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### REVIEW OF TATTOO PIGMENT CHEMISTRY AND METABOLISM, IN SITU DEPOSITION IN SKIN AND SUGGESTED SYSTEMIC EXPOSURE

Wolfgang Bäuml<sup>1</sup>

<sup>1</sup>*Dept. of Dermatology, University of Regensburg; (Regensburg, Germany).*

Various tattoo inks are commercially available to stain the skin. An internet based survey revealed that most of tattoos are partially or complete black, followed by the use of red, blue, or green inks. Black inks frequently consist of soot products like Carbon Black or polycyclic aromatic hydrocarbons (PAH). The colored inks frequently contain azo pigments (red) or phthalocyanines (blue, green). Colorants in tattoo inks are manufactured for other intended uses and both, black and colored tattoo inks may not have an established history for safe use in humans. Specification of ingredients and labeling are lacking in many tattoo colorants, which are distributed by national wholesalers or through the internet.

Vibrating needles of tattoo machines puncture the tattoo inks into the skin. After that, part of the tattoo inks (e.g. Carbon Black, colored pigments, admixtures) stay in the dermis, is transported away from skin or is decomposed in skin by solar radiation during months and years. In addition, tattoo ink particles in the skin may be destroyed by intense laser radiation along with the effort to remove a tattoo from skin, whereas ink molecules can be decomposed. Thus, in addition to various tattoo ink ingredients, the human skin is exposed to radiation induced decomposition products. The injection of tattoo inks is hence a potential source for many adverse skin reactions, which were described in the medical literature during the past decades.

It is evident that tattoo inks, admixtures and decomposition products are transported away from skin to lymph nodes at least. However, it is almost unexplored so far, whether that transportation process might cause any systemic health problems in a long-term view. Toxicological and epidemiological studies are highly recommended.