New Zealand has found that there are a number of disturbing health problems that people could be exposed to via tattoo inks. Research assessing tattoo inks in Europe found potentially more serious problems with 60% of tattoo inks tested having to be withdrawn from the market. Permanent make-up and temporary tattoos have also seen issues emerging about toxicity of these products as well.

We urge anyone thinking about getting a tattoo to get detailed information from their tattooist about the exact constituents of the ink that they are about to use. If the tattooist cannot provide this basic information then we urge people not to go ahead with getting a tattoo. We also urge people to do their own research about the potential toxicity of tattoo inks. We have also provided some useful references at the bottom of this document.

**What can be in tattoo ink?**

**Heavy Metals**



***Car paint has been found in tattoo inks!***

Heavy metals in tattoo ink can include: lead, mercury, arsenic, cadmium, chromium, nickel, iron, antimony, beryllium, cobalt and titanium. The American Environmental Safety Institute claims that an average sized tattoo (3 inches by 5 inches) contains 1.23 micrograms of lead! Some tattoo inks would be suitable for use as printing ink or car paint. Some red inks can contain mercury others can contain cadmium or iron oxide. The metals, particularly those in red pigment have been reported to cause allergic reactions including eczema. While red causes the most problems, most other colours of standard tattoo ink are also derived from heavy metals. Heavy metals can have a range of toxic side effects and can be linked to cancer and birth defects. Most coloured inks contain various coloured minerals, whilst black ink is more likely to contain nano-particles. Black Ink made from carbon black is listed by the International Agency for Research on Cancer as (2B) possibly carcinogenic to humans.

## Phthalates

Black ink can also contain common plasticisers. Dibutyl phthalate was found in 14 black tattoo inks in a recent survey. Phthalates have been linked to endocrine disruption where they mimic estrogen and disrupt testosterone. Pregnant and nursing women should particularly avoid tattooing as endocrine disruptors could impact on the foetus and be passed through to a baby via breast milk.



*Phthalates are also found in many plastic products.*

## PAH's Polycyclic Hydrocarbons

Black tattoo ink is often made from soot which can contain PAH's. Benzo(a)pyrene is a PAH which is also known as a potent skin carcinogen. Benzo(a)pyrene is listed as a Group 1 Carcinogen by the (IARC) International Agency for Research on Cancer (1) and is known to cause skin cancer in test animals. The US EPA describe it as *'among the most potent and well-documented skin carcinogens.'*

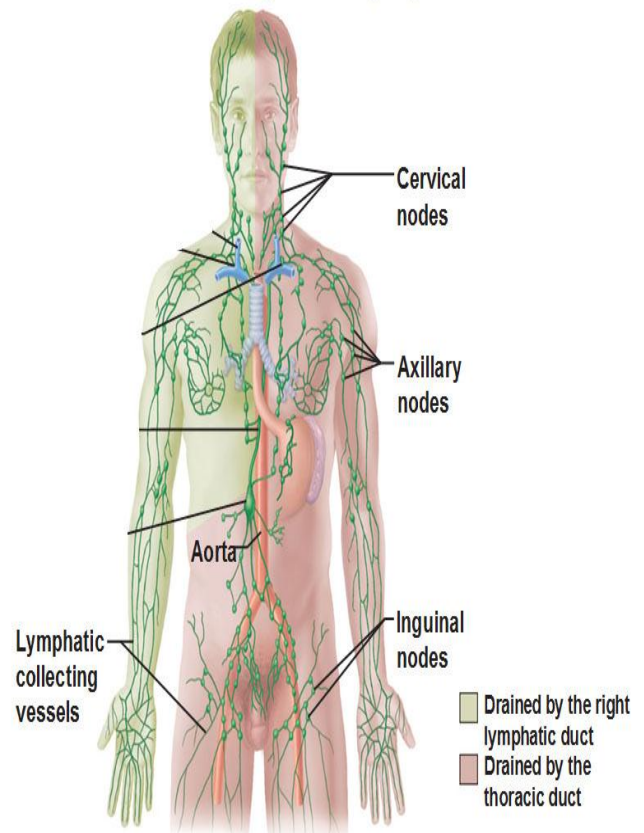


**Soot – Carbon Black**

## N-nitrosamine

The following nitrosamines have also been detected in tattoo ink, N-nitrosodiethanolamine and N-nitrosomorpholine. These substances are carcinogenic chemical compounds, found in cosmetics, pesticides and most rubber products. Approximately 300 nitrosamine compounds have been tested, and 90% of them have been found to be carcinogenic in a wide variety of experimental animals. Most nitrosamines are mutagens and a number are transplacental carcinogens. There are also medical reports showing that pigment from tattoo ink can accumulate in lymph nodes. *"Eventually the tattoo ink appears in the regional lymph nodes"*.

## General Distribution of Lymphatic Collecting Vessels and Regional Lymph Nodes



# Nanoparticles

For more information on Nanoparticles go to: [nano.foe.org.au](http://nano.foe.org.au)

Recent research has confirmed that nanoparticles of titanium dioxide and carbon black are more toxic and generate free radicals to a greater extent than larger particles of the same chemicals.

*“Researchers publishing in the British Journal of Dermatology found that most types of tattoo pigments contain tiny particles called nanoparticles, which could pose a health hazard. The particles are so small that tens of thousands or more of them could fit on the head of a pin...Studies show that nanoparticles have the potential to generate unstable chemical species that can damage cells and tissues, but more studies are needed to see how those lab findings might translate to human health.”* (2)



According to the British Journal of Dermatology November 24 2011: *“The size of the [tattoo] pigments could be divided into three main classes. The black pigments were the smallest, the white pigments the largest and the coloured pigments had a size in between the two. The vast majority of the tested tattoo inks contained significant amounts of NPs [Nanoparticles] except for the white pigments. The black pigments were almost pure NPs, i.e. particles with at least one dimension <100nm.”*

*“...The body's connective tissue, is permanently damaged by the dyes, and that nanoparticles of tattoo pigment are transferred away from the skin and into the body... toxins in the dyes may be entering the bloodstream and accumulating in the spleen or the kidneys, both organs responsible for filtering impurities from the blood. "It takes a long time for the multiple-step nature of cancer to show its face. I don't think we should wait 20 years to see if there is anything wrong with these ingredients," he said. A study by Jorgen Serup, professor of dermatology at Copenhagen's university hospital, found cancer-causing chemicals in 13 out of 21 commonly used European tattoo inks.”* (3)

Some health concerns can be summed up below:

*“While pigment is largely stable the first few weeks after being injected, it may move locally in the skin. Over time it may also be degraded by factors such as sunlight. In these cases, loose particles may enter the lymphatic system and come to rest in regional lymph nodes from where there is direct contact with the bone marrow and the immune system. Serup says a high percentage of people unknowingly have their lymph nodes tattooed. Neither the tattooist nor the subject is aware of this because the lymph node is not visible.”*

*“Often pathologists will find green pigment in the lymph node of that area. The node is a filter and stops most pigment from entering the circulation. But we don't know the degree to which particles enter because some, like the black ones, are nanoparticles and can get through and reach the bloodstream.”These nanoparticles could have an effect similar to the one that happens with metal-on-metal hip replacement joints. As the components of these joints move against each other, they can release ions, such as cobalt and chromium, into the bloodstream. These accumulate and have been associated with effects on the heart, skin, endocrine and nervous system.”*(4)

## Laser Removal Treatment

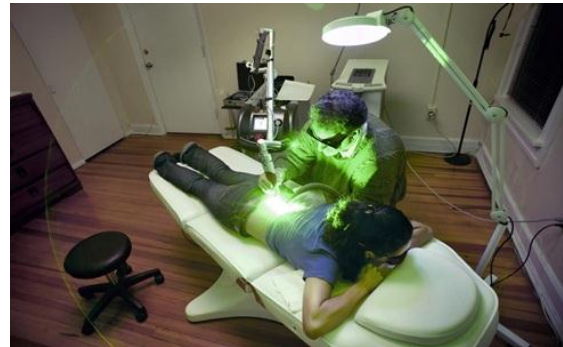
*“Scientists in the US have devised the “Kirby-Desai scale” to estimate how many treatments it will take to remove a tattoo. Black tattoos on fair skin are the easiest to remove, while coloured tattoos on dark skin are the most difficult. Because there is often burning and blistering, treatments can only be conducted every six to eight weeks. An average tattoo could take eight to 12 sessions to remove, at around \$350 a session. The rule of thumb seems to be that whatever you outlaid for your body art, it will cost 10 times as much to erase it - and be patient, it’ll take 18 months to two years.” (5)*

Even if a person wants to remove a tattoo there are potential health problems that could occur. Each tattoo colour may require a different laser wavelength, meaning that more than one laser may need to be used. Lasering also releases pigments which can be transported away into the human body.

Unregulated laser machines may be used by untrained beauticians where there is no indemnity insurance (unlike if the lasering is conducted by doctors). Beauticians may also try and remove the tattoo in one session. If you apply the laser incorrectly, you can cause the ink to coagulate, which then turns into a superheated liquid mass, increasingly likelihood of infection.

Release of Aromatic Amines (o-anisidine, o-toluidine) have been created by irradiation with UV light. Aromatic amines are a class of chemicals often found in plastics, pesticides, foams, dyes, pharmaceuticals and semi-conductors. Aromatic amines have been linked to bladder and breast cancer. *“the production of carcinogenic aromatic amines and other substances if certain inks/pigments are irradiated by laser light in order to remove tattoos. the production of carcinogenic aromatic amines and other substances by irradiation with UV light the presence of*

*high amount of PAH - up to 80 mg/kg in one ink”*



## Tattoos and Cancer

According to past information provided by the Cancer Council of NSW, *“There is no evidence to link tattoos with cancer directly. There are several indirect cancer risks from tattoos. Dark tattoos can make it difficult to detect and treat cancerous skin lesions such as melanoma. It is also important to note that tattoos do not protect your skin from ultraviolet (UV) radiation from sunlight.”*

However in September 2013, the Australian Cancer Council called for *“more research into tattoo inks after a European study found many contain carcinogenic substances.”* The study, led by Jorgen Serup, professor of dermatology at Copenhagen University Hospital, found as many as 13 out of 21 commonly used inks contained cancer-causing agents.”

## Regulatory Black Hole

*“Tattoo inks are the least-regulated substances injected in an established business setting. The purity and identity of most are unknown” (6)*

In Australia, our chemical regulator NICNAS (National Industrial Chemicals Notification and Assessment Scheme) claims it assesses industrial chemicals - including those in tattoo inks.



***Cosmetic Tattooing Inks also contain dangerous substances.***

Friends of the Earth is calling for greater regulation of Tattoo Inks. In Australia all the State and Territories regulate invasive body art procedures in some form to minimise the risk of blood borne infections – usually through various Health Acts. The legislation is usually not intended to cover skin reactions resulting from irritation/allergy/trauma following non-invasive procedures to the skin.

The other key health issue with tattooing, not presently addressed by various Australian Governments, is the lack of regulation on tattoo ink products, particularly contaminated tattoo ink pigment products. All jurisdiction in Australia must introduce legislation that properly regulates tattoo ink pigment products.

The problem is that there is no special regulation for Tattoo ink products, as they are not classified as a cosmetic. There is no regulation that exists in Australia that specifies what chemical substances may or not be used in tattoo ink pigment products. Tattoo ink pigment products should be listed/regulated as cosmetic products and require mandatory labelling/chemical classification with appropriate chemical safety sheets which list the content of substances contained in the tattoo ink pigments. Paint pigments containing a harmful chemical substance must not be allowed for use in tattoo ink pigment products. They must be banned.

## Questions to Ask You Tattooist Regarding Inks?

Does the tattooist have any supporting information about the quality of the products that they're using? Would it be possible to see that? Can they substantiate it if they're saying "we use the best quality inks"? What are they basing that statement on? Can the tattooist supply you with chemical safety sheets describing what is exactly in the tattoo inks?

## References

- (1)<http://monographs.iarc.fr/ENG/Monographs/vol100F/mono100F-14.pdf>
- (2)<http://news.health.ufl.edu/2012/19237/multi-media/health-in-a-heartbeat/tattoo-inks-are-some-of-the-finer-things-in-life/>
- (3) <http://www.indianexpress.com/news/toxic-tattoo-inks-may-raise-cancer-risk-experts/1172662/>
- (4) Australian Financial Review October 1 2013
- (5)<http://www.theaustralian.com.au/news/features/no-regrets/story-e6frg8h6-1226671276004#sthash.dM4aueR0.dpuf>
- (6) N Engl J Med 1992; 326:207January 16, 1992



***Tattoo removal by laser, a new growth industry, but what health problems could eventuate.***

## Interesting Links

<http://www.dailymail.co.uk/news/article-2428867/Could-tattoo-cancer-Scientists-fear-toxins-ink-enter-blood-accumulate-major-organs.html>

[http://m.afr.com/p/lifestyle/mens\\_health/science\\_unveils\\_sinister\\_side\\_to\\_l2XyZFBM38Uqa0KF3JFEfO](http://m.afr.com/p/lifestyle/mens_health/science_unveils_sinister_side_to_l2XyZFBM38Uqa0KF3JFEfO)

<http://www.theaustralian.com.au/news/features/no-regrets/story-e6frg8h61226671276004#sthash.dM4aueR0.dpuf>

[http://www.huffingtonpost.com/michael-yaremchuk-md/tattoos-infection\\_b\\_2814444.html](http://www.huffingtonpost.com/michael-yaremchuk-md/tattoos-infection_b_2814444.html)

<http://blogs.mirror.co.uk/investigations/2013/06/cancer-causing-tattoo-ink-on-s.html>

<http://www.agricultureguide.org/tattooed-greenies-whats-really-lurking-under-your-skin/>

<http://www.environmentalhealthnews.org/ehs/news/2011/tattoo-inks-face-scrutiny>

[http://217.160.137.22/time-online\\_eu/about.html](http://217.160.137.22/time-online_eu/about.html)

<http://www.scientificamerican.com/article.cfm?id=tattoo-ink-mercury-and-other-toxins>

<http://www.dailymail.co.uk/health/article-2032696/Now-tattoos-cancer-U-S-regulator-probes-fears-inks-contain-carcinogenic-chemicals.html>

<http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1325237/>

<http://www.ibtimes.co.uk/articles/507961/20130922/tattoo-cancer-toxic-carcinogenic-tattoist-beckham.htm>



***Skin Infection from Henna. Temporary tattoo inks can also contain toxins including bacteria***



*Image:*

<http://www.environmentalhealthnews.org/ehs/news/2011/tattoo-inks-face-scrutiny>



***Some tattoos may be done on the spur of the moment and the “owner” may want to remove the tattoo soon after. Many laser treatments may be required. What are the health impacts?***