

# Melanoma Arising in a Tattoo: Case Report and Review of the Literature

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## Practice Points

- Melanocytic lesions arising in tattoos made with dark ink can easily be missed by both patients and clinicians.
- Patients should undergo regular skin examinations to monitor pigmented lesions that can arise in tattoos.
- Patients should be advised to avoid getting a tattoo over a preexisting nevus because of the possibility that it will make the diagnosis of skin cancer more challenging.

*Various benign and malignant lesions have been described in relation to tattoos including melanoma. Few cases of malignant melanoma (MM) arising in tattoos have been reported in the literature. We report a 79-year-old man with an MM that arose in a tattoo he had for 60 years on the inferior aspect of the left arm. This case underscores the need for careful examination of tattoos to insure that dysplastic or malignant pigmented lesions are not overlooked. We also discuss the possibility of a pathogenic relationship between MM and tattoos.*

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## Case Report

A 79-year-old man presented to our office for a total-body skin examination. On physical examination a tattoo was noted on the left arm. The patient explained he had gotten the tattoo while serving in

the military 60 years prior. He denied any changes on the tattooed skin or any other location on the body.

The patient reported no history of trauma or irritation to the area. A dark asymmetric lesion with irregular borders consistent with malignant melanoma (MM) was noted on the inferior aspect of the tattoo (Figure 1). Physical examination was negative for axillary adenopathy.

The melanocytic lesion was excised with narrow margins. Histopathology revealed the presence of a superficially spreading MM with a Breslow thickness of 0.25 mm (Figure 2). The MM was not associated with a preexisting nevus. Ink-containing melanophages were observed in the portion of the excisional biopsy corresponding to the distribution of the tattoo ink. It was noted that the tattoo ink was confined to the macrophages.

The MM was subsequently excised with 1-cm margins. Histopathology revealed the presence of scarring and ink-containing melanophages consistent with a tattoo (Figure 3). The patient recuperated uneventfully.

## Comment

In Tahiti, the word *tattoo* is translated as “painting in the skin.”<sup>1</sup> Complications have been reported in 2% of individuals who get tattoos, including infections and allergic or granulomatous reactions to the tattoo pigment.<sup>2</sup> Pseudolymphomatous and

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The authors report no conflict of interest.

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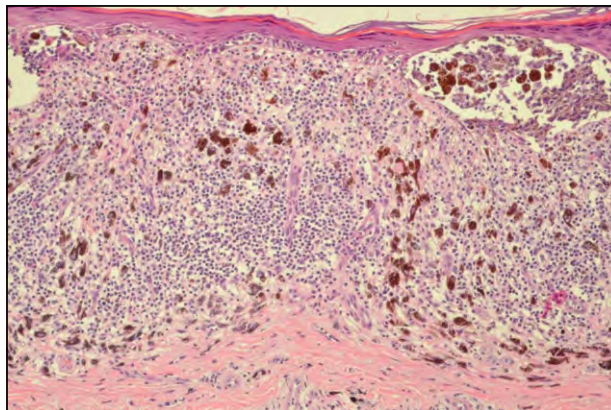
**Figure 1.** Melanocytic lesion consistent with a malignant melanoma on the inferior aspect of a tattoo on the left arm.

lichenoid reactions to red tattoo ink also have been reported.<sup>3,4</sup> Malignant melanomas and basal or squamous cell carcinomas have been reported to arise in tattoos.<sup>5-16</sup>

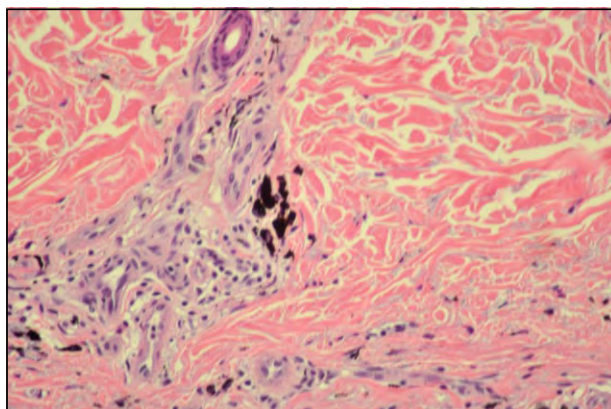
An increase in the prevalence of MM in patients with tattoos has not been found.<sup>5,6</sup> Relatively few cases of melanoma occurring in tattoos have been reported in the literature despite the continued increase in prevalence of both tattoos and melanoma.

A comprehensive review of the literature was performed using PubMed for articles indexed for MEDLINE, the Cochrane Database of Systematic Reviews, and the Embase Biomedical Database, with search terms *melanoma*, *malignant melanoma*, or *skin neoplasm* with one of the following: *tattoo*, *tattooing*, or *tattooing/adverse effects*. A manual review of the references of all articles also was performed to supplement electronic searches and identify additional relevant studies. Our search revealed 15 previously reported cases of MM arising in a tattoo (Table).<sup>5,7-18</sup> Including our current case, 12 cases occurred in white men. Additionally, approximately half of the cases found in the literature occurred in patients younger than 40 years, which is considerably younger than the median age of melanoma diagnosis (61 years).<sup>19</sup>

The pathogenesis of melanomas developing at tattoo sites is unknown. The ink, which may contain cobalt, aluminum, or mercury sulfide, or trauma associated with the tattooing process may trigger the development of melanoma,<sup>8,11,14,15</sup> but this theory has been dismissed due to lack of supportive data. A statistical analysis of MMs associated with tattoos would be difficult because of the small number of cases of melanomas that are observed versus the large number of individuals who have tattoos.



**Figure 2.** Malignant melanoma with a Breslow thickness of 0.25 mm (H&E, original magnification  $\times 10$ ).



**Figure 3.** Ink-containing melanophages consistent with a tattoo (H&E, original magnification  $\times 20$ ).

Reported melanomas arising in tattoos often occurred on areas of skin that were directly or intermittently exposed to UV light (eg, forehead, arm, trunk, back).<sup>7-10,12,14,16-18</sup> It has been suggested that the increased absorption of UV light by the dark pigment in tattoos may contribute to carcinogenesis.<sup>20,21</sup> It also has been hypothesized that india ink and radiation work as cocarcinogens, which may contribute to melanomas occurring in tattoos used for radiotherapy field marking.<sup>5</sup>

In our patient, the color of the neoplastic lesion blended in with the tattoo ink, which sufficiently camouflaged the MM. Additionally, because the melanoma was contained within the shape of the tattoo and was asymptomatic, it was more difficult to identify. It is challenging for clinicians to evaluate pigmented lesions within tattoos through clinical examination and dermatoscopy.

We agree with the conclusions of prior reports that melanomas occurring in tattoos are most likely coincidental.<sup>17</sup> The number of occurrences reported

## Cases of Melanoma Arising in a Tattoo

| Reference (Year)                     | Gender  | Age, y | Location of Lesion               | Clark Level <sup>a</sup> | Breslow Thickness <sup>b</sup> | Additional Information                                      |
|--------------------------------------|---------|--------|----------------------------------|--------------------------|--------------------------------|---|
| Sharlit <sup>7</sup> (1938)          | M       | 9      | Forehead                         | Unknown                  | Unknown                        | Tattoo made with indelible pencil                           |
| Kirsch <sup>8</sup> (1969)           | M       | 52     | Right arm                        | Unknown                  | Unknown                        | Axillary metastasis occurred                                |
| Wolfort et al <sup>9</sup> (1974)    | M       | 55     | Right arm                        | Unknown                  | Unknown                        | Mercury-cadmium tattoo                                      |
| Bartal et al <sup>10</sup> (1980)    | F       | 52     | Left tangential chest wall field | Level II                 | Unknown                        | Tattoo used for radiotherapy field marking                  |
|                                      | Unknown | 34     | Left forearm                     | Level IIB                | Unknown                        | Tattoo used for radiotherapy field marking                  |
| Lee and Craig <sup>11</sup> (1984)   | M       | 44     | Anterior chest wall              | Level IV                 | 2.5 mm                         | Nodular melanoma in a blue tattoo                           |
| Kircik et al <sup>12</sup> (1993)    | F       | 36     | Back                             | Level III                | 1.15 mm                        | Lesion appeared on the border of blue and green pigments    |
| Soroush et al <sup>13</sup> (1997)   | Unknown | 47     | Abdomen                          | Unknown                  | 0.75 mm                        | MM  |
| Khan et al <sup>14</sup> (1999)      | M       | 44     | Forearm                          | Unknown                  | 0.9 mm                         | Mercury-cadmium tattoo                                      |
| Stinco et al <sup>15</sup> (2003)    | M       | 26     | Left scapula                     | Level III                | 0.92 mm                        | Superficially spreading MM                                  |
| Paradisi et al <sup>5</sup> (2006)   | M       | 36     | Left scapula                     | Level III                | 0.3 mm                         | Tattoo had been made on existing nevus                      |
| Gall et al <sup>16</sup> (2007)      | M       | 20     | Left arm                         | Level III                | 0.95 mm                        | Superficially spreading MM                                  |
| Kluger et al <sup>17</sup> (2008)    | M       | 70     | Left upper arm                   | Level IV                 | 8 mm                           | Patient was a farmer with a history of chronic sun exposure |
| Jaigirdar et al <sup>18</sup> (2009) | M       | 64     | Right deltoid                    | Level III                | 1.2 mm                         | Sentinel lymph node had abundant tattoo pigment             |
|                                      | M       | 29     | Left forearm                     | Level IV                 | 3.9 mm                         | Sentinel lymph node had abundant tattoo pigment             |
| Current case                         | M       | 79     | Inferior aspect of the left arm  | Unknown                  | 0.25 mm                        | Superficially spreading MM                                  |

Abbreviations: M, male; F, female; MM, malignant melanoma.

<sup>a</sup>Clark levels are defined as: level I, confined to epidermis; level II, invasion of papillary dermis; level III, filling of papillary dermis but no extension to reticular dermis; level IV, invasion of reticular dermis; level V, invasion of deep subcutaneous tissue.

<sup>b</sup>Breslow thickness is defined as: <0.75 mm, stage I; 0.75–1.5 mm, stage II; 1.51–2.25 mm, stage III; 2.26–3.0 mm, stage IV; >3.0 mm, stage V.

is not statistically significant in light of the total number of individuals who have tattoos.<sup>9</sup>

Commonly accepted clinical guidelines advise against patients getting tattoos over preexisting nevi because of the possibility that tattoos will make diagnosis of MM more challenging when using the ABCDE (asymmetry, borders, color, diameter, evolving) signs.<sup>22</sup> Our patient notably did not have dysplastic nevus syndrome.

The practice of tattooing has increased enormously over the years.<sup>23</sup> A national data set on tattoos and body piercings published in 2006 (N=500) reported that 24% of Americans aged 18 to 50 years have tattoos, with the trend increasing for the younger demographic. The survey reported that 36% of Americans aged 18 to 29 years have at least 1 tattoo.<sup>23</sup>

### Conclusion

Melanocytic lesions arising in tattoos made with dark ink can be easily missed by both patients and physicians. It is prudent to maintain heightened vigilance and careful inspection of tattooed skin to ensure early detection and removal. Patients should undergo regular skin examinations to monitor pigmented lesions that can arise in tattoos.

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