

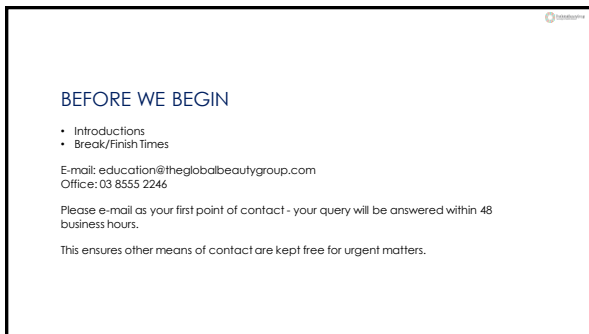


TOP TIP:

Enhance your memory retention by downloading this e-resource & taking notes as you work your way through chapter 1. Your notes can be digitally entered & printed off or printed off and hand written.




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THE TATTOOING PROCESS


A tattoo is a form of body art, made by inserting permanent ink into the dermis.

Tattoos arise from a rich cultural history dating back 5,000 years.


Ötzi, a copper age ice man, displayed tattoos that may have been used to mark the locations for acupuncture treatments or perhaps the tattoos were the treatment itself.

Today, in modern society, tattoos are primarily used as a form of self-expression, and widely accepted throughout western culture.


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Professional
tattoo parlour/studio




Cosmetic
permanent makeup



Amateur
Prison, Backyard, DIY




Trauma
Road/gravel rash




Surgical or Medical
Radiation Treatment


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THE TATTOOING PROCESS

← Ink is dispersed through the epidermis and upper dermis.



The immune system's phagocytes engulf any smaller ink particles.


The upper dermis heals and large ink particles remain trapped


The damaged epidermis flakes away.


Deep in the skin, granulation tissue forms converting to connective tissue by way of collagen growth.

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PIGMENTS


Early tattoo inks were obtained naturally and were limited in colour.

Today, an unlimited number of colors and shades of tattoo inks are available and can be mixed together to produce unique shades.

A wide range of dyes and pigments are used and made from inorganic materials like titanium dioxide, iron oxides, carbon black and azo dyes.

Modern tattooing inks are carbon-based pigments that have uses outside of commercial tattoo applications.

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PIGMENT HEALTH RISKS

- 90% of the pigments in tattoo inks are obtained from India.
- A study from the University of Northern Arizona found ink components and ingredients from various manufacturers have completely different compositions.
- Paint or poly-aromatic hydrogens are sometimes used in brighter inks.
- Although some inks contained toxic ingredients, other hazardous materials can also be found in carrier substances:
 - Denatured Alcohol
 - Methanol
 - Antiseptic
 - Alcoholic Uniment
 - Detergent
 - Formaldehyde

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PIGMENT HEALTH RISKS

A report by the EU Commission for Health reported almost 40% of organic dyes found in the inks haven't been approved.

Prohibited colour pigments and carcinogenic impurities found in 22 out of 26 tested tattoo inks during routine inspections in 2013.

A study conducted by the University of Copenhagen found carcinogenic ingredients in 13 out of 21 tattooing inks customarily used in Europe.

The effects of tattoo ink are evident from a large number of clinical observations. Nano-particles can enter the bloodstream and result in functional disruptions of organs essential to life.

- Allergies**
Itching, swelling, eczema, necrosis, hyper-pigmentation & scarring
- Skin Diseases**
May trigger eczema, psoriasis, etc can transfer to other organs
- Cancer**
Poly-aromatic hydrocarbons may cause leukaemia, lung or intestinal cancer
- Secondary Effects**
Chemicals transported into the bloodstream can result in cellular mutations of the skin and trigger melanoma (50 cases attributed to tattoos so far)

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MOTIVE FOR REMOVAL

- "I was too young when I got the tattoo" (20%)
- "It's permanent" and "I'm marked for life" (19%)
- "I just don't like it!" (18%)
- Those who regret their tattoos were typically tattooed in their late teens or early 20's and are evenly distributed by gender.
- Over 50% reported they've "suffered embarrassment".
- A new job, problems with clothes or a significant life event are also motives.



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AUSTRALIAN STATISTICS

- 1 in 5 or 19% of Australians have at least one tattoo
- 15.4% of men have tattoos and women 13.6%.

Of the Australians that have tattoos:

- 48% have one tattoo.
- 30% have two or three.
- 8% have four to five.
- 14% having 6 or more.

- 27% regret getting it, of which 15% are considering removal.




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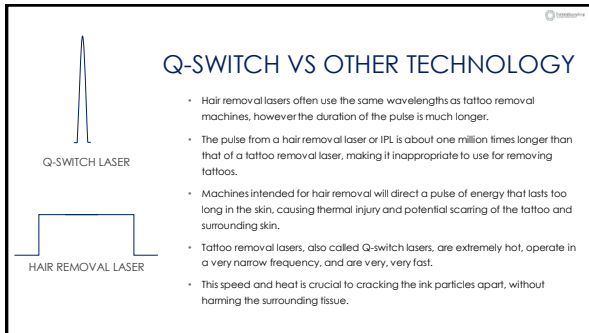
TATTOO REMOVAL METHODS

- Salabrasion (salt abrasion)
- Dermabrasion
- Cryosurgery
- Skin excision
- Fading Creams
- Acid Peels – TCA
- Q-Switched laser
- Argon laser
- CO2 laser
- Or a "Cover-up"

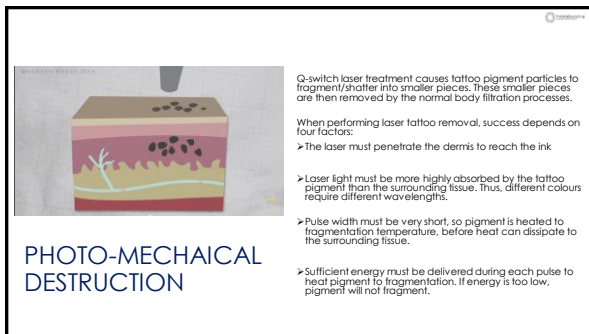


Scarring and ink retention after salabrasion treatment.

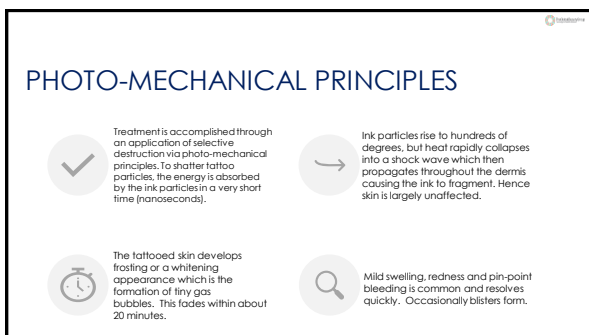
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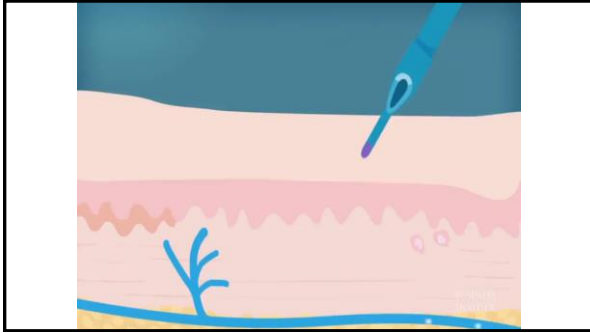
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INK ELIMINATION: PHAGOCYTOSIS

- Macrophages are a type of white blood cell that engulf and digest cellular debris, foreign substances, microbes, cancer cells, and anything else that does not represent a healthy body cell.
- This process is called phagocytosis.
- Phagocytosis works to engulf the shattered ink particles by way invagination, where the macrophage draws the particle inward, stretches and closes in around it.
- Once the contents have been absorbed, a phagolysosome forms a residual body to contain the tattoo particles.
- The residual body is eventually discharged from the cell, and into the lymphatic system to be excreted.

 A diagram titled "Stages of phagocytosis" showing four sequential steps in a 2x2 grid.
 1. Attachment: A blue macrophage with a nucleus is shown with a small black square (ink particle) on its surface.
 2. Ingestion: The macrophage's membrane is shown pinching off to engulf the black square.
 3. Killing: The black square is now inside the macrophage, surrounded by a blue internal structure.
 4. Degradation: The black square is broken apart into smaller pieces within the macrophage.

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LYMPHATIC SYSTEM AND ELIMINATION

- The lymphatic system is a network of delicate tubes that help rid the body of toxins, waste and other unwanted materials.
- Its primary function is to transport lymph, a fluid containing infection-fighting white blood cells, throughout the body.
- During laser tattoo removal, lymph transports the shattered ink particles through the lymphatic system and the bloodstream, before it is then delivered to the lymph nodes to be eliminated as a waste product.
- Ink is then metabolized through either the sweat glands, kidneys, or liver, removing ink through sweat, urine, or bowel movements.

 A diagram of a human figure showing the lymphatic system in green. Labels point to various parts:
 - Cervical lymph nodes (neck)
 - Lymphatics of the mammary gland (chest)
 - Pelvic lymph nodes (lower torso)
 - Thoracic duct (upper chest)
 - Thymus (upper chest)
 - Axillary lymph nodes (armpits)
 - Spleen (upper left abdomen)
 - Inguinal lymph nodes (groin)

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ABSORPTION OF WAVELENGTHS

The most common wavelengths used to remove tattoos are:

- **1064nm** (infrared light) absorbed by black and most other ink colours.
- **532nm** (green light) is absorbed by red and orange inks.
- 650nm, 694nm, 755nm (red light) are absorbed by green ink.
- 585nm (yellow light) is absorbed by blue ink.



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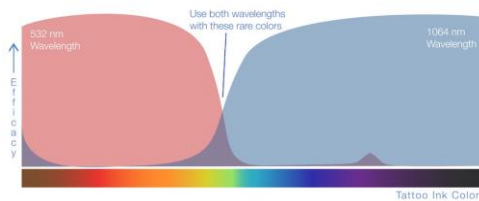
WAVELENGTHS

Different wavelengths are better for different tattoo colours:

- **Nd:YAG 1064 nm:** creates a near-infrared light which is poorly absorbed by melanin and haemoglobin, making this the safest laser for all skin types including darker skin. This wavelength is also absorbed by all dark tattoo pigments.
- **Nd:Yag 532 nm:** creates green light (absorbed by red & orange targets). As it is highly absorption by melanin, 532nm is recommended for use on skin types I – IV.
- **Alexandrite 755 nm:** weakest and has a slightly lower incidence hyperpigmentation than a ruby laser. Works well on green and dark tattoos but not well on black and blue ink. It doesn't work on red, orange, brown, etc.
- **Ruby 694 nm:** creates red light (highly absorbed by green and dark targets). It's highly absorbed by melanin. This laser may cause hyper or hypopigmentation in darker skin types.

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Efficacy of Nd:YAG Laser Wavelengths



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PARAMETERS

Pulse width - lasers with shorter pulses are safer and are more efficient.

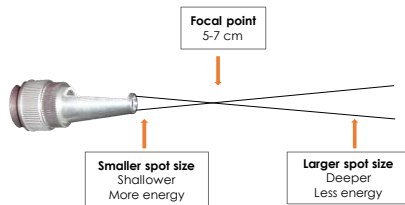
Spot size - A larger spot size increases the depth of penetration, enabling more effective targeting of deeper tattoo pigments.

Energy - Important to treat with high enough energy to fragment tattoo particles.

Repetition rate - helps to make treatments faster.

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SPOT SIZE



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TREATMENT IN THE FOCAL POINT



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ATTACHMENTS

- Square lens = 532nm (Magnified)
- Circle lens = 1064nm (Magnified)
- Larger spot size = Carbon facial (No Magnification)



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NUMBER OF TREATMENTS

Tattoo removal requires numerous treatments, spaced at least 6-8 weeks apart.

As tattoos fade, clients should wait several months between treatment to facilitate ink resolution and minimize unwanted side effects.

Fading can continue for months or even years after treatment. Extremities take the longest.

A predictive scale, known as the "Kirby-Desai Scale", was developed to assess the potential number of treatments necessary. The Kirby-Desai Scale assigns numerical values to certain characteristics.

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Kirby-Desai Tattoo Removal Scale

SKIN TYPE

1	2	3	4	5	6
Very Fair	Fair	Medium	Dark	Very Dark	Black
1 point	2 points	3 points	4 points	5 points	6 points

LOCATION

1	2	3	4	5	6
Face	Neck	Upper Arm	Lower Arm	Hand	Foot
1 point	2 points	3 points	4 points	5 points	6 points

AMOUNT OF INK

1	2	3	4	5	6
Light	Medium	Dark	Very Dark	Black	Black
1 point	2 points	3 points	4 points	5 points	6 points

LAYERING

1	2	3	4	5	6
Single Layer	Double Layer	Triple Layer	Quadruple Layer	Quintuple Layer	Six Layer
1 point	2 points	3 points	4 points	5 points	6 points

SCARRING & TISSUE CHANGES

1	2	3	4	5	6
No Scarring	Minimal Scarring	Moderate Scarring	Severe Scarring	Very Severe Scarring	Extensive Scarring
1 point	2 points	3 points	4 points	5 points	6 points

COLORS

1	2	3	4	5	6
Black	Dark Blue	Medium Blue	Light Blue	Green	Yellow
1 point	2 points	3 points	4 points	5 points	6 points

Estimated Number of Treatments Required to Achieve Goal

THE KIRBY DESAI SCALE

- This scale can be used by the clinician during consultation to estimate the number of treatments required.
- Tattoos scoring greater than 15 points may be difficult to remove and should be assessed by the clinician to decide whether laser removal is the best method of choice for the client.
- The Kirby-Desai scale enables a thorough assessment and hopefully aids in defining a more accurate treatment plan and improved patient satisfaction.
- There are 6 parameters that determine the Kirby-Desai score.



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SKIN TYPE

- Tattoo removal requires laser penetration into the dermis without causing significant damage to the surrounding skin.
- As Melanocytes absorb laser energy, one of the considerations is skin type.
- Since melanin and tattoo ink have different absorption spectrums, successful treatment outcomes can be achieved on darker skin types although adverse reactions, such as hypo/hyper pigmentation, are higher.
- Decreased efficacy with darker skin types can be seen due to lower settings required and longer times between treatments to minimise reactions.
- Fitzpatrick skin type scores as its corresponding number of 1 to 6



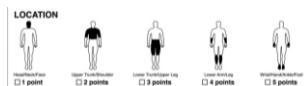
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	Skintone	Description	Female	Male
0-6	Pale yellow skin	Extremely pale skin, blue or light blue eyes Caucasian, Ashkenazi and Russian		
7-13	White skin	Very white skin, blue or light blue eyes European, Ashkenazi, Ashkenazi, Ashkenazi, Ashkenazi		
14-20	Light brown skin	Medium skin, brown eyes, blue or light blue eyes European, Ashkenazi, Ashkenazi, Ashkenazi		
21-27	Moderate brown skin	Medium skin, brown eyes, blue or light blue eyes European, Ashkenazi, Ashkenazi, Ashkenazi		
28-34	Dark brown skin	Medium skin, brown eyes, blue or light blue eyes European, Ashkenazi, Ashkenazi, Ashkenazi		
35+	Deeply pigmented dark brown to black skin	Very dark skin, brown eyes, blue or light blue eyes European, Ashkenazi, Ashkenazi, Ashkenazi		

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LOCATION

- Blood and lymphatic supply vary by anatomic region, so does the efficacy of tattoo removal in such corresponding anatomic areas.
- The head and neck have the largest amount of lymph nodes and have a large vascular supply, thus, they are able to mount an increased immune response to better remove the ink particles.
- The upper and lower trunks also have a vast vascular and lymphatic supply, trailing behind the head and neck regions.
- The proximal extremities have more lymphatic supply than the distal extremities, making distal extremities the slowest to remove.



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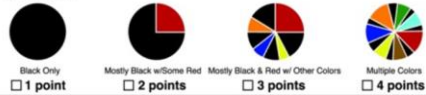
COLOUR

- The differences in pigment size and composition lead to the difference in the amount of treatments needed.
- Professional and amateur tattoos differ in their physical and chemical composition.
- Black ink is the easiest to remove as it easily absorbs the most amount of energy.
- Red inks are easier to remove in comparison to other colours.
- Other colours, such as blue, green, yellow and orange are difficult to remove and warrant higher amount of points on the Kirby-Desai scale.
- White is impossible to remove.



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COLORS



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AMOUNT OF INK


- The amount of ink and size within a tattoo will affect the treatment.
- The difference in the amount of ink, lies within the type of tattoo the client has; amateur or professional.
- In the Kirby-Desai scale, the amount of ink is divided into four categories;
 - amateur (letters, words, or small symbols)
 - minimal (one colour, simple design)
 - moderate (one colour, complex design)
 - significant (multi-coloured, complex design)

Table II: Amount of Ink		= sessions
	Amateur	1
	Minimal	2
	Moderate	3
	Significant	4

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No Scar	0
Minimal amount of scarring	1
Moderate amount of scarring	3
Significant amount of scarring	5

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LAYERING

- Clients sometimes want to "remove" a tattoo by layering it with another.
- It is necessary for the new tattoo to be larger and darker than the tattoo it is replacing, as tattoo ink is opaque.
- Therefore, the new tattoo will typically require more treatments.
- As such, layering is given 2 points in the Kirby-Desai scale. Those without layering receive 0 points.

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LAYERING

No

☐ 0 points

Yes

☐ 2 points

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CONSULTATION PROCESS

Client to fill in consent form and sign.

A comprehensive initial consultation is required before any treatment

This involves taking a full health/medical history, evaluating the tattoo, explaining the procedure, reviewing risks and benefits, options, answering questions, and establishing price per treatment

Risk of sun exposure to be discussed.

A photo of the tattoo and a test patch is undertaken

A review is then booked and treatment can begin

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TEST PATCHING

- Have client sign consent form
- Take photo (every treatment)
- Wash hands and glove up
- Clean treatment area (use alcohol wipe)
- Use white eyeliner to protect un-inked skin
- Dry shave treatment area if necessary
- Put safety glasses on client and yourself
- Set laser parameters appropriately and record settings
- Perform test patch or treatment - systematically
- Review and treat according to your insurance policy




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TREATMENT PARAMETERS

- Test patching for new clients/tattoos always starts at 200mj.
- Continue to increase by increments of 20mj until a clinical end point is achieved (popping or frosting).
- Always test patch in the darkest area of the tattoo.
- Test patching is always performed in a single shot (1 hertz).
- Test patching should be done before every treatment. Start consecutive treatment test patch on settings performed at last treatment.
- 1064nm will be used for all darker pigments throughout the entire treatment course.
- For tattoos including red, orange and brown, 532nm can be incorporated (only on the coloured ink) once a large majority of the darker pigment has been removed. Typically around treatment 3-5 depending on clearance.
- Once most of the ink has been removed treating remaining ink by holding the handpiece 8-10cm away from the skin to increase depth of penetration (this should not be done when first starting out).

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PAIN MANAGEMENT

- Ice packs prior and during treatments work very effectively and are recommended.
- While the application of an anesthetic cream prior to treatment can be utilized, topical anesthetic creams only work by blocking the pain sensation in the epidermis, while laser tattoo removal is working deep in the dermis.
- Some of the anesthetic may also be absorbed into the blood stream via the skin, and potentially cause adverse side effects such as:
 - Heart Palpitations
 - Vomiting
 - Anesthesiology
 - Tingling in the area
 - Risk of anaphylaxis (allergy)
- Limit application of numbing to an A5 size.
- Treat larger tattoos on different dates by sections, min. 3 weeks apart.

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CONTRAINDICATIONS

- Pregnancy or trying to become pregnant
- Breast feeding (Risk of transfer of ink to baby)
- Cancer or Chemotherapy (light sensitivity and compromised immunity)
- Users of Roaccutane within last 6 months
- Users of Retin-A or Tretinoin in the tx area in the last 2 weeks
- Diabetes
- Auto immune, peripheral vascular or bleeding disorder
- Tanned or sunburned skin in area of tattoo
- Renal Failure (Acute or Chronic)
- Multiple Sclerosis or Epilepsy
- Surgical metal pins or plates under tissue to be treated
- Pacemakers
- Photosensitising medication or St. John's Wort in the past month.

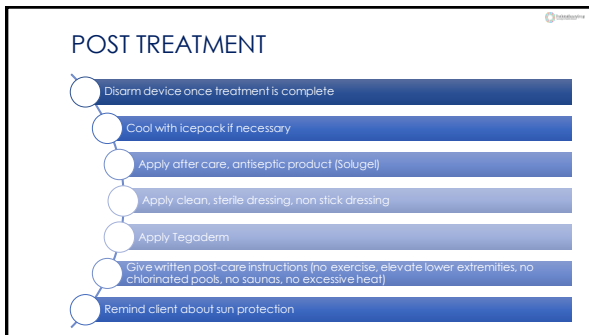
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PRECAUTIONS

Clients to exercise extra precautions with:

- Allergic reaction to ink, primarily red tattoo ink, may lead to increased chance of anaphylaxis.
- Skin types 4/5 increased chance of hyper-pigmentation and scarring.
- History of keloid scarring.
- If the client is unwell (flu, common cold etc.)
- Smoking/Drugs
- Chronic disease (delay in healing). Longer between treatments to allow proper healing
- Older clients may also take longer to heal.
- Immuno-compromised patients (ex. HIV, AIDS, Arthritis, Allergies) may take longer to heal or not flush out ink.
- Allergies (to latex or anesthesia)
- Tanning (natural/fake) will increase risk of burns.
- Client to stay out of the sun for at least 4 weeks prior to treatment

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POST TREATMENT

- Immediately after treatment, frosting occurs, dissipating soon after
- Pinpoint bleeding and oedema usually resolves within 24-72 hours
- A crust appears over the entire tattoo, which clears up approximately 2-3 weeks post-treatment. Some tattoo pigment may be found within this crust
- Post-treatment care consists of simple wound care and a sterile dressing.
- Fading will be noticed (post treatment over 8 weeks) and re-treatment energy levels can be tailored depending on clinical response observed
- Most tattoos will itch for several weeks after treatment and skin may feel dry and flaky. Clients can use a barrier cream on the area
- Scarring is uncommon, however if persistent red, elevated skin develops for more than a week, medical attention may be required

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SIDE EFFECTS AND COMPLICATIONS

- Transient changes in normal skin pigmentation (PIH) can sometimes be seen post treatment, these changes usually resolve in 6 to 12 months but may sometimes be permanent.
- Transient textural changes are also occasionally noted but often resolve within a few months.
- Blisters can occur post treatment. If a blister or crust forms following treatment, it is imperative that the client does not manipulate this secondary skin change; Early removal of a blister or crust increases the chances of developing a scar.
- Aftercare instructions for a blister includes elevation, rest, and intermittent icing.

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SIDE EFFECTS

- Some tattoo colours including light red, peach and light brown, as well as some green and blue tattoo pigments (most containing iron oxide or titanium dioxide), may change to black when treated.
- If tattoo darkening does occur after 8 weeks the newly darkened tattoo can be treated as if it were black ink. However, the grey-black colour may require more treatments to remove.
- Rarely, when yellow cadmium sulphide is used to "brighten" the red or yellow portion of a tattoo, a photoallergic reaction may occur. The reaction will be confined to the site of the red/yellow ink.
- Treatment consists of strict sunlight avoidance, sunscreen, anti-histamines and oral anti-inflammatories.
- Unlike the destructive modalities mentioned, treatment may mobilise the ink and may generate a systemic allergic response.



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BLISTERS

If blisters are cared for, scars will not result

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BLISTERS

If blisters are cared for, scars will not result

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TREATMENT OUTCOMES

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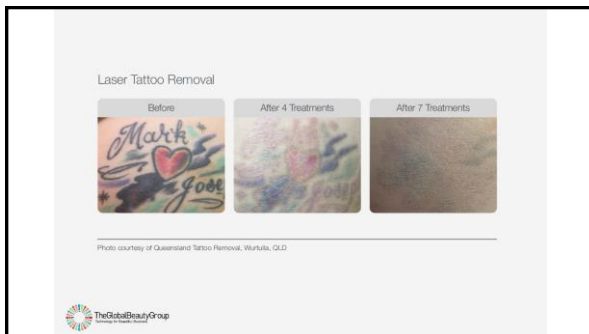
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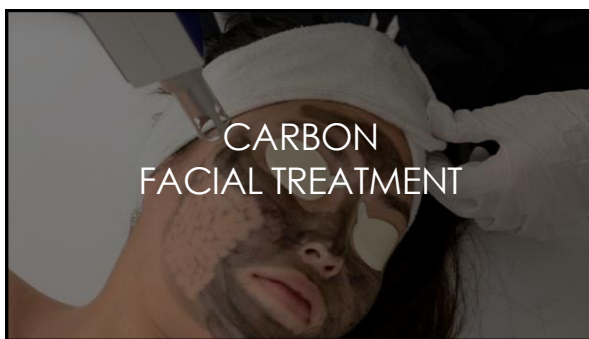
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WHAT IS A CARBON FACIAL?

A Carbon facial is also commonly referred to as the China doll facial or Hollywood peel.

It utilises the Q-Switched laser mechanism as well as liquid carbon applied to the face to deep cleanse, exfoliate, rejuvenate and remove oil and congestion.



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01

A layer of medical grade carbon, which has a liquid/cream consistency, is applied to the face and is absorbed by the pores

02

We then pass over the face using a q-switch laser. Energy is absorbed by the carbon chattering it into particles

03

As the carbon is blasted off the area, it takes away dead epidermal cells, contaminants and oil with it

04

This process delivers instant exfoliation, deep cleansing and purification of pores

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WHY CHOOSE CARBON FACIAL?

Unique, high-tech facial experience

Results are instant and accumulative

No down time

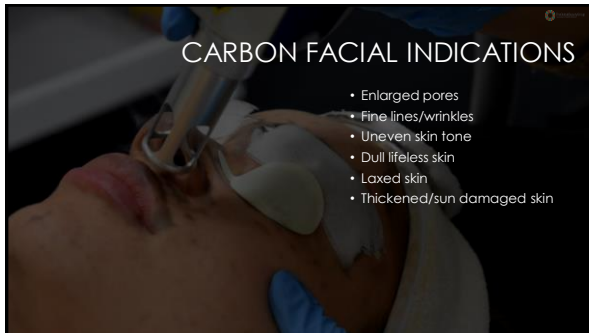
Quick treatment times

Can be performed every 2-4 weeks

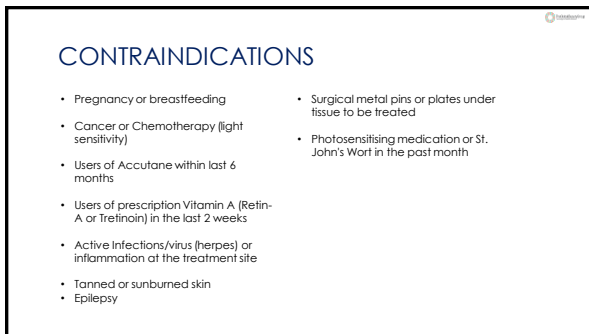
4 - 6 treatment course recommended

Can treat Fitz 1 - 5

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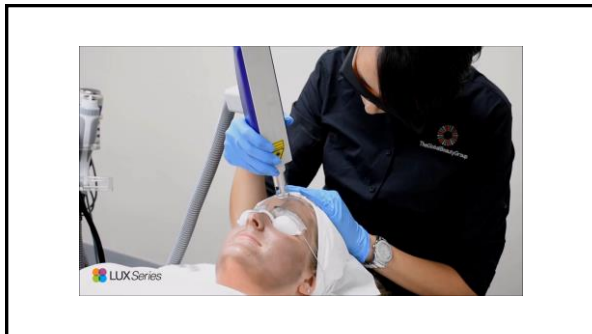


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CARBON FACIAL TREATMENT PROTOCOL

1. Apply gloves
2. Apply headband/hair net
3. Cleanse skin
4. Cover eyebrows with micropore tape
5. Apply thin layer of carbon the entire face
6. Allow to sit for 1-2 mins to allow maximum absorption
7. Apply eye shields/goggles
8. Set up the device
9. Holding laser head about 1cm away from the face begin treatment
10. Perform 2-3 passes over the entire face, making sure all the carbon gets removed
11. Cleanse/wipe down face
12. Apply aftercare products/SPF

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Carbon Facial + LED

Before

After

Photo courtesy of DermaClear Clinic, Emington, NSW

After 1 Treatment

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CARBON FACIAL POST CARE

- Avoid the use of physical exfoliants or active skin care for 72hrs post treatment
- Avoid chemical peels, microdermabrasion, IPL/laser on the area treated (2 weeks)
- Avoid swimming, spa, saunas, hot showers and excessive sweating for 24-48hrs post treatment
- Apply SPF 30+ everyday and avoid direct sun exposure

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