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IDENTIFICATION OF TATTOO PIGMENTS IN BIOLOGICAL SAMPLES

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Tattooing exists already since the Neolithic period. In Europe and the US tattooing becomes more and more a popular mainstream accessory, comparable to piercings or jewellery. Astonishingly little is known about human health risks arising from long time effects of tattoos during pigment aging or about possible health risks of tattoo pigment fragments resulting from laser treatments used for tattoo removal. Valid data on the spatial distribution of tattoo pigments, their fragments resulting from laser removal within skin samples together with information about possible degradation metabolites occurring over time are key pre-requisites in a valid health-based risk assessment of tattooing. Imaging Mass Spectrometry (ToF-SIMS) was used in 2D and 3D mode to analyze, identify and visualize tattoo pigments and their laser treatment fragments in pig skin biopsy samples. ToF-SIMS is a technique where mass spectra can be acquired in a pixel like raster movement on a given surface thereby acquiring a mass spectrum for each pixel. Additionally using a layer-by-layer analysis technique ToF SIMS can be used to acquire 3D depth profiles of the analysed samples. ToF-SIMS combines high mass resolution with high spatial 2D resolution (< 100nm) and high depth resolution in 3D depth profiles (down to ca. 2.5nm). The results show for the first time the spatial distribution of tattoo colours and tattoo colour fragments resulting from laser treatment direct in biological samples on a sub-micrometer scale. Accumulation of specific tattoo colour fragments after laser treatment in “hot spot regions” of skin biopsies was observed.