

TATTOOS, MEDICO-LEGAL SIGNIFICANCE

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Background

In the past a tattoo was symbolic of commitment to a group, of strength, or of having passed a significant event in life. Now tattoos are mainly adopted as body decoration and as a means of self-expression.

The word tattoo was invented by Captain Cook, around 1770, based on the Polynesian word “tattaw” for describing the practice of permanently decorating the skin. The process of producing a permanent tattoo requires implanting a pigment into the dermis of the skin. Usually, the tattooist will apply a stencil to the skin and the areas to be colored will be filled in using a machine that pushes the ink into the dermis using needle(s) that are vibrated up and down many times a second.

Tattoos can be categorized into: (1) flat; (2) traditional; and (3) fine-line.

The images used in the figures in this article are illustrations based on real examples.

Flat Tattoos

Tribal tattoos are examples of flat tattoos. These tattoos lack detail. They include the facial decoration of Maoris (Moko), or the Pe’a tattoos of Samoans, which are distributed from the waist to just below the knees (**Figure 1**). The Celtic style (**Figure 2**), which may include intricate line designs termed knotwork, would also be regarded as flat.

Traditional Tattoos

Traditional (and the more elaborate neotraditional)-style tattoos emerged in western society in the late nineteenth century. These tattoos comprise stylized representations in thick outlines and solid blocks of color. Designs typically incorporate daggers, hearts,



Figure 1 Samoan tattoo of flat design comprising solid blocks of ink, in this example covering the waist to the thighs. This is also a characteristic cultural tattoo.



Figure 3 A variation on the traditional/neotraditional style of tattoo comprising a Buddha that incorporates the owner's umbilicus.



Figure 2 A Celtic cross tattoo (a commonly encountered type of flat-style tattoo).



Figure 4 This tattoo attempts to create the illusion that ghouls are emerging from within.

panthers, and other symbols that traditionally have intrinsic meaning. For example, a panther symbolizes spiritual and sexual power; a skeleton in a lifelike stance represents life after death; a cobweb means the wearer killed someone; the tiger is associated with anger and cruelty. However, it is unlikely that many who wear tattoos have given thought to the underlying meaning of their chosen design. Variations on the themes of traditional or neotraditional designs may incorporate anatomical features (Figure 3) or

attempt to create illusions, such as creatures emerging from within the body (Figure 4).

Fine-line Tattoos

Fine-line tattoos may include detailed images (Figure 5), including portraits. A further category is the amateur, jailhouse, prison, or joint tattoo (also referred to as black and gray), which was developed by prisoners making tattoos by hand using ink, ash, or other available pigments. These tattoos are characterized by being simplistic and monochromatic. It is not uncommon to attempt humor (Figures 6A and 6B).



Figure 5 A fine-line-style tattoo – these tattoos may be intricate and highly detailed.

The Pathophysiology of Tattoos

Immediately after being made, the tattoo is crisp in appearance (Figure 7), due to the presence of the pigment in the epidermis as well as in the dermis. A weal-and-flare reaction will occur. Within a day, there is a burn-like response. Blistering does not occur, because of the puncturing of the epidermis by the needles; however, the epidermis is shed and regeneration occurs from the basal epidermis. Over the next few days, sloughing of the epidermis occurs, often as small flakes that can make the design indistinct. However, the colors are usually vibrant around this early stage. Induration will be apparent from around 5–7 days, with erythema around the edge of the tattoo and fine crusts of exudate on the surface, and over the needle punctures. After about 10–14 days the healing process subsides. The restoration of the epidermal layer from around 2 weeks causes a slight loss of the striking color and clarity of the initial tattoo. Pigment granules persist in the dermis where they are phagocytosed by macrophages over time, resulting in a gradual diffusing and fading of the tattoo over the decades (Figure 8).

Medicolegal Aspects of Tattoos

Tattoos can also be classified into nonpermanent and permanent. Nonpermanent tattoos include inked stamps (Figure 9), transfers, and henna tattoos. None of these are likely to have forensic significance. However, local skin reactions may occur and application of henna to the skin has the potential of causing life-threatening hemolysis in infants with glucose-6-phosphate dehydrogenase deficiency.



Figure 6 (A and B) Typical, monochromatic, amateur or jailhouse type of tattoos, with attempts at humor.



Figure 7 Fresh tattoo of traditional type. Note the vibrant colors.



Figure 9 Temporary, stamped ink tattoos of the type commonly acquired on admission to events.



Figure 8 This tattoo has become blurred due to its age.



Figure 10 The former owner of this arm, recovered from water possibly after having been mauled by a shark, was identified by the tattoos.

Permanent tattoos may be unintentional or intentional. Unintentional tattoos include those related to work, such as due to coal mining or working with metals. Amalgam tattoos may be seen resulting from dental work and these may even be used in the subsequently edentulous subject for identification by radiographic comparison. Dust or dirt tattoos may be seen if an abrasion from a dirty surface is inadequately debrided; for example, if a motorcyclist sustains abrasions as a result of being thrown along a road. Gunpowder tattooing may be seen in close-range firearm injuries and can be utilized to assist with estimation of range and/or angle of fire.

Permanent intentional tattoos may be of forensic relevance in a number of situations. Identification may be achieved through tattoos (**Figure 10**),

particularly if they have unique features. Even in blackened, decomposed bodies, tattoos may be revealed by removing the epidermis, due to the persistence of the dye in the dermis (**Figure 11**). However, this may be hampered by the tendency of tattoos to smudge and fade with time – in the elderly this can result in obscuration of details such as names or dates that might have been included in the tattoo. Occasionally tattoos may be used to alter appearances. They can hide scars or can be used in reconstruction operations (for example, to reproduce the areolar region of the breast following mastectomy). Appearances can be cosmetically modified using tattoos

around the lips or eyebrows. Tattoos may also be used to create permanent “jewelry” (Figures 12A and 12B).

Tattoos may be indicative of culture (Figure 13) or lifestyle: mention has been made above of characteristic tattoos of racial groups and of prison-associated

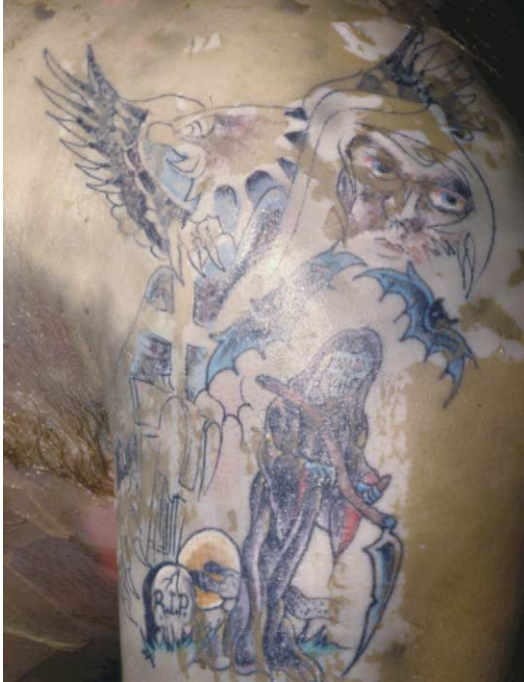


Figure 11 Because the pigment of the tattoo resides in the dermis, in a decomposing body the detail of a tattoo may be rendered more apparent by removing the epidermis.

tattoos. Members of the services such as the navy or military may bear tattoos. Gang members may wear a tattoo of allegiance and symbolism to indicate status or other aspects relevant to their particular group. Illicit drug users may have tattoos that identify them as belonging to a particular group or they can use tattoos to obscure injecting sites (Figure 14).

In addition to the risk of disease due to lifestyle indicated by some forms of tattoos, tattoos themselves (particularly the amateur ones) carry a risk of bloodborne infections such as hepatitis.

Tattoo Removal

Permanent tattoos may be removed by processes including dermabrasion, cryosurgery, or resection. Laser ablation utilizes focused laser light to vaporize pigment granules in the dermis. All of these techniques usually leave scarring to some degree (Figure 15A). Unwanted tattoos may also be modified (Figure 15B).

Describing Tattoos

On external examination of the body at autopsy, tattoos should be recorded. Depending on the nature of the case, this may range from noting the presence of a tattoo on an anatomical site, such as the forearm, to a detailed description (for identification purposes). A detailed description should precisely note the anatomical location; the style or type (Celtic, traditional, amateur, fine-line) and the principal components (for example, skulls, ghosts, birds, figures) with



Figure 12 (A and B) Examples of permanent, tattooed, “jewelry” as enhancers of appearance.



Figure 13 An example of a traditional tattoo denoting membership to Indian culture.



Figure 14 A particularly imaginative intravenous drug user's tattoo – an indicator of lifestyle, a possible clue as to the cause of death, and a warning of possible bloodborne infection.



Figure 15 (A and B) Attempts to remove tattoos usually leave scarring. Names may be changed or simply tattooed over.

their physical relationship to each other; the observer should also record any written details such as names or dates. Finally, any tattoo of significance should be recorded photographically.

See Also

Yakuza

Further Reading

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