

Review Article

If you think you can safely ink, beware of the masking effects of tattoos

如果你認為你可以安然著墨，請注意紋身的掩蔽效應

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Once associated with criminals, sailors and circus sideshow artists, tattoos are no longer taboo. These days, tattoos are adorned by high-profile people in the press, on television and in magazines. More and more people, both young and mature, are acquiring tattoos. This is particularly so in western countries. However, tattoos are not without potential risks. The risks include infections, physical trauma and other skin reactions. Meanwhile, there is increasing concern regarding chemical toxicity of tattoo inks. Another risk which may have been neglected is the danger tattoos pose in masking cutaneous disease and malignancy.

曾幾何時，紋身與罪犯、水手和馬戲雜耍藝人畫上等號，現已不再是禁忌了。這些年，紋身時尚在報刊、電視和雜誌中的潮人身上不難發現。現在更是不分老幼，對紋身趨之若鶩，以西方國家為甚。但其實紋身不是零風險的，風險包括感染、物理創傷及其他皮膚反應。與此同時，有越來越多的關注聚焦在紋身油墨的化學毒性上；而另一種被忽視的風險，則是紋身掩蓋了皮膚疾病和惡性腫瘤的危險。

Keywords: Beware, masking effects, skin diseases, skin tumours, tattoos

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Introduction

These days tattoos are not necessarily taboo. Indeed, tattoos adorn celebrities, actors, models and sporting personalities around the world. In addition to their popularity in younger populations, an emerging group of people age 50+ years are also gaining tattoos. One in four young people aged less than 30¹ and the same proportion aged 40-64 years are tattooed.² In the United States as many as 36% of those under 30 are tattooed.³ To

date, published research investigating tattoo prevalence in Asia has been scarce. However, studies have indicated that 1-6% of people in Asia have one or more tattoos.^{4,5} One study showed 1% of Southern Taiwan high school students had tattoos compared with 3-16% of Western white students.⁵

The taboo surrounding tattoos appears to be diminishing somewhat inexplicably. Although an ancient Asian practice, there is now growing acceptance of tattoos due to the influence of popular culture.⁶ More and more women in traditionally conservative cities such as Hong Kong are getting tattoos. In fact it has been reported that there has been a 40% rise in female clients requesting tattoos.⁶ Internationally, many now perceive tattoos as a form of self-expression, a bold adventure and a symbol of passage in life.⁷

The rise and rise of tattoos

With the rising interest in tattoos, there should also be increased awareness of the risks associated with tattoos. Accordingly, a review of the common and not so common risks associated with tattooing would be timely. Rather surprisingly, the masking effects of tattoos, which have a negative impact on health, have not been prominent on international radars. In Australia, people with tattoos who are at risk, such as those with a family history or previous history of skin cancers, should have regular skin checks. As well, doctors who come across patients with tattoos should be aware of the common risks and be cognisant of potential tattoo toxicity and tattoos' masking effects upon dermatological diseases and skin tumours.

Diamonds may be forever; however, permanent tattoos can have negative social and psychological effects on people for the rest of their lives.^{8,9} At times, tattoos are acquired impulsively and without careful consideration in youth. Moreover, they can cause financial stress and problems.⁸ The recent

case of Bryon Widner, who decided to have racist tattoos on his face removed, illustrates the great social burden tattoos can have on daily life. Sadly, he was shunned from job sites, stores and restaurants. His tattoos created such stigmatisation that he wished to 'douse his face in acid'.⁹ Brian underwent painful, extensive and expensive plastic surgery to have the tattoos removed. The tattoo removal procedures cost US\$35000, which was donated by an anonymous donor. Like Bryan, many people are increasingly seeking to have tattoos removed.⁸

Furthermore, tattoos may affect a person's employability, community acceptance and livelihood. Tattoos on exposed areas such as the face, head, neck or hands have been popularised by movies and high-profile people. Whilst in some cultures it might be the norm and acceptable to have facial tattoos, in the workplace however, employers may not accept tattoos due to the stigma associated with tattoos.¹⁰ For instance, the New South Wales Police Force recently proposed to ban all visible tattoos amongst serving police and new recruits.¹¹ This policy may be adopted and expanded in Australia in the future. In addition, some hoteliers have indicated their support of a ban on visible tattoos on their patrons.¹²

During the recent Surf 'n' Ink 2011 convention held in Australia on the Gold Coast, more than 800 delegates attended, indicating the rising popularity of tattoos.¹³ Tattoo designs range from small butterflies on the back of the shoulder or a cross on the ankle to larger designs that cover the entire back from nape to natal cleft. Furthermore there has been an increased interest in sleeve tattoos which cover the length from the shoulder to the arm. More alarming is the rising interest in facial and neck tattoos.

There are many well-known health risks associated with tattoos. Adverse skin reactions have been well reported. These include bacterial, viral and fungal

skin infections and allergic problems.¹⁴ For example, HIV, hepatitis B and hepatitis C are viral infections associated with tattooing.¹⁴ These reactions may be scarring or result in chronic disability. The risk of viral disease transmission has become a real concern with increasing "backyard" and do-it-yourself tattooing.¹⁵ Prison populations and those in the developing world are at higher risk of viral disease spread as tattooing is often conducted in non-sterile environments. Suboptimal infection control practices adopted for tattooing has been associated with viral hepatitis.¹⁴ The recent case of HIV contracted from tattooing in Bali is the first case of its kind in Australia.¹⁶ The Australian tourist visited a tattoo parlour whilst on holiday in Bali. Soon after returning to Australia the tourist had blood tests that returned positive for HIV. This case demonstrates the real risk of contracting HIV from tattooing.

Not all colours in our lives are natural. A range of chemicals and metals are used to produce the pigments in tattoo ink. The pigments used are manufactured for non-dermatological purposes. The safety of the pigments in humans is unclear. Chemical analyses of tattoo inks have shown the presence of azo chemicals, carbon and naphtha derived chemicals. Heavy metals are also used and they include mercury, lead, cobalt, nickel and metal oxides.¹⁷ Several studies have revealed potential harm from these compounds.¹⁸ The latter can be used to produce brilliant tattoos that are enduring and insoluble. However, allergic reactions can occur and they may develop many years after tattoo placement.¹⁹

Tattoos masking skin disease

The senior author first raised his concerns about the masking effects of tattoos in 2009. It had been intuitively accepted that tattoos could alter skin colouration and hinder adequate examination of pigmented lesions. Clinically, tattoos add pigment

variability to skin tone and render dermatological diagnosis more difficult. Key diagnostic features include shape and colour, and sudden changes of the above should signal the need of careful clinical and histologic examination. Skin examinations by patients and their doctors are made more difficult by the tattoos' masking effects. This could lead to delayed, missed or wrong diagnosis and poorer outcomes for patients.

Cases of skin diseases and tumours being masked by tattoos have been reported. The first case of melanoma masked by a 'tattoo' was documented in a nine-year-old boy.²⁰ The correct diagnosis of melanoma was not made initially: the naevus-like spot was in fact a mark made by an indelible pen. Subsequently, the spot enlarged, changed colour and became elevated. The lesion was eventually excised and proven to be a melanoma. There were no known sequelae of that lesion, three years later. Interestingly, skin diseases and tumours such as morphea, *Mycobacterium chelonae* infection, dermatofibroma, keratoacanthoma, basal and squamous cell carcinomas have also been reported to develop in tattooed skin.^{14,21}

Melanoma is the fourth most common cancer in Australia and the ninth most common cause of death.²² In 2007, just over ten thousand people were diagnosed with melanoma and there were 1273 deaths.²³ There is a bimodal distribution of melanoma cases. Apart from the 15-30 years age group, the second peak of melanoma cases occur in those above 50 years of age.²⁴ This peak coincides with the increasingly prominent peak of mature age and extensive tattooing. Consequently these individuals, especially men with significant risk factors, should be encouraged to have thorough melanoma checks. The incidence of melanoma is considerably lower in non-Caucasians than in Caucasians.²⁵ One distinguishing feature of non-Caucasian melanomas is that they often develop on the palms and soles. The latter was found to be commonest sites for the Japanese and Hong Kong Chinese.²⁶

Fortunately palmoplantar tattoos have not flourished ragingly.

Furthermore, tattooing should be avoided at a young age when pigmented naevi have not yet appeared or fully developed.²⁷ For a persons with a family history of dysplastic naevus syndrome, it is even more important to avoid large tattoos. If a patient has decided to be tattooed, small tattoo designs in light colours and areas devoid of naevi are preferred.²⁷ As tattoos become more prevalent it is gratifying to note that there has already been some recognition of its masking effects.²⁸

It should also be noted that tattooed skin is problematic in the context of diagnosing amelanotic melanoma. Amelanotic melanoma is notoriously difficult to diagnose, even with dermoscopy. This type of melanoma may be clinically non-pigmented or only partially pigmented. If an amelanotic melanoma develops in tattooed skin, timely and accurate diagnosis of the melanoma would be difficult to achieve.

Partly because of recent visibility and publicity regarding tattoos, concerns have clouded over the medico-legal landscape. The fundamental issue is that of missed, delayed or wrong diagnosis due to tattoos' masking effects on skin disease and tumours. Clinical diagnosis of skin cancers can be difficult, even if the clinician is well-trained and experienced. Medico-legally induced anxiety amongst medical practitioners may ironically result in more lesions being excised and examined by pathologists. It has been shown that up to 13% of malpractice claims arise from alleged misdiagnosis of melanoma.²⁹ This may inflate the practice of defensive medicine and drive up health care costs. Educational strategies such as formal dermatological training courses in skin cancer diagnosis may be useful in improving diagnostic skills.³⁰ Medico-legal implications are only touched upon here, but they warrant further analysis in future studies.

Current awareness of the tattoo problem

Skin diseases can be masked by tattoos. To date, robust data relating to the number of relevant cases have been lacking. Nonetheless, there should be a wider and deeper awareness of the issue by doctors. Medical practitioners can then proceed to investigate the extent and ways in which tattoos may mask skin disease and tumours. In the interim, it might be helpful for at-risk people who are considering new or additional tattoos to consult a doctor and have a skin examination. Finally, risk factors and informed consent issues need to be adequately explained and explored by relevant stakeholders in the future.

Statement of competing interests

There are no competing interests.

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