***THE SCIENCE***

***THE SCIENCE - UV/LED NAIL LAMPS AND SKIN HEALTH RISKS
(SPOILER ALERT: THEY'RE PREVENTABLE)***

At MANISAFE London, they are big fans of gel manicures and strongly value the emotional well-being a fresh set of gel nails can bring. They are also passionate about healthy skin as we are and encourage gel nail users to protect their hands from UV rays during a gel manicure. Just like going out for a walk, being aware of UV risks and protecting your skin, will preserve the youthfulness and health of your hands.

But don't just take it from them and us at SunSibility, below you will find a compilation of the research available on UV nail lamps and skin health risks, so you can make an informed decision for yourself.



Gel manicures provide long-lasting and glossy nails, which have revolutionised the original manicure. Many people, especially women, find joy in getting a gel manicure and it can boost confidence in having well manicured hands. Dr. Chris Adigun, a board certified Dermatologist, also states that gel nails can be great and even life-changing, for her patients with disfiguring nail diseases [1].

***ULTRAVIOLET (UV) EXPOSURE & GEL MANICURES***

Although, gel nails bring many positives to people's lives it cannot be ignored that nail lamps, both UV and LED, used to cure the gel polish, emit ultraviolet (UV) rays [2, 6].



In 2012, solar (from the sun) and artificial ultraviolet radiation (UVR) was classified by the International Agency for Research on Cancer (IARC) as a group I carcinogen to humans [3]. Meaning all types of UV rays, UVA, UVB, and UVC cause cancer with cumulative exposure. UVA and UVB are the main types of rays emitted by the sun, that reach the earth's surface.

The type of UV rays emitted from nail lamps are UVA, the same type emitted from the sun [4]. UVA rays are longer wavelengths (315-400nm), that penetrate into deeper layers of the skin, called the dermis and are associated with skin ageing [4]. Unprotected exposure to UVA damages the DNA in skin cells, producing genetic defects, or mutations, that can lead to premature ageing (wrinkles, dark spots and dull, leathered looking skin) and skin cancer [4]. An estimated 90% of non-melanoma skin cancers and skin ageing is associated with ultraviolet (UV) radiation [4, 26].



 Source: sqonline.ucsd.edu

Gel manicures have been around for a long time but skyrocketed in popularity in 2010, when CND launched their Shellac® brand. Now, gel manicures are the manicure of choice for most salon customers and for many who do at-home manicures. From a health risk perspective, this is a short period of time to determine the health impacts.

***WHAT DOES THE RESEARCH SAY?***

**Case Reports**

In 2009, before the popularisation of gel nails, there was a case report of 2 healthy middle-aged women with no personal or family history of skin cancer developed non-melanoma skin cancers on the backs of their hands [5]. These women reported repeated exposure to UV nail lamps.

Recently, in 2019 and 2020, there have been 2 further case reports published [6,7]. Ractyz et al. reported on a woman with no personal or family history of cancer, who had an 18 year history of nail lamp use every 3 weeks and an 18 year history of tanning beds with many precancerous lesions and skin cancer isolated to the backs of her hands and nowhere else on her body [6]. Freeman et al. reported on a woman taking the photosensitizing agent hydrochlorothiazide, who developed numerous squamous cell carcinomas on the backs of her hands and feet with a 10-year history of UV nail light exposure every 2-3 weeks for gel manicures and pedicures [7].

**Research Studies**

The research studies looking at the role UV nail lamps play in directly causing skin cancer remain controversial, and the authors of such studies remain divided. ﻿Most of the research consists of photodynamic/irradiance studies and mathematical models completed between 2010 and 2014, after the case report published in 2009. This type of study involves measuring the energy dose of UVA rays being emitted from the lamps and making an estimate of the skin cancer risk [8-13].

The authors of these studies (Doug Schoon, the previous Chief Scientist for nail polish manufacturer CND, and colleagues [8], Diffey [9], Markova and Weinstock [10] and Dowdy and Sayre [11]) **all estimated the risks of skin cancer in direct relation to UV nail lamps to be between very low and moderate** [8-11].

Alternatively Curtis et al. found that **a single 10-min session of UV nail lamp use exposes clients to an energy dose that matches the exposure limit for outdoor workers in a single day** [12]. Also, Shipp et al. studied the energy density from 17 UV nail lamps and found that to reach the **UVA light threshold that causes DNA damage in skin cells and potential skin cancer formation**, **the numbers varied widely across the lamps measured, from 8 -208 visits.** They found the midway point to be **a number of 11.8 visits with a UV nail lamp session, or 6 months, if receiving a gel manicure every 2 weeks, is needed** [13]. Both Curtis and Shipp are board certified dermatologists.

In his study, Diffey, a Professor of Photobiology in Dermatological Sciences, **acknowledged risk estimates based off of his mathematical model needs to be viewed with caution**, due to the assumptions made in the analysis. Estimating dose response using a power model derived from epidemiological and animal studies incorporates a number of assumptions, none of which is likely to be entirely correct [9].

A newly completed study by Zhivagui et al. in February 2021, is **the first study to directly examine the effects of UV rays emitted specifically from nail lamps on human and rodent skin cells.** They examined the pre-mutagenic and  mutagenic changes of DNA of human and rodent cells after being exposed to UV rays of a common UV-nail dryer that can be purchased online. Their study demonstrated that radiation from UV-nail devices is cytotoxic and genotoxic. **The authors' analysis of their findings combined with several case reports and previous research, strongly suggests that UV rays emitted by nail lamps may cause cancers of the hand and that UV-nail polish dryers, similar to tanning beds, may increase the risk of early-onset skin cancer** [14].

***WHAT IS THE CURRENT GUIDANCE BY SKIN HEALTH EXPERTS ON GEL MANICURES AND NAIL LAMP USE?***

Prior to the newly released research in 2021, **the overall risk of UV nail lamps for skin cancer risk is estimated as low**. However, **skin health experts urge caution** as these photodynamic studies [8-12], and their varying outcomes, make it challenging for clinicians to determine the true real-life risks for nail lamp users [15,16, 21]. Below you will find a list of recommendations from public health organisations and leading skin health experts

**Public Health Organisations provide the following advice:**



The American Academy of Dermatology of Dermatology recommends [17]:     **Before getting a gel manicure, apply a broad-spectrum, water-resistant sunscreen with an SPF of 30 or higher to your hands to prevent skin cancer and premature skin aging. This will help protect your skin from the ultraviolet radiation used to seal gel nail polish to the nail. Another option is to put on dark, opaque gloves with the fingertips snipped off before your nail polish is applied.**



The Karen Clifford Skin Cancer Charity (SKCIN), UK's national skin cancer charity recommends [18]:**"As part of our MASCED training course, we recommend that clients apply broad spectrum sunscreen 20 minutes before using nail lamps."**



Skin Cancer Foundation recommends [20]: **To play it safe with gel manicures, The Skin Cancer Foundation recommends applying a broad spectrum (UVA/UVB) sunscreen to hands 20 minutes before your hands are exposed to UV light** [19]. As well as:**Be careful sitting under the dryer. Some nail lamps are called “UV” lamps, and some are called LED lamps, but both emit UV radiation (predominantly UVA). Although these lamps present only a moderate risk, it’s best to avoid using them if you can. If you’re setting a gel manicure, apply sunscreen to your hands 20 minutes before putting your hands under the dryer**[20].



FDA's positioning statement from 2017 [22]: **The FDA views nail curing lamps as low risk.**

**That said, if you’re concerned about potential risks from UV exposure, you can avoid using these lamps. You may particularly want to avoid these lamps if you’re using certain medications or supplements that make you more sensitive to UV rays. These medications include some antibiotics, oral contraceptives, and estrogens—and supplements can include St. John’s Wort.**[**See an extended list of medications that can cause sun sensitivity on the FDA’s website**](https://www.fda.gov/drugs/special-features/sun-and-your-medicine)**.**

**Also remove cosmetics, fragrances, and skin care products (except sunscreen!) before using these lamps, as some of these products can make you more sensitive to UV rays.**

**If you have questions about using nail drying or curing lamps, consult a health care professional.**

**And if you do choose to use these devices, you can reduce UV exposure by:**

* **Wearing UV-absorbing gloves that expose only your nails.**
* **Wearing a broad-spectrum sunscreen with an SPF of 15 or higher. (Since nail treatments can include exposure to water, follow the sunscreen’s labelled directions for use in these situations.)**

**Individual Skin Health Experts provide the following advice:**

In a recent interview in 2021, Professor Brian Diffey, Emiritus Professor of Photobiology in Dermatological Sciences from the University of Newcastle provided the following recommendation ***"It's wise to use fingerless gloves to protect your skin against unnecessary UV exposure to UV rays, emitted from nail lamps. Backs of the hands are a common site of premature ageing due to sun exposure. Unprotected gel manicures will compound the problem and accelerate the ageing process."***

 Irish Plastic Surgeons, Dr. Stephanie Bollard et al. recommend [21]:  "**The evidence on this subject is variable and often controversial, leaving the health-care provider with no clear conclusion, and further research is warranted. In the interim, we agree with the advice that approximately 20 min before having a manicure a broad spectrum, high sun protection factor sunscreen is applied to the hands, or the use of fingerless gloves should be considered."**

Dr. Jordan Wang et al. (Board Certified Dermatologists) recommend [16]: **"If women insist on getting gel manicures, then a discussion on UVA can be integrated into routine sun safety education. Patients can also apply a broad spectrum sunscreen 20 minutes prior to the use of curing lamps, which is recommended by the Skin Cancer Foundation. Finally, patients can also be advised to wear nitrile exam gloves with the finger tips cut off, which has been suggested to be effective."**

UK Plastic surgeons Dr. Alexandra Khoury et al. recommend [15]: **"We find it difficult to accept the stance from some authors that ‘low risk’ is so negligible that it should be ignored. Reasonable recommendations include sunscreen application 30 min before lamp use and provision of UV protective gloves in salons. We suggest also that sale of home lamps should be age restricted with warning stickers and safely standardised UV. This may reduce risk of malignancy as well as photo aging and its adverse cosmetic effects, and allow customers to make informed choices."**

 Dr. Chris Adigun, Board Certified Dermatologist recommends [1,23]:

 **“In an ideal world, every salon would provide customers with a safe solution to protect their hands andfingers from UVradiation during a gel manicure. Until that solution exists, however, customers should be proactive about UV protection," she says. “I recommend that they use fingerless gloves or a similar garment with an Ultraviolet Protection Factor of 50 and wear them for every gel manicure..."**

Doug Schoon, previously the Chief Scientist for CND and holding a Master's degree in Chemistry, promotes that UV nail lamps are safe [2,8,24]. However, he has also been recorded **acknowledging that the use of UV nail lamps can cause premature ageing of the skin** [25]. As mentioned above, premature ageing is a form of skin damage [4]. Mr. Schoon also recommends the use of SPF15+ broad spectrum sunscreen or a cloth to cover the hand in the lamp, if a client is concerned about UV exposure [2]. [Click here to view the video.](https://www.youtube.com/watch?v=L7wTDsbVEqY)

***THE BIG PICTURE:***

The current overall estimate of nail lamp's contribution to skin cancer is low, however, as you can see above, the research is inconclusive and does not factor in the most recent study completed by Zhivagui et al. or recent case reports [14,6,7].  The above studies also look only at cancer risk of UV nail lamps and when used in isolation. However, there is skin damage that occurs long before skin cancer may develop, and that presents as premature ageing, also known as photoageing [26]. The good news is, as per skin health experts recommendations above, there are easy solutions to protect your hands from the unnecessary UV exposure; a broad-spectrum sunscreen or UV protective fingerless gloves.

It is also important to note that many people are highly sensitive to UV exposure, also know as having photosensitivity [1, 22]. This can be due to autoimmune diseases or genetic predisposition. However, it is more common that a person's photosensitivity is due to either medications or supplements they are taking [1,22]. Often, people are unaware of this increased sensitivity to UV exposure. Over 100 medications and supplements can cause photosensitivity [1]. It is of even more importance for those with photosensitivity to protect their skin from sources of UV radiation [1,22].

It is also not practical to look at nail lamp UV exposure in isolation, as cumulative UV exposure contributes to sun damage [26]. So your daily outdoor exposure combined with nail lamp use add up to the total amount of UV exposure that causes skin damage. It all adds up. So, it is best to practice UV safe habits when you are out doors and in the salon to keep your hands healthy!

If you have any questions please contact us at info@sunsibility.co.uk

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