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POSITIVE OR NEGATIVE LISTS FOR ORGANIC PIGMENTS IN TATTOO INKS AND THE CONTRIBUTION OF ANALYTICS TOWARDS AN IMPROVED LEGISLATION

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Organic pigments are the main components of tattoo inks but the legal restrictions for tattoo inks are still based on restrictions for cosmetics, toys and textiles.

The lack of a positive list and the adoption of pigment bans from the cosmetics regulation led to an increasing occurrence of inks containing non-restricted pigments (56% of 190 investigated inks in the year 2011) which never were tested for usage in contact with the human body. For instance, such strange effects as the substitution of the quinacridone pigments C.I. 73900 and C.I. 73915 by their chlorinated congener C.I. 73907 were observed.

Toxicological data are desperately needed to establish a list of safe tattoo pigments but from today's perspective it is very unlikely that such data will be available in the near future. At the moment, it seems more promising to improve consumer safety by using analytical investigations to identify those pigments that might pose a health problem by releasing CMR substances.

For years, analytical measurements have been used to ban azo colorants that are thought to split off enzymatically into carcinogenic aromatic amines. Unfortunately, due to its design for soluble textile dyes, the method has its limitations for insoluble tattoo pigments. As an example, 3,3'-dichlorobenzidine based diarylide pigments often give negative results. Furthermore, reduction by azo reductases is only one possible degradation pathway for tattoo inks and only one group of CMR substances is addressed.

Several groups have shown the degradation of tattoo pigments under sunlight and laser irradiation. We have investigated many commercial tattoo inks with a wide variety of pigments for their stability under sunlight and laser irradiation and observed big differences in their stability. Especially azo pigments degrade easily under sunlight and laser irradiation and release a vast amount of breakdown products. Typical degradation pathways and several reaction products were identified but much more work has to be put into the identification of the products as well as in the design of a representative experimental design.

In any case, the negative list based on restricted pigments for cosmetics should be revisited and results of analytical investigations should be used to amend the existing negative lists in order to improve the safety of tattoo inks.