

Skin as a Living Medium: Pigment, Permanence, and the Artistic Status of Dermal Micropigmentation

Diana Lee*

L'Oréal Research & Innovation, USA

* Corresponding author

OPEN ACCESS

Citation:

Diana Lee (2026). Skin as a Living Medium: Pigment, Permanence, and the Artistic Status of Dermal Micropigmentation. *Am. Impact Rev.* [10.66308/air.e2026074](https://doi.org/10.66308/air.e2026074)

Received: July 8, 2026**Accepted:** September 1, 2026**Published:** September 2, 2026**DOI:**[10.66308/air.e2026074](https://doi.org/10.66308/air.e2026074)**ISSN:** 3071-124X**Copyright:**

© 2026 Diana Lee. This is an open access article distributed under the terms of the Creative Commons Attribution License (CC BY 4.0).

Abstract

Dermal micropigmentation, most visibly marketed as permanent makeup (PMU), is institutionally classified as a cosmetic service, yet the technique implants an image into living tissue, where biology continues to act on the work after the procedure ends. This article asks under what conditions dermal micropigmentation can count as an artistic practice, and how the biological temporality of its medium alters authorship and professional responsibility. The analysis is a conceptual interdisciplinary synthesis informed by a targeted narrative review spanning PMU materials science, skin biology, and the aesthetics and sociology of body art; it is not a systematic review. The argument follows the pigment's material itinerary, vial, needle, dermis, lymph node, laser, showing that at each station the material imposes constraints a practitioner must design around: inks are engineered particulate systems; placement depth shapes the image's future; persistence is best explained, in a murine model, by a cellular relay of capture, release, and recapture; pigment species have been identified in paired skin and regional lymph nodes in postmortem human tissue; and laser removal transforms pigment chemically rather than reversing it. Three evidence registers are kept distinct throughout: direct PMU evidence, mechanistic transfer from decorative-tattoo research, and conceptual proposition. The article contributes a conditional model of artistic status for PMU, an interdisciplinary account of skin as a living medium, and a concept of temporally distributed responsibility. Its chief limitation is that no direct empirical study of PMU as art yet exists; the criteria proposed here await empirical scrutiny.

Keywords: dermal micropigmentation, permanent makeup, cosmetic tattooing, tattoo pigments, living medium, artistic authorship, material aesthetics

1. Introduction: a category problem

A procedure marketed as long-lasting makeup produces an image whose material life continues after the practitioner has finished working. A client who purchases permanent makeup buys what regulators, insurers, and the beauty industry describe as a cosmetic service. What they receive is categorically different: an image implanted into the dermis of their face, executed in a material that their immune system will negotiate with for years. The clinical literature is unambiguous about the technique itself. Micropigmentation is the introduction of pigment into the skin with a tattooing device, placed in the superficial dermis, and its recognised complications include not only infection and allergy but fading, pigment fanning beyond the intended line, and dissatisfaction with colour and shape (De Cuyper, 2008). These latter complications are not incidental: they are failures of an *image over time* - the kind of failure a painting or a print can also suffer, but which no shampoo or facial can.

The institutional frame reinforces the commercial category. In the United States, micropigmentation is regulated with wide variability across jurisdictions, and training requirements are heterogeneous, typically oriented to hygiene and technique rather than to design (Ghafari et al., 2024). Certification regimes of this kind classify the practice alongside other personal services, and the market language of the field - “long-lasting makeup”, “cosmetic tattooing packages” - completes the frame. None of this is illegitimate; safety regulation is indispensable. The point is that the frame describes the *procedure* and remains silent about the *object* the procedure creates: an image with a material life of its own.

There is thus a gap between the commercial category of the procedure and the ontology of its result. Existing literatures each illuminate one side of this gap and leave the other dark. The clinical and materials-science literature describes pigments, placement, and complications without asking what kind of object the healed image is (De Cuyper, 2008, 2015; Ghafari et al., 2024; Jin & Chang, 2022). The aesthetics and sociology of body art analyse decorative tattooing as artwork and as a field undergoing artification, but have not addressed micropigmentation (Kosut, 2014; Sizer, 2020). No published study, to the author’s knowledge, connects the material biology of implanted pigment to the question of artistic status.

This article addresses that gap. Its research question: *under what conditions can dermal micropigmentation count as an artistic practice, and how does its biological temporality alter authorship and professional responsibility?* Its central thesis, deliberately conditional: dermal micropigmentation becomes an artistic practice when individualised visual authorship is joined to materially informed design for biological change. Biological complexity does not confer art status by itself - a coronary stent inhabits a more complex environment than any eyebrow, and no one calls stenting art. The claim lives where design works knowingly with biology.

The article makes three contributions. First, a *conditional model of artistic status* for micropigmentation: explicit criteria under which some - not all - PMU work qualifies as artistic practice. Second, an *interdisciplinary model of skin as a living medium*, integrating pigment materials science, skin biology, and aesthetics into a single account of what the practitioner actually works with. Third, a concept of *temporally distributed responsibility*: the practitioner answers not only for the image’s first appearance but for its projected trajectory of healing, fading, correction, and possible removal.

Section 2 states the evidential approach and working definitions. Section 3 examines the service-craft-art boundary and proposes criteria and boundary cases. Sections 4 and 5 follow the pigment’s material itinerary. Section 6 develops distributed authorship and its ethical consequences. Section 7 answers objections and states limitations; Section 8 concludes.

2. Approach and evidentiary scope

2.1 A conceptual synthesis, not a systematic review

This article is a conceptual interdisciplinary synthesis informed by a targeted narrative review. It joins three literatures: the clinical and materials-science literature on micropigmentation and tattoo pigments; experimental skin biology on pigment fate; and the aesthetics, sociology, and history of body art. Sources were assembled through targeted, iterative searching of biomedical indices (PubMed/MEDLINE, PMC) and humanities resources (PhilPapers, publisher databases), supplemented by backward citation tracking from key works; bibliographic records and DOIs of all cited sources were verified against Crossref and PubMed in August 2026. Selection prioritised primary empirical studies for every material claim and canonical peer-reviewed texts for conceptual claims; no marketing, trade-school, or social-media material is used as evidence. The review is targeted rather than systematic: it does not estimate effect sizes, coverage, or prevalence, and no such inference is drawn from it.

Because the argument mixes measurement with interpretation, the evidential status of every claim is kept visible through three registers, introduced once here and marked in prose thereafter. First, *direct PMU evidence*: studies of permanent-makeup products or procedures themselves (De Cuyper, 2008, 2015; Ghafari et al., 2024; Jin & Chang, 2022). Second, *tattoo-to-PMU mechanistic transfer*: experimental and postmortem work on decorative-tattoo pigments, whose relevance to PMU is material rather than clinical - the pigments and the implantation principle are closely related, but doses, sites, and populations differ (Baranska et al., 2018; Bäuml, 2015; Engel et al., 2008; Schreiver et al., 2015, 2017). Third, *conceptual or normative proposition*: claims from aesthetics, sociology, and history that no laboratory finding could establish, marked by verbs such as “this article argues” or “on this account” (Kosut, 2014; Oumeish, 2001; Sizer, 2020). No causal chain below runs across a register boundary without being flagged as the author’s synthesis, and no single study cited here traces the full route from vial to node in one PMU client: the itinerary is an organising device, not a measured pathway (Figure 1).

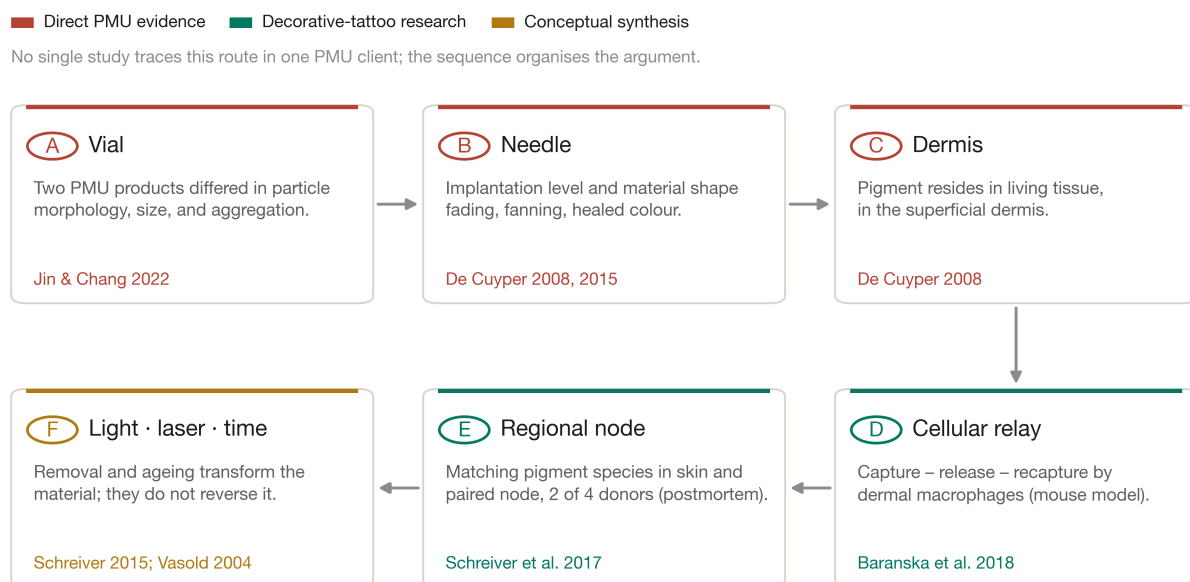


Figure 1. The material itinerary of a dermal image (conceptual synthesis). Panels A-F organise the argument: pigment product (vial), placement (needle), tissue residence (dermis), cellular persistence (relay), regional lymphatic tissue (node), and transformation through light, laser, and time. Stages are colour-coded and text-labelled by evidential register: direct PMU literature (rust), transfer from decorative-tattoo research (green), and the author’s conceptual synthesis (ochre). The route is conceptual, not kinetic: arrows organise the argument and do not represent measured rates, probabilities, or a universal PMU pathway; no single study traces the full sequence in one client. Sources: Jin & Chang (2022); De Cuyper (2008, 2015); Baranska et al. (2018); Schreiver et al. (2015, 2017); Vasold et al. (2004).

2.2 Working definitions

Dermal micropigmentation is used as the technically neutral umbrella term for the introduction of pigment into skin for cosmetic, reconstructive, or camouflage purposes. *Permanent makeup (PMU)* is its cosmetic variety, aimed at durably reproducing or modifying features usually created with makeup. *Medical or restorative tattooing* denotes pigment implantation for optical restoration or camouflage in a medical context. *Decorative tattooing* denotes tattooing whose primary task is not the imitation of a cosmetic or reconstructive result. *Artistic practice* is understood here as activity involving individual form-giving, meaningful authorial discretion, and results open to aesthetic evaluation - not merely technically demanding activity. A *living*

medium is a material whose properties continue actively to change the result after the procedure ends. *Persistence* - the term preferred here to “permanence” - means the durable existence of an image under conditions of cellular turnover, material loss, and optical change, not immutability. Throughout, the cosmetic customer is a *client*, the medical case a *patient*, and the professional a *practitioner*; “artist” is reserved for cases where the criteria of Section 3.4 are argued to be met.

3. From service to situated work

3.1 A historically porous boundary

The modern intuition that cosmetics are a service industry and art a separate sphere of autonomous creation is historically recent. The etymology already resists the division: *kosmētikos*, the skill of adornment, derives from *kosmein* - to adorn and to order - the same root that gives *kosmos*; the concept of the cosmetic has from antiquity included both the decorative and the corrective (Oumeish, 2001). Body marking, painting, and modification have functioned across cultures as ritual, medicine, status display, and artistic transformation simultaneously, a range documented in the anthropological and historical literature on body art (Caplan, 2000; Rubin, 1988). The point of this background is narrow: the cosmetics/art boundary is not natural or ancient, but produced - and therefore movable.

3.2 Artification: how practices cross the boundary

How a practice moves across that boundary is a sociological question with an empirical answer. Kosut (2014) describes the *artification* of tattooing: the process by which a practice once evaluated as low craft or deviant service came to be assessed, by segments of the cultural field, as art. The shift was not driven primarily by technique. It was driven by originality and creativity norms, by practitioners entering with formal art education, by exclusivity, and by new institutions of evaluation - galleries, media, collectors, criticism. Artification is a social achievement, not an automatic consequence of skill.

The relevance to PMU is structural. Permanent makeup today occupies the position decorative tattooing occupied before its partial artification: sold as a standardised service, evaluated by consistency and safety, its practitioners typically certified through short courses rather than trained as artists, with regulation and training varying widely across United States jurisdictions (Ghafari et al., 2024). Yet the internal logic of high-end practice - individual composition for a particular face, original colour decisions, and the signature styles, portfolios, and mentorship lineages readily observable in professional communities, though not yet documented in scholarship - already mirrors the logic Kosut identifies in tattooing’s artification. Whether PMU *will* undergo institutional artification is an empirical question this article does not answer. What the framework licenses is weaker and more useful: the boundary is in principle crossable, and the interesting question is what, in any individual case, crossing it would require.

3.3 The living body as a component of the work

If some works can be made *on* a living body, what kind of object results? Sizer (2020) argues that at least some tattoos are artworks in the full sense, and - crucially for the present argument - that the living body is not a passive support like canvas or paper but an essential component of the work, one that contributes to it. The body’s contribution is not metaphorical: it supplies ground tone, topography, movement, and, as Sections 4 - 5 show, the ongoing physiological processes that hold and alter the image. A work whose material component is alive differs ontologically from a print: it has no stable final state, and its author must compose for a trajectory rather than a moment.

Sizer's argument concerns tattoo art, not permanent makeup, and does not claim that every tattoo - much less every PMU procedure - is an artwork. The transfer to micropigmentation is this article's own move, to be earned case by case through the criteria below. Complementary sociological work supports the prosocial reading of body modification more generally: Atkinson (2004), from three years of participant observation among Canadian tattoo enthusiasts, interprets tattooing as an affect-regulated, communicative practice of self-control rather than pathology or mere risk-taking. This supports treating the client as a deliberate commissioning agent, though it does not itself establish art status.

3.4 Criteria for artistic micropigmentation

This article proposes the following criteria as a cluster - or threshold - model: a micropigmentation work counts as artistic practice when it satisfies a substantial preponderance of them. None is claimed to be individually necessary, and no single criterion is sufficient on its own; what is defended is the cluster.

1. **Individualisation.** The work is designed for a particular body, not merely reproduced from a template.
2. **Authorial discretion.** The practitioner makes consequential aesthetic decisions that another competent practitioner could defensibly have made differently.
3. **Site-specificity.** Anatomy, existing asymmetry, scarring, undertone, and the mobility of the treated zone inform the composition.
4. **Formal composition.** Shape, line, rhythm, saturation, edge, scale, and negative space are deliberately designed.
5. **Material competence.** Decisions reflect the physical behaviour of the pigment, the depth of implantation, and the tissue environment.
6. **Temporal design.** Not only the immediate appearance but the anticipated healing and ageing of the image are designed for.
7. **Interpretive execution.** The practitioner interprets the task rather than mechanically executing a predetermined instruction.
8. **Aesthetic evaluability.** The result can be assessed not only for safety and technical correctness but for compositional conviction.

Criteria 5 and 6 are the ones that require the empirical material of Sections 4 - 5, because one cannot design for a material trajectory one does not understand.

3.5 Three boundary cases

Not every PMU procedure is art, and the criteria must be tested against cases (Table 1). These cases are typological constructions, not reports of the author's own clients.

Case A: the standardised service. A practitioner reproduces a stencil-derived brow shape, in a standard pigment, at a standard depth, with the client selecting from a catalogue. The work may be technically excellent and commercially valuable; success is measured by symmetry and technical correctness. Nothing in it is authored in the sense of criteria 1 - 4, and calling it art would empty the term. It remains honourable service.

Case B: the individualised artistic work. A practitioner studies a particular face - its asymmetries, undertones, habits of expression, how this skin has aged and will age - and designs an original solution across several sketches: a line existing in no catalogue, a colour mixed against the drift this skin type is known to produce, a density calibrated to soften as the image matures. The composition exists once, for one body, and anticipates its own transformation. All eight criteria are engaged.

Case C: the restorative commission. An areola reconstruction after mastectomy, a scar camouflage, a brow rebuilt after chemotherapy. The task is set by a medical or bodily-restorative need; the work may succeed precisely by being visually unnoticeable. Authorship is distributed between client, practitioner, and medical context, and originality expresses itself in the precision of the illusion and its adaptation to this body - a possibility examined further in Section 6. The case shows that *naturalism can be a form of originality*: an imperceptible result may embody more site-specific invention than a demonstrative one.

Table 1. When does micropigmentation cross the service-art boundary? Application of the proposed criteria (Section 3.4) to three typological boundary cases (Section 3.5). The cases are analytical constructions; the table makes the article's central conceptual claim inspectable, not an empirical frequency claim.

Criterion	Case A: standardised service	Case B: individualised artistic work	Case C: restorative commission
Individualisation	Minimal - template adapted to face	Central - designed for this body	High - adapted to surgical site and history
Authorial discretion	Low - client selects from catalogue	High - consequential aesthetic decisions	Shared - bounded by medical task
Site-specificity	Incidental	Constitutive	Constitutive, including scar tissue
Formal composition	Predetermined by system	Deliberately designed	Designed toward imperceptibility
Material competence	Required for execution	Required and compositionally exploited	Required under hardest conditions
Temporal design	Rarely explicit	Explicit - healed and aged result designed	Explicit - durability of illusion
Interpretive execution	Mechanical	Interpretive	Interpretive within constraints
Aesthetic evaluability	Technical correctness, symmetry	Compositional conviction	Precision and fidelity of illusion
Status on this account	Service (honourable, not art)	Artistic practice	Distributed authorship; may be artistic

4. The living medium

The argument now follows the material itself through the first three stations of its itinerary (Figure 1). At each, the material imposes a constraint that is simultaneously something the practitioner must design around and a property largely foreign to conventional artistic media.

4.1 Vial: a colour is a particulate system

A PMU colour is not a hue in a jar; it is a suspension of engineered particles whose behaviour in tissue is set before the practitioner touches skin. Jin and Chang (2022) examined the separated inorganic fractions of two commercial PMU products from one manufacturer using scanning electron microscopy with energy-dispersive X-ray (EDX) analysis. In the red product, formulated for lips, the analysed fraction was dominated

by cubic-to-spherical titanium dioxide particles with primary diameters of 110 - 200 nm (a reported observed range, not a distribution estimate); in the taupe-yellow product, used for brows and the lash line, by rod-shaped yellow iron-oxide particles of roughly 600 - 700 nm. Both products contained aggregates far larger than their primary particles - approximately 5.4 - 12 μm in the red ink, and in the taupe product a compressed lump of roughly 15 μm that the authors interpret as a raw-material processing artifact and suggest may contribute to colour mismatch after healing (Figure 2). The EDX percentages reported in the study describe local scans of the separated inorganic fraction, not the bulk composition of the ink.

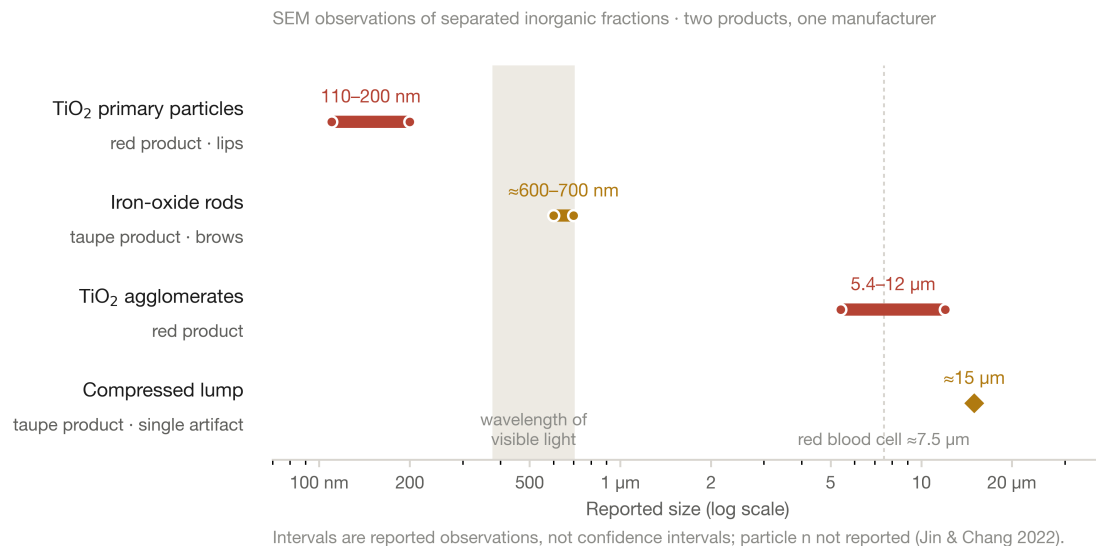


Figure 2. A colour is a particulate system: reported particle observations in two PMU products. Primary particle sizes and aggregate observations from scanning electron microscopy of separated inorganic fractions of two commercial products of one manufacturer (Jin & Chang, 2022), plotted on a logarithmic size axis with reference scales (visible-light wavelength band; red blood cell diameter). Direct observation: the plotted intervals as reported by the source. Author’s synthesis: none - the figure visualises reported values only. Limitations: intervals are observed ranges, not confidence intervals; particle counts were not reported; two products are not a market survey; elemental data in the source are local fractions, not bulk ink composition. TiO₂ = titanium dioxide; SEM = scanning electron microscopy.

It is worth pausing on what “colour” even means under this description. The perceived colour of a healed implant is not a property of the particle alone: it emerges from the interaction of particle chemistry and geometry with the optics of the surrounding tissue - the depth of the deposit, the scattering of overlying skin layers, the client’s own melanin and vascular tone. Particle, aggregate, and perceived colour are three different things, and the literature currently offers no bridge from the first two to the third: no published study links the particulate characteristics of a PMU ink to its healed, aged appearance in skin. That absent bridge is not a detail. It is the exact location of the practitioner’s expert judgement, which must currently do with experience what no dataset yet does with measurement - and it is the first entry in the research programme of Section 8.

Two inks from one manufacturer cannot represent a market; the study did not examine healed skin, longitudinal colour change, or clinical outcomes, and its findings must not be generalised (Jin & Chang, 2022). But the conceptual consequence survives the small sample: what the practitioner’s palette contains is *geometry* - particle shapes, sizes, aggregation states - and nominally similar colours from different formulations may prove materially different systems, a hypothesis the two-product comparison illustrates across colours but was not designed to test. A painter who mixes cadmium red with an ochre works with photochemistry; a micropigmentation practitioner who mixes a red against future drift works with particle engineering, whether they know it or not. The palette is a material construction before it is a colour choice.

4.2 Needle: depth designs the future

Where the pigment lands conditions how the image will age. The PMU literature describes implantation in the superficial dermis and ties the level of implantation and the material used to the quality and stability of the result; its catalogue of visual failure modes includes fading, fanning of pigment beyond the intended contour, and dissatisfaction with healed colour and shape (De Cuyper, 2008). The literature on cosmetic-tattoo complications adds a specifically instructive phenomenon: some iron-oxide- and titanium-containing pigments can darken paradoxically under laser treatment - a darkening that may be irreversible or may complicate subsequent removal (De Cuyper, 2015). Contemporary reviews confirm that technique, regulation, and training vary widely and that inflammatory, allergic, and appearance-related complications remain a live clinical concern (Ghafari et al., 2024); a recent review devoted specifically to PMU longevity likewise treats fading and colour shift as expected outcomes of pigment-tissue interaction over time rather than as product failure (Andreou, Hatziantoniou, Rallis, & Kefala, 2024).

The laser-darkening phenomenon deserves emphasis because of what it reveals about the medium's logic. In a reversible medium, a failed correction returns the work to its prior state; here, an attempted correction can worsen the image in ways that may not be reversible, because the correction is itself a material intervention in an already-implanted system. The practitioner therefore works inside a decision tree in which some branches may close permanently: pigment choice constrains future correction options, which constrain future removal options. Choosing a pigment is choosing a set of futures.

No published model predicts the healed colour of a specific client from needle depth, device, and pigment; the literature offers factors, not formulas (De Cuyper, 2008, 2015). This gap is where professional judgement lives. Depth, angle, needle configuration, and pigment load are decisions about the *future* of the image - how a line will soften, how a colour will cool or warm as particles settle into their tissue context. That this constitutes compositional, and therefore potentially artistic, decision-making is this article's interpretation, not the clinical literature's; the claim is normative, not a reported empirical finding. But the underlying asymmetry is documentary: in micropigmentation, unlike almost any other visual practice, the first-day appearance is not the work. The work is the trajectory.

4.3 Dermis: persistence as cellular relay

Why does an implanted image persist at all? The strongest mechanistic answer available comes from a murine model of decorative tattooing, and its content is the opposite of the popular intuition of inert ink. Baranska et al. (2018) showed that in tattooed mouse skin, pigment particles were captured and held predominantly by dermal macrophages. When these macrophages were experimentally ablated, the pigment did not disperse: dying cells released their particles, incoming macrophages recaptured them, and by day 90 the per-cell particle distribution had returned to approximately its pre-ablation state - with the visible tattoo intact. In skin-graft experiments, pigment initially held by donor cells had, by six weeks after grafting, been recaptured by host-derived macrophages. Persistence, in this model, is a *capture-release-recapture relay*: the image outlives every individual cell that carries it (Figure 3).

The conservation analogy sharpens the ontological point. Traditional conservation ethics distinguishes works that survive by protection - a panel painting in controlled humidity - from works that survive by maintenance, such as functioning kinetic sculptures or living gardens, where survival requires the continuous replacement of parts. In this mouse model, the dermal image belongs to the second family, with one radicalisation: the maintenance is performed not by a curator but by the medium itself. The work's custodian is the client's immune system. If this mechanism operates in human micropigmentation - a hypothesis, not a finding - then every healed PMU image would be, materially speaking, a performance the body renews without an audience.

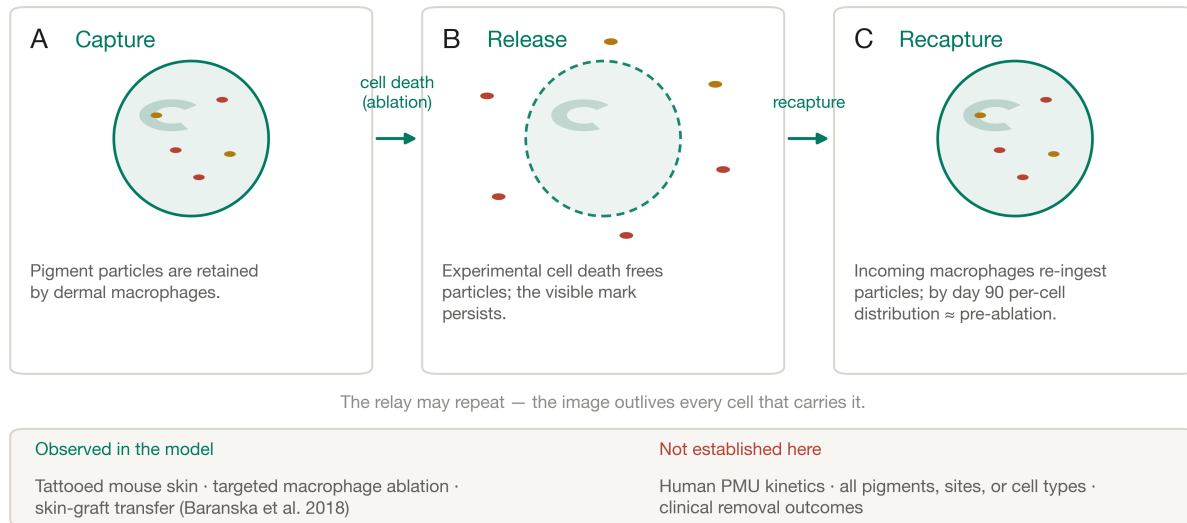


Figure 3. Persistence as cellular relay (mouse tattoo model). Schematic of the capture-release-recapture dynamic demonstrated by Baranska et al. (2018) in tattooed mouse skin. (A) Pigment particles held predominantly by dermal macrophages. (B) Experimental macrophage ablation releases particles; the visible mark persists. (C) Incoming macrophages recapture particles; by day 90 the per-cell particle distribution approximated pre-ablation values, and in graft experiments host-derived macrophages recaptured donor-held pigment. Direct observation: the relay in this mouse model. Author's synthesis: its relevance to PMU persistence, as a mechanistic hypothesis only. Limitations: mouse decorative tattoo, one pigment type; not demonstrated in longitudinal human PMU research; other cell types may participate in other models.

The transfer boundary must be stated with care. This is a mouse model, with one pigment type; the relay has not been demonstrated in longitudinal human PMU research, and other cell types may participate in other models. What the study licenses is a mechanistic hypothesis *consistent with* the observed longevity of human tattoos: persistence maintained by continuous biological work rather than by chemical inertness - persistence, not immobility. Even under this strict reading, the philosophical yield is considerable. The canvas is not a surface that holds a mark; it is a cell population that actively re-forms the mark, generation after generation. A painting survives by being left alone. A dermal image survives by being continuously re-made. The material is not a support but a participant - precisely the property Sizer (2020) identified as distinguishing works on living bodies.

5. Beyond the visible image

5.1 Node: the image exceeds its visible border

The living canvas is also not sealed. Schreiver et al. (2017) examined postmortem samples from four tattooed donors and two non-tattooed controls, combining mass-spectrometric pigment identification with synchrotron-based X-ray fluorescence mapping and infrared microspectroscopy of skin and the corresponding regional lymph nodes. In two of the four tattooed donors, matching organic pigment species were identified in the skin and the paired regional node (Figure 4). Titanium dioxide was likewise detected in both tissue types; in one donor, primary TiO_2 particles measured approximately 180 ± 23 nm - an estimate from ten measured particles in a single donor, not a size distribution for tattoo pigments generally. Element mapping suggested that smaller particle species preferentially reached the nodes, and spectroscopic signatures near pigment

deposits showed shifts in protein conformation and elevated lipid signals - associations within a small series, not demonstrated harm.

Postmortem human tissue · decorative tattoo, not PMU

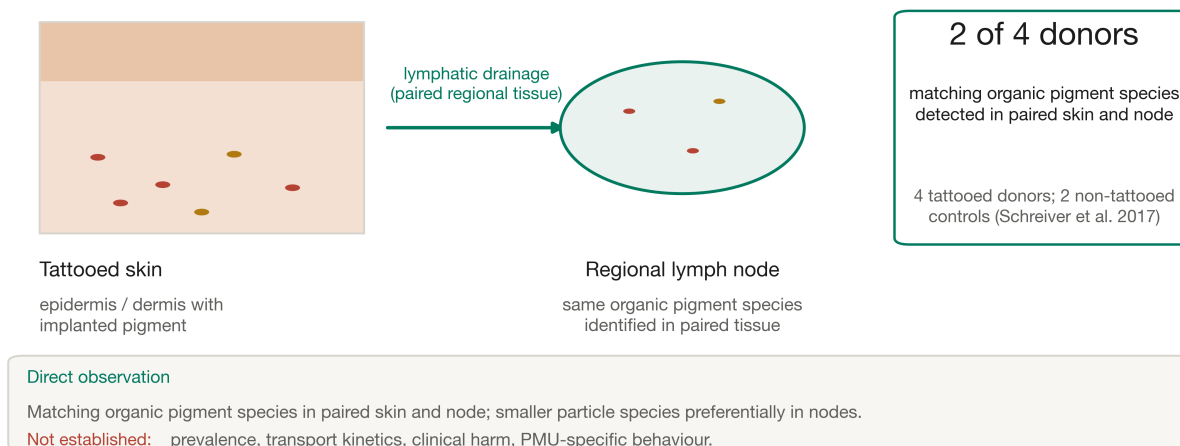


Figure 4. The image exceeds its visible border (postmortem human tissue). In two of four tattooed donors, matching organic pigment species were detected in skin and the paired regional lymph node; titanium dioxide was detected in both tissue types, and smaller particle species were preferentially found in nodes (Schreiver et al., 2017; four tattooed donors, two non-tattooed controls). Direct observation: matched pigment identification in paired tissues. Author's synthesis: the reading of surface persistence and partial export as one process at two scales. Limitations: small postmortem series; decorative tattoos, not PMU; regional lymphatic tissue, not systemic distribution; no prevalence, kinetics, or clinical harm established.

The inference limits are integral to the finding. This is a small postmortem series of decorative tattoos, not PMU; it concerns regional lymphatic tissue, not systemic distribution; it establishes that pigment material *can* reach a regional node, not how often, how fast, or with what clinical consequence (Schreiver et al., 2017). An elevated cadmium level found in one node cannot be attributed to transport from the sampled skin site: the authors themselves note possible alternative exposure. Nothing here shows harm - and nothing here should be read as toxicology.

What it shows is a property of the medium: the visible image and its material substrate do not share a boundary. Part of the palette can leave the picture, silently, along the body's own drainage routes. Persistence at the surface and partial export below it are not opposites but the same process observed at two scales. On this account, a practitioner's material decision - which pigment, which particle system - is also a decision about matter that may travel beyond the composition. Hardly any conventional visual art has this property; it belongs to the medium's biology, and a practitioner who claims command of the medium inherits it.

5.2 Laser: removal is transformation

The final station tests the deepest assumption of the service category: reversibility. Most services can be discontinued; most purchases can be returned. Laser removal of an implanted image is neither, and one narrow in vitro example suffices to make the point. Ruby-laser irradiation (694 nm) of the copper phthalocyanine pigment Blue 15:3 in aqueous suspension fragmented the molecule into new chemical species - hydrogen cyanide, benzonitrile, 1,2-benzenedicarbonitrile, and traces of benzene - while the tested Nd:YAG wavelengths produced substantially fewer decomposition products (Schreiver et al., 2015; Figure 5). Earlier in vitro work had shown that laser light cleaves selected azo pigments into compounds including 2-methyl-5-nitroaniline,

2,5-dichloroaniline, and 4-nitrotoluene (Vasold et al., 2004), and pigment classes differ in light stability outside the laser context: in the conditions studied, several phthalocyanines, quinacridones, and dioxazines were comparatively photostable while the examined azo pigments degraded (Hauri & Hohl, 2015).

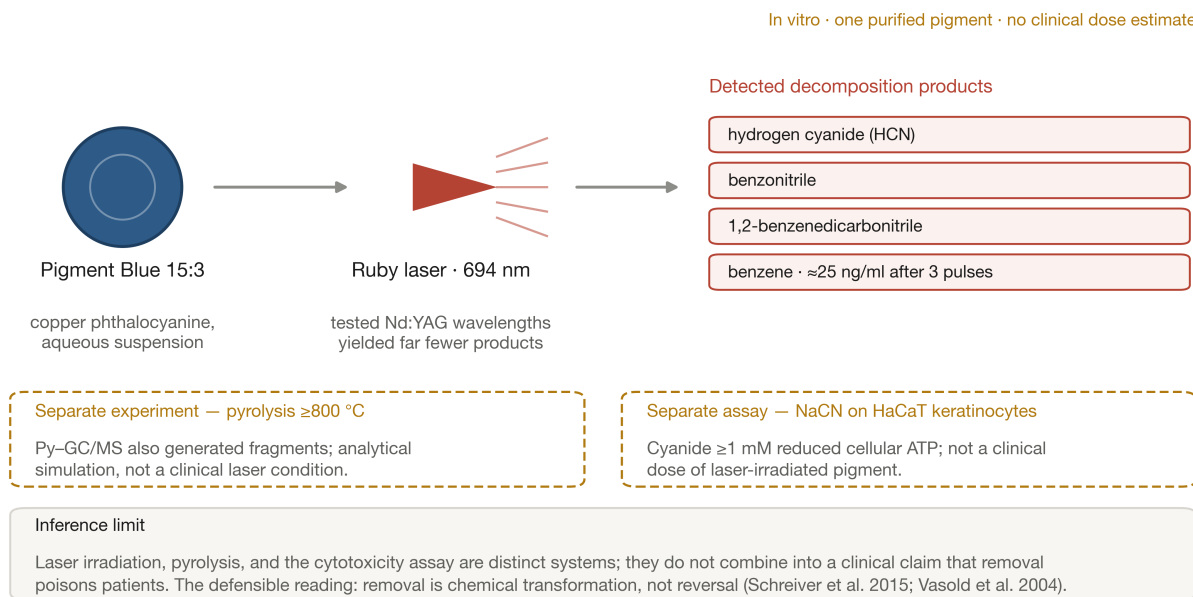


Figure 5. Removal is chemical transformation (in vitro). Ruby-laser irradiation (694 nm) of Pigment Blue 15:3 (copper phthalocyanine) in aqueous suspension generated hydrogen cyanide, benzonitrile, 1,2-benzenedicarbonitrile, and traces of benzene; tested Nd:YAG wavelengths generated substantially fewer products (Schreiver et al., 2015). The pyrolysis experiment (≥800 °C) and the sodium-cyanide cytotoxicity assay shown are separate experimental systems and do not combine into a clinical exposure claim. Direct observation: fragmentation products in the studied in vitro system. Author’s synthesis: the reading of removal as material transformation rather than reversal. Limitations: one purified pigment; in vitro aqueous suspension; no clinical dose estimate. HCN = hydrogen cyanide; NaCN = sodium cyanide; HaCaT = an immortalised human keratinocyte line; ATP = adenosine triphosphate.

These are in vitro results for specific pigments and lasers. The 2015 study’s separate pyrolysis experiment (≥800 °C) and separate cytotoxicity assay (sodium cyanide at ≥1 mM reducing ATP in HaCaT keratinocytes) characterise fragment behaviour in distinct experimental systems; chaining them into a claim that “removal poisons patients” would misrepresent all three, and no clinical risk estimate is offered or implied here (Schreiver et al., 2015). The defensible conclusion is narrower and, for the present argument, more interesting: *removal is chemical transformation, not reversal*. The eraser does not restore the blank page; in the studied experimental system it produced new chemical species. A medium whose unmaking is itself an irreversible material event behaves, in this respect, more like a made object than like a service that can simply be undone. The asymmetry does not by itself confer art status - surgery is equally irreversible, and no one calls it art on that ground - but it underwrites the temporal-design and responsibility arguments of Section 6. Table 2

consolidates these transfer boundaries.

Table 2. Evidence transfer across research domains. How each material claim travels - and where it must stop. Registers: direct PMU evidence; tattoo-to-PMU mechanistic transfer; conceptual proposition.

Claim in this article	Evidence base	Model / material	Permissible inference	Prohibited inference
A PMU colour is an engineered particulate system	Jin & Chang (2022) - direct PMU	SEM/EDX of separated inorganic fractions, two products, one manufacturer	Two products differed in particle morphology, size, aggregation	Market-wide composition; bulk ink content; healed-colour prediction
Placement depth conditions the image's future	De Cuyper (2008, 2015); Ghafari et al. (2024) - direct PMU	Clinical narrative reviews	Level and material relate to stability; fading, fanning, dissatisfaction occur	A quantitative dose-response model for healed colour
Persistence is a cellular relay	Baranska et al. (2018) - tattoo transfer	Tattooed mouse skin; macrophage ablation; grafts	Mechanistic hypothesis for PMU persistence, plausible but untested in humans	"Macrophages make PMU permanent"; human kinetics
The image exceeds its visible border	Schreiver et al. (2017) - tattoo transfer	Postmortem human tissue, 4 donors + 2 controls	Pigment material can reach the paired regional node	Prevalence, speed, systemic distribution, clinical harm
Removal is chemical transformation	Schreiver et al. (2015); Vasold et al. (2004) - tattoo transfer	In vitro; specific pigments and lasers	Laser can fragment specific pigments into new species	Clinical exposure or "removal poisons patients"
Some micropigmentation is artistic practice	Sizer (2020); Kosut (2014) - conceptual	Aesthetics of tattoo; sociology of artification	Conditional criteria can be defended for PMU	That PMU is already institutionally recognised as art

6. Distributed authorship and ethical responsibility

6.1 Five participants, asymmetric roles

Who is the author of a dermal image? The material itinerary complicates any single-author answer. The honest reply is structured: the *making* of a dermal image is distributed across participants with asymmetric roles (Table 3) - of whom only some hold authorship in the strict sense, while others participate in the work's realisation or its recognition. The *client* sets intention, consent, and the limits of the acceptable, and will live as the work's permanent exhibition site; the sociology of body modification supports treating this role as deliberate and communicative rather than passive (Atkinson, 2004). The *practitioner* holds the classical authorial functions - interpretation, composition, material execution - under the constraint that every formal choice is also a prediction about material behaviour. The *skin* contributes ground tone, topography, immune dynamics, and time. It is not an author in any intentional sense: this article deliberately uses *material participation*, not "co-authorship", which would overstate what Sizer's (2020) framework licenses. The *medical context*, where present, sets functional limits and safety constraints. The *audience and cultural field* - from the client's social world to professional communities - supply recognition and evaluation, which

artification theory identifies as constitutive for art status (Kosut, 2014).

Table 3. The distributed making of a dermal image: participants and roles (conceptual model, this article). Authorship in the strict sense belongs to client and practitioner; the skin participates materially without intention; the audience and cultural field supply recognition.

Participant	Role
Client / patient	Intention, consent, limits of the acceptable outcome
Practitioner	Interpretation, composition, material execution, temporal design
Skin / body	Variable conditions of realisation; material participation, not intention
Medical context (where present)	Functional limits and safety constraints
Audience / cultural field	Recognition and evaluation (artification)

Distributed authorship is clearest in the restorative case, and its stakes are documented: a systematic review of medical tattooing across eighteen studies reported consistently high patient satisfaction across applications from scar camouflage to nipple-areola reconstruction (Becker & Cassisi, 2021), and in a BREAST-Q cohort of ninety-three breast-reconstruction patients, satisfaction with the reconstruction improved significantly after nipple-areolar tattooing (Smallman et al., 2018). In an areola reconstruction, the client’s history, the surgical context, and the practitioner’s judgement are jointly and inseparably responsible for the result; the work’s meaning - restoration, closure, continuity of self - is constituted between them, on and through the living material. It would be a category error to ask which participant “really” made the work. The productive question is who holds responsibility for which dimension of the work’s life.

6.2 Temporally distributed responsibility

If the medium is a living system, responsibility extends along the image’s whole trajectory, and this has concrete ethical content.

Consent and expectation management. Informed consent for a living image differs from consent for a service. The client must understand that *long-lasting* does not mean *unchanging*: the image will heal, settle, soften, and drift (Andreou et al., 2024), and correction or removal are themselves material interventions with their own behaviour - including, for some iron- and titanium-containing pigments, the documented possibility of paradoxical darkening under laser (De Cuyper, 2015). A practitioner who shows only first-day photographs is, on this account, misrepresenting the work.

Designing for difference. The living medium differs from body to body. Undertone, phototype, scarring, and skin behaviour vary, and a competence built only on one skin type is incomplete command of the medium. The same design executed identically on different skins is not the same work; treating it as such is precisely the template logic of Case A. Equity across skin tones is thus not an add-on to professional ethics but a direct consequence of taking the medium seriously.

Beauty norms and the pressure of standardisation. PMU operates inside commercial beauty culture, and its template economy - catalogue brows, fashionable shapes - exerts pressure toward standardisation that is in tension with site-specific design. Recognising an artistic register within PMU should not become a way of denigrating service work or of ranking clients’ choices; the claim defended here concerns the *conditions* of artistic status, not a hierarchy of worth. But it does imply that a practitioner bears responsibility for distinguishing what a trend prescribes from what this face, this skin, and this decade of ageing can sustain.

Correction, removal, and the end of the work. Because the medium is irreversible in the strict sense (Section 5.2), the work’s possible endings belong to its design. A practitioner exercising temporal design considers, at the moment of composition, how the image could later be corrected, refreshed, or retired: which pigments

leave workable ground for a future revision, which will resist removal, and which - as the laser-darkening literature warns - can darken under attempted removal in ways that may be irreversible or may complicate further treatment (De Cuyper, 2015). In few other cosmetic services does the provider owe the client an exit strategy; in micropigmentation, the exit belongs to the composition.

Who evaluates success. In the service frame, success is adjudicated by the client's immediate satisfaction and the technician's checklist. A living-medium frame distributes evaluation in time and across parties: the client at healing and at year five; the practitioner against her own compositional intent; peers and the professional field against emerging standards of the practice (Kosut, 2014, shows how such evaluative institutions constitute art status). None of these verdicts is final alone, because the work itself is not final - evaluation of a trajectory can only ever be provisional.

The responsibility to decline. Command of a living medium includes knowing when not to work: when expectations cannot be met by the material, when a requested design will age badly, when a medical context requires referral rather than pigment. In a service logic, refusal is lost revenue; in the logic of temporally distributed responsibility, it is part of the professional role.

7. Objections and limitations

7.1 Objections and replies

Objection 1: a complex material does not make a practice art. Agreed - this is the article's own premise. Biology specifies the medium; artistic status depends on the kind of visual and authorial decision made in it (Section 3.4). The criteria, not the complexity, carry the claim.

Objection 2: PMU is a standardised commercial service. Much of it is, and remains so on this account. Service, craft, and art are not mutually exclusive; the artistic status defended here is assessed at the level of the individual work, not the industry (Section 3.5).

Objection 3: the client is the real author, since the client determines the desired result. Authorship can be distributed. Intention, interpretation, execution, and material realisation are distinct contributions; the client's intention no more makes her the author of the composition than a commissioning patron authored a portrait (Section 6.1).

Objection 4: a naturalistic result is not original. Originality can consist in site-specific optical adaptation rather than demonstrative stylistic novelty. The imperceptible reconstruction of Case C may embody more invention than a conspicuous design (Section 3.5).

Objection 5: skin has no intention and cannot be a co-author. Agreed; the article claims material participation, not intentional authorship. The skin contributes conditions and transformations, not decisions (Section 6.1).

Objection 6: tattoo research cannot be transferred to PMU. It cannot be transferred *as PMU evidence*, and it is not so used here. Every transfer in Sections 4 - 5 is marked as a mechanistic hypothesis consistent with, but not demonstrated in, human PMU (Table 2).

7.2 Limitations

The evidential limits of this article are constitutive and are stated in one place. There is no direct empirical research on PMU as art; the criteria of Section 3.4 are a normative proposal awaiting empirical scrutiny. Most of the cellular biology invoked derives from decorative-tattoo research: the macrophage relay is a mouse finding (Baranska et al., 2018); human pigment migration is shown in a small postmortem series (Schreiver et al., 2017); removal chemistry is in vitro for specific pigments and wavelengths (Schreiver et al., 2015;

Vasold et al., 2004). The materials science of PMU inks rests, here, on two products of one manufacturer (Jin & Chang, 2022). The decorative-tattoo pigment-load range of 0.60 - 9.42 mg/cm², with a mean of 2.53 mg/cm² reported by Engel et al. (2008) from experiments on excised porcine and human skin and summarised as approximately 2.5 mg/cm² by Bäuml (2015), is cited only to indicate the scale studied in that adjacent field and is not a PMU dose. No longitudinal chain from ink batch through placement to healed colour and ageing exists in the literature; this article determines no clinical risk; and the artification framework describes tattooing, not PMU (Kosut, 2014). None of these limits weakens the central conditional - where authorship meets this material knowingly, the result merits evaluation as art - but each marks where the empirical floor under the argument should be strengthened.

8. Conclusion

Under what conditions, then, can dermal micropigmentation count as artistic practice? Not by price, difficulty, or biological intricacy. On the account developed here, it counts as artistic practice when individualised visual authorship - original, site-specific composition under genuine authorial discretion - is joined to materially informed design for biological change: command of a palette that is engineered geometry, of placement that programmes the image's future, of a persistence that in the studied models is maintained by cellular labour, of borders that may be open, and of an unmaking that is transformation rather than reversal. The skin is a canvas only in a sense no canvas has ever had: in the models studied it continually re-makes the work, contributes its own matter and motion, and ages alongside the image it carries. That is why the title's metaphor must ultimately give way to the more accurate term - a living medium.

The biological temporality of that medium reshapes authorship and responsibility. Authorship, strictly speaking, is distributed between client and practitioner, with the practitioner holding the compositional centre; the work's material realisation additionally involves the skin and, where present, the medical context, and its recognition belongs to the audience and cultural field. Responsibility, meanwhile, is distributed across time, from first needle pass through healing, drift, correction, and possible removal. The professional consequence follows directly: professional responsibility in dermal micropigmentation should include not only procedural safety and immediate visual accuracy, but informed aesthetic judgement about how an image will heal, persist, change, and potentially be revised.

A research programme follows from the gaps this synthesis has exposed: characterisation of particulate systems across the actual PMU market; longitudinal studies linking pigment characteristics and placement to healed and ageing colour; investigation of whether the cellular relay operates in human micropigmentation sites; particle-fate studies specific to facial work; and empirical study of how practitioners, clients, and institutions actually negotiate the service-art boundary that this article has mapped conceptually. Each is a study someone can now design. Together they would convert the account given here - skin as a living medium, worked knowingly - from a defended proposal into a tested one.

Supplementary tables

Table S1. Two commercial PMU products as particulate systems (Jin & Chang, 2022). SEM/EDX analysis of separated inorganic fractions; elemental values are local weight-percent within the analysed fraction, not bulk ink composition. Findings from two products of one manufacturer must not be generalised to the PMU market.

Product	Application	Dominant particle type (separated inorganic fraction)	Primary particle size	Local EDX (wt%)	Aggregates
Red (“wine”)	Lips	Cubic-to-spherical TiO ₂	110 - 200 nm	Ti 52.8; Al 17.8; S 15.9; Cl 10.1; Fe 3.4	5.4 - 12 µm
Taupe yellow	Brows / lash line	Rod-shaped yellow iron oxide	~600 - 700 nm	Fe 79.2; Ti 17.2; S 2.1; Al 1.5	≈15 µm compressed lump (representative measured example); interpreted by the authors as a raw-material artifact

Note. Weight-percent values as given in the EDX inset tables of Figures 8 and 15 of the source; the article’s running text quotes the corresponding atomic-percent column.

Table S2. Tattoo material in paired human skin and regional lymph nodes (Schreiver et al., 2017). Postmortem series; decorative tattoos, not PMU.

Observation	Value	Scope	What it does not establish
Matching organic pigment species in skin and paired regional node	2 of 4 tattooed donors	4 tattooed donors + 2 controls	Frequency or universality of transport
TiO ₂ primary particle size in skin and node	~180 ± 23 nm	10 measured particles, one donor	A size distribution for tattoo/PMU pigments generally
Preferential presence of smaller particle species in nodes	Element mapping (one donor)	Studied samples	Transport kinetics or clinical outcome
Protein/lipid spectral shifts near pigment deposits	Amide I $\alpha \rightarrow \beta$; elevated lipid signal	Studied samples	Caused clinical harm
Elevated cadmium in one node	-	Single observation	Migration from the sampled skin site (authors note possible alternative exposure)

Table S3. Laser interaction with tattoo pigments in vitro: intervention, observed products, inferential status (Schreiber et al., 2015; Vasold et al., 2004).

Parent pigment	Condition	Observed products	Inferential status
Copper phthalocyanine (Blue 15:3)	Ruby laser, 694 nm, aqueous suspension (1 mg pigment/ml)	HCN, benzonitrile, 1,2-benzened icarbonitrile, benzene (~25 ng/ml after 3 pulses)	In vitro observation; tested Nd:YAG wavelengths yielded substantially fewer products
Copper phthalocyanine (Blue 15:3)	Pyrolysis ≥ 800 °C	Fragmentation products	Separate analytical simulation, not a clinical laser condition
- (assay context)	NaCN ≥ 1 mM on HaCaT keratinocytes	Reduced ATP	Separate cytotoxicity assay; not a clinical dose of irradiated pigment
Selected azo pigments	Laser irradiation	2-methyl-5-nitroaniline; 2,5-dichloroaniline; 4-nitrotoluene	In vitro; hazard identification for specific compounds, not PMU risk quantification

Declarations

Funding. This work received no external funding.

Ethics approval. Not applicable. This is a conceptual article based on published literature; no human or animal subjects, patient data, or client cases were involved. The boundary cases in Section 3.5 are typological constructions, not reports of actual clients.

Consent. Not applicable (no patient or client material is used).

Data availability. No new data were generated. All cited data are available in the referenced publications. The data and script reproducing Figure 2 are available as supplementary material.

References

1. Andreou, E., Hatziantoniou, S., Rallis, E., & Kefala, V. (2024). Why permanent makeup (PMU) is not a lifetime application. *Cosmetics*, 11(5), Article 160. <https://doi.org/10.3390/cosmetics11050160>
2. Atkinson, M. (2004). Tattooing and civilizing processes: Body modification as self-control. *Canadian Review of Sociology/Revue canadienne de sociologie*, 41(2), 125 - 146. <https://doi.org/10.1111/j.1755-618X.2004.tb02173.x>
3. Baranska, A., Shawket, A., Jouve, M., Baratin, M., Malosse, C., Voluzan, O., Vu Manh, T.-P., Fiore, F., Bajénoff, M., Benaroch, P., Dalod, M., Malissen, M., Henri, S., & Malissen, B. (2018). Unveiling skin macrophage dynamics explains both tattoo persistence and strenuous removal. *Journal of Experimental Medicine*, 215(4), 1115 - 1133. <https://doi.org/10.1084/jem.20171608>
4. Bäumlér, W. (2015). Absorption, distribution, metabolism and excretion of tattoo colorants and ingredients in mouse and man: The known and the unknown. In J. Serup, N. Kluger, & W. Bäumlér (Eds.), *Tattooed skin and health* (Current Problems in Dermatology, Vol. 48, pp. 176 - 184). Karger. <https://doi.org/10.1159/000369222>

5. Becker, S. J., & Cassisi, J. E. (2021). Applications of medical tattooing: A systematic review of patient satisfaction outcomes and emerging trends. *Aesthetic Surgery Journal Open Forum*, 3(3), ojab015. <https://doi.org/10.1093/asjof/ojab015>
6. Caplan, J. (Ed.). (2000). *Written on the body: The tattoo in European and American history*. Princeton University Press.
7. De Cuyper, C. (2008). Permanent makeup: Indications and complications. *Clinics in Dermatology*, 26(1), 30 - 34. <https://doi.org/10.1016/j.clindermatol.2007.10.009>
8. De Cuyper, C. (2015). Complications of cosmetic tattoos. In J. Serup, N. Kluger, & W. Bäumlér (Eds.), *Tattooed skin and health* (Current Problems in Dermatology, Vol. 48, pp. 61 - 70). Karger. <https://doi.org/10.1159/000369188>
9. Engel, E., Santarelli, F., Vasold, R., Maisch, T., Ulrich, H., Prantl, L., König, B., Landthaler, M., & Bäumlér, W. (2008). Modern tattoos cause high concentrations of hazardous pigments in skin. *Contact Dermatitis*, 58(4), 228 - 233. <https://doi.org/10.1111/j.1600-0536.2007.01301.x>
10. Ghafari, G., Newcomer, J., Rigali, S., & Liszewski, W. (2024). Permanent makeup: A review of its technique, regulation, and complications. *Journal of the American Academy of Dermatology*, 91(4), 690 - 698. <https://doi.org/10.1016/j.jaad.2024.01.098>
11. Hauri, U., & Hohl, C. (2015). Photostability and breakdown products of pigments currently used in tattoo inks. In J. Serup, N. Kluger, & W. Bäumlér (Eds.), *Tattooed skin and health* (Current Problems in Dermatology, Vol. 48, pp. 164 - 169). Karger. <https://doi.org/10.1159/000369225>
12. Jin, H. S., & Chang, B. S. (2022). Analysis of microstructural characteristics and components of red and yellow ink pigments used in permanent makeup. *Applied Microscopy*, 52, Article 3. <https://doi.org/10.1186/s42649-022-00072-3>
13. Kosut, M. (2014). The artification of tattoo: Transformations within a cultural field. *Cultural Sociology*, 8(2), 142 - 158. <https://doi.org/10.1177/1749975513494877>
14. Oumeish, O. Y. (2001). The cultural and philosophical concepts of cosmetics in beauty and art through the medical history of mankind. *Clinics in Dermatology*, 19(4), 375 - 386. [https://doi.org/10.1016/S0738-081X\(01\)00194-8](https://doi.org/10.1016/S0738-081X(01)00194-8)
15. Rubin, A. (Ed.). (1988). *Marks of civilization: Artistic transformations of the human body*. Museum of Cultural History, University of California, Los Angeles.
16. Schreiber, I., Hesse, B., Seim, C., Castillo-Michel, H., Villanova, J., Laux, P., Dreijack, N., Penning, R., Tucoulou, R., Cotte, M., & Luch, A. (2017). Synchrotron-based v-XRF mapping and μ -FTIR microscopy enable to look into the fate and effects of tattoo pigments in human skin. *Scientific Reports*, 7, Article 11395. <https://doi.org/10.1038/s41598-017-11721-z>
17. Schreiber, I., Hutzler, C., Laux, P., Berlien, H.-P., & Luch, A. (2015). Formation of highly toxic hydrogen cyanide upon ruby laser irradiation of the tattoo pigment phthalocyanine blue. *Scientific Reports*, 5, Article 12915. <https://doi.org/10.1038/srep12915>
18. Serup, J., Kluger, N., & Bäumlér, W. (Eds.). (2015). *Tattooed skin and health* (Current Problems in Dermatology, Vol. 48). Karger. <https://doi.org/10.1159/isbn.978-3-318-02777-8>

19. Sizer, L. (2020). The art of tattoos. *The British Journal of Aesthetics*, 60(4), 419 - 433. <https://doi.org/10.1093/aesthj/ayaa012>
20. Smallman, A., Crittenden, T., Yip, J. M., & Dean, N. R. (2018). Does nipple-areolar tattooing matter in breast reconstruction? A cohort study using the BREAST-Q. *JPRAS Open*, 16, 61 - 68. <https://doi.org/10.1016/j.jpra.2018.01.003>
21. Vasold, R., Naarmann, N., Ulrich, H., Fischer, D., König, B., Landthaler, M., & Bäuml, W. (2004). Tattoo pigments are cleaved by laser light - The chemical analysis in vitro provide evidence for hazardous compounds. *Photochemistry and Photobiology*, 80(2), 185 - 190. <https://doi.org/10.1111/j.1751-1097.2004.tb00069.x>