



### How Does Tattoo Ink Stay in the Skin?

Every time I Google this I am presented with the same illustrated cross-section of a cube of flesh. The colourful flesh block describes the three main layers of the skin; the epidermis, the dermis and the sub-cutaneous fat layer, and threading through the diagram are hair follicles like great spears, ribbons of blood vessels and nerve endings. An illustrated needle pierces the epidermis and deposits ink blobs into the dermis.

This illustration doesn't ever get me much closer to understanding what is happening. In fact, it gives me an unhappy feeling, as most diagrammatic medical images tend to do. Its dead-slab meatiness, its straight-line cubeness, is dissociative and alienating. I prefer to think about the skin layers like the oceanic zones—sunlight zone, twilight zone, and midnight zone. The fluidity of this connects more with my understanding of the body as something constantly in flux, constantly mutating, constantly changing. Within 100 days, about 30 trillion cells in my body will have regenerated and been replaced, and over the course of a lifetime every single one of my cells will have been replaced at least once—the cellular flow is in constant motion.

As a tattoo artist, I see my job as a facilitator of shape shifting, and I take this process of transformation seriously. For me, the act of getting a tattoo is both profoundly weighty, saturated with meaning, and also extremely light, silly, even meaningless. I hold both these feelings as equally magical and sacred. Everyone who comes to get a tattoo does so with their own intentions, and the list of these intentions is limitless. Some are explicit and specific, such as the desire to mark a specific occasion or memory, to retake ownership of the body after a traumatic event, or to celebrate a connection to heritage or subculture. Some intentions are more like a gentle undercurrent, such as the development of a personal style one wishes to communicate to the world, or part of a process of rebellion from a particular ideology one has felt constrained by.

The act of creating a visible design within the skin using a needle and ink taps into a long legacy. As far as we know, tattooing as a cultural practice has existed throughout human history. The list of reasons why is as infinite as human experience. Tamara Santibañez writes, in *Could This Be Magic? Tattooing As Liberation Work*, that “Tattooing is a powerful form of metamorphosis. It can mark a coming of age or a turning point in one's life (...) Tattooing can be transformative—a way to create a new version of yourself. A tattoo can be a coping strategy, a manifesto, a bold declaration. Tattoos are armour. Being able to access these types of expression can make us feel more free as individuals, and affirms the values that bring us into ourselves.”

Tattoos have this transformative and self-actualising potential to bring about a shift in these constantly fluctuating bodies of ours, which are constantly regenerating at a cellular level. When I first started taking tattooing seriously (i.e. when I transitioned from DIY kitchen table sessions with friends to undertaking training in health and safety, technique, and trauma-informed practice) I kept wondering how it could be that tattoo ink was ‘permanent’ when nothing else about us is. Why, if we are made of a vast ecosystem of cellular life that is constantly dying, being excreted and reborn as new cells, do our tattoos not also die? Why are they not broken down and carried off to be recycled in the lymphatic system?

To begin with, it was difficult to find a very clear answer. The flesh-cube diagram doesn't explain this, at least not to my brain. It doesn't explain why slight shifts happen over many years, or why the shitty stick and poke your friend did with a sewing machine needle didn't stay even though it hurt like hell and seemed to be incredibly deep.

Still, there is some uncertainty in the scientific community about the precise reasons that tattoos remain visible in the skin for a lifetime and beyond. There was a time when it was presumed that the ink just sat there, undisturbed beneath the top layers of the skin somehow

trapped in this little pocket. It was known that tattoo ink had to reach the dermal layer—or twilight zone—to stay in place. It was already understood that the epidermal layers—the sunlight zone—regenerate outwards like an onion, so any ink deposited in those layers would be pushed out when that layer got shucked off the skin, ending up as dust under the bed or on the bathroom floor. The subcutaneous fat layer—or midnight zone—is too deep for the ink to stay, it would be carried off into the blood or to the lymph nodes from disassembly and ejection. The dermal layer was understood to be the goldilocks zone for tattoo longevity. But it still wasn't exactly clear why. There were beliefs that the ink was staining a certain kind of dermal cell that rarely regenerates, one with a very long lifespan.

But in 2018, Anna Baranska et al, found out that the body's immune system response to the physical trauma of being tattooed—specifically the role of dermal macrophages—is responsible for tattoo longevity. Macrophage comes from Greek meaning 'big-eater', and their job is to destroy potential threats to the body by engulfing them. During the process of being tattooed, the immune system responds as it does to any wounding or potential threat: it activates a huge number of dermal macrophages to engulf the threatening substance that is entering the body. They consume, consume, and consume. Usually the next step involves breaking down the pathogens they have eaten with enzymes, however this doesn't work on the tattoo ink. The blobs of ink are too big to be broken down, so the macrophage do the next best thing to defend the body—they stay put. The tattoo seen through the healed epidermis is actually the imprisoned ink visible through the microscopic membranes of countless filled-up big-eater cells.

Big-eaters have a long life span compared to many other human cells. They can live anywhere from a few months to a few years. Once they die, they drop the ink they were holding, only to be quickly gobbled up again by a newly born macrophage cell, which then sets about its life's work of holding onto the ink. The cycle repeats, again, and again, and again. The microscopic cosmos of the dermis stays constantly in flux as there is a changing of the guard. It was through this study that Baranska et al showed that it was the process of renewal, and not the longevity of cellular life, that leads to tattoos staying in place. There is nothing static about this process, nothing static about the tattoo, as it mutates along with us through our lives.

When a macrophage dies and releases the ink, there is a very short period of time when the ink particles float freely, before they are once again swallowed and anchored in place. I imagine this accounts for the shifting of lines, the 'bleeding-out' over time, the spreading of ink from its place of mooring.

My tattoos remind me that my body is not a temple. It is not a zipped up vessel holding anything. It does not belong to God. It is a shape shifting community. For me, in my own personal experience (as a lapsed Catholic queer learning how to undo the intense shame I felt so strongly when I was growing up), that is a liberating feeling.

Santibañez writes that one potential reason that people come to get tattooed is to gain or regain "authority and ownership over one's own body" and that this may be particularly necessary for those whose bodies have been policed by external forces, for those whose boundaries have been violated, those who have been incarcerated, those who have experienced chronic illness or medical traumas, and those who have been denied gender affirming healthcare. In my opinion, we could add the experience of living within neoliberal capitalism and the conditions these systems impose on our bodies as enough to cut us off from ourselves. Santibañez writes that "tattooing is a way for those of us who have experienced a loss of control over our bodies (...) to reinstate ourselves as authorities of our own selves."

The tattoos in my skin help me feel closer to a self that I recognise, and they are only able to remain visible because of my immune system's incredible capacity to protect my body from potential harm. Some are playful, some serious, some spiky, some soft, but they all mutate right along with me, and act as witness, map, and memory bank. Through their incidental stewardship of my tattoos, the macrophage cells help me to connect to my sense of self, but at the same time help remind me of the interconnectedness of that self with others. The way we absorb meaning and image from our surroundings and then mirror that back in our choices of design, speaks to a collectivity, as well as an assertion of individuality.

I see the skin as an interface between self and not-self—a slippery terrain where outside and inside cannot be clearly separated. It is a place to communicate outwards, and also absorb inwards—physiologically as well as metaphorically. There is no clear line where one ends and one begins; selfhood seeps in and out, with tattoos acting as portals for meaning, meeting at this beach of the body.

