

Laser Tattoo Removal

Communication Skills 1 – Assignment 1

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According to The Harris Poll, approximately 23% of Americans with tattoos regret having at least one of them done¹. As a consequence of this and of the fact that the tattoo industry has been continuously growing for the past decades, the tattoo removal market is projected to surpass the 27 billion USD worth by 2023, which represents a growth greater than 100% from its 11.6 billion USD value in 2016². The most widely used technique for tattoo removal is laser surgery, because it is more effective, safer, and less invasive than other methods such as dermabrasion and excision³.

A tattoo is created by injecting ink into the dermis (the second layer of skin) with a needle. As a result, an inflammation of skin tissue occurs and the immune system sends macrophages to remove foreign particles (i.e. pigments from the ink) and carry them into the bloodstream to be excreted. Nevertheless, some of the pigments are too large to be swallowed by macrophages, and therefore remain in the dermis. Laser tattoo removal consists of using a high-intensity laser to break down the pigments into particles small enough for macrophages to be able to remove them from the dermis.

The fragmentation of pigments is achieved by heating them up with a laser pulse for a very short period of time (shorter than the thermal relaxation time of the heated particle). By using a laser with a specific wavelength, pigments of different colors can be selectively targeted and the rapid heating (in the nanosecond or picosecond range) will produce the rupture of the pigments. This process is called “selective photothermolysis” and is widely used in microsurgery⁴.

Due to the reduced size of pigment fragments, macrophages are able to absorb them, which results in elimination of the tattoo. However, it is necessary to repeat this process multiple times to fully remove a tattoo and the final results may vary between patients⁵. Despite the effectiveness of laser removal, it is still a costly and lengthy process that can be easily avoided by choosing our tattoos wisely.

¹ Harris Insights and Analytics LLC (2017). Tattoo Takeover: Three in Ten Americans Have Tattoos, and Most Don't Stop at Just One. The Harris Poll.

² Allied Market Research (2017). Tattoo Removal Market by Procedure and End User – Global Opportunity Analysis and Industry Forecast, 2017-2023.

³ U.S. Food & Drug Administration (FDA) (2017). Tattoo Removal: Options and Results.

⁴ Ho S., Leok Goh C. (2015). Laser Tattoo Removal: A Clinical Update. *Journal of Cutaneous and Aesthetic Surgery*. 2015 Jan-Mar; 8(1):9-15. U.S. National Library of Medicine, National Institutes of Health.

⁵ Anderson R., Parrish J. Selective Photothermolysis: Precise microsurgery by selective absorption of pulsed radiation. *Science*. 1983;220:524-7