O14. TATTOO INK ANALYSIS BY PYROLYSIS-GC/MS (PY-GC/MS)

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Aim: To enable risk assessment, tattoo inks used on the market need to be monitored for the presence of prohibited compounds. Since most pigments and polymeric ingredients of tattoo inks are insoluble and non-volatile the working-out of appropriate analytical means reveals rather challenging.

Methods: Py-GC/MS provides a quick and reliable method for pigment decomposition and product identification via comparison to pure pigments or tattoo ink formulations. Here, we pyrolyzed pigments or tattoo inks at different temperatures coupled online to gas chromatography with mass selective detection. Using this method, the chemical structures of unknown parental compounds could be assigned based on the decomposition patterns compiled in the commercial or custom mass spectra libraries.

Results: Pigments and polymers used for pigment dispersion, such as polyvinyl pyrolidones and polysiloxanes, were identified simultaneously in tattoo inks. Also other organic ingredients like fragrances, preservatives or impurities resulting from synthesis were identified 1).

We established a pyrogram library of commonly used pigments and other ingredients in tattoo inks applicable for substance screening. Based on this, false declaration of tattoo pigments, suspicious additives and carcinogenic cleavage products can be easily identified. Further, Py-GC/MS was successfully used to predict toxic cleavage products formed by laser irradiation of organic pigments.

Conclusions: Py-GC/MS is an efficient tool for the identification of pigments and other organic compounds present in tattoo inks. It can also be used as a powerful prediction model for fragmentation products to be expected originating from organic pigments upon laser irradiation 1), 2).

References:

1) Schreiver et al. Arch Toxicol. 2016: 90(7): 1639-50. doi: 10.1007/s00204-016-1739-2.
2) Schreiver et al. Sci Rep. 2015: 5:12915. doi: 10.1038/srep12915.