Skintastic Aesthetic Lasers Ltd

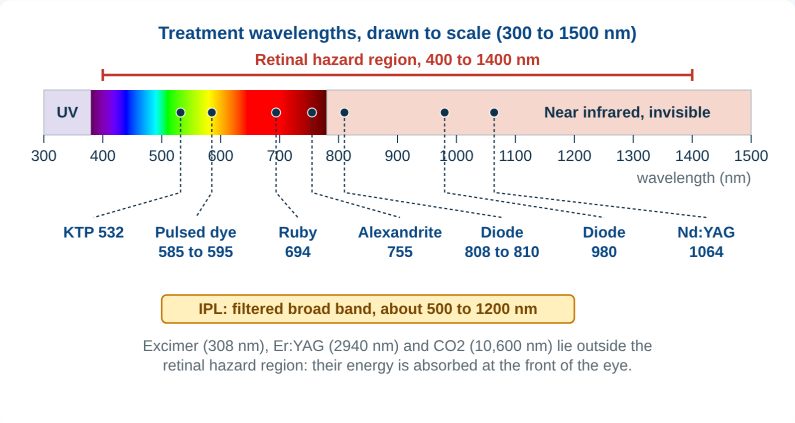
Advanced Aesthetic Training Academy

Core of Knowledge: Laser and IPL Safety CPD Course

Lasers, intense pulsed light and LEDs: physics, hazards, controls and the law

Online, self-paced • 3 hours • 3 CPD credits

Accredited CPD: 3 CPD credits, The CPD Group activity 1005546



Excimer (308 nm), Er:YAG (2940 nm) and CO2 (10,600 nm) lie outside the retinal hazard region: their energy is absorbed at the front of the eye.

Every aesthetic laser and IPL works inside the retinal hazard region, 400 to 1400 nm.
Student manual and workbook.

THE CPD GROUP — APPROVED PROVIDER #777800 — Verify @ https://thecpdregister.com

This manual belongs to

Student name: _____

Date started: _____

Date finished: _____

26 The Avenue, Southampton, SO17 1XL • 02381 946394

info@skintasticaesthetics.com • www.skintasticaesthetics.com

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Skintastic Aesthetic Lasers Ltd

Advanced Aesthetic Training Academy

Core of Knowledge: Laser and IPL Safety CPD Course

Laser, intense pulsed light (IPL) and LED safety, physics and legislation

Student manual and workbook. Online, self-paced. 3 hours, 3 CPD credits.

Edition 2, October 2026.

Student registration

Full name: _____

Date started: _____

Date finished: _____

Email: _____

Telephone: _____

Clinic or employer: _____

3 CPD credits, The CPD Group activity 1005546

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Welcome to your course

Welcome to Skintastic. This is your Core of Knowledge manual, and it is yours to keep.

Core of Knowledge is the safety training that your insurer, your local authority and your Laser Protection Adviser will ask to see before you use a class 3B or class 4 laser or an intense pulsed light (IPL) device. It is also the course people most often treat as a box to tick, which is exactly why it is worth doing properly.

Why this matters more than any treatment course you will do

A laser or IPL can permanently damage someone's sight in less time than it takes to blink. It can set fire to a treatment room. It can burn a client badly enough to scar. None of those things happens because the operator did not know a treatment protocol. They happen because the operator did not understand the hazard. That is what this manual is for.

Read this carefully, because it is the point of the whole course

Core of Knowledge is not a treatment qualification and it does not make you competent on any particular machine. The approved syllabus says so: it is essential that Core of Knowledge is supplemented by additional training in specific applications.

You need three things before you treat anybody: this course, for the hazard; device training from your supplier, for the machine; and a treatment qualification, for the procedure. Anyone who tells you one of them covers the others is wrong.

How this manual is laid out

Every section opens with a blue learning outcomes box telling you what you should be able to do by the end of it, followed by a table of the detailed topics it covers. Through each section you will find these boxes:

Box	What it is for
Learning outcomes (blue)	What you should be able to do by the end of the section.
Key fact (sage green)	The things worth committing to memory.
Caution (red bar)	The things that cause harm if you get them wrong.
Check your understanding	Questions at the end of each section, to answer in your own words. They form part of your evidence.
Notes (pale blue)	Writing lines for your own reminders.

Finding your way around

- **Sections 1 to 5** are the learning content, following the syllabus. **Appendix A** gives the official reference for every law named.
- **Section 6** is your assessment: multiple choice questions, short answers and a scenario, which you answer online.
- **Section 7** holds the templates you will use back in your own clinic (local rules, risk assessment, registers, logs, checklists, audit and incident report), followed by your course completion pages.
- The sources, and the originality and image credits, are at the end.

If anything in here is unclear, ask. We would far rather answer a question now than have you guess with a client in front of you.

Carla Cooper-Gale
Managing Director, Skintastic Aesthetic Lasers Ltd
IQA | Assessor | Level 5 DET | UK Responsible Person for medical devices, registered with the MHRA (through Skintastic Aesthetic Supplies Ltd)

Your course at a glance

Course	Core of Knowledge: Laser and IPL Safety CPD Course
Training provider	Skintastic Aesthetic Lasers Ltd. Course author: Carla Cooper-Gale
Accreditation	Accredited CPD: 3 CPD credits, The CPD Group activity 1005546. The course appears on the public CPD register as "Online Core Of Knowledge", accredited until 29 September 2029.
Total hours	3 hours of self-paced online study, including the assessment
Delivery	Online and self-paced, with this manual as your study text and workbook
Type	Theory only, with no practical element. It is accredited CPD, not a regulated qualification, and carries no qualification level. It is safety training: it does not teach treatment protocols or make you competent on a particular machine.
Mapped to	The BMLA, IPEM and SRP Core of Knowledge syllabus; MHRA guidance (2015), Appendix C; BMLA Essential Standards (2017)
Structure	Five sections and Appendix A, 31 learning outcomes
Assessment	Section 6: multiple choice questions, short written answers and a scenario, plus the "Check your understanding" questions in each section. You answer online; written answers are AI-read, with feedback by email.
Entry requirements	Aged 18 or over, with English good enough to read the manual. No previous laser qualification is needed.
On completion	An accredited CPD certificate (3 CPD credits), valid for three years, and a CPD reflective record for your portfolio
Renewal	Refresh Core of Knowledge at least every five years, as the MHRA guidance and the BMLA recommend, and sooner after an extended absence or a significant change in equipment or practice. Your insurer, LPA or regulator may require it sooner; your certificate is valid for three years.

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What you will be able to do

These are the learning outcomes for the course as a whole. Each section has its own detailed outcomes, and Section 6 maps every one of them to the questions that assess it.

No.	By the end of this course you will be able to	Sections	How it is assessed
1	Explain optical radiation and how lasers, IPL and LEDs produce and deliver it.	1	Section 6, Parts A and B; Check your understanding, Section 1
2	Describe the hazards to the eye and skin, the laser classes and IPL risk groups, MPE and NOHD, and the protective eyewear needed.	2	Section 6, Parts A and B; Check your understanding, Section 2
3	Control the hazards in a treatment room: the controlled area, risk assessment, the hierarchy of control, non-beam hazards, and equipment management and quality assurance.	3	Section 6, Parts A, B and C; Check your understanding, Section 3
4	Explain how laser and light interact with tissue, how the common treatments work, and how to recognise and manage adverse effects.	4	Section 6, Parts A and B; Check your understanding, Section 4
5	Explain registration and licensing across the UK, the safety roles, local rules, protocols, legislation and standards, and what to do after an accident or adverse incident.	5, Appendix A	Section 6, Parts A, B and C; Check your understanding, Section 5

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The Core of Knowledge syllabus

The recognised national Core of Knowledge syllabus was approved by the British Medical Laser Association, the Institute of Physics and Engineering in Medicine and the Society for Radiological Protection (advice notice, July 2014). It describes Core of Knowledge as "a body of knowledge that underpins the safe use of lasers in clinical practice", intended for all staff using class 3 and 4 lasers and IPL and LED sources, and sets a minimum course length of three hours. The table shows where each syllabus topic is covered in this manual.

Syllabus topic	Covered in
Basic principles of laser generation, and laser and IPL technology	Section 1
Laser hazard classification	Section 2
The meaning of warning labels	Section 2
Principles of quality assurance	Section 3
Emission characteristics of different types of equipment	Section 1
Laser and tissue interaction mechanisms	Section 4
Penetration of light of different wavelengths through skin and eye	Sections 2 and 4
Dangers of central versus peripheral retinal damage	Section 2
Hazards to eye and skin from accidental exposure	Section 2
Maximum Permissible Exposure and Nominal Ocular Hazard Distance	Section 2
Principles of risk assessment	Section 3
Laser safety management: the LPA, LPS, local rules and controlled area	Sections 3 and 5
Risks from accidental reflections	Section 2
Personal protection, including eye protection	Sections 2 and 3

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Syllabus topic	Covered in
Hazards to the patient, such as endotracheal tube ignition	Section 3
Incidental hazards: electrical, fire, explosion and plume	Section 3
Relevant legislation, standards and guidelines	Section 5, Appendix A
Dealing with an adverse event or accidental exposure	Sections 4 and 5

How this course measures against the syllabus

The syllabus asks for	This course
At least 3 hours	3 hours of study, including the assessment
An assessment of understanding "has merit"	A full written assessment (Section 6), read with an AI assistant
An attendance certificate	An accredited CPD certificate
Records of attendees kept for at least five years	Skintastic keeps learner records for at least five years
Re-attendance every five years, or sooner after an extended absence or significant changes	Taught in Section 5 and shown on your record of completion
Approval by a recognised body	Accredited by The CPD Group

The MHRA guidance adds that a Core of Knowledge course should ideally include practical exercises on risk assessment, safety administration and equipment management. In this course those are the scenario in Section 6 and the templates in Section 7.

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Your study plan

This is a self-paced online course of three hours. You work through the manual in order, at your own pace, answering the "Check your understanding" questions as you go, and then complete the assessment in Section 6. You can take a break whenever you need one; breaks are not counted in the three hours.

Step	What you do	Study time
1	Read the front section: welcome, syllabus, study plan, accessibility; complete the registration form	10 min
2	Section 1: light, lasers and intense light sources, with its questions	25 min
3	Section 2: the hazards, eyes, skin and classification, with its questions	25 min
4	Section 3: controlling the hazards in your treatment room, with its questions	25 min
5	Section 4: how laser and intense light affect tissue, with its questions	20 min
6	Section 5 and Appendix A: safety management, the law and standards, with its questions	30 min
7	Section 6: the assessment (Parts A, B and C), answered online	40 min
8	Section 7: look through the templates; complete the feedback form and CPD reflective record	5 min
	Total	**180 min (3 hours)**

It is all theory: learning content with its questions, 2 hours 20 minutes; assessment, 40 minutes; total 3 hours, 3 CPD credits.

About the course author: Carla Cooper-Gale

Founder and Managing Director, Skintastic Aesthetic Lasers Ltd and Skintastic Aesthetic Supplies Ltd. Level 5 Diploma in Education and Training (DET) qualified teacher.

Carla brings nearly two decades in health and aesthetics, over a decade working with lasers, and a decade teaching. She founded Skintastic in Southampton in 2011; before that she worked in health and social care (Craegmoor Healthcare, 2006 to 2011). She writes and teaches 22 CPD-accredited courses, accredited by The CPD Group, and delivers Ofqual-regulated Focus Awards qualifications.



Carla Cooper-Gale, founder and lead trainer, in the Skintastic clinic. © Carla Cooper-Gale, Skintastic Aesthetic Lasers Ltd.

> **For this course:** the most relevant of these are the ITEC Level 4 Award in Core of Knowledge for Laser and Light Devices (2024) and Aesthetic Laser and IPL Core of Knowledge (Intermed Clinical, 2013; OCN Level 4, 2020).

Teaching and quality assurance (Ofqual regulated, Focus Awards)

- Level 5 Diploma in Education and Training (DET)
- Level 4 Internal Quality Assurance of Assessment (IQA)
- Level 3 Certificate in Assessing Vocational Achievement (Assessor)
- Level 3 Award in Education and Training

Laser, light and energy-based qualifications (Ofqual regulated)

- Focus Awards Level 5 Diploma in Laser Tattoo Removal
- VTCT Level 4 Certificate in Laser and IPL Treatments (2023)
- ITEC Level 4 Award in Core of Knowledge for Laser and Light Devices (2024)
- ITEC Level 4 Radio Frequency
- ProQual Level 4 Ultrasound Cavitation Treatments
- Focus Awards Level 4 Award in Facial Anatomy and Physiology

Also: Edexcel BTEC Level 3 National Diploma in Health and Social Care (2009).

Specialist operator training (CPD and awarding body certificates)

- Aesthetic Laser and IPL Core of Knowledge (Intermed Clinical, 2013; OCN Level 4, 2020)
- Laser tattoo removal and carbon face peel operator training (Intermed Clinical, 2014 and 2015)
- OCN Level 5 Laser Tattoo Removal (2018 and 2021)
- OCN Level 5 Q-switched Nd:YAG Laser Nail Fungal (2018)
- OCN Level 4 Laser, IPL and Nd:YAG (2021)
- IPL, radiofrequency, E-Light and SHR operator training (Intermed Clinical, 2015; Coolcontours, 2015)
- Laser lipolysis operator training (Intermed Clinical, 2015)
- Ultrasound cavitation lipolysis (CIBTAC, Intermed Clinical, 2021)
- CO2 fractional laser, cold plasma and endolifting fibre laser (Hydurage)
- HIFU in Aesthetic Practice (Skinovation, 2026)
- Cryotherapy fat freeze (Fox Tox Training Academy, 2022)
- HI-EMT high intensity electromagnetic technology (B&E, 2022)
- Laser hair removal (One Education, 2023)
- LED light therapy (2020)

Injectables and vitamins (CPD)

- Foundation botulinum toxin and dermal filler (Derma Pro Training, 2020)
- Injectable fat dissolve (Bellate, 2020)
- Vitamin B12, biotin (B7), C and D injections (Bellate)
- Complications and medical emergencies for injectables (Dr Radford Aesthetics, 2021)

First aid

- Qualifi Level 3 Emergency First Aid at Work
- Qualifi Level 3 Basic Life Support and Anaphylaxis

Memberships and registrations

- Full Member of the British Medical Laser Association (BMLA), 2026 to 2027
- UK Responsible Person registered with the MHRA for the Kes MED-870+ FOCXEL fractional CO2 laser and the AL1 Q-switched Nd:YAG (supplied by Skintastic Aesthetic Supplies Ltd). **Registration is not approval: no device is "MHRA approved".**
- The CPD Group accredited training provider
- Focus Awards approved centre, delivering Ofqual-regulated qualifications
- Skintastic is registered with the FCA for equipment finance

Entry requirements

Core of Knowledge is the starting point for laser and IPL work, so no previous laser or IPL qualification is needed.

Requirement	Status	Why
Aged 18 or over	Essential	The course prepares you for work with class 4 equipment in a clinical setting.
English good enough to read this manual and write short answers	Essential	Tell us if English is an additional language and we will support you.
Access to a computer or device and the internet	Essential	The course is delivered online.
Working in, or planning to work in, a clinic using lasers, IPL or LEDs	Recommended	You will get the most from Sections 3 and 5 if you can picture your own room.

Recognition of Prior Learning

Recognition of Prior Learning (RPL) is **not available** against this course. Core of Knowledge is a safety requirement that insurers, licensing authorities and regulators expect you to have completed, recently, as a course in its own right, so every learner completes all of the learning and all of the assessment in Section 6.

If you already hold a Core of Knowledge certificate from another provider that is still within its refresh period, you may not need this course at all: check with your insurer, your LPA or your licensing authority whether your existing certificate is accepted. If you are taking this course as a refresher, you still complete it in full.

This course has no practical element. Where Skintastic's practical laser and IPL treatment courses require Core of Knowledge as an entry requirement, RPL is never granted for their practical element.

How the course is delivered

The course is online and self-paced. This manual is your study text and your workbook.

Method	Where it is used	What it is for
Self-paced reading	Sections 1 to 5, Appendix A	The underpinning knowledge, written in plain English with technical terms explained as they appear.
Diagrams	Throughout	Most pages carry a diagram, because where light goes is easier to see than to read.
Check your understanding	End of every section	You answer in your own words as you go. Your answers form part of your evidence.
Practical exercises on paper	Section 6, Part C; Section 7	A room scenario, and real templates for risk assessment, local rules and equipment management.
Written assessment	Section 6	Multiple choice, short answers and a scenario: draft your answers in this book, then answer online.
Support	Throughout	Questions by email or telephone at any point: 02381 946394, info@skintasticaesthetics.com.

When you have completed Section 6, enter your answers in the online assessment on the course page. Part A is marked straight away, and the correct answers to any you miss are emailed to you: write them in the Notes section of this book. Your written answers are read with the help of an AI assistant and you receive feedback by email.

Accessibility and additional support

We want everyone who books this course to be able to take part fully. Under the Equality Act 2010 we make reasonable adjustments, and we would far rather know what you need before you start.

Use the additional needs form at the end of this front section, ring 02381 946394 or email info@skintasticaesthetics.com. You do not have to give a diagnosis: tell us what would help.

What we have already done

Need	What is built in as standard
Visual impairment and low vision	This manual follows RNIB Clear Print guidance: a plain sans-serif typeface, body text at least 12 point, generous line spacing, strong contrast, text aligned to the left and no italics. Captions are printed in dark grey and upright. Large-print copies of this manual and of every form are available on request. As an online learner you can also enlarge the pages on screen.
Colour vision deficiency	No information is carried by colour alone. Every box carries a heading, and every diagram is labelled in words.
Dyslexia and processing differences	Short paragraphs, plain English, and technical terms explained where they first appear. You work at your own pace. Tell us if a coloured background helps.
Hearing impairment	All content is written; nothing depends on audio.
Assessment support	Extra time is not an issue on a self-paced course. Answers can be given verbally by arrangement.
Concentration and fatigue	Study in short sessions, section by section, and take breaks whenever you need them.
English as an additional language	Tell us in advance and we will check understanding with you as you go.

Student registration form

Please complete this form when you start and keep it with your manual. We use the details you gave at checkout to register you, to issue your certificate in the correct name, and to keep an accurate training record.

Full name (as it should appear on your certificate): _____

Business or employer (if any): _____

Address: _____

Postcode: _____ **Telephone:** _____

Email: _____

Your background

Which lasers, IPL or LED devices do you use, or plan to use (type and wavelength if known)?

Have you held a Core of Knowledge certificate before? If so, from whom and when?

In which nation of the UK do you work (England, Wales, Scotland or Northern Ireland), and which council area?

Your declaration

I confirm that the information on this form is true and complete, and that I will complete the assessment myself.

Signature: _____

Date: _____

Notes: _____

Additional needs and reasonable adjustments

Please tell us about anything that may affect your learning, so we can support you and make reasonable adjustments. This is confidential and is used only to support you. If you would prefer to talk it through, ring 02381 946394.

Name: _____

Please tell us about any of the following

- ☐ A disability or long-term health condition
- ☐ A specific learning difficulty such as dyslexia, dyscalculia or ADHD
- ☐ A visual or hearing impairment
- ☐ A need for large print or another format
- ☐ English is an additional language and you would like extra support
- ☐ Nothing to declare

If you ticked any of the above, please tell us a little more so we can help:

_____

_____

_____

Signature: _____

Date: _____

Our reply

Adjustments agreed: _____

Agreed by Skintastic and date: _____

Section 1 Light, lasers and intense light sources

Learning outcomes

By the end of this section you will be able to:

- Describe optical radiation and its ultraviolet, visible and infrared bands, and say which part of the spectrum is most dangerous to the eye
- Explain wavelength, frequency, power, energy, pulse duration, fluence and irradiance, and work out a fluence from a spot size
- Explain how a laser produces its beam, name the types of laser by active medium, and describe the properties of laser light
- Describe the emission modes of lasers, including continuous wave, gated, pulsed, Q-switched and picosecond output
- Explain how an intense pulsed light (IPL) source and an LED work, how ultraviolet is removed from an IPL, and why a worn flashlamp is a hazard
- Describe laser and IPL delivery systems and why beam profile and working distance matter

Ref	What this section covers, in detail
1.1	Optical radiation; the ultraviolet, visible and infrared bands and their limits; the whole electromagnetic spectrum; ionising and non-ionising radiation
1.2	Wavelength and frequency; the units of wavelength; power, energy, pulse duration, fluence (radiant exposure) and irradiance (power density); spot area
1.3	How a laser works; the parts of a laser; laser types by active medium; monochromatic, collimated and coherent light; point and extended sources
1.4	Emission modes; the aiming beam
1.5	The flashlamp; filtering, and how ultraviolet is removed; pulse shape and pulse trains; lamp ageing; LEDs, compared with IPL and lasers
1.6	Delivery systems: fibres, articulated arms, waveguides, handpieces, scanners, diffusers and other specialist systems; IPL contact and cooling; beam profile; working distance

Why the physics comes first

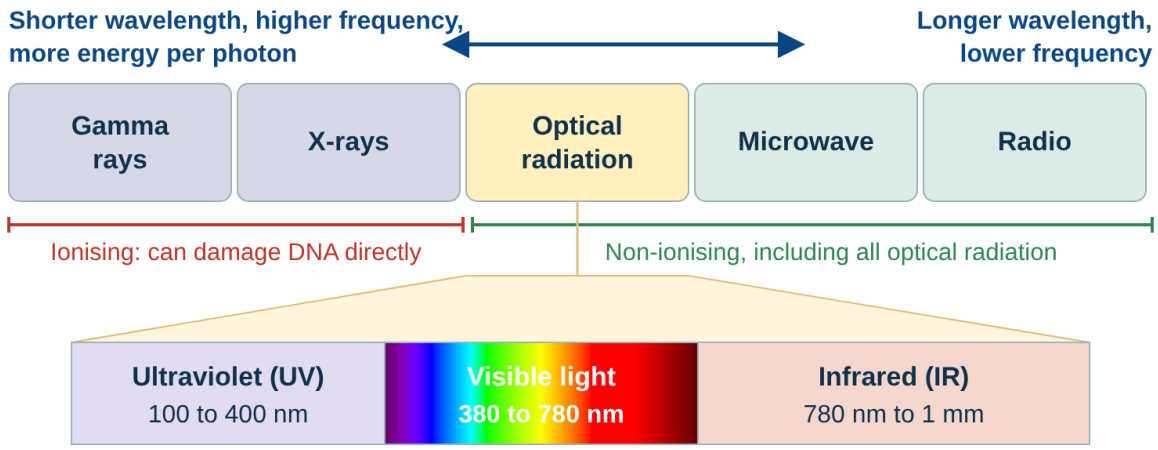
Every safety rule in this course follows from a handful of physical facts: what wavelength the light is, how much energy it carries, how long it lasts and how small a spot it is squeezed into. If you understand those, the rules in Sections 2 to 5 stop being a list to memorise and start making sense. Take this section slowly. Nothing in it needs maths beyond a calculator.

Optical radiation

Light is a form of electromagnetic radiation. It travels as a wave and carries its energy in small packets called photons. All of it travels in straight lines at the speed of light, which is why a reflection goes exactly where the angles send it, and why a beam that leaves a room through a window keeps going.

The electromagnetic spectrum runs from gamma rays and X-rays at the short end to microwaves and radio waves at the long end. The part this course is about, **optical radiation**, sits in between: from 100 nanometres (nm) in the ultraviolet to 1 millimetre in the far infrared.

Optical radiation within the electromagnetic spectrum



Optical radiation runs from 100 nm to 1 mm. 380 to 780 nm is the visible band as defined in the Artificial Optical Radiation Directive; the eye has no sharp cut-off at either end. (Bands not drawn to scale.)

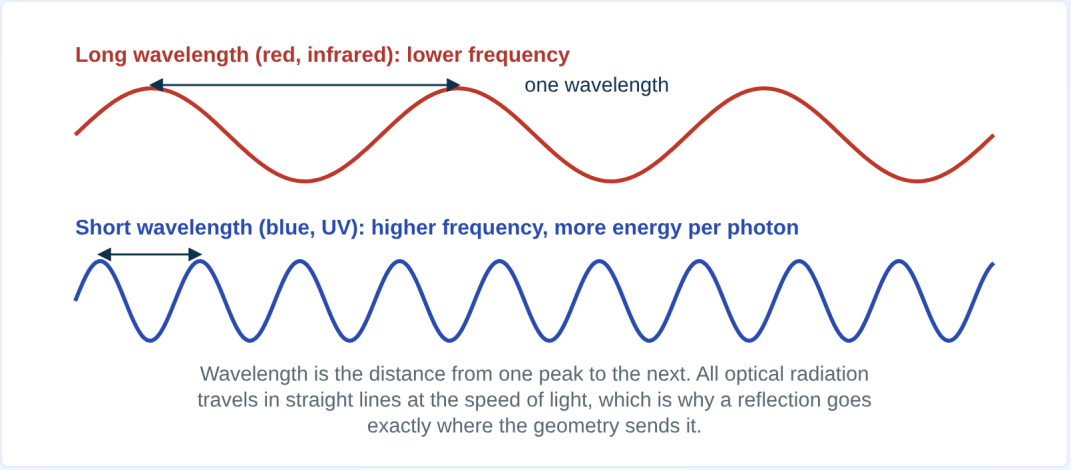
Optical radiation is non-ionising: it does not have the energy to break atoms apart the way X-rays do. It harms tissue in other ways, mainly by heating it. Drawn for this manual.

Wavelength and frequency

Wavelength is the distance from one wave peak to the next. In this field it is measured in nanometres. One nanometre is one billionth of a metre. Far infrared wavelengths are sometimes given in micrometres (µm): 1 µm is 1000 nm, so 10.6 µm and 10,600 nm are the same thing.

Frequency is how many waves pass a point each second. Wavelength and frequency go in opposite directions: the shorter the wavelength, the higher the frequency, and the more energy each photon carries. That is why ultraviolet can damage DNA in the skin and infrared mostly just heats.

Wavelength and frequency



Wavelength is the distance from one peak to the next. All optical radiation travels in straight lines at the speed of light, which is why a reflection goes exactly where the geometry sends it.

Wavelength decides what absorbs the light, how deep it goes and how dangerous it is. Drawn for this manual.

The three bands

Band	Wavelength	What it does
Ultraviolet (UV)	100 to 400 nm: UVC 100 to 280, UVB 280 to 315, UVA 315 to 400	Photochemical: it changes molecules rather than simply heating them. UV causes sunburn, tanning, vitamin D production and DNA damage that can lead to skin cancer. UVC from the sun is absorbed by the ozone layer. UV is filtered out of IPL output for this reason.
Visible	380 to 780 nm (violet to red)	The light we see. The eye is most sensitive in the middle, around green and yellow, so a green or yellow beam looks brighter than a red one of the same power. Strongly absorbed by melanin and haemoglobin.
Infrared (IR)	780 nm to 1 mm: IRA 780 to 1400 nm, IRB 1400 to 3000 nm, IRC 3000 nm to 1 mm	Felt as heat, and invisible. IRA (near infrared) still passes through the eye to the retina. Longer infrared is absorbed by water at the surface, which is why CO2 and Er:YAG lasers ablate skin and can burn the cornea rather than the retina.

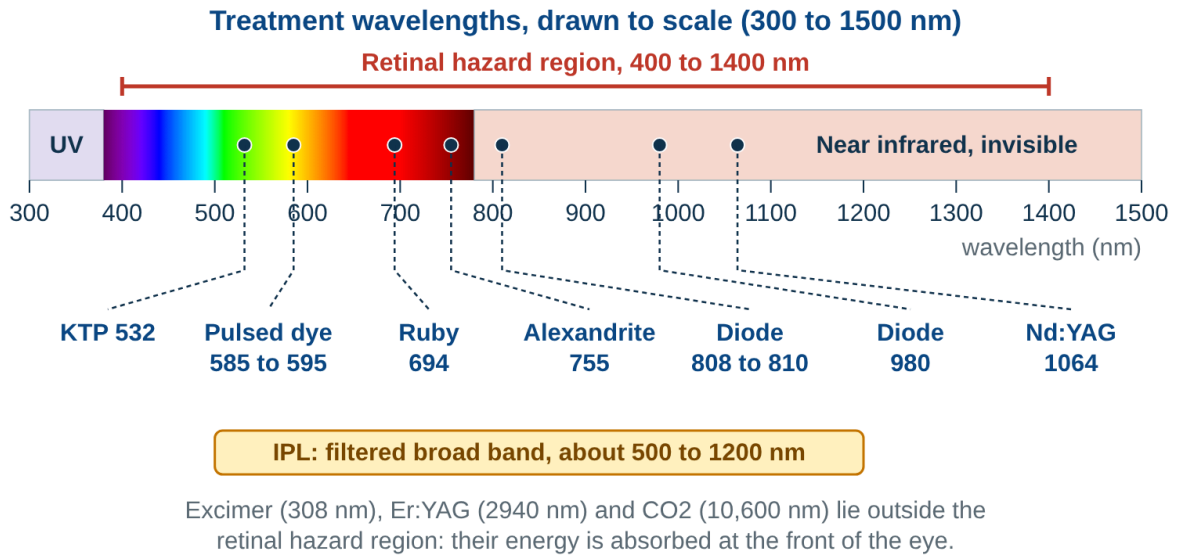
You will sometimes see visible light given as 400 to 700 nm. That is the range the eye sees well. The wider 380 to 780 nm figure is the one used in the legal

definitions behind the Control of Artificial Optical Radiation at Work Regulations 2010, so it is the one to use in a risk assessment. Biological effects do not stop sharply at any band edge.

The retinal hazard region: 400 to 1400 nm

Light between about 400 and 1400 nm passes through the clear front of the eye and is focused onto the retina. The eye concentrates it, so a beam that would barely warm your skin can burn the retina in an instant. Almost every aesthetic laser and IPL works inside this band. If you remember one number from this course, make it this one.

The wavelengths you will meet, on a true scale



Excimer (308 nm), Er:YAG (2940 nm) and CO2 (10,600 nm) lie outside the retinal hazard region: their energy is absorbed at the front of the eye.

Each marker sits at its true wavelength. Every one of these devices falls inside the retinal hazard region. Drawn for this manual, replacing the earlier course slide whose markers were misplaced.

The key technical terms

These words appear on every machine screen, in every protocol and in every risk assessment.

Term	Unit	What it means
Wavelength	nm	The colour of the light, and so what absorbs it and how deep it goes.
Energy	joules (J)	The total amount of energy delivered, for example in one pulse.
Power	watts (W)	How fast energy is delivered. One watt is one joule per second, so energy = power × time.
Pulse duration (pulse width)	ms, µs, ns, ps, fs	How long the light is on. It decides whether heat stays in the target or spreads.
Spot size	mm	The diameter of the beam at the skin.
Fluence (radiant exposure)	J/cm²	Energy per square centimetre. The figure you set on most pulsed devices, and the one that burns people when it is wrong.
Irradiance (power density)	W/cm²	Power per square centimetre. The figure that matters for continuous wave and cutting lasers.

Time units, from long to very short

Unit	Fraction of a second	Where you meet it
millisecond (ms)	one thousandth	Hair removal and vascular pulses; IPL pulses
microsecond (µs)	one millionth	Some short-pulse lasers
nanosecond (ns)	one billionth	Q-switched lasers for tattoo and pigment
picosecond (ps)	one million millionth	Picosecond tattoo and pigment lasers
femtosecond (fs)	a thousandth of a picosecond	Some eye surgery lasers; not used in aesthetic practice

Working out a fluence

Fluence is energy divided by the area it lands on. For a round spot, the area is 3.14 × radius × radius, with the radius in centimetres.

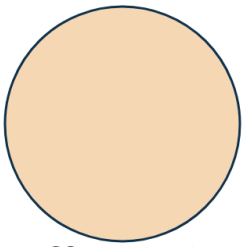
Worked example

A 10 mm spot has a radius of 0.5 cm. Its area is 3.14 × 0.5 × 0.5 = 0.785 cm². A pulse of 7.85 J through that spot gives 7.85 ÷ 0.785 = **10 J/cm²**.

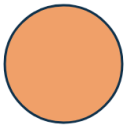
Put the same 7.85 J through a 5 mm spot (area 0.196 cm²) and the fluence is **40 J/cm²**: four times as much, from the same energy setting.

Change the spot and you change the dose

The same 7.85 J pulse through three spot sizes



20 mm spot
area 3.14 cm²
2.5 J/cm²



10 mm spot
area 0.785 cm²
10 J/cm²



5 mm spot
area 0.196 cm²
40 J/cm²

Area of a round spot = 3.14 × radius × radius (radius in cm). Fluence = energy ÷ area.
Halve the spot diameter and the area falls to a quarter, so the fluence rises four times.
Record the spot size with every fluence, every time.

Same energy, very different fluence. Record the spot size with every fluence you write down. Drawn for this manual.

Fluence is the number that hurts people

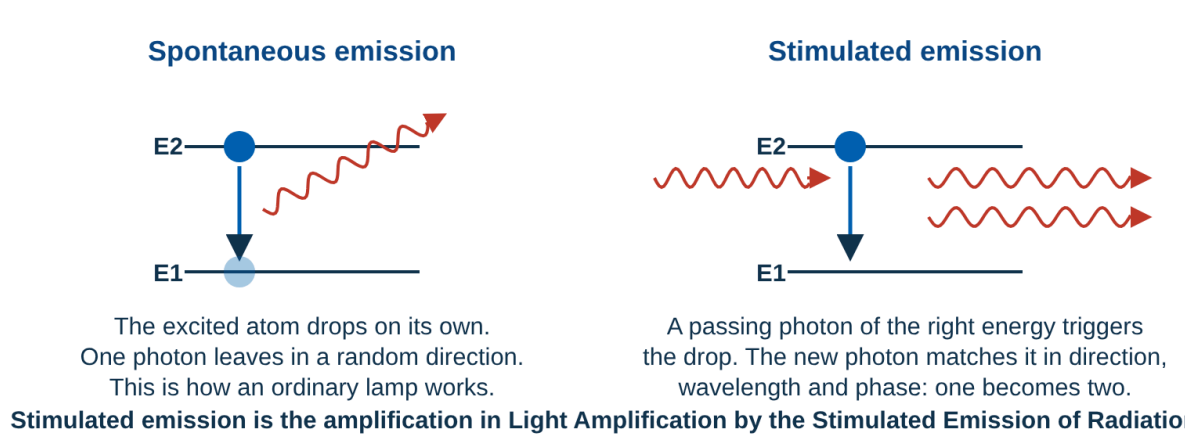
Two clients treated at the same joules with different spot sizes receive completely different doses. When you record a treatment, record the fluence and the spot size, not just the energy. When you read a protocol, check which figure it is quoting. Confusing them is a common route to a burn.

How a laser works

LASER stands for **Light Amplification by the Stimulated Emission of Radiation**. The word "light" is used loosely: many lasers emit infrared or ultraviolet that you cannot see.

An atom that absorbs energy becomes excited. It can release that energy in two ways. In **spontaneous emission** it drops back on its own and gives off a photon in a random direction, which is what an ordinary lamp does. In **stimulated emission**, a passing photon of exactly the right energy triggers the drop, and the new photon leaves in the same direction, at the same wavelength and in step with the first. One photon becomes two, two become four, and the light is amplified.

Spontaneous and stimulated emission

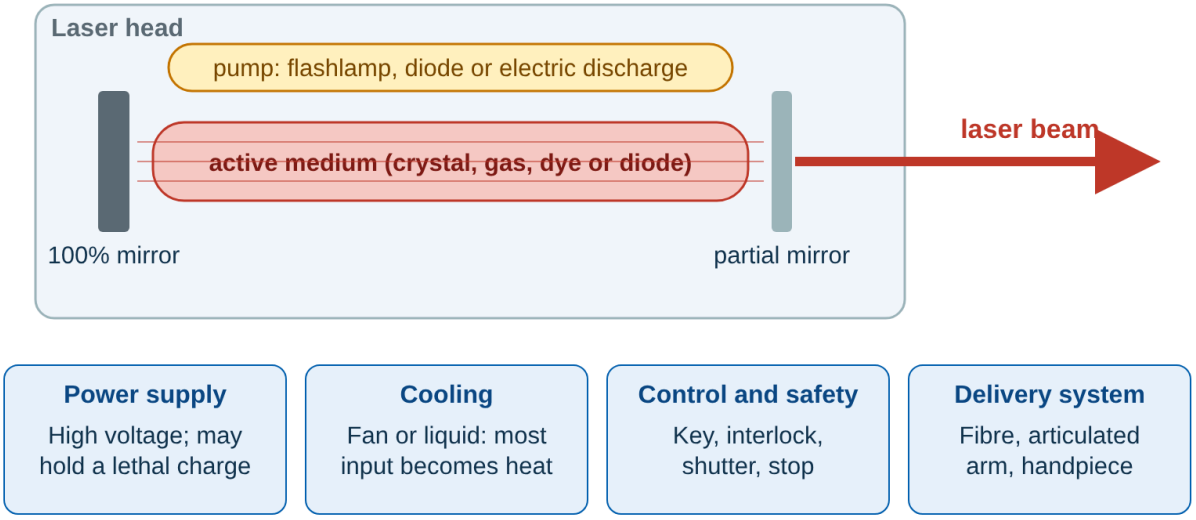


Stimulated emission is the amplification in the word laser. Drawn for this manual.

The parts of a laser

- **Active medium:** the material that is excited. It gives the laser its name and its wavelength.
- **Pump:** the energy source that excites the medium: a flashlamp, another laser (often a diode) or an electrical current or discharge.
- **Optical resonator:** two mirrors, one fully reflective and one partly reflective. Light bounces between them, building up on each pass, and the beam leaves through the partial mirror.
- **Power supply:** high voltage, which can hold a dangerous charge after the machine is switched off.
- **Cooling system:** lasers are inefficient, and most of the electrical energy that goes in comes out as heat, not light. A fan or a liquid cooling circuit carries it away. Never block the vents, and check coolant levels where your manual asks you to.
- **Controls and safety features:** key or password, emission indicator, shutter, interlock connection and emergency stop (Section 3).
- **Delivery system:** the fibre, arm or handpiece that brings the beam to the skin.

Inside a laser



The laser head, and the four systems around it that matter for safety. Drawn for this manual.

The first working laser, built in 1960, used a ruby crystal. Within a few years lasers were being used in medicine.

Types of laser, by active medium

Lasers are grouped by their active medium. You will see the groups described as three (solid, liquid and gas) or as four, with semiconductor diodes counted separately. Both are correct; this course uses four.

Four families of laser

Solid state	Gas	Liquid (dye)	Diode
crystal or glass rod	gas in a sealed tube	dye in a solvent	semiconductor junction
Nd:YAG 1064 Alexandrite 755 Ruby 694 Er:YAG 2940	CO2 10,600 argon 488 to 514 excimer 308	pulsed dye 585 to 595 (vascular)	808 to 810 940 and 980 aiming beams

Wavelengths in nanometres. The active medium gives the laser its name and its wavelength.

The active medium sets the wavelength. Drawn for this manual.

Semiconductor diode lasers make light where a current crosses the junction between two layers of semiconductor. They are small, efficient and long-lived, and many diodes can be stacked in arrays for more power. They are the usual hair removal laser at 808 to 810 nm, and low-power diodes also serve as pumps for other lasers and as aiming beams. Their raw beam spreads widely, so the handpiece optics shape it.

A diode laser system



The settings screen of a diode laser system. Generated image commissioned by Skintastic, not a photograph.

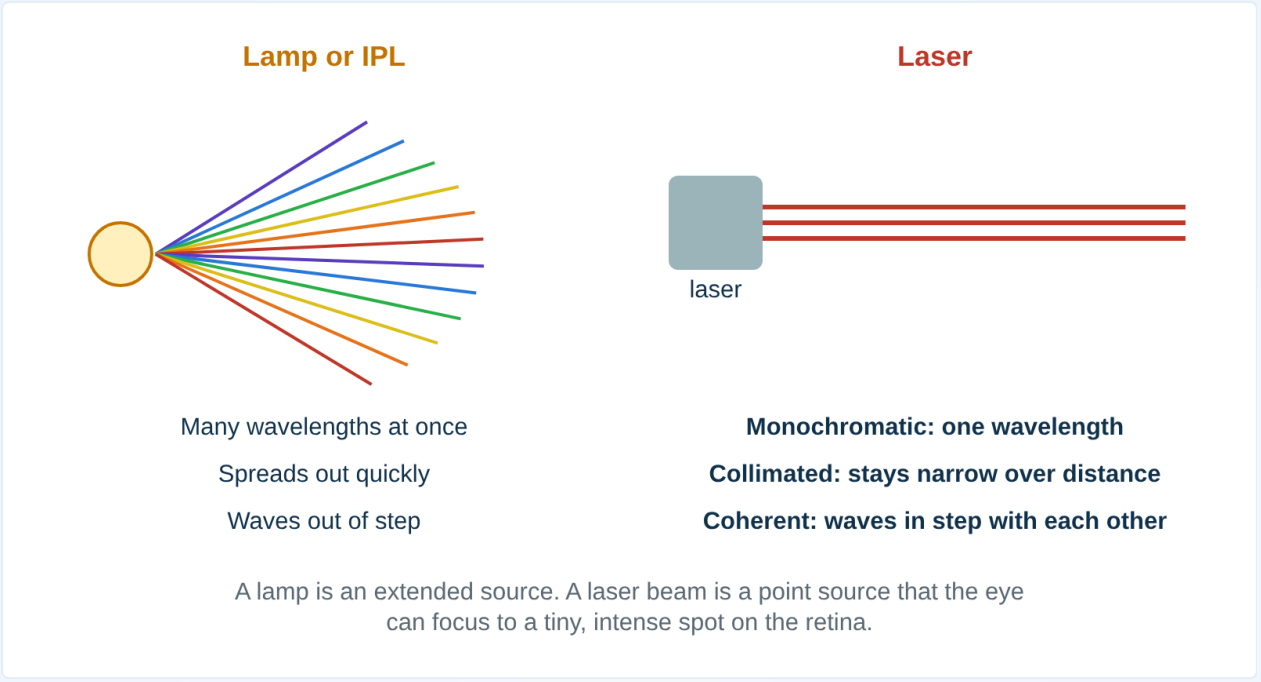
What makes laser light different

- **Monochromatic:** one wavelength, so it can be matched to one target. An IPL emits a broad band.
- **Collimated:** the beam travels almost parallel and barely spreads, so it stays dangerous across a room. This is why the Nominal Ocular Hazard Distance exists (Section 2).
- **Coherent (spatially coherent):** the waves are all in step. Coherence is partly lost when the beam passes down a fibre and is lost quickly inside tissue.

A laser behaves like a **point source**: the eye can focus it to a tiny, intense spot on the retina. A lamp or IPL is an **extended source**: its light lands on a larger area of

retina and is less concentrated. That is a large part of why a laser is the more severe eye hazard at a distance, although an IPL close to the eye is still dangerous.

A lamp and a laser



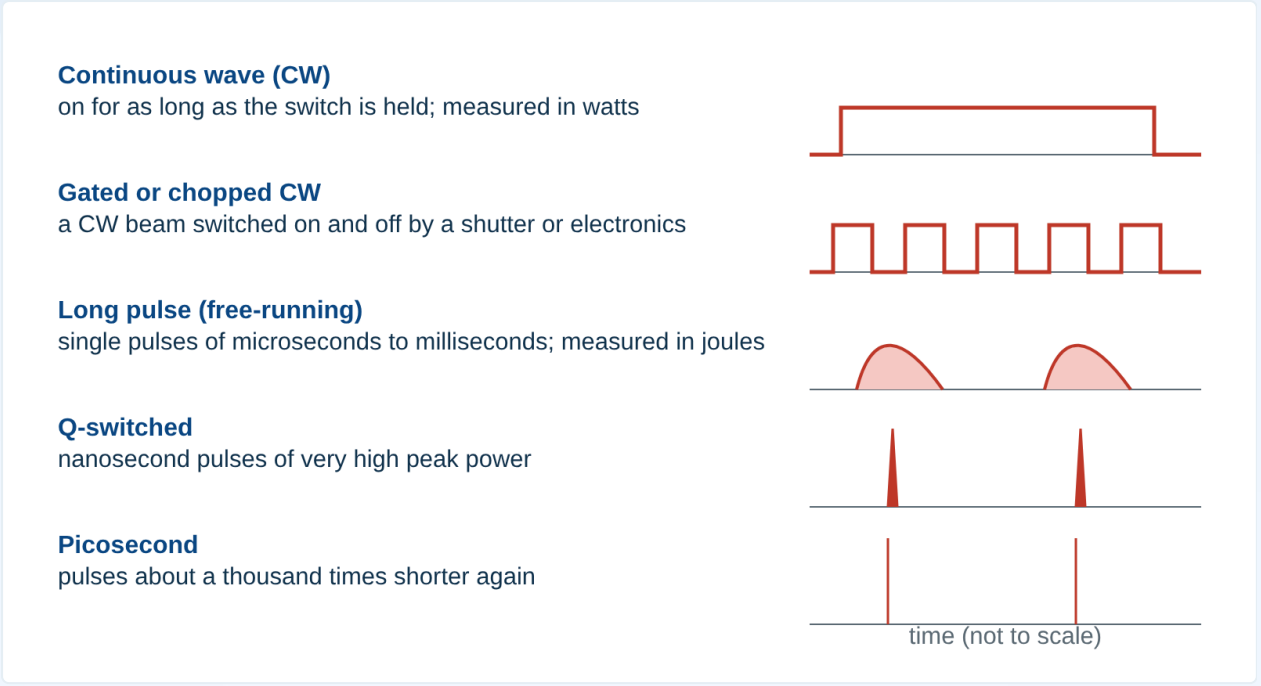
Monochromatic, collimated and coherent: the three properties that make laser light different. Drawn for this manual.

A simple way to see "monochromatic": shine white light through a glass prism and it splits into a rainbow. Laser light goes through as a single colour, because there is only one colour in it.

Emission modes, and the aiming beam

Lasers deliver their energy in different patterns over time. The pattern is called the emission mode, and it matters both for the treatment and for the eyewear, which is tested for particular pulse types.

How lasers deliver their energy over time



The shorter the pulse, the higher the peak power for the same energy. Drawn for this manual.

- **Continuous wave (CW):** the beam is on for as long as the foot or finger switch is held. Output is given in watts.
- **Gated or chopped CW:** a continuous beam switched on and off by a shutter or electronically, to give a series of pulses.
- **Pulsed (free-running or long pulse):** single pulses or pulse trains, typically microseconds to milliseconds long. Energy per pulse is given in joules. Most hair removal and vascular lasers work this way.
- **Q-switched:** energy is stored in the active medium and released all at once by a fast optical switch inside the resonator, giving pulses only nanoseconds long with a very high peak power. This is what shatters tattoo ink and pigment (Section 4).
- **Picosecond:** pulses about a thousand times shorter again, with an even stronger shattering effect.

The aiming beam

Many lasers emit at wavelengths you cannot see, so a low-power visible **aiming beam** (usually red or green) shows where the treatment beam will land. It travels the same path, through the same fibre or arm, and it must line up with the treatment beam. A knock to the handpiece can put them out of line, so check the alignment before use (Section 3).

An aiming beam is not an "on" light

No aiming beam does not mean no laser. If the aiming beam is missing, faint or misshapen, stop: the fibre may be damaged or the alignment lost, and the device should not be used until it is checked. The MHRA guidance says a laser should not be operated if its aiming system is faulty.

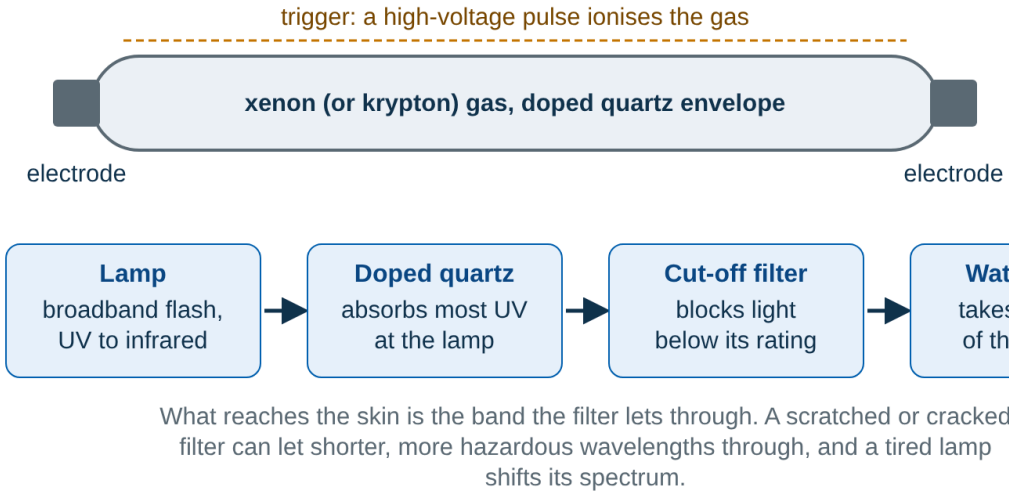
Intense pulsed light (IPL)

An IPL is not a laser. It is a very bright **flashlamp**: a sealed quartz tube filled with xenon (sometimes krypton) gas, with an electrode at each end. A high-voltage trigger pulse ionises the gas, and the stored charge then discharges across it as an intense flash covering a broad spread of wavelengths. Filters then select the band used for treatment, typically somewhere in the range of about 500 to 1200 nm.

A typical IPL delivers pulses of a few milliseconds through a window a few square centimetres in size, at a low repetition rate. It is not a laser, but it is a serious hazard to the eye and skin, and it is controlled in much the same way. Separate standards apply to it (Section 5), and some devices sold under other names (intense light source, light-based or heat-based system) are IPL by another name, with the same hazards.

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The flashlamp, and how ultraviolet is kept out



What reaches the skin is the band the filter lets through. A scratched or cracked filter can let shorter, more hazardous wavelengths through, and a tired lamp shifts its spectrum.

Ultraviolet is removed in two stages: the lamp glass is doped to absorb it, and the cut-off filter removes the rest of the short wavelengths. Drawn for this manual.

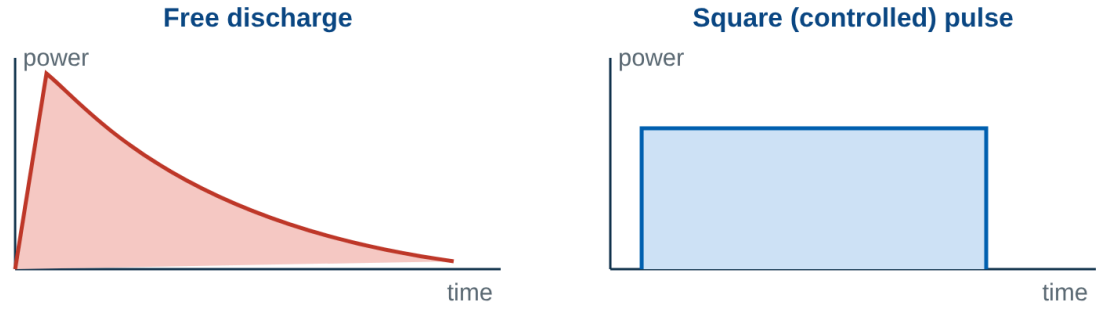
The drive circuit

The power supply charges a **capacitor bank** to a high voltage, and a switch releases it into the lamp. The capacitors can hold a lethal charge after the machine is switched off, which is one reason only trained engineers open a housing. How the charge is released shapes the pulse:

- **Free discharge:** the energy dumps in one burst with a sharp peak and a long tail, and the spectrum shifts as the pulse fades.
- **Partial (switched) discharge:** an electronic switch holds the current steady and then cuts it, giving a square pulse with a constant spectrum.
- **Pulse trains:** many IPLs split one shot into a series of sub-pulses with short gaps, so the epidermis can cool between them while the larger target keeps its heat. Splitting the energy this way can also make treatment more comfortable. Pulse trains need extra capacitor capacity.

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Free and controlled pulses



Energy dumps, peaks, then tails away.
The spectrum shifts as it falls.

Held steady, then stopped.
An even dose for the whole pulse.

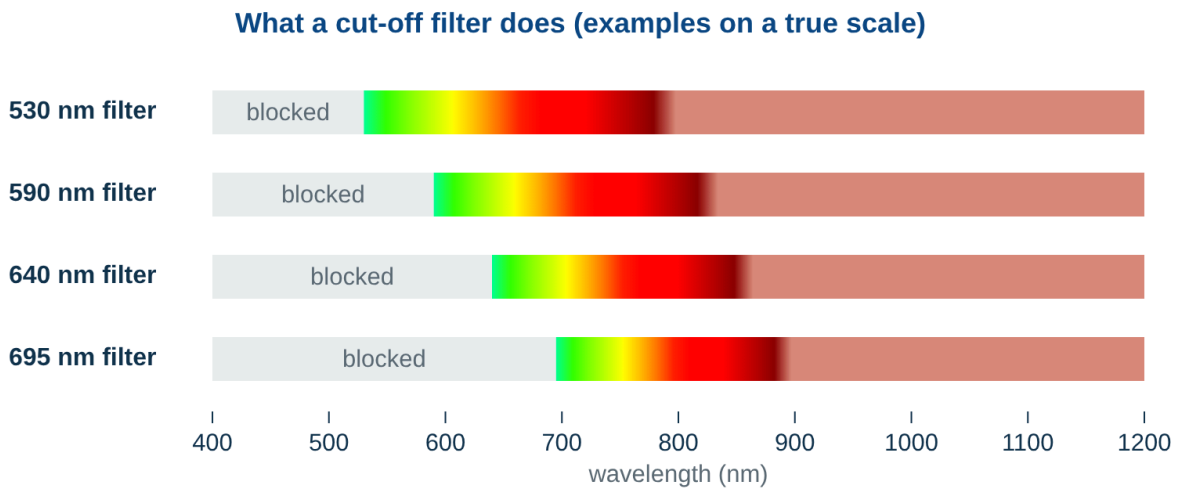
Many IPL devices split the energy into a train of shorter sub-pulses with gaps between them, so the epidermis can cool while the larger target keeps its heat.

A controlled pulse delivers the wavelengths you filtered for from start to finish. Drawn for this manual.

Filters

A **cut-off filter** (long-pass filter) blocks everything below its rated wavelength. Choosing the filter chooses which part of the spectrum reaches the skin, and so which chromophore you target. Short wavelengths are cut for skin safety, because the melanin in the epidermis absorbs them strongly. Systems may also use **dichroic** filters (mirrors that reflect unwanted wavelengths away) and **absorption** filters (coloured glass). Water around the lamp, or the coupling gel on the skin, takes up much of the far infrared. Filters may be fixed into a handpiece or interchangeable.

IPL cut-off filters



Examples drawn on a true wavelength axis. Drawn for this manual, replacing the earlier course slide whose axis was out of order.

Typical cut-off	Typically used for
Lower, about 515 to 560 nm	Superficial vascular lesions and surface pigment on fair, untanned skin
Middle, about 560 to 640 nm	Pigment and vessels, and hair on lighter skin types
Higher, about 640 to 755 nm	Hair, especially on darker skin, where the epidermis must be protected

Example: the IPL Skintastic trains on

The Stelle IPL handle Skintastic trains on takes five filters: 480 nm for acne; 530 nm for vascular treatment; 590 nm for pigment; 640 nm for hair removal on fair skin; 690 nm for hair removal on dark skin.

These ranges and this example are a general guide only. Your device manual sets out the filters for your machine and what each is for, and it always takes precedence.

A worn lamp, a damaged filter or a new lamp: all change the dose

A xenon flashlamp wears out. As it ages its output falls and its spectrum shifts, so the same setting delivers less energy, and less of it where you want it. The dangerous response is to turn the energy up to compensate. Track the shot count, follow the manufacturer's replacement schedule, and never chase a fading lamp with more power.

A scratched or cracked filter can let shorter, more hazardous wavelengths through and burn the skin, and debris burnt onto the light guide creates hot spots. Clean the light guide as the manufacturer directs and withdraw a damaged filter.

After a new lamp, a new handpiece or a service, the output may not match the old one even at the same setting. Patch test again at conservative settings before you treat.

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LEDs, compared with IPL and lasers

A **light emitting diode (LED)** is a semiconductor that emits a narrow band of light, typically one colour. LEDs are far lower in power than IPL, are not coherent, and spread their light widely. In aesthetic practice they are used in panels or arrays for non-thermal, light-driven effects (photobiomodulation), for example red light for skin and blue light for acne, and as the light source in some photodynamic therapy (Section 4).

The MHRA guidance lists the advantages of LEDs over lasers and IPL as their small size, low power use and very little heat output. In practice that means a much lower hazard and a large area treated at once. They are at the low end of the hazard scale, but not without risk: very bright blue light can still harm the retina with long exposure, so follow the manufacturer's eye protection advice.

Laser, IPL and LED side by side

	Laser	IPL (flashlamp)	LED
Output	one wavelength	broad band, filtered	narrow band, one colour
Beam	collimated, coherent	spreading, not coherent	spreading, not coherent
Typical effect	thermal or mechanical	thermal	non-thermal (light-driven)
Power	high (Class 4)	high	low
Eye hazard	severe, at a distance	serious, close to the source	low, not none

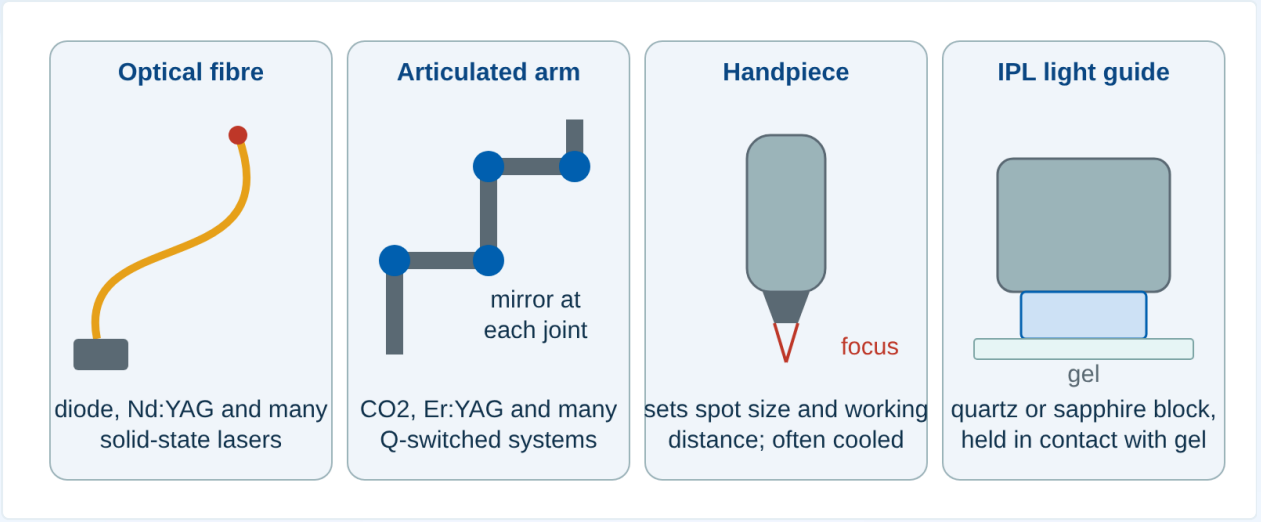
An LED will not heat a follicle or close a vessel. It does a different job, not a gentler version of the same one. Drawn for this manual.

Delivery systems

A delivery system carries the beam from the device to the tissue. It has three parts: the optics where the beam enters, a **beam guide** that carries it, and the optics that shape it at the target.

System	Used by, and what to know
Optical fibre	Diode, Nd:YAG and many other lasers. Flexible, but fibres are not built to bend sharply. A damaged fibre can leak radiation along its length or break off a tip. Inspect it, and check the connector is fully home, before use.
Articulated arm	CO2 and other lasers whose wavelength or peak power will not pass down a standard fibre, and many Q-switched systems, because the arm keeps the beam quality. A jointed arm with a mirror at each joint. If a mirror is knocked out of line, the beam can come out in the wrong place.
Waveguide	A hollow guide that carries the beam along its bore; used in some handpieces connected to an arm.
Handpiece	Holds the end of the beam guide. It contains the focusing or collimating optics, sets the spot size, often has a distance guide or spacer to fix the working distance, and often carries contact cooling.
IPL light guide	A quartz or sapphire block held against the skin through gel. Contact couples the light in, reduces reflection at the surface and lets a cooled crystal protect the epidermis.
Scanners and diffusers	Scanners move the beam in a set pattern, for example fractional treatment. Diffusers spread the light over a larger area.
Specialist systems	Micromanipulators connect an arm to an operating microscope; endoscopic applicators deliver the beam inside the body; fibres with contact or side-firing tips are used in surgery and dentistry. You will not use these in aesthetic practice.
LED arrays	Panels of many LEDs held over the treatment area.

Four ways of getting the light to the skin



Each delivery system carries its own hazards and its own pre-use checks. Drawn for this manual.

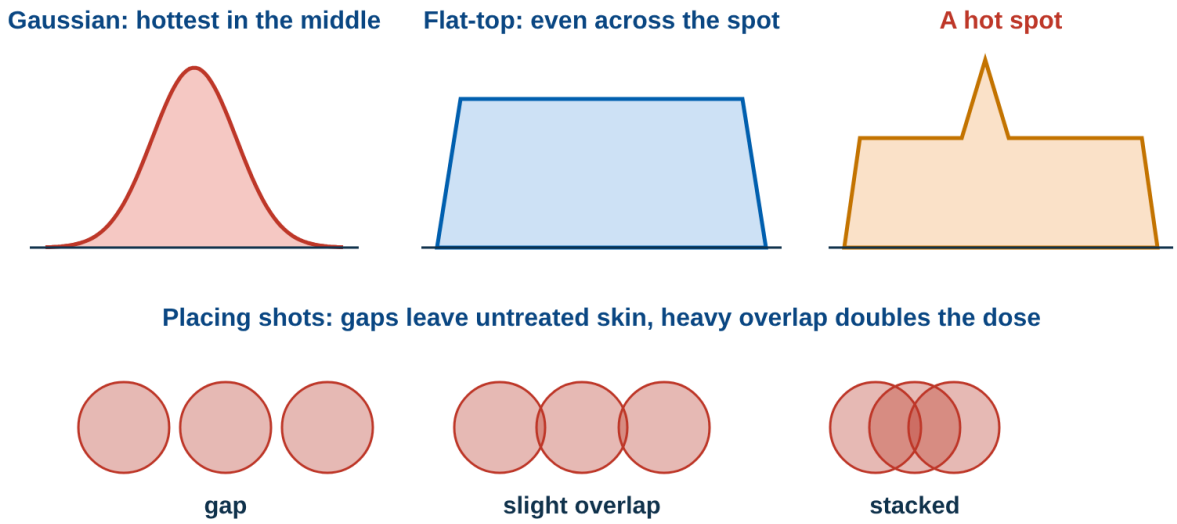
Cooling the skin

Most laser and IPL treatments protect the epidermis by cooling it, so that it stays below damaging temperatures while the deeper target heats. Cooling also allows an effective fluence to be used and makes treatment more comfortable. The main methods are a chilled sapphire or quartz window in contact with the skin, chilled gel, cold forced air blown onto the area, and on some lasers a cryogen spray timed around each pulse.

Beam profile

The energy across a laser spot is not always even. A **Gaussian** profile is hottest in the middle and fades towards the edges; a **flat-top** profile is more even across the spot. An IPL gives a rectangular footprint. A **hot spot** (a small area of much higher energy, for example from a damaged filter or debris on the window) can burn and leave pigment change. Weak edges are why shots are placed with the slight overlap your device manual gives; too much overlap stacks the dose.

Beam profiles and shot placement

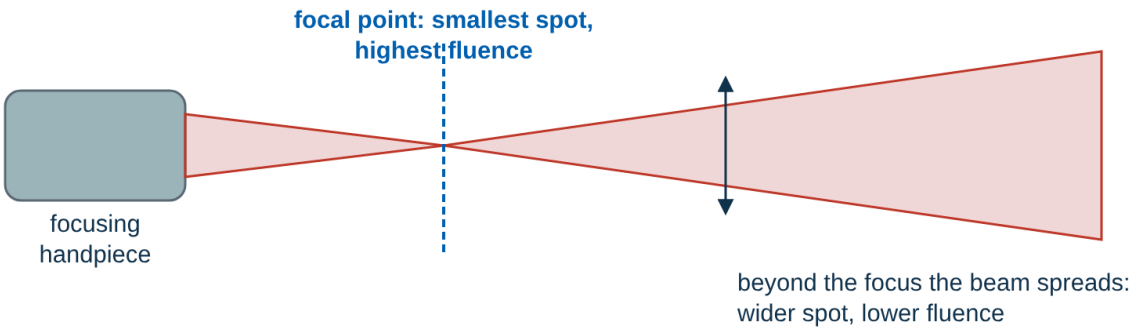


Even energy and correct overlap give an even dose. Drawn for this manual.

Working distance

A focusing handpiece brings the beam to its smallest spot, and highest fluence, at its focal point. Hold it closer or further away and the spot size, and so the fluence, changes. Distance guides and spacers exist to hold the working distance the manufacturer designed for. Beyond the focus a focused or fibre-delivered beam spreads quickly, so its hazard distance is shorter than that of a collimated beam: your Laser Protection Adviser takes each device and delivery system into account.

Working distance changes the spot



Distance guides and spacers hold the handpiece at the distance the manufacturer designed for. A focused or fibre-delivered beam spreads quickly, so its hazard distance is shorter than that of a collimated beam. Your LPA works this out for each device and delivery system.

Keep the working distance your device is designed for. Drawn for this manual.

Where lasers and IPL are used

Laser or source	Wavelength	Usual mode	Typical uses
Excimer	308 nm (UV)	pulsed	Psoriasis and vitiligo (medical); corneal surgery at other UV wavelengths
KTP (frequency-doubled Nd:YAG)	532 nm	pulsed or Q-switched	Superficial vessels, surface pigment, red tattoo ink
Pulsed dye	585 to 595 nm	pulsed	Vascular lesions, including port wine stains
Ruby	694 nm	Q-switched	Pigment; green and blue tattoo ink
Alexandrite	755 nm	long pulse or Q-switched	Hair on lighter skin; pigment and tattoo ink
Diode	808 to 980 nm	long pulse or CW	Hair removal; 980 nm for small vessels
Nd:YAG	1064 nm	long pulse or Q-switched	Hair on darker skin; deeper vessels; black ink
Er:YAG	2940 nm	pulsed	Ablative and fractional resurfacing
CO2	10,600 nm	CW or pulsed	Ablative and fractional resurfacing; surgery
IPL	about 500 to 1200 nm, filtered	pulsed (ms)	Hair reduction, photorejuvenation, vascular and pigment on suitable skin
LED	narrow bands, often blue, red, near infrared	continuous	Photobiomodulation, acne, photodynamic therapy

Lasers are also used well beyond aesthetics: in dentistry (soft tissue surgery and cavity preparation), in eye surgery, and in general, gynaecological and ear, nose and throat surgery, often through fibres and endoscopes. The same physics and the same safety principles apply.

Check your understanding

Answer in your own words. These questions are part of your evidence (Section 6), so do not leave them blank.

Over to you: light, lasers and IPL

1. Give the three bands of ultraviolet with their wavelength ranges, and explain why ultraviolet is removed from an IPL output and how it is done.

2. What is the retinal hazard region, in nanometres, and why is that band the dangerous one?

3. A pulse of 5 J is delivered through a 10 mm spot. Work out the fluence, and say what happens to it if the spot is changed to 5 mm at the same energy.

4. Explain the acronym LASER, and name the three properties that make laser light different from IPL output.

5. What is a Q-switched laser, and how does its output differ from a long-pulse hair removal laser?

6. What happens to an IPL as its lamp ages, and why is turning the energy up the wrong response?

7. Name the four families of laser by active medium and give an example of each.

8. Why does IPL treatment use direct skin contact through gel, and what is the advantage?

Notes on Section 1

Section 2 The hazards: eyes, skin and classification

Learning outcomes

By the end of this section you will be able to:

- Describe how lasers, IPL and LEDs can injure the eye, which part of the eye each band of wavelengths reaches, and the difference between central and peripheral retinal damage
- Explain how the eye's aversion responses work and why they cannot be relied on
- Describe the laser classes from 1 to 4, explain how IPL is classified, and explain the meaning of the warning labels on equipment
- Explain the Maximum Permissible Exposure, the Nominal Hazard Zone and the Nominal Ocular Hazard Distance, and how they are used
- Choose, check and care for protective eyewear, and read its markings
- Describe the skin hazards and the risks from reflections

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Ref	What this section covers, in detail
2.1	The eye: cornea, lens, iris and retina; the focusing effect of the eye; photochemical (blue light) and thermal retinal injury; central and peripheral damage; iris injury near the eye
2.2	Aversion responses: blink, pupil constriction, looking away; why they fail with invisible and very short pulses
2.3	Laser classes 1, 1M, 1C, 2, 2M, 3R, 3B and 4; the accessible emission limit; the manufacturer's engineering requirements; IPL and lamp risk groups; warning labels
2.4	Maximum Permissible Exposure; Nominal Hazard Zone; Nominal Ocular Hazard Distance
2.5	Laser and IPL eyewear: wavelength, protection level and marking; fit, checks, cleaning and storage; eye shields for treatment near the eye
2.6	Skin injury and how the skin protects itself; specular and diffuse reflection

This section and the next are the heart of the course. Everything in them exists because somebody has already been hurt.

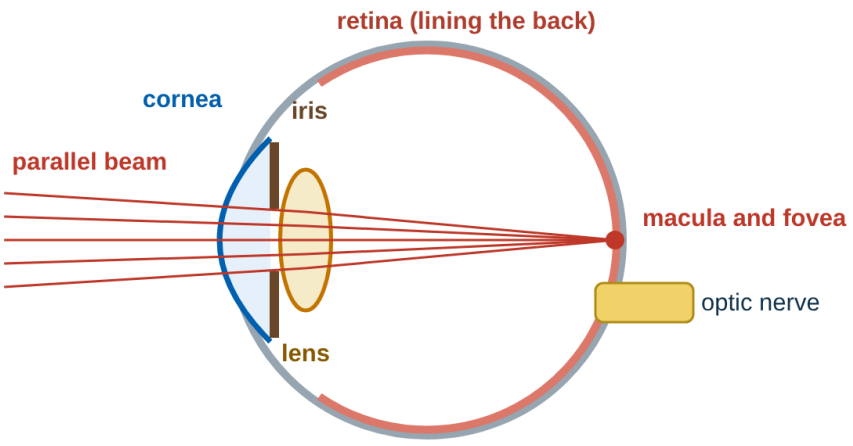
The eye

The injury that does not heal

Skin repairs itself. The retina does not. A retinal burn is permanent, it can be painless at the moment it happens, and if it lands on the macula the person loses central vision in that eye for life. There is no first aid for it. That is why eye protection is not negotiable for the operator, the client and anyone else in the room.

The cornea and lens focus light onto the retina. That is what lets us see, and it is what makes a beam so dangerous: a parallel beam entering the pupil is concentrated onto a tiny spot, and the power per square centimetre at the retina is many thousands of times higher than at the front of the eye. A beam that would barely warm your hand can burn the retina instantly.

How the eye focuses a beam



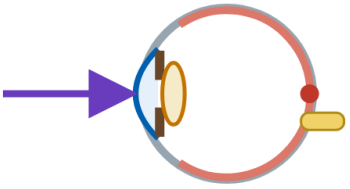
Cornea and lens focus a parallel beam to a tiny spot on the retina. The power per unit area at that spot is many thousands of times higher than at the front of the eye. (Simplified drawing.)

A simplified drawing of the eye. The cornea and lens bring a parallel beam to a point on the retina. Drawn for this manual.

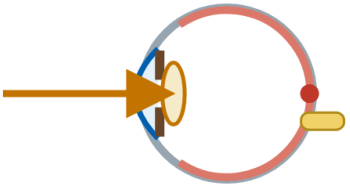
Which part of the eye each wavelength reaches

Wavelength decides where the damage lands

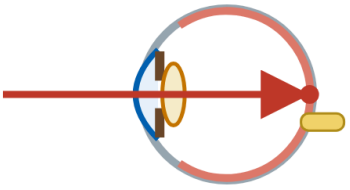
UVC, UVB; and far infrared above about 1400 nm
absorbed at the cornea
photokeratitis (arc eye), corneal burn



UVA, and part of the near infrared
absorbed in the lens
cataract, developing over time



400 to 1400 nm: visible and near infrared
focused onto the retina
retinal burn and permanent blind spot



The cornea, the lens and the retina are the three parts most at risk. Drawn for this manual.

Part	Wavelengths	Injury
Cornea	UVC and UVB; far infrared above about 1400 nm (Er:YAG, CO2)	Photokeratitis, like arc eye or snow blindness: painful and gritty, often delayed by hours, usually heals. Far infrared causes corneal burns.
Lens	UVA, and near infrared	Cataract, developing over time.
Iris	Visible and near infrared, absorbed by the iris pigment	Iris damage, inflammation and pigment change. Iris injuries have been reported after alexandrite laser and IPL treatment close to the eye.
Retina	400 to 1400 nm	Thermal burn and a permanent blind spot. Blue and violet light (about 400 to 600 nm) can also cause a photochemical "blue light" injury with longer exposure.

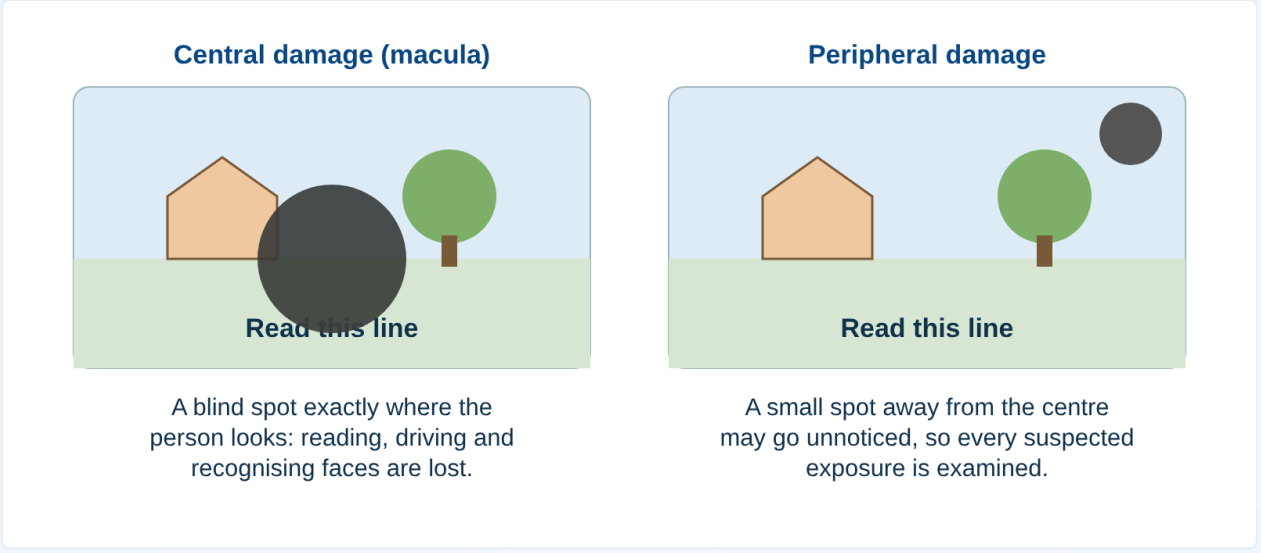
Central and peripheral retinal damage

Where on the retina an injury lands changes everything.

Central damage falls on the **macula**, and at its centre the **fovea**: the small area responsible for sharp, detailed, straight-ahead vision, reading and colour. It has the highest density of cone cells in the eye. A burn here leaves a blind spot exactly where the person is trying to look. They may still see all around it and yet be unable to read, drive or recognise a face.

Peripheral damage falls outside the macula, on retina made mostly of rod cells, which give night vision and side vision. It is still permanent, but a small peripheral lesion may go unnoticed because the brain fills in the gap. Larger or repeated injuries cause loss of side vision and night vision.

What the person sees



Central damage destroys the vision the person relies on most. Peripheral damage may not be noticed at all. Drawn for this manual.

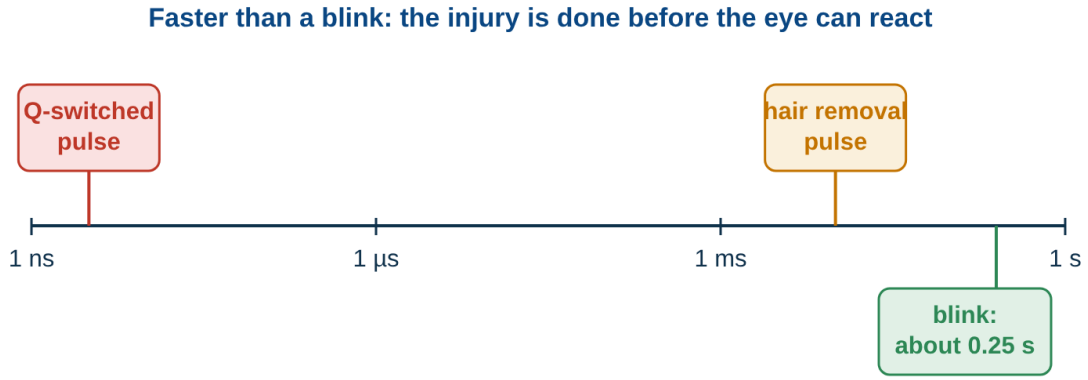
Why this matters to you

The eye automatically turns whatever catches its attention onto the macula, so a person who glances towards a flash is aiming it at the worst possible spot. And because a peripheral injury can happen without the person knowing, anyone with a suspected exposure is sent for an eye examination whether or not they report a symptom (Section 5).

Aversion responses, and why you cannot rely on them

The eye protects itself against bright light by blinking, by the pupil narrowing, and by looking or turning the head away. The blink reflex takes about a quarter of a second (0.25 s), and the safety limits for low-power visible lasers (class 2) are based on it.

The blink is too slow



Treatment pulses are over long before a blink can begin. Drawn for this manual.

- A Q-switched pulse lasts nanoseconds; the injury is complete long before a blink starts.
- Near-infrared light from a diode or Nd:YAG laser is invisible, so there is nothing to blink at.
- A sedated or anaesthetised person has no blink reflex at all.

The aversion response is a feature of the eye, not a control measure. Eyewear is the control measure. One practical point: during IPL work keep the room brightly lit, so that pupils are smaller and the flash is less startling.

Laser classification

Every laser product is classified by its **manufacturer** under the standard BS EN 60825-1, according to its **accessible emission**: how much laser radiation a person could be exposed to from the product in use. Each class has an **accessible emission limit (AEL)**, the most the product may emit and still belong to that class. The class tells you at a glance how hazardous the beam is.

The laser classes

Laser classes in BS EN 60825-1, from least to most hazardous

1	Safe in normal use (includes products with an enclosed, more powerful laser)
1M	Safe to the naked eye; may be hazardous through magnifying optics
1C	Designed for skin contact; eye-safe because emission needs skin contact
2	Visible, low power; a brief glance is protected by the aversion response
2M	As class 2, but hazardous through magnifying optics
3R	Low risk; eye injury possible if the beam is stared into
3B	**Direct beam hazardous to the eye; diffuse reflections normally safe**
4	**Direct beam and diffuse reflections hazardous; skin burns; fire risk**

Aesthetic treatment lasers are almost always class 3B or class 4.

Classes as described in the MHRA guidance, Table 5, from BS EN 60825-1. Drawn for this manual, replacing the earlier photograph of a treatment-room door.

Class	Meaning, and an example
1	Safe under normal use. Includes "embedded" products such as some printers or enclosed systems with a more powerful laser inside, which become hazardous only if the casing is opened, for example during servicing.
1M	Safe to the naked eye, but may be hazardous viewed through magnifiers or binoculars.
1C	A newer class for devices designed to be used on the skin, such as some home-use devices, which only fire when in good contact with the skin. A skin hazard, but no eye hazard in normal use.
2	Visible, low power; a brief accidental glance is protected by the aversion response, but staring into the beam can injure. Some aiming beams and pointers.
2M	As class 2, but hazardous through optical instruments.
3R	Low power; accidental exposure is usually not hazardous, but deliberate viewing can injure. The letter R stands for reduced requirements.
3B	Medium power. Direct viewing, including brief accidental exposure, can cause serious eye injury; diffuse reflections are normally safe; very limited skin hazard. Many low-level laser therapy devices.
4	High power. The direct beam and close viewing of diffuse reflections can cause serious eye injury; serious skin hazard; fire hazard. Almost every aesthetic treatment laser.

Older lasers may still carry the previous classes (1, 2, 3A, 3B, 4). Class 3A has been replaced by 3R.

The two classes that matter most to you

Class 3B: hazardous if the beam, or a mirror-like reflection of it, enters the eye.

Class 4: hazardous from the direct beam and from diffuse reflections, can burn skin and can start a fire. With a class 4 device, light bouncing off a wall can still injure an eye. That is why the whole room matters, not just the handpiece.

What the manufacturer must build in

Manufacturers keep the accessible emission within the limits of the class, and build in the safety features the class requires. Class 3B and 4 lasers must have a key switch (or password), a remote interlock connector, a beam stop or shutter, and an emission warning, and every laser must be labelled with its class. IPL and laser systems also filter their output (including removing ultraviolet), shield their fibres, provide an emergency stop, and often supply suitable eyewear. These features are what makes a device fit its class: disabling one changes the hazard.

How IPL is classified

The laser classes do not apply to IPL, because it is not a laser. Lamps, including IPL and LEDs, are assessed under the photobiological safety standard IEC 62471 (in the UK, BS EN 62471), which places them in **risk groups**: the exempt group, then risk groups 1 (low), 2 (moderate) and 3 (high). For pulsed lamps such as IPL the assessment applies to a single pulse, and to any group of pulses within a quarter of a second, measured at 200 mm from the source. A treatment IPL is a high-risk source. Medical and cosmetic IPL equipment also has its own product safety standard, BS EN 60601-2-57 (Section 5).

Warning signs and labels

The laser warning symbol is the yellow triangle with the burst and beam. Labels on the equipment are a requirement of BS EN 60825-1, and the MHRA guidance says they should be easy to read, not hidden at the back. Read them before you use any device for the first time, and never use a machine whose labels are missing, painted over or illegible.

The warning symbol and the labels on a laser



Laser radiation warning symbol (redrawn)

- **Explanatory label** — the class, in words, and the precautions
- **Aperture label** — where the beam comes out
- **Output label** — maximum output, pulse length, wavelength
- **Interlock and panel labels** — removing this exposes radiation
- **Identification** — maker, model, serial number, date

The warning symbol, redrawn, and what each equipment label tells you. Drawn for this manual.

Label	What it tells you
Explanatory label	The class in words, with the precautions; for a class 4 product, a warning to avoid eye or skin exposure to direct or scattered radiation. Labels are usually printed in capitals.
Hazard symbol	The triangle. Its presence means the accessible emission is hazardous.
Aperture label	Where the beam leaves the device (required on class 3R, 3B and 4).
Output label	Maximum output, pulse duration and wavelength or wavelengths, with a warning if the radiation is invisible. Your eyewear specification is chosen from this.
Panel and interlock labels	Removing a panel or defeating an interlock gives access to hazardous radiation. If you can read this label, you are about to do something you should not.
Identification	Manufacturer, model, serial number and date: what you quote when you report a fault or an incident.

An IPL carries its own optical radiation warning sign. Signs on doors must comply with the Health and Safety (Safety Signs and Signals) Regulations 1996; Section 3 covers where they go and when they come down.

If the labels and the manual disagree, stop

A machine whose labelled class or wavelength does not match its manual, or whose labels have been removed, is one you cannot safely specify eyewear for. Do not use it. Contact the supplier and your Laser Protection Adviser.

MPE, the hazard zone and the hazard distance

Maximum Permissible Exposure (MPE): the highest level of laser exposure to the eye or skin that is generally considered safe. The Control of Artificial Optical Radiation at Work Regulations 2010 use the term **exposure limit value**, which means the same thing. The MPE is not one number. It depends on four things:

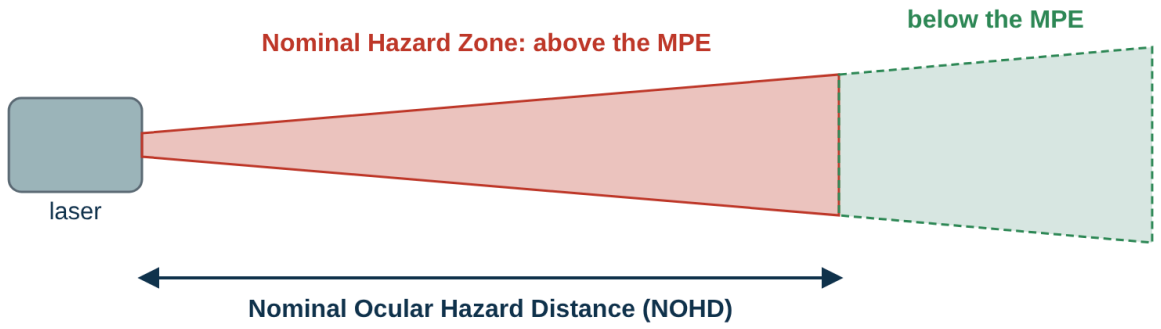
- the wavelength;
- the pulse duration or exposure time;
- the tissue at risk (the eye's limits are far lower than the skin's);
- for 400 to 1400 nm, the size of the image on the retina.

Published MPE values are set below the lowest exposures known to cause injury, with a margin of safety. They are guides for controlling exposure, not exact lines between safe and harmful.

Nominal Hazard Zone (NHZ): the space in which direct, reflected or scattered radiation is above the MPE. Inside it, eye protection is required.

Nominal Ocular Hazard Distance (NOHD): the distance from the source at which the beam has spread enough to fall to the MPE. Because a laser beam is collimated, it can be long. Changing the handpiece or delivery system can change it.

The hazard zone and the hazard distance



The MPE is the most exposure the eye or skin can take without injury. It depends on wavelength, exposure time, the tissue, and for 400 to 1400 nm the size of the image on the retina. Your LPA uses it to set the NOHD, the controlled area and the eyewear protection needed.

Your Laser Protection Adviser uses the MPE to work out the NOHD, the extent of the controlled area and the protection level your eyewear needs. Drawn for this manual.

Protective eyewear

Eyewear is personal protective equipment: the last line of defence, used together with engineering and administrative controls, never instead of them. It is also designed for brief accidental exposure, not for looking into a beam.

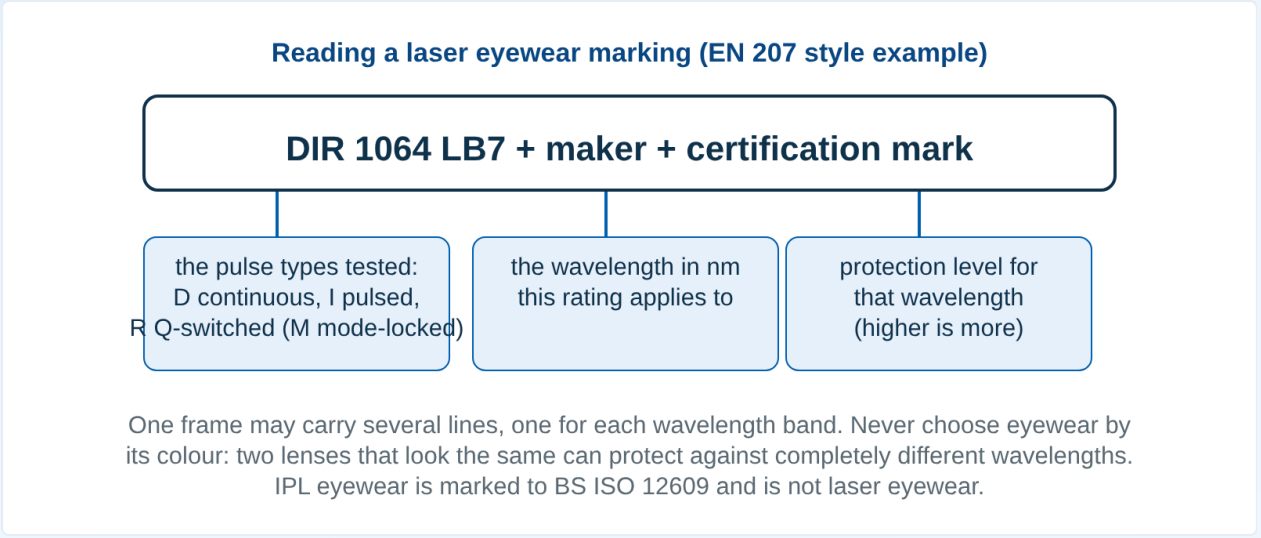
Point	What you must know
Wavelength specific	Laser eyewear protects only at the wavelengths marked on it. Goggles for an Nd:YAG at 1064 nm give little or no protection against an alexandrite at 755 nm. Dual-wavelength devices need eyewear marked for both.
Protection level	Must be high enough for the device's output at that wavelength, as specified by your LPA and written in your local rules.
Never by colour	Two lenses that look the same can protect against completely different wavelengths. Read the marking.
IPL eyewear is not laser eyewear	IPL eyewear is made for broadband light and is marked to BS ISO 12609. It will not reliably protect against a laser. Never substitute one for the other.

Point	What you must know
Fit and vision	Close fitting with side protection; fits over glasses if needed. Check you can still see the display, the skin and the endpoint, and would see a fire start. Visible warning lights must be visible through it.
Enough pairs	One correct pair for everyone in the controlled area, client included, plus a spare outside the door.
Labelled to the device	Mark each pair for the laser or IPL it belongs to, for example with matching coloured stickers.
Condition and care	Inspect before every use. Scratched, crazed, pitted or cracked filters and damaged frames are withdrawn that day. Clean between users exactly as the maker directs; harsh chemicals can damage coatings. Store in individual cases.
Treating near the eye	For treatment of the face, close-fitting patient eye protectors or opaque eye cover are used, not ordinary goggles. For treatment inside the orbital rim, metal intra-ocular (corneal) shields are fitted under topical anaesthetic by someone trained and permitted to do so.

Reading the marking

Laser eyewear made to EN 207 carries a code for each wavelength band it covers. The letters show the pulse types it was tested against, the number is the wavelength in nanometres, and the LB number is the protection level (the scale number) at that wavelength: the higher the number, the greater the protection.

Decoding a marking



An example marking, to show the format. It is not a recommendation for any device; your LPA specifies what your eyewear must carry. Drawn for this manual.

Eyewear for alignment work on visible lasers is made to a different standard, EN 208. Eyewear for intense light sources is made to BS ISO 12609-1 and -2, which cover the product and its use, and is marked for IPL with the wavelength range it covers. When you work through viewing optics such as an endoscope, loupe or slit lamp, a filter fitted to the instrument may protect you instead: ask your LPA.

Skin hazard

Skin has some natural protection. The outer layer reflects and scatters light, melanin absorbs it, conduction spreads heat into surrounding tissue, the blood flow carries heat away, and sweating cools the surface. None of that is enough against a class 4 laser or a treatment IPL. Large areas of skin are protected by ordinary clothing; hands and face may need shielding.

Effect	Usual cause
Erythema (redness) and oedema (swelling)	The commonest effect, and an expected one; excessive if the fluence is too high
Blistering and crusting	Too much fluence, poor cooling, or the wrong wavelength for the skin type
Burns, partial or full thickness	Gross overdose, stacked pulses, a hot spot, or a stationary beam
Hyperpigmentation and hypopigmentation	More common in darker skin; loss of pigment may be permanent
Scarring, including keloid	Deep thermal injury, infection or poor healing
Leucotrichia (white hair)	Damage to the pigment cells of the hair follicle
Pruritus (itching)	A temporary reaction after treatment
Photosensitivity reactions	Medicines, herbal remedies or skin products that make the skin react to light
Photochemical damage	Ultraviolet: one reason UV is removed from IPL output

Asking about medicines at every visit

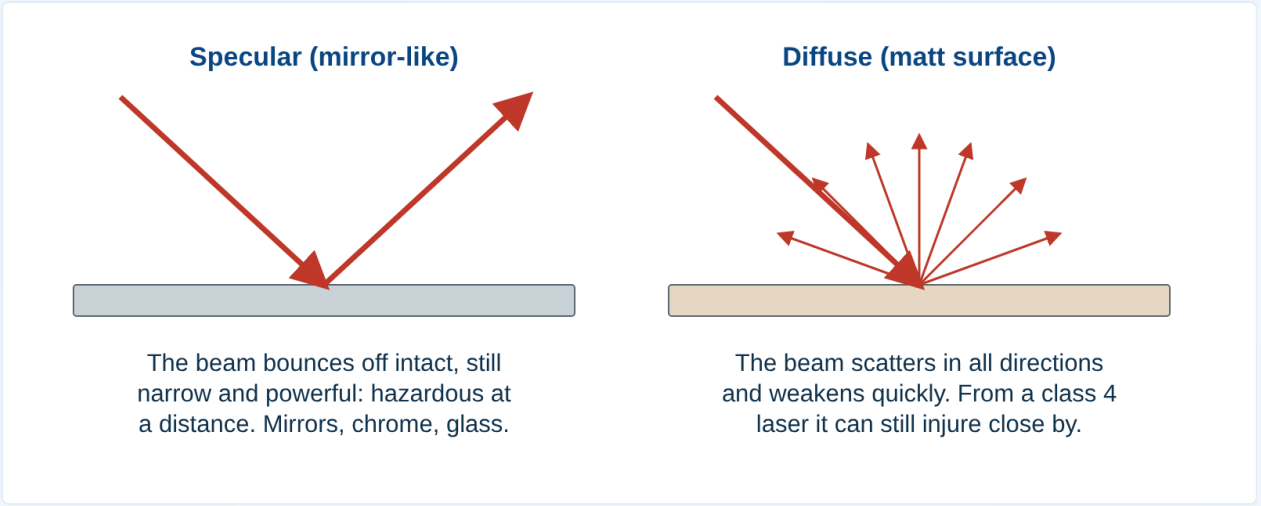


Medicines, herbal preparations and skin products can make skin react far more strongly than expected. Ask at every visit, not just the first. Generated image commissioned by Skintastic, not a photograph.

Reflections

A beam does not have to hit someone directly to hurt them.

Specular and diffuse reflection



A mirror-like reflection is the most hazardous, because the beam stays narrow and keeps its energy. Drawn for this manual.

Specular reflection comes from smooth, shiny surfaces: mirrors, glass, chrome, polished trolleys, jewellery, a phone screen, a watch face. **Diffuse** reflection comes from matt surfaces. Reflectivity also depends on wavelength: a surface that looks dull to you may still reflect infrared. Long-wavelength lasers such as the Nd:YAG at 1064 nm also scatter some light back out of the skin towards the operator, which is another reason the operator's eyewear is never optional.

Check your understanding

Answer in your own words. These questions are part of your evidence (Section 6).

Over to you: the hazards

1. Name the three parts of the eye most at risk and say which wavelengths reach each.

2. Explain the difference between central and peripheral retinal damage, and why someone with a suspected exposure is examined even if they notice nothing.

3. Why can you not rely on the blink reflex to protect an eye from a Q-switched or near-infrared laser?

4. What is the difference between class 3B and class 4, and why does it change how you set up the room?

5. How is an IPL classified, given that the laser classes do not apply to it?

6. Define the MPE and the NOHD, and say who works them out for your room.

7. Can IPL goggles be used for laser work? Explain, and say what you would read on a pair of laser goggles before using them.

8. Which type of reflection is the most hazardous, and why?

Notes on Section 2

Section 3 Controlling the hazards in your treatment room

Learning outcomes

By the end of this section you will be able to:

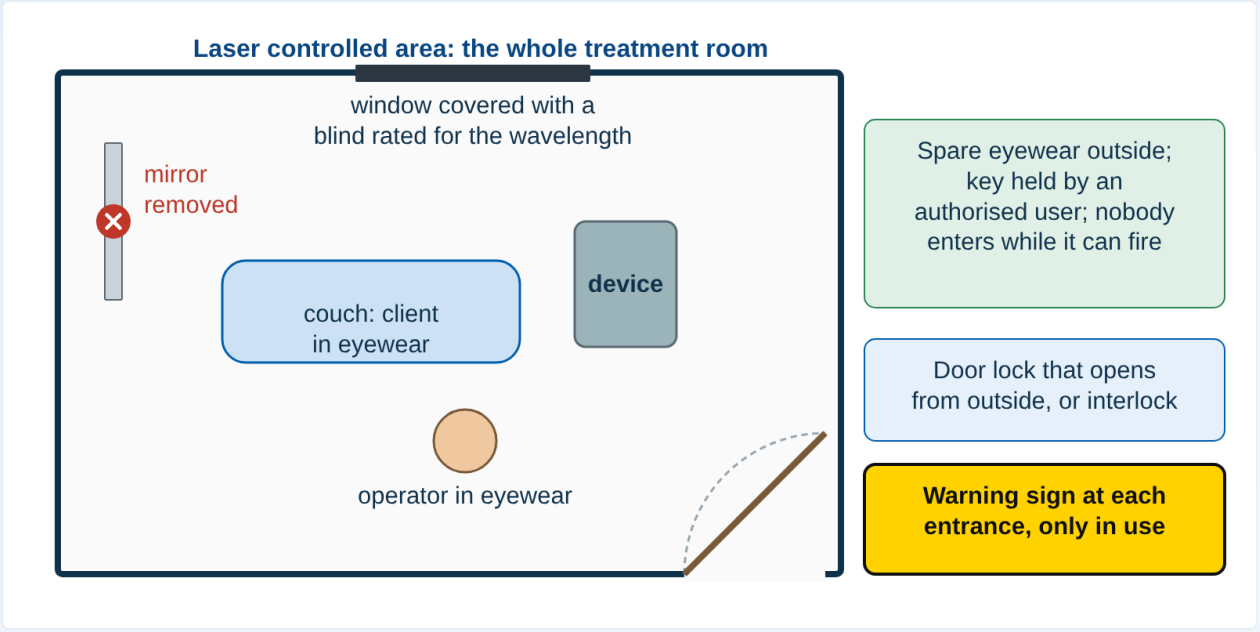
- Set up and run a laser or IPL controlled area, including access, signs, windows and reflective surfaces
- Carry out a laser and IPL risk assessment, and apply the hierarchy of control
- Describe the built-in safety features of a laser or IPL and the safe ways of working before, during and after use
- Describe the non-beam hazards (plume, fire, electrical and others) and the hazards to the client, and how each is controlled
- Explain equipment management and quality assurance: acceptance checks, routine checks, servicing, the fault log, modifications and accessories
- Plan for non-routine situations and carry out a simple safety audit

Ref	What this section covers, in detail
3.1	The controlled area: boundary, access, door security, signs, windows, reflective surfaces, spare eyewear
3.2	Risk assessment: the legal duty, five steps, four areas, who drafts and reviews it; the hierarchy of control
3.3	Engineering features; standby, key and password control; one device at a time; safe working before, during and after use; end of the day
3.4	Plume, blood and tissue spatter, fire, electrical, chemical, noise and ordinary hazards; clothing and gloves; hazards to the client
3.5	Equipment management: purchase, loan and demonstration; installation and acceptance; daily, weekly and yearly checks; servicing; the fault log; what can go wrong; modifications; accessories
3.6	Contingency arrangements: servicing, cleaning, out of hours; safety policies; safety audit

The laser controlled area

The **laser controlled area** (LCA) is the area around the laser or IPL in which people could be exposed above the MPE, and in which specific controls apply. In a clinic it is normally the whole treatment room, with the walls and a closed door as its boundary. Your Laser Protection Adviser defines it, taking the NOHD into account, and it is written in your local rules.

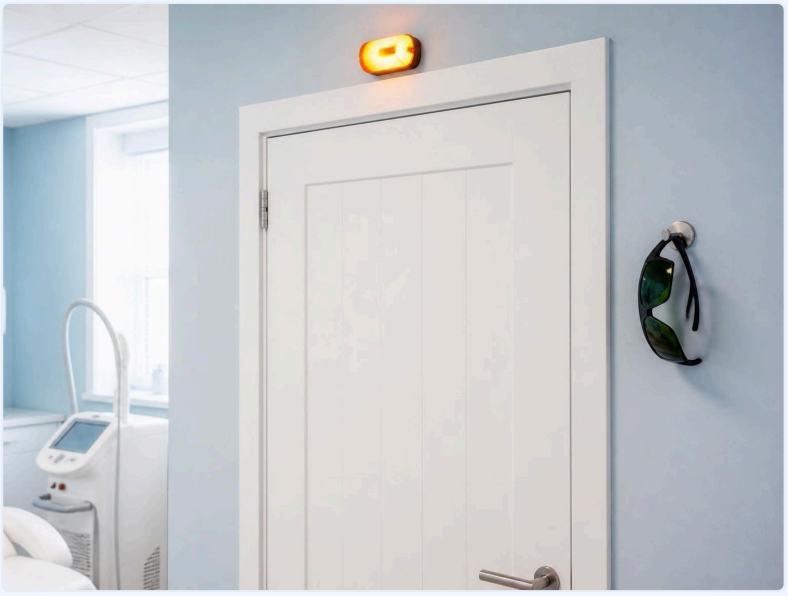
A controlled treatment room



The room, not just the handpiece, is what you control. Drawn for this manual.

Control	What it means in practice
A defined boundary	Everyone knows where the controlled area starts and stops. It is not used as a corridor or for other work while treatment is in progress.
Controlled access	Only the authorised user, the client and anyone essential, all wearing the right eyewear and briefed. Keep the number of people to a minimum.
Door security	Knock and wait, a keypad or twist lock, or an interlock, as your LPA advises, so nobody walks in mid-pulse. A lock must be openable from outside in an emergency. It also protects the client's privacy and dignity.
Warning signs	The laser or IPL warning sign, with "eye protection must be worn" and the type of eyewear, at every entrance. Up or lit only while the device is in use; removed, reversed or switched off afterwards, so it never becomes wallpaper.
Windows	Covered with a blind or barrier rated for the wavelength in use. Ordinary glass and ordinary blinds do not stop most treatment wavelengths, and an IPL flash seen from outside can startle a passer-by or a driver.
Reflective surfaces	Mirrors, glass, chrome, polished trolleys, framed pictures, screens and jewellery removed or covered; matt surfaces preferred.
Spare eyewear	Kept outside the door so that anyone who must enter in an emergency can protect their eyes.

The door to the controlled area



A closed door with a warning light above it and protective eyewear hanging outside. Generated image commissioned by Skintastic, not a photograph.

Signs go on **every entrance** to the controlled area. Some clinics use an illuminated "laser in use" sign linked to the device, placed at eye level. Whatever system you use, the rule is the same: the sign is displayed only while the hazard is present.

Risk assessment

Risk assessment is a legal duty. Regulation 3 of the Management of Health and Safety at Work Regulations 1999 requires a "suitable and sufficient" assessment of the risks to employees and to anyone else affected by the work, and the Control of Artificial Optical Radiation at Work Regulations 2010 require the employer to assess the risk to employees' eyes and skin from optical radiation. The law does not expect every risk to be removed, but expects people to be protected so far as is reasonably practicable. It is the document an inspector, an insurer and your Laser Protection Adviser will ask for first.



The Health and Safety Executive's five steps, as recommended in the MHRA guidance. Drawn for this manual.

The MHRA guidance asks for four areas to be covered:

1. **Equipment:** every device, including anything on loan or demonstration.
2. **People who may be at risk:** authorised users, other staff, cleaners, maintenance staff, contractors, visitors, clients and anyone else.
3. **Procedures:** each treatment, and non-routine work such as servicing.
4. **Location:** the room, its windows, door, surfaces and what is next to it.

It should cover normal work and what happens when things go wrong, with contingency plans, but should not be over-complicated.

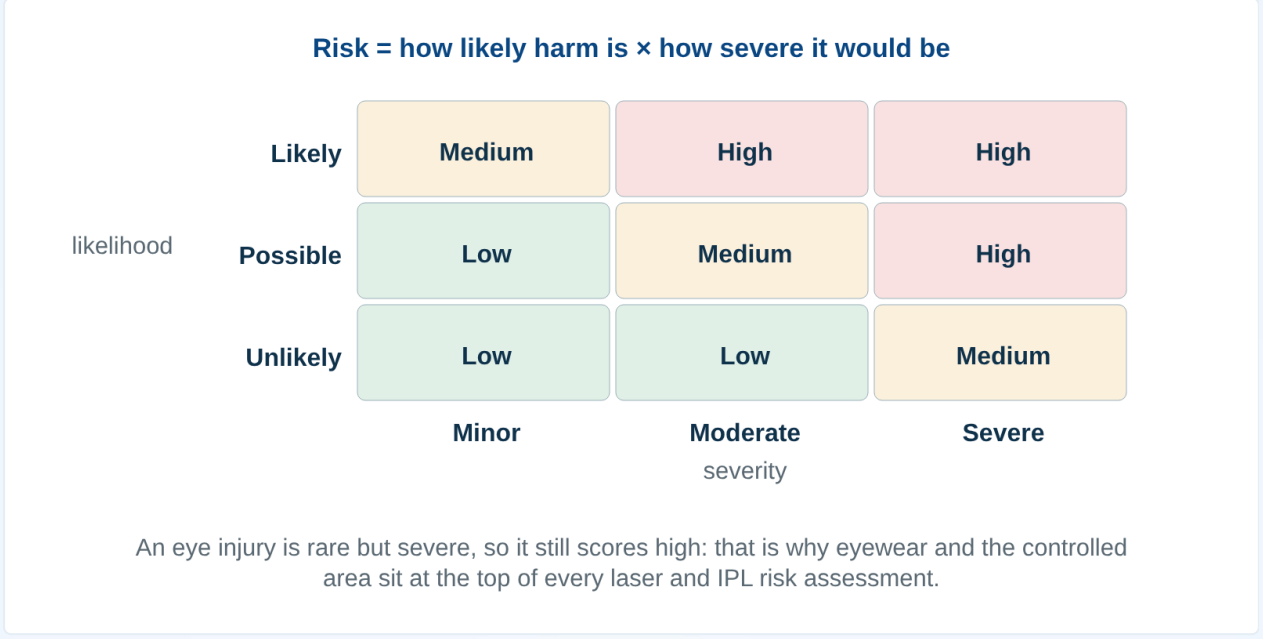
Who does what

- The **employer** holds the legal duty and signs off the final version. The task can be delegated; the responsibility cannot.
- The **Laser Protection Adviser** usually carries out or advises on the laser and IPL risk assessment, after a site visit.
- The **Laser Protection Supervisor** and the **authorised users** contribute their knowledge of the day-to-day work.

The MHRA guidance says the LPS should review the risk assessment every year, or sooner if anything changes, and the LPA should audit it at least every two

years, or sooner if procedures or equipment change. Review it at once after a new device, a new room, new staff, a modification or an incident.

Scoring a risk



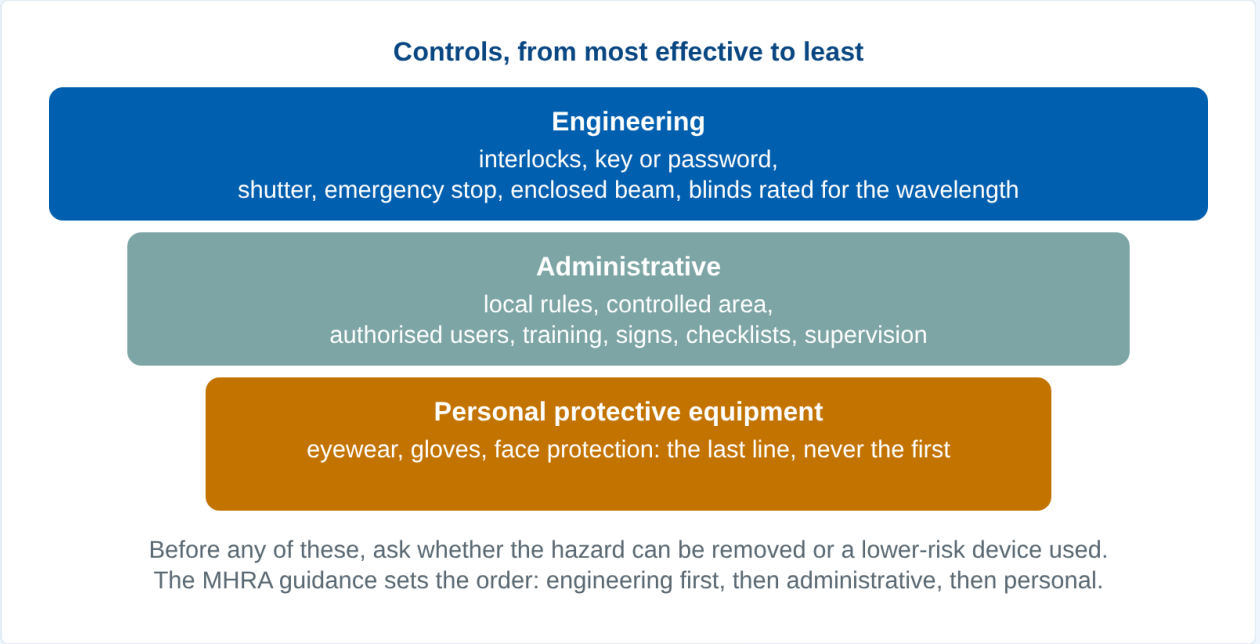
A rare but blinding injury still scores high. Drawn for this manual.

A risk assessment template is in Section 7. Have yours checked and signed off by your LPA before you rely on it.

The hierarchy of control

Work through the controls in order. Do not jump to PPE because it is the easiest.

Engineering first, PPE last



The order of control set out in the MHRA guidance. Drawn for this manual.

1. **Remove or reduce the hazard** where you can: for example a lower-risk device or technique.
2. **Engineering controls:** device interlocks, key or password, shutter, enclosed beams, room interlocks, warning lights, rated blinds and barriers.
3. **Administrative controls:** local rules, operating procedures, the controlled area, authorised users, training, signs and checklists.
4. **Personal protective equipment:** eyewear, gloves, face protection. Never the main control.

Review your safety measures every year, or sooner if anything changes.

Built-in safety features

Know what your device has and what each feature is for. Each one is part of what makes the device safe to use, and bypassing one is not a shortcut, it is a change to the hazard.

Feature	What it does
Key switch, smart card or password	Stops anyone unauthorised using it. The key is removed and stored safely when the device is not attended.
Standby and ready modes	In standby the device is on but cannot fire. Return to standby whenever you are not actually treating, including while you talk to the client or reposition.
Emission indicator	A light and often a sound that warns that the device is ready or firing; visible through the eyewear.
Remote interlock connector	Can be linked to the door so that opening it stops emission, where the LPA advises it.
Shutter or beam stop	Blocks the beam inside the device until treatment is intended.
Emergency stop	A red button that shuts the device down at once. Everyone in the room should know where it is. Test it periodically.
Foot switch or finger switch	A foot switch is shrouded so it cannot be pressed by accident. Only one foot switch in the room, and only the person holding the handpiece fires it.
Exposure termination	A timer, pulse counter or energy monitor that ends each exposure.
Skin contact sensor	On some IPLs and lasers, prevents firing unless the applicator is in contact with the skin.
Protective housing	Keeps the beam and the high voltage inside. Covers come off for engineers only.

Safe working, before, during and after use

Before you start

- Complete the daily checks (later in this section) and the pre-treatment checklist (Section 7).
- Door secured, sign displayed, windows covered, reflective items removed.
- The correct eyewear for this device and wavelength for everyone present, inspected.
- Fibres and connectors checked; the aiming beam present and aligned.
- Fire precautions in place, and the extinguisher and first aid kit at hand.

During treatment

- Only an authorised user operates the device, and only the person holding the handpiece fires it.
- The device is in standby whenever you are not actually firing.
- Only one laser or IPL switched on in the room at a time. Switch one off before using another.
- The beam is directed only at the treatment site or a beam stop.
- Everyone keeps their eyewear on until the device is in standby or switched off.
- If the device is left unattended, even briefly, it is switched off and the key removed.

At the end of the session or day

- Device powered down and isolated; key, smart card or password removed or locked to a safe place.
- Signs taken down, reversed or switched off.
- Eyewear cleaned as the manufacturer directs, inspected and stored in its cases.
- Handpiece, light guide and fibres cleaned; any fault written in the fault log.
- Treatment register and records completed.
- The room secured.

Cleaning down at the end of the day



The room is cleaned down, the device made safe and the key put away. Generated image commissioned by Skintastic, not a photograph.

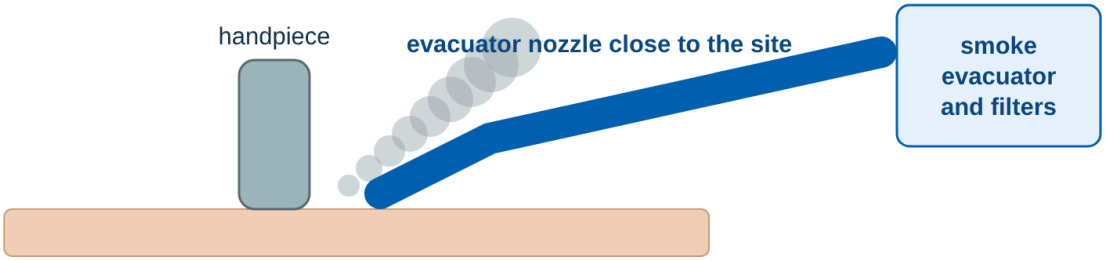
Non-beam hazards

The beam is not the only way a laser or IPL hurts someone.

Plume

Hair removal, ablative and surgical procedures vaporise tissue and hair. The plume can carry hair and cell debris, viable bacteria and virus particles, and chemicals such as benzene and formaldehyde, and it can irritate the airways and cause nausea. Under the Control of Substances Hazardous to Health Regulations 2002 (COSHH) the employer must assess exposure to plume and control it.

Capturing plume at the source



Plume can carry hair and cell debris, viable bacteria and virus particles, and chemicals such as benzene and formaldehyde. Use a dedicated smoke evacuator held close to where the plume forms; a mask helps with odour and particles but is not the main control, because it does not seal to the face.

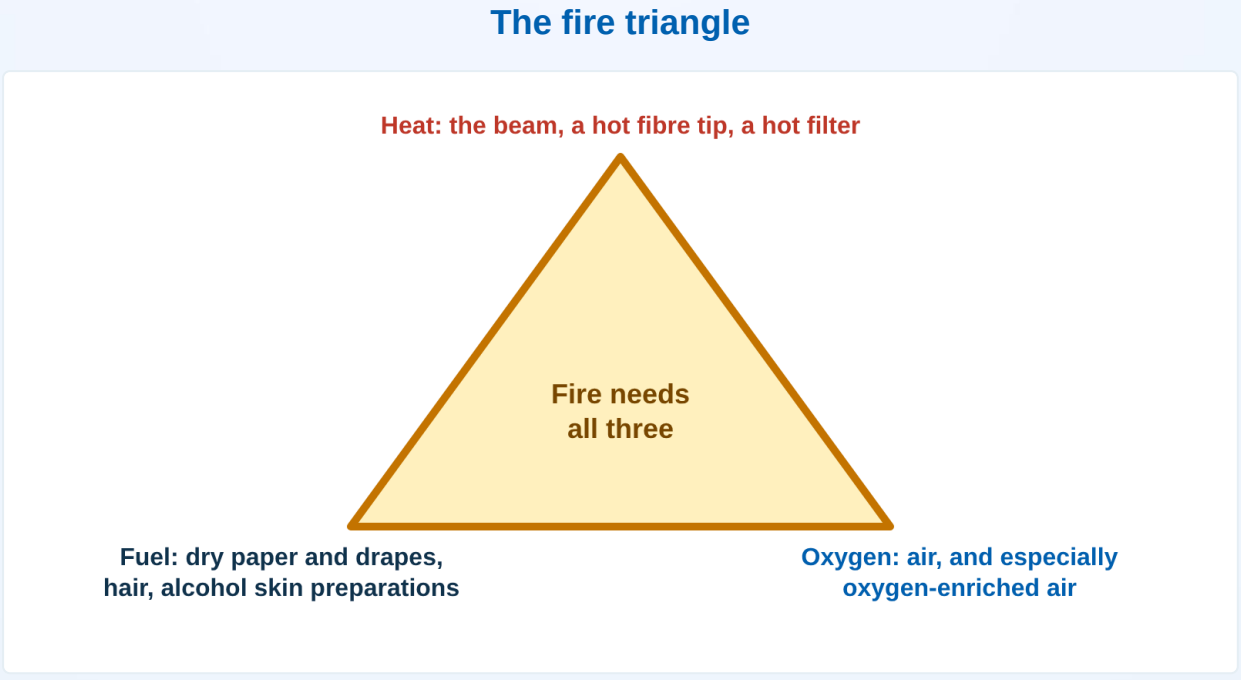
A dedicated smoke evacuator, with its nozzle close to where the plume forms, is the main control. Drawn for this manual.

- Use a dedicated smoke evacuator with filters able to capture very fine particles, down to about 0.01 micrometres according to the MHRA guidance, held close to where the plume forms. Ordinary room extraction or theatre suction is not enough.
- Masks help with hair particles and odour but are not the main control, because they do not seal to the face. Where a respirator is needed, your risk assessment should specify a properly fitted one (such as FFP3).
- Used filters are disposed of as contaminated waste.
- The client is closer to the plume than you are: extract at the site, not across their face.

Blood and tissue spatter

Q-switched and picosecond tattoo and pigment removal can throw tissue and blood some distance. Use eyewear that also guards against splashes, gloves and an apron, and an enclosure such as a cone fitted over the handpiece, or a clear dressing over the area where the manufacturer allows it.

Fire



Take away any one side and a fire cannot start. Drawn for this manual.

- A class 4 beam can ignite paper, dry drapes and swabs, hair, some plastics and alcohol-based preparations. Let skin preparations dry completely and never let them pool in a skin fold. Keep swabs damp.
- Dark fabric absorbs stray energy and can scorch: practitioners wear pale uniforms, and a client's dark clothing near the area is covered with a pale towel.
- Never leave a handpiece, fibre tip or IPL applicator resting on paper, drapes or clothing: tips stay hot after firing.
- Oxygen and lasers are never casually combined.
- Keep a carbon dioxide (CO_2) extinguisher for electrical fires, and know your fire procedure. Never use water on an electrical fire. A small fire on a drape can be smothered with a damp towel.

If a fire starts: stop firing and make the device safe, remove the burning material from the client, put the fire out if it is small and safe to do so, raise the alarm, and leave if it cannot be controlled. Record and report it (Section 5).

Other hazards

Hazard	Risk and control
Electrical	High-voltage capacitors can hold a charge after switch-off. Never open a housing. No liquids on the cabinet; no adaptors or extension leads unless the manufacturer allows; annual electrical safety testing; mop up spills at once.
Chemical	Laser dyes, cryogen cooling sprays and cleaning products, assessed under COSHH. Handle cylinders correctly and ventilate.
Hot surfaces	Fibre tips, mirrors, beam stops and IPL crystals heat with use and can burn.
Trips, spills and lifting	Trailing cables, coolant spills and heavy devices. Route cables safely and move equipment as the manufacturer advises (the Manual Handling Operations Regulations 1992 apply).
Noise	Fans, cooling and smoke evacuators can be noisy; keep noise at a level where you can hear the client and the device's alarms.

Gloves and clothing

Gloves worn for infection control must also suit the risk assessment; single-use, latex-free gloves are the usual choice. Special gloves or clothing protect only at certain wavelengths, so use them only where your LPA advises, never as a substitute for other controls.

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Hazards to the client

The person on the couch has hazards of their own, and you are responsible for them.

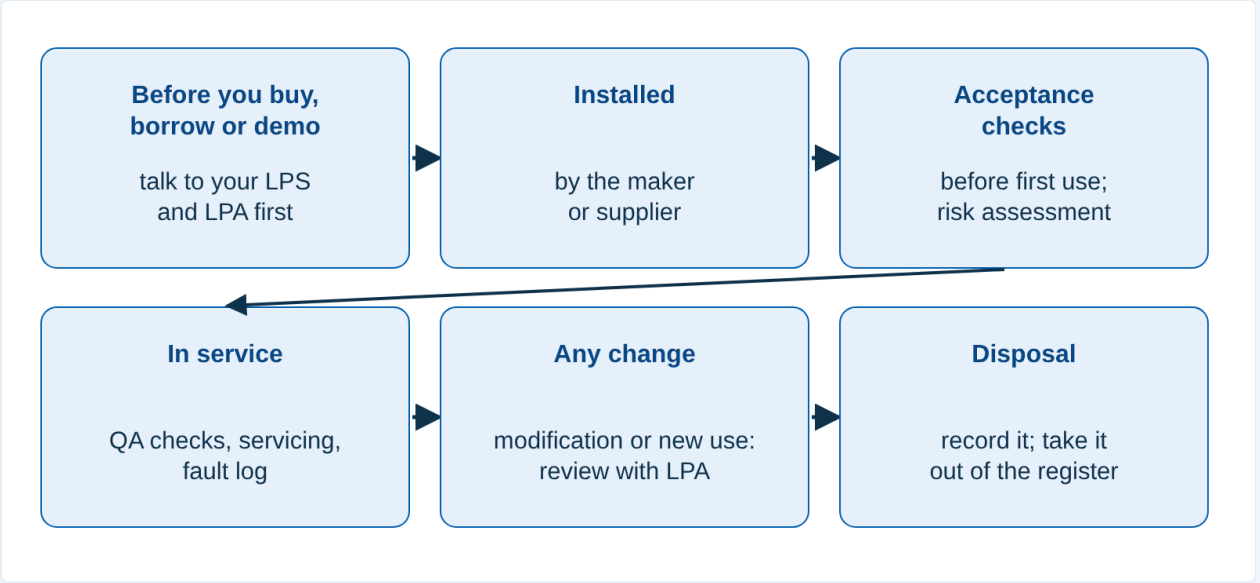
Hazard	What to do about it
Eye injury	The correct eye protection fitted before the first shot and kept on until the last; never removed while the device can fire. Treatment of the face is the highest-risk situation.
Stray radiation	From a misdirected beam, a reflection, a damaged fibre or a leaking housing. Check fibres and connectors, and fire only at the treatment site.
Burn from a damaged IPL filter	Scratches can let shorter wavelengths through. Inspect the filter and withdraw it if damaged.
Burn from hot spots on the filter	Hair and debris build up on the light guide. Wipe it as the manufacturer directs during treatment, never with anything abrasive.
Broken fibres	A broken fibre or detached tip can burn or lodge in tissue. If no beam or tissue effect is seen, stop and inspect before firing again.
Fire, outside or inside the body	Drapes, hair and skin preparations outside; in surgery, airway (endotracheal tube) fires where oxygen-rich gas is present, and fires inside body cavities. Airway fires are a surgical hazard you will not meet in aesthetic practice, but you should know they exist.
Mistreatment	The wrong client, the wrong area, the wrong device or the wrong settings. Check identity, the consented area and your settings every time, and record them.
Burns beyond the site	From poor contact, stray shots, hot handpieces, jewellery, watches or spectacle frames. Remove metal from the field.
Tattoos, permanent make-up and marks	Pigment absorbs strongly and can blister or burn. Cover them or keep a margin around them. Never treat a mark that has not been assessed.
Plume	Extract at the site, not across the client's face.
Positioning	Support limbs on long treatments, and take care with reduced sensation, for example in some diabetic clients.

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Equipment management and quality assurance

Quality assurance is how you show that your device does what its screen says, every day. The MHRA guidance recommends a written **equipment management policy** covering how a device is bought or borrowed, acceptance checks, instructions, quality assurance checks, the fault log, maintenance and servicing, modifications and disposal.

A device from arrival to disposal



Equipment management, from purchase to disposal. Drawn for this manual.

Buying, borrowing and demonstration devices

Before you buy a device, accept one on loan, or let a rep demonstrate one in your clinic, talk to your LPS and, where necessary, your LPA. A demonstration device is still a class 4 laser or a treatment IPL, and it needs the same controlled area, eyewear and risk assessment. Get enough information from the supplier to know the device meets your clinical and practical needs: the operator manual, installation requirements (power supply, room, cooling), the training offered and how servicing is provided.

Installation and acceptance checks

The maker or supplier installs the device. Before it is used on anyone, **acceptance (pre-use) checks** are carried out, by or on behalf of the LPA or LPS, often with the supplier's engineer. They give a baseline for future checks. Depending on the device they include electrical safety, output measurements, beam alignment, the shutter, the aiming beam, timer accuracy, interlocks, filters, the emergency stop, warning lights, the foot switch, eyewear, accessories and fibre connectors. Keep the record.

Routine checks

Quality assurance checks by frequency

Daily (authorised user)	Weekly	Once or twice a year
output stops when the switch is released	eyewear lenses and frames	by an engineer or specialist:
aiming beam lines up	blinds, windows and doors	electrical safety
filters and aperture clean, unscratched	warning lights and illuminated signs	output and calibration
alarms and lights work	interlocks work	shutter, timer, filters, emergency cut-off
cables and connectors sound		

Examples from the MHRA guidance. Not every check applies to every device. Drawn for this manual.

Before the first treatment of the day the authorised user also confirms the key is present and controlled, the emergency stop works, the sign is displayed and the door secured, the handpiece, filters and cooling are clean and working, and any built-in self-test or calibration has passed. Where a power meter or self-calibration function is fitted, check the output matches the setting. Record every check: a daily and weekly log is in Section 7.

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The device is serviced by an engineer trained by the manufacturer, at the interval the manufacturer sets, and has an annual electrical safety test. Acceptance checks are repeated after servicing, upgrades or repairs.

Servicing by a trained engineer



Covers come off for trained engineers only. Generated image commissioned by Skintastic, not a photograph.

The equipment fault log

Keep a fault log for each laser and IPL, where the LPA, the service engineer and an inspector can see it. For each fault record the date, what happened, any error code or alarm, the action taken, and the signature of the person who saw it, countersigned by the LPS or another named person. A template is in Section 7.

What can go wrong

Fault	Why it matters
Shutter jams or the switch sticks	Emission when you do not expect it
Broken or damaged fibre	Radiation leaks along it; the tip can burn or break off
Scratched, dusty or cracked filter or light guide	Hot spots and shorter wavelengths reaching the skin
Hair or gel burnt onto the optics	Hot spots and burns
Old lamp	Lower output and a shifted spectrum
Output not matching the setting	Under-treatment, or a burn
Aiming beam missing or out of line	The beam lands somewhere other than you think
Interlock, emergency stop or warning light not working	A safety feature lost without anyone knowing
Cooling failure	Epidermal burns, or the device overheating

If a fault affects safety, take the device out of use, put a "do not use" notice on it, record it, and tell your LPS and the service engineer.

Modifications and accessories

Any modification, or a change in how a device is used, can change its safety. Discuss it with your LPA and LPS first and review the risk assessment and local rules. A medical device should not be modified without the manufacturer's written consent; if a fault follows an unauthorised modification, the clinic rather than the manufacturer may be liable. Do not keep a device running with parts taken from old equipment.

Buy accessories (handpieces, tips, filters, fibres) that are made for your make and model, are suitable for the procedure and in date, and, for a medical device, carry

the appropriate CE or UKCA marking.

Non-routine work and contingency plans

Your risk assessment and local rules should cover the times when normal routines do not apply:

- **Servicing and engineer visits:** the engineer may need covers off and safety features overridden. Agree who is present, keep the controlled area in force with signs and eyewear, and make sure nobody else enters. Take extra care if an engineer works alone.
- **Cleaning and decontamination:** cleaners work with the device switched off and the key removed.
- **Out of hours:** the device isolated, the key locked away, the room secured.
- **Equipment failure during a treatment:** stop, make safe, look after the client, record and report.
- **Power cut, fire alarm or LPS absence:** who decides, and who the named deputy is.
- **Temporary staff and visitors:** briefed, protected, never operating the device.

Safety policies and the safety audit

Keep, at a minimum, an **optical radiation (laser and IPL) safety policy**, separate from your local rules, setting out management's commitment and approach to safety; plus policies for infection control, consent, complaints and adverse incident reporting. A separate safety policy gives everyone clear responsibilities, gives inspectors and your LPA a single document to check, and makes review easier. Alongside them keep your risk assessments, local rules, the register of authorised users, training records, servicing and QA records, the fault log and your treatment records.

Audit yourself regularly, and at least yearly. Walk through the controlled area, check the documents are current and signed, and look at a sample of treatment

records to see that settings, consent and patch tests were recorded. A safety audit checklist is in Section 7.

Check your understanding

Answer in your own words. These questions are part of your evidence (Section 6).

Over to you: controls and management

1. List five things you would put in place to control access to your treatment room while a class 4 laser is in use.

2. Set out the five steps of risk assessment, and name the four areas the MHRA guidance asks you to cover.

3. Name the levels of the hierarchy of control in order, and say why PPE comes last.

4. List three built-in safety features on a laser or IPL and say what each prevents.

5. Give two reasons why plume is a hazard, and say what controls it.

6. A sales rep offers to leave a demonstration IPL with you for a week. What do you do before it is used?

7. Give three daily and two weekly quality assurance checks.

8. Why does a pre-treatment checklist exist, when a trained operator already knows all of it?

Notes on Section 3

Section 4 How laser and intense light affect tissue

Learning outcomes

By the end of this section you will be able to:

- Explain what happens to light when it meets skin, and why it must be absorbed to have any effect
- Explain chromophores, absorption and penetration depth, and how wavelength, spot size and pulse duration are chosen
- Explain selective photothermolysis and thermal relaxation time
- Describe the photothermal, photomechanical, photochemical and photoablative effects, and photobiomodulation
- Explain how the common laser, IPL and LED treatments work, and the safety point that goes with each
- Recognise the main adverse effects on skin and eyes, tell an expected reaction from a complication, and say what to do

Ref	What this section covers, in detail
4.1	Reflection, scattering, absorption and transmission; the skin and its layers; melanin in the epidermis
4.2	Chromophores: melanin, haemoglobin and water; absorption; the optical window; penetration depth; spot size
4.3	Selective photothermolysis; thermal relaxation time; the extended theory for hair
4.4	The five tissue effects; temperature and time
4.5	Hair reduction, pigment, vessels, acne, skin rejuvenation and resurfacing, tattoo removal, photodynamic therapy, light and hair growth; other uses
4.6	Adverse effects and their management; paradoxical hair growth; patch testing; endpoints

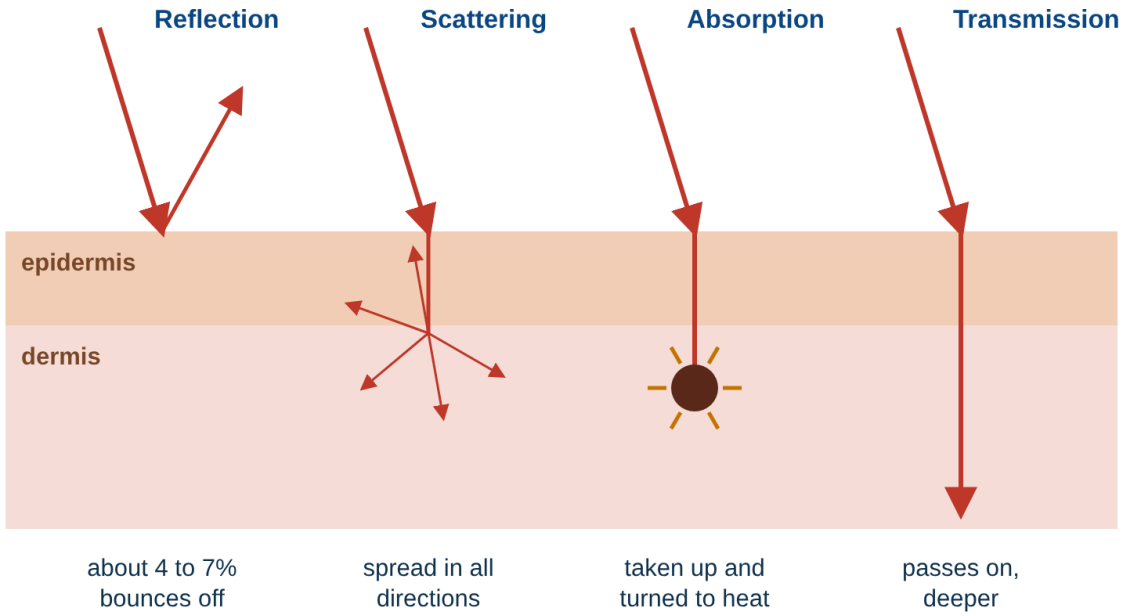
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Sections 2 and 3 were about not hurting anybody. This section is about making the light do something useful. They are the same subject seen from opposite ends: everything that produces a result can produce an injury if it lands in the wrong place or at the wrong dose.

What happens when light meets skin

Skin is not a clear window. When light arrives, four things happen to it, usually all at once.

Four fates of light in skin



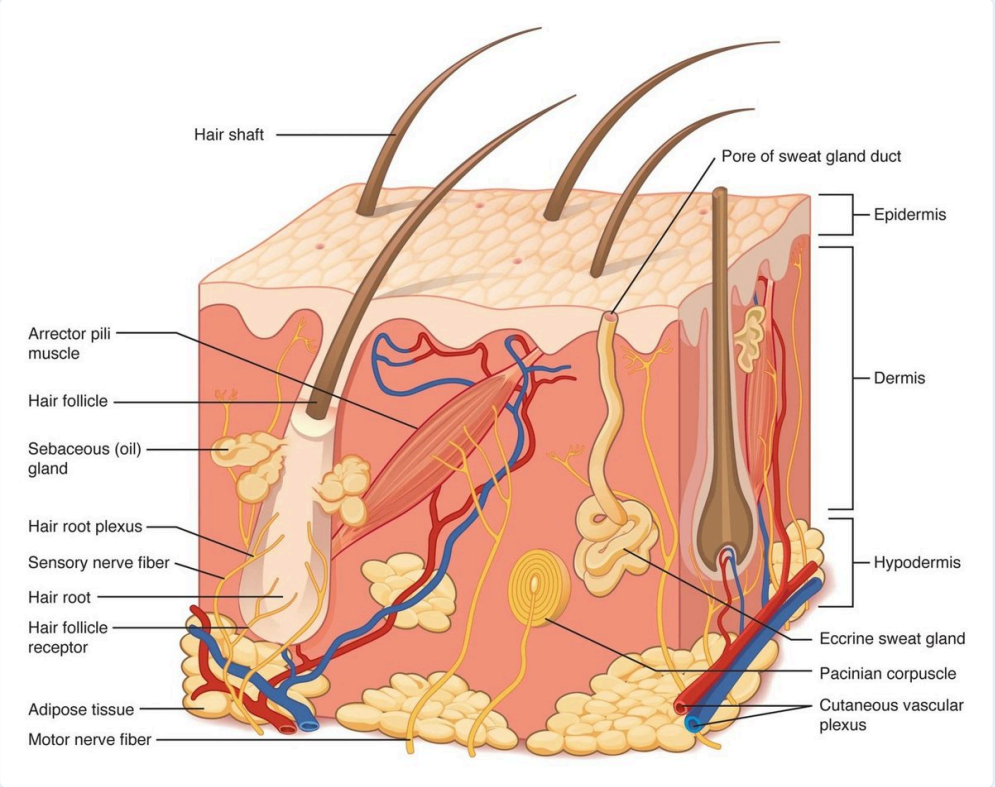
Only absorbed light does anything, good or harmful. Drawn for this manual.

- **Reflection:** about 4 to 7 per cent bounces off the surface, whatever the skin colour.
- **Scattering:** collagen and cell structures deflect light in all directions. Scattering is stronger at shorter wavelengths, one reason blue light stays shallow.
- **Absorption:** energy is taken up by a target and converted, usually into heat, sometimes into a chemical reaction or a glow (fluorescence).
- **Transmission:** light passes on to deeper layers unabsorbed.

> **The first rule of this subject**
>
> Light must be absorbed to have any effect. Everything else in this section follows from choosing a wavelength your target absorbs and the tissue around it does not.

The skin

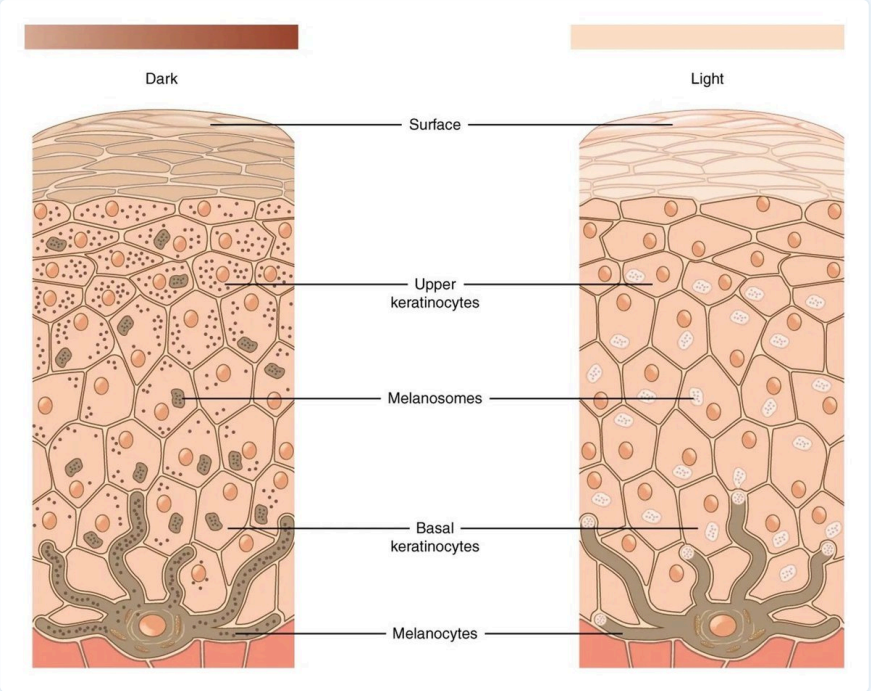
The layers of the skin



Epidermis, dermis and hypodermis. Each treatment target sits at its own depth. OpenStax, Anatomy and Physiology, figure 5.2. Creative Commons Attribution 4.0.

The **epidermis** is the thin outer layer. It has no blood vessels. **Melanocytes** in its deepest layer make melanin, which is passed to the surrounding cells. That melanin sits between your device and every target below it, which is why it matters so much in laser and IPL work.

Melanin in lighter and darker skin



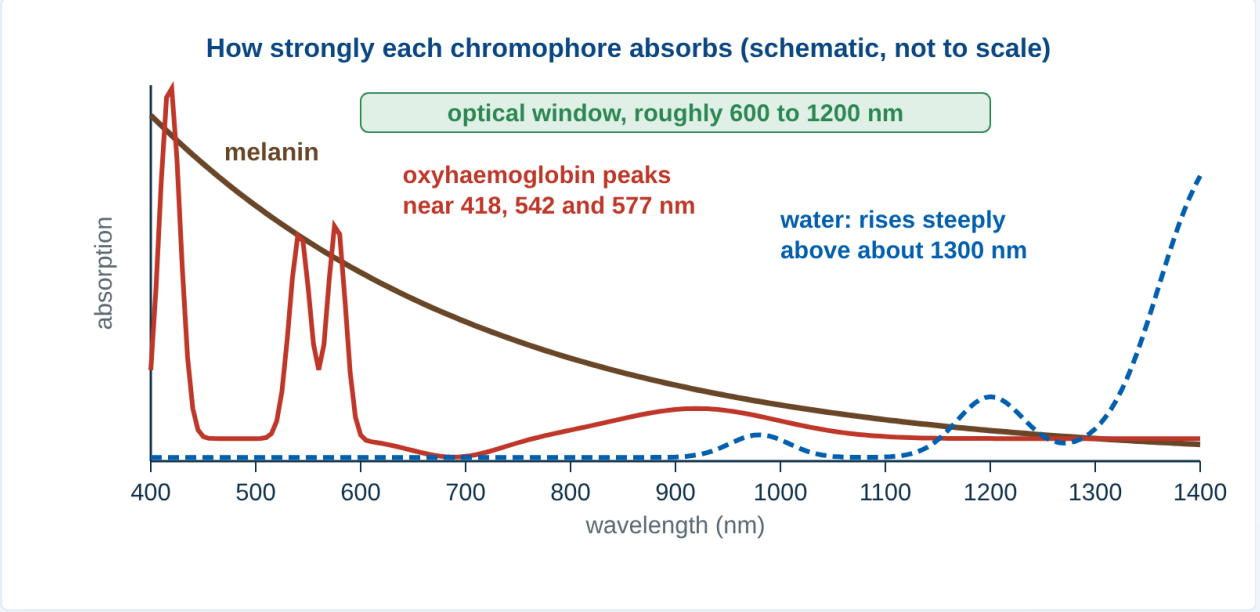
Darker skin has roughly the same number of melanocytes, but much more melanin spread through the epidermis. OpenStax, Anatomy and Physiology, figure 5.8. Creative Commons Attribution 4.0.

Chromophores: what absorbs the light

A **chromophore** is the part of the tissue that absorbs light. There are three main ones in skin, and nearly every aesthetic laser and IPL treatment is aimed at one of them. Others include tattoo ink, the porphyrins made by acne bacteria, and photosensitising drugs.

Chromophore	Absorbs best	Treatments
Melanin	Broadly; strongest in the UV and blue, falling steadily through the visible and near infrared	Hair reduction, pigmented lesions
Haemoglobin (in blood)	Peaks around 418, 542 and 577 nm, with a smaller broad peak in the near infrared	Thread veins, rosacea, port wine stains and other vascular lesions
Water	Low through the visible, rising steeply above about 1300 nm; very strong at 2940 and 10,600 nm	Ablative and fractional resurfacing, surgical cutting

Absorption by the main chromophores



A schematic only: the real curves differ by many times and are usually drawn on a log scale. Where your target's curve is high and the others are low is your treatment window. Drawn for this manual.

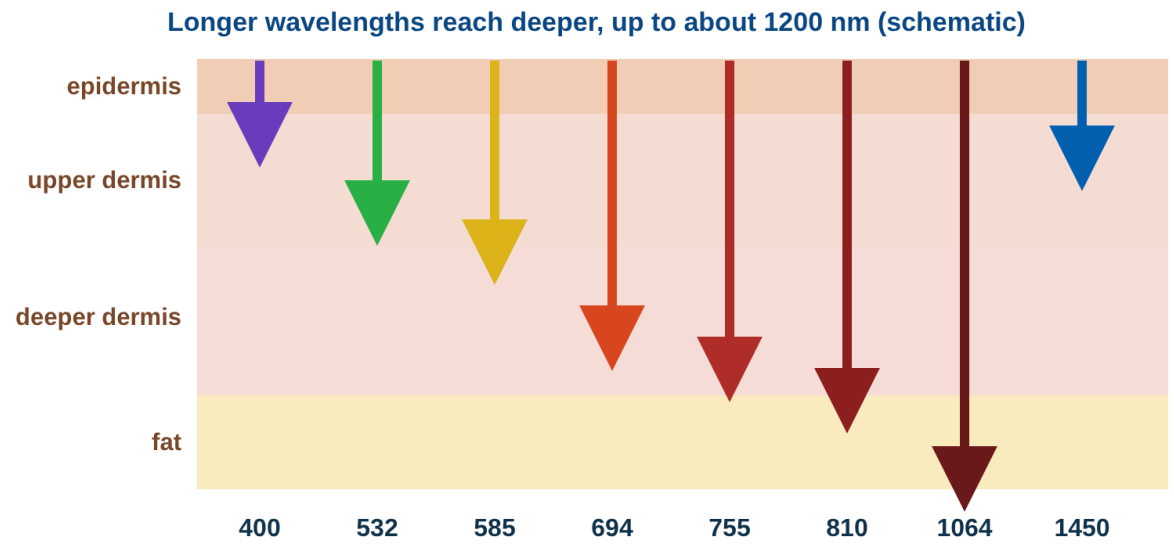
Melanin is the problem chromophore

Melanin absorbs across a very wide range. That is useful when it is the target, as in hair reduction, and a hazard when it is not. In darker or tanned skin the epidermis is full of melanin competing for your energy: it absorbs light meant for the follicle or vessel below, heats the epidermis and causes blistering, crusting and pigment change. It is one of the commonest causes of injury in aesthetic practice and is largely avoidable with a longer wavelength, a lower fluence, a longer pulse and good cooling.

Penetration depth and spot size

As a rule, the longer the wavelength, the deeper the light goes, up to about 1200 nm. Beyond that, water absorption takes over and penetration falls again. This gives an **optical window** of roughly 600 to 1200 nm, where scattering has fallen and water absorption has not yet risen, and it is why most deep-target devices work in that range. Most of an IPL's energy reaches the skin between about 500 and 850 nm.

How deep each wavelength reaches



A schematic only: real depths vary with skin type, spot size and the device. Drawn for this manual.

Spot size matters too. A larger spot loses proportionally less light sideways by scattering, so more reaches depth, and it covers the area faster. A smaller spot gives a higher fluence for the same energy and better precision for small or awkward areas and fine detail. Change the spot and you change the dose (Section 1).

Selective photothermolysis and thermal relaxation time

The principle behind most aesthetic treatments

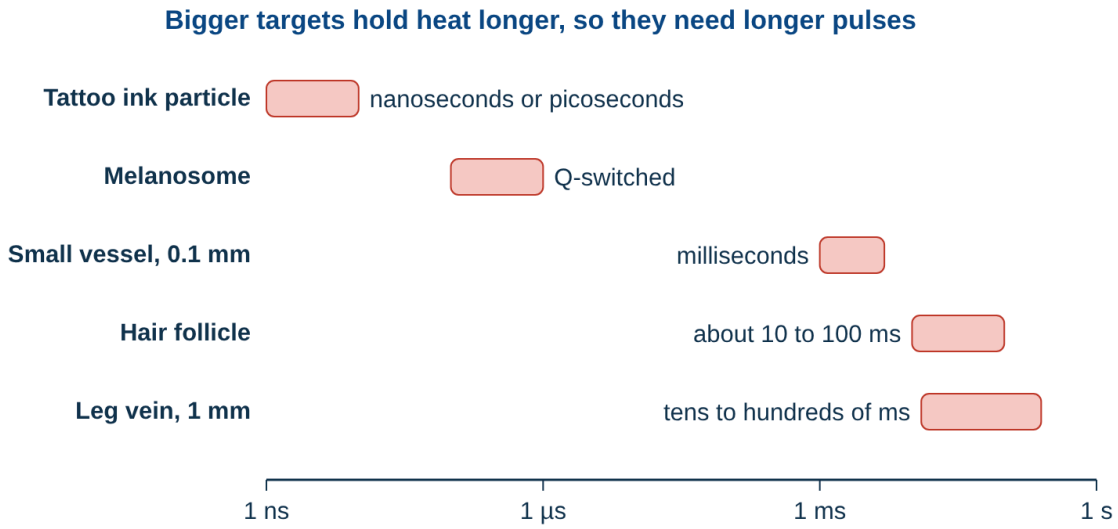
Described by Anderson and Parrish in 1983. To damage a target and spare the tissue around it, you need three things at once:

1. a wavelength the target absorbs better than the surrounding tissue;
2. a pulse duration no longer than the target's thermal relaxation time;
3. enough fluence to reach a damaging temperature within that pulse.

Get all three right and the target is damaged while the tissue beside it stays cool. Get the pulse duration wrong and the heat spreads before you have finished.

Thermal relaxation time (TRT) is the time a target takes to lose about half its heat to the tissue around it. Small targets cool fast and large ones slowly: TRT rises roughly with the square of the target's diameter. That one fact explains why pulse durations differ so widely between treatments.

Matching the pulse to the target



Approximate thermal relaxation times. Drawn for this manual.

Target	Approximate TRT	Pulse used
Tattoo ink particle	under 10 nanoseconds	Q-switched nanosecond, or picosecond
Melanosome	about 250 ns to 1 µs	Q-switched
Small vessel, 0.1 mm	a few milliseconds	millisecond pulses
Terminal hair follicle	roughly 10 to 100 ms	long pulse, 10 to 100 ms
Leg vein, 1 mm	tens to hundreds of ms	long-pulse Nd:YAG

For hair, the cells that matter (the stem cells in the bulge and the dermal papilla) contain little pigment. The melanin in the hair shaft absorbs the light and the heat then conducts out to them, so slightly longer pulses are used to allow time for that. This is the **extended theory of selective photothermolysis**. Longer pulses also protect the epidermis: its thin layer of melanin cools quickly, while the larger hair shaft holds its heat. Very short nanosecond pulses only blast the hair shaft and do not reach the stem cells.

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The tissue effects

Five ways light changes tissue

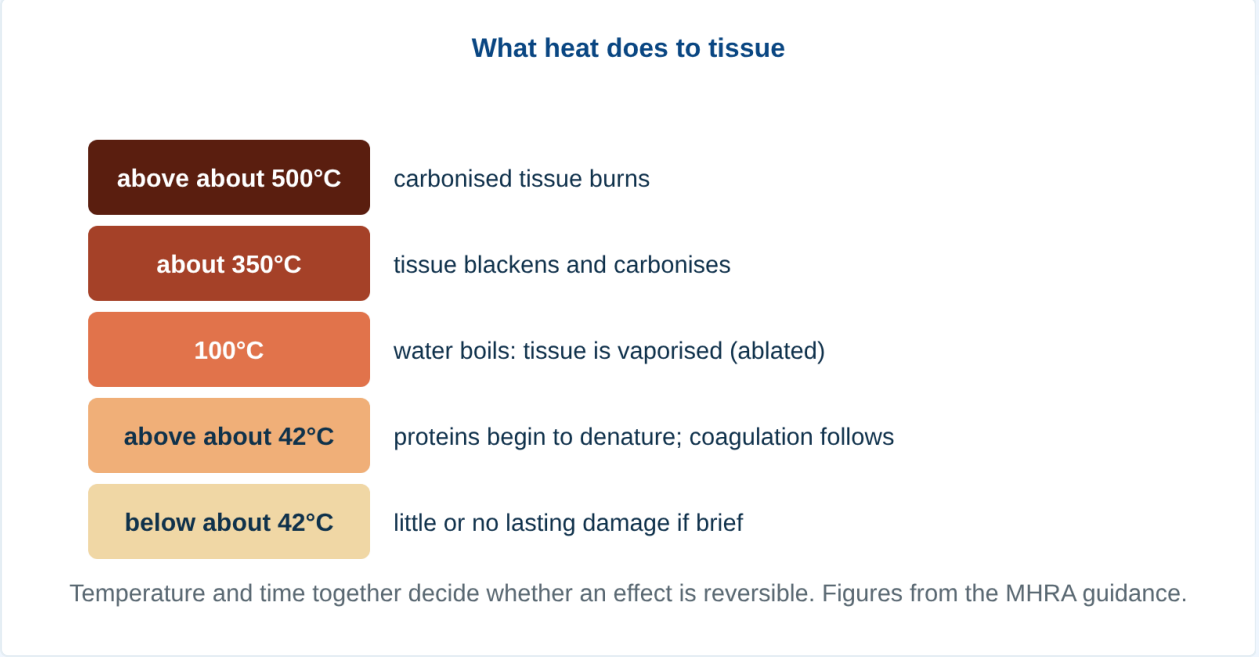


The four effects named in the MHRA guidance, and photobiomodulation. Drawn for this manual.

Effect	What happens
Photothermal	Absorbed light becomes heat. Most aesthetic treatment works this way: hair reduction, vascular and many pigment treatments, skin heating and resurfacing.
Photomechanical (photoacoustic)	Pulses of nanoseconds or less heat a particle so fast that it expands violently and shatters, sending a pressure wave through the tissue. This is how tattoo and pigment removal work.
Photochemical	Light drives a chemical reaction rather than heating. Photodynamic therapy and blue light on acne bacteria are examples. Ultraviolet damage to the skin and the cornea, and blue light injury to the retina, are photochemical too.
Photoablative	Short-wavelength ultraviolet, from an excimer laser, breaks molecular bonds directly and removes a precise layer of tissue, as in some eye surgery. Infrared lasers such as Er:YAG and CO2 also ablate, by vaporising tissue water.
Photobiomodulation	Low-level light producing a biological response without significant heating, used for example for wound healing and hair growth. The evidence is mixed and still developing, so treat claims about it with care.

Temperature and time

What heat does to tissue



Figures from the MHRA guidance, section 8.2. Drawn for this manual.

The boundary between a treatment and an injury is temperature multiplied by time. A brief, mild temperature rise is reversible, and most non-ablative work relies on it. Sustained heat, or a higher peak, crosses into coagulation and is permanent. Your fluence and pulse settings decide which side of that line you land on.

Common treatments, and how they work

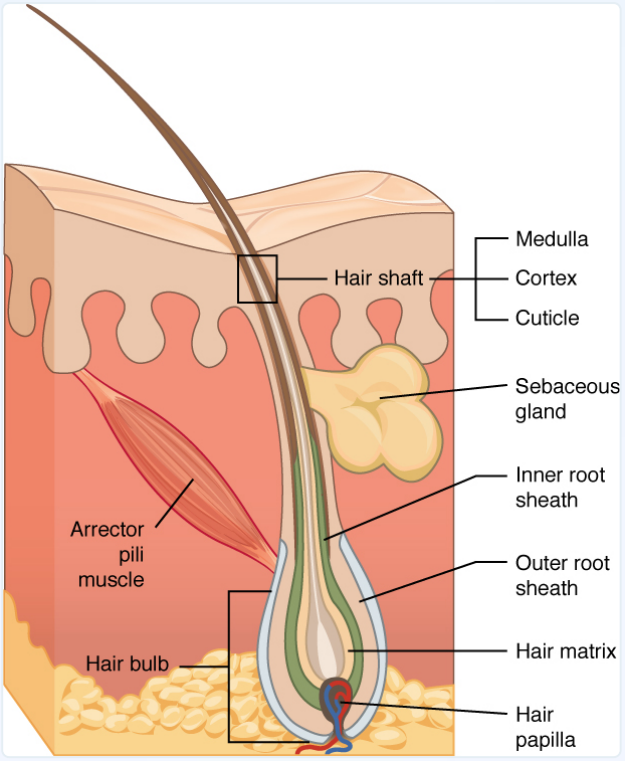
Hair reduction

Melanin in the hair shaft absorbs the light and the heat spreads to the stem cells in the bulge and the dermal papilla. Only hairs in **anagen**, the growing phase, are well pigmented and attached, so a course of sessions is needed: at any time only some hairs are in anagen. Heating that falls short of destroying the follicle can push it into its resting phase early, delaying regrowth rather than preventing it.

Typical wavelengths: 755 nm alexandrite for lighter skin and finer hair; 800 to 810 nm diode as the general choice; 1064 nm Nd:YAG for darker skin, because

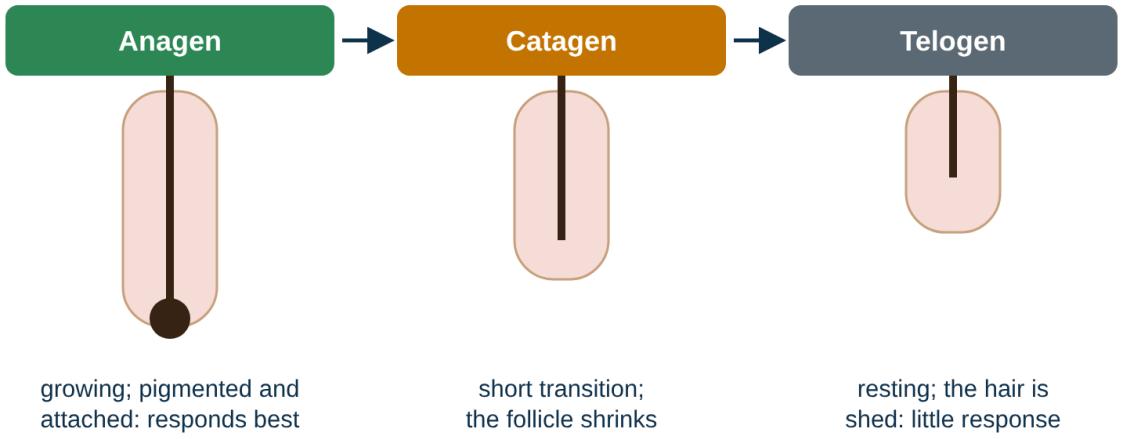
epidermal melanin absorbs it less; IPL filtered from about 600 to 700 nm upwards. White, grey, red and fine vellus hairs have too little melanin and will not respond.

The hair follicle



The pigmented shaft absorbs the light; the heat must reach the bulge and papilla. OpenStax, Anatomy and Physiology, figure 5.11. Creative Commons Attribution 4.0.

The hair growth cycle



At any time only some hairs are in anagen, which is why hair reduction needs a course of sessions. White, grey and fine vellus hairs have too little melanin to respond.

Only anagen hairs respond well, which is why treatment is given as a course at intervals. Drawn for this manual, replacing the earlier course slide.

Light and hair growth

Low-level red light, often around 650 nm, is used in some devices that aim to stimulate hair growth. It is thought to work by photobiomodulation, not by heat. The evidence is still developing.

Pigmented lesions

Melanin absorbs the pulse, the melanosomes heat faster than they can cool, and the pigment is broken up and cleared by the body over the following days: the mark darkens, crusts and flakes away. Q-switched lasers at 532, 694, 755 and 1064 nm and filtered IPL are used. Surface (epidermal) pigment responds far better than deep (dermal) pigment.

Never treat a mark that has not been assessed

Melanoma has been treated by people who assumed it was a sun spot. Treating it destroys the evidence and delays diagnosis. Any mole, or any mark that is new, changing, irregular, raised, itchy or bleeding, is referred to a doctor first.

Vascular lesions

Oxyhaemoglobin absorbs the pulse, the blood in the vessel heats and coagulates, the vessel wall is damaged and the vessel closes and is reabsorbed. Wavelengths at or near the haemoglobin peaks are used: 532 nm and 585 to 595 nm (pulsed dye) for fine surface vessels, and 1064 nm for deeper or larger vessels such as leg veins, where the lower absorption is offset by much better penetration. The endpoint is the vessel disappearing or darkening, not blistering.

Bruising (purpura) is an expected effect with some short-pulse vascular treatments, especially pulsed dye lasers, and is explained to the client beforehand. Clients taking anticoagulant (blood-thinning) medicines bruise more easily. Skintastic's rule is to treat them only with written confirmation from their GP or prescriber, at reduced energy, with the bruising risk explained, and never to advise anyone to stop their medication.

Acne

Two mechanisms, often combined. Cutibacterium acnes bacteria make porphyrins that absorb strongly at about 415 nm (blue), with smaller peaks in the red; the absorbed light produces reactive oxygen inside the bacteria and kills them. Separately, red light around 630 nm reaches deeper and calms inflammation, and some infrared and laser devices heat the oil glands to reduce oil production.

Skin rejuvenation and resurfacing

Rejuvenation treatments are sometimes grouped as type 1, aimed at colour (pigment and small vessels), and type 2, aimed at texture and fine lines. Texture treatments use controlled heat in the dermis: existing collagen tightens and new collagen forms over the following weeks and months, so change is gradual.

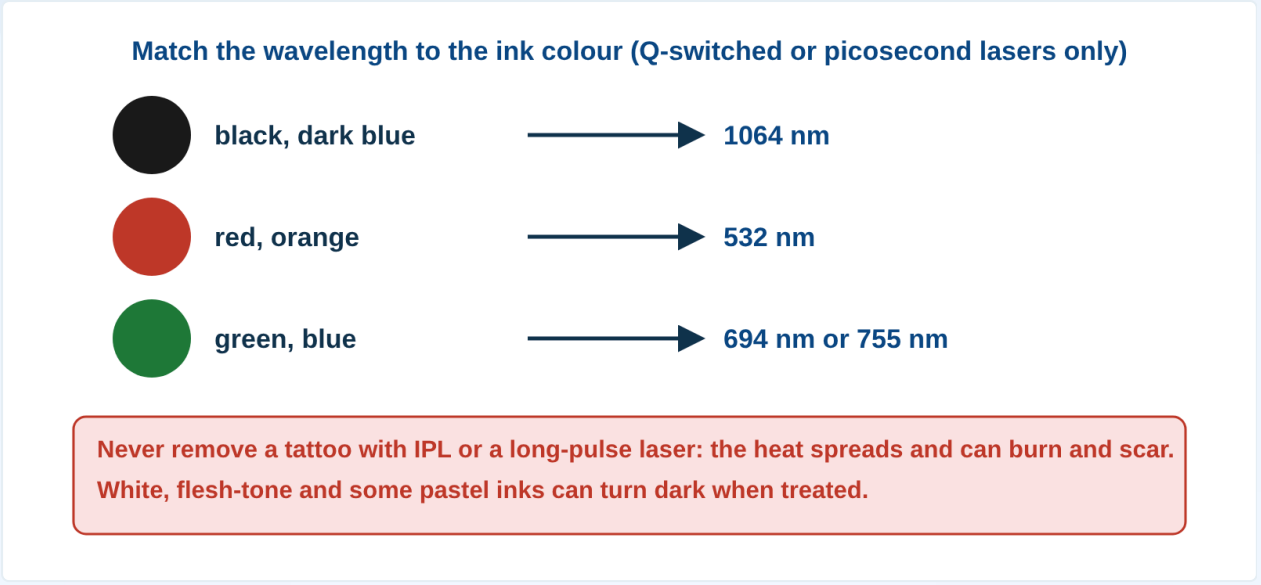
Approach	How it works
Fully ablative	CO2 (10,600 nm) or Er:YAG (2940 nm) vaporises the whole surface. A long recovery, with real risks of infection, scarring and permanent pigment change.
Fractional ablative	Tiny columns of tissue are ablated with untreated skin between them, which supplies cells for repair, so healing is much quicker.
Fractional non-ablative	Columns of heated tissue under an intact surface. The skin barrier is not broken.
Non-ablative heating	IPL, some lasers and other devices warm the dermis more evenly. The gentlest approach, and the slowest to show change.

Compared with ablative resurfacing, non-ablative and fractional non-ablative treatments keep the skin barrier intact, so recovery is shorter and the risks of infection, scarring and permanent pigment change are much lower, and they are generally safer in darker skin types. The trade-off is that more sessions are usually needed for a smaller change.

Tattoo removal

Ink particles are far too small to treat with millisecond pulses. Nanosecond (Q-switched) or picosecond pulses make each particle absorb, expand violently and shatter: a photomechanical effect. The body's immune cells clear the fragments over weeks, which is why sessions are spaced well apart. The immediate endpoint is a white frosting. Picosecond devices shatter particles more finely.

Ink colour and wavelength



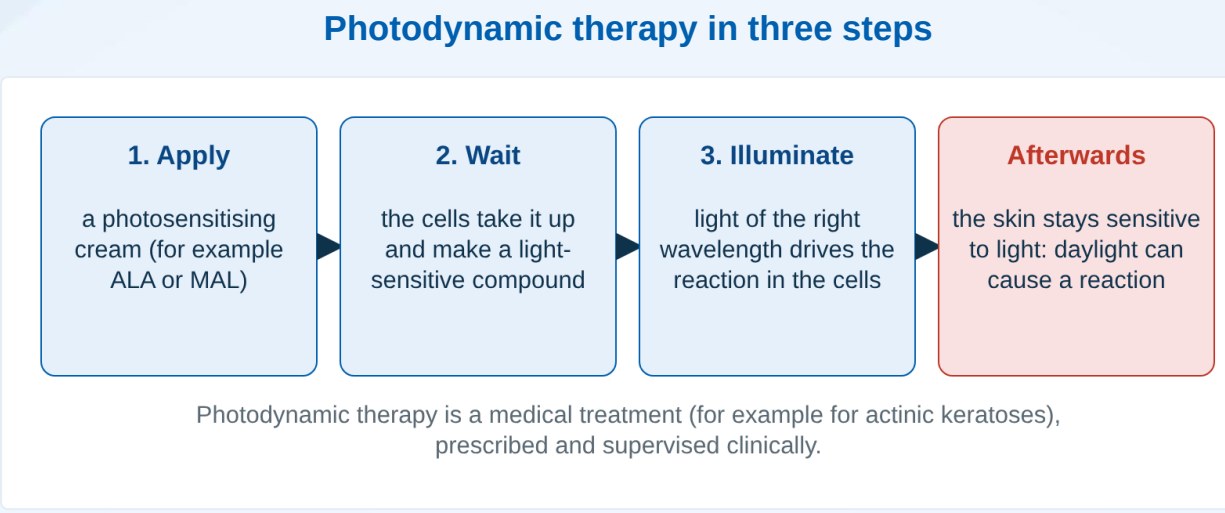
The wavelength is chosen to match the colour the ink absorbs. Drawn for this manual.

Tattoo safety

- Never use IPL or a long-pulse hair removal laser to remove a tattoo. The pulses are far too long: the heat spreads into the skin and can burn and scar.
- White, flesh-tone, some pastel and many cosmetic (permanent make-up) inks can turn dark, sometimes permanently, when treated. Test a small area first.
- During other treatments, cover tattoos and permanent make-up or keep a margin around them, because the ink absorbs strongly and can blister.
- Amateur tattoos often use less ink, placed unevenly; professional tattoos usually carry more ink, more deeply, and in more colours, and may need more sessions.

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Photodynamic therapy (PDT)



Photodynamic therapy is a medical treatment, prescribed and supervised clinically. Drawn for this manual.

A photosensitising cream (such as aminolaevulinic acid, ALA, or its methyl ester, MAL) is applied; the abnormal cells take it up; light of the right wavelength, often from an LED panel or in some cases daylight, then triggers a reaction that destroys them. It is used medically for conditions such as actinic keratoses, superficial basal cell carcinoma and Bowen's disease. Afterwards the treated skin stays sensitive to light for a time, so it must be protected from daylight as instructed.

Other uses

Lasers and light are also used for laser-assisted fat reduction, infrared skin tightening, intimate treatments and, in surgery, for closing veins (endovenous laser treatment), in dentistry, eye surgery and many other specialties. Each needs its own specific training.

Adverse effects

You must be able to tell an expected reaction from a complication, and know what to do.

Effect	What to do
Erythema and oedema (the commonest effect, and expected)	Cool, avoid heat and sun. Usually settles within hours to a couple of days.
Blistering	Do not burst. Keep clean and lightly covered, review, and refer if it is large, broken or infected.
Crusting	Do not pick. Keep moisturised and protected from the sun.
Burns	NHS first aid: cool the burn under cool running water for 20 minutes, no ice, do not burst blisters, cover loosely with cling film or a clean dressing. Facial, large, deep or electrical burns go to A&E. Record and report.
Bruising (purpura)	Expected with some vascular treatments; otherwise a sign of too much energy. Record it.
Hyperpigmentation	Strict sun protection and time; refer for advice if it persists. Usually fades over months.
Hypopigmentation	May be permanent. Correct settings are the only real prevention.
Scarring, including keloid	Refer to a doctor.
Infection, including cold sore reactivation	Refer for medical treatment. Ask about cold sores before treating near the mouth.
Leucotrichia (whitening of hair) and pruritus (itching)	Record and monitor; itching usually settles.

Effect	What to do
Paradoxical hair growth	See below.
Tattoo or permanent make-up darkening or smudging	Prevent by covering it or keeping a margin; record and refer if it happens.
Eye injury	Stop at once. Refer the person to an eye casualty department straight away; they should be examined by an ophthalmologist within 24 hours. Treat it as a serious adverse incident (Section 5).

Paradoxical hair growth

Occasionally, hair reduction is followed by **increased** hair growth at or near the treated area. It is mostly reported on the face and neck, in darker skin types, and in people with hormonal conditions such as polycystic ovary syndrome. If it happens, stop light-based treatment of that area, record it, and discuss other hair removal methods with the client.

Patch testing

A patch test at the intended settings, on a small representative area, and checked before the full treatment, is the simplest and most effective way to avoid most of the effects above. The usual review is at 24 to 48 hours, or longer where the device manufacturer, the clinic protocol or the insurer requires it. Repeat it after a change of device, lamp, handpiece or settings, after a service, and if the client's skin, tan or medication has changed.

Endpoints

Every treatment has a clinical endpoint you are looking for: for hair, perifollicular redness and swelling; for a vessel, disappearance or darkening; for pigment, darkening or a grey-white change; for tattoo ink, white frosting. Knowing it, and stopping when you see it or anything unexpected, is the difference between a result and an injury. Device training teaches the endpoints for your machine.

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Check your understanding

Answer in your own words. These questions are part of your evidence (Section 6).

Over to you: tissue interaction

1. Name the three main chromophores in skin and give one treatment that targets each.

2. What is thermal relaxation time, and why does it decide your pulse duration?

3. Why is 1064 nm the safer choice for hair reduction on Fitzpatrick type V or VI skin?

4. Give two advantages of a large spot size and one of a small spot size.

5. Name the four tissue effects described in the MHRA guidance and give an example of each.

6. Which wavelength excites porphyrins in acne treatment, and what does that achieve?

7. Why must IPL never be used to remove a tattoo?

8. Explain why fractional non-ablative treatment carries less risk than fully ablative resurfacing.

Notes on Section 4

Section 5 Safety management, the law and standards

Learning outcomes

By the end of this section you will be able to:

- Explain the registration and licensing requirements for lasers and IPL in England, Wales, Scotland and Northern Ireland
- Describe the roles of the employer, the Laser Protection Adviser, the Laser Protection Supervisor, the Laser Safety Officer, authorised users, assisting staff and the Expert Medical Practitioner
- Explain what local rules, a treatment protocol and a treatment register contain, and how they are kept up to date
- Explain the main health and safety, product and consumer laws that apply to a laser or IPL clinic, and the difference between a law, a standard and guidance
- Name the main safety standards for lasers, IPL and protective eyewear
- Take the right emergency action after an accident or adverse incident, and report it to the right people
- Describe the training and educational standards for laser and IPL work, including how often Core of Knowledge is refreshed

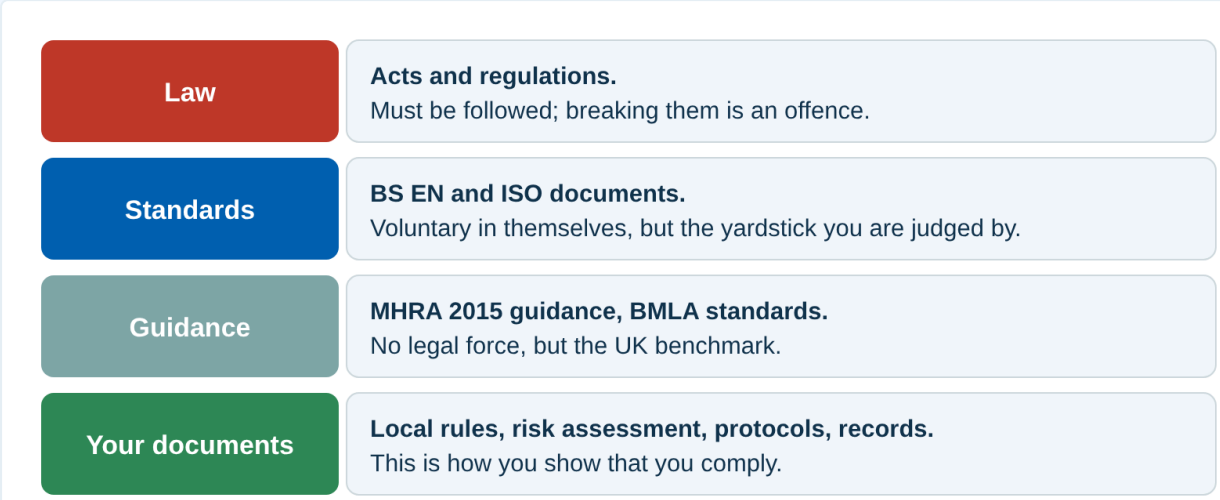
Ref	What this section covers, in detail
5.1	Law, standards and guidance; registration and licensing in each nation; enforcement
5.2	The safety roles, and the LPA requirement in each nation
5.3	Local rules; the treatment protocol; the treatment register; consent and records
5.4	Health and safety law; medical device and product law; consumer and data law; older laws you may meet
5.5	Standards for devices and eyewear
5.6	Emergency action, incident reporting and investigation
5.7	Training, refreshers and educational standards; before you start

Check the current position for yourself

This section was written and checked in October 2026. Regulation in this field is changing, and the rules differ between England, Wales, Scotland and Northern Ireland. Before you rely on anything here, check the current position with your local authority, your regional regulator and your Laser Protection Adviser. Nothing in this manual is legal advice.

Law, standards and guidance

Four layers, and how they fit together



A regulation is law; a standard and guidance are how you show you met it. Drawn for this manual.

A **regulation** (or an Act) is law: breaking it is an offence. A **standard** is a published technical document setting out good practice. It is voluntary in itself, but it is the yardstick a court, an insurer or a regulator uses, and following it is often how you show you complied with the law. **Guidance** such as the MHRA's 2015 guidance on lasers, IPL and LEDs has no legal status, as the MHRA itself says, but it is the main UK benchmark. If something goes wrong and you ignored it, you will find it hard to show you acted reasonably.

Knowing the rules for your area



Check the rules for your own area before you start, and again whenever they change. Generated image commissioned by Skintastic, not a photograph.

Registration and licensing in the four nations

There is no single UK-wide rule. Where you work decides what you must do.

The four nations at a glance (October 2026)

England	Wales
No national registration for cosmetic laser and IPL at present Special treatment licences in London and some other areas National licensing scheme planned (Health and Care Act 2022, s180)	Registration with Healthcare Inspectorate Wales (HIW) Class 3B and 4 lasers and intense light are prescribed technologies LPA and protocol required
Scotland	**Northern Ireland**
Clinics run by doctors, dentists, nurses or midwives: Healthcare Improvement Scotland Council licence for non-ablative laser and light: from 6 September 2027	Registration with the Regulation and Quality Improvement Authority (RQIA) Class 3B and 4 lasers and intense light are listed LPA and protocol required

A summary only: the detail follows. Drawn for this manual.

England

Until 2010, independent clinics using class 3B or 4 lasers or IPL in England had to register with the regulator of the time. Since October 2010 it is the activity, not the equipment, that decides. Registration with the **Care Quality Commission (CQC)** is needed only for a "regulated activity", such as treatment of disease, disorder or injury, or a surgical procedure, carried out by or under a healthcare professional. Non-surgical cosmetic laser and IPL work, such as hair reduction and skin rejuvenation, is not a regulated activity, so it generally sits outside CQC registration. Falling outside CQC does not mean falling outside the law: health and safety, product, consumer and data law, and any local licensing, all still apply.

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Special treatment licensing in England

Some local authorities have their own local Acts requiring a **special treatment licence** for premises (and often for named practitioners) offering treatments that include laser and IPL. The best known are the London Local Authorities Act 1991 (most London boroughs), the Nottinghamshire County Council Act 1985 and the Essex Act 1987. Operating without a required licence is an offence. Ring your council's licensing team and ask.

A licence usually involves:

- an application and fee to the council, naming the treatments and the people who will carry them out, with their qualifications;
- evidence such as your local rules, risk assessment, LPA appointment, treatment protocol, fire risk assessment and insurance;
- an inspection by an environmental health officer (EHO) before the licence is granted, and conditions you must keep to, renewed each year.

Councils, through their EHOs, also enforce health and safety law in most clinics and salons, including the Control of Artificial Optical Radiation at Work Regulations 2010. Under the Health and Safety at Work etc. Act 1974 an inspector can enter and inspect, issue an improvement notice or a prohibition notice (stopping an activity at once), seize or make safe a dangerous article, and prosecute.

Where England is heading

Section 180 of the Health and Care Act 2022 gives the Secretary of State power to create a licensing scheme for non-surgical cosmetic procedures in England. The Government consulted in 2023 and published its response on 7 August 2025, proposing green, amber and red risk categories. Its proposals placed IPL and LED treatments, non-ablative laser hair removal and laser photorejuvenation in the lowest-risk (green) group, and extensive fully ablative resurfacing with lasers such as CO2 in the highest-risk (red) group. At the time of writing no scheme is in force. Check gov.uk for the current position.

Wales

Wales still regulates by equipment. Under the Independent Health Care (Wales) Regulations 2011, treatment using a class 3B or class 4 laser product, or an intense light source, is a prescribed technology, and an establishment that uses one is an independent hospital that must register with **Healthcare Inspectorate Wales (HIW)**. There are exceptions for class 3B treatment carried out by or under the supervision of a healthcare professional, and for class 4 dental lasers used in a private dental practice. Registration in Wales normally requires a certificated Laser Protection Adviser, treatment protocols from an Expert Medical Practitioner, local rules, a register of authorised users, a register of treatments, servicing records and update training, and serious incidents must be notified to HIW.

Northern Ireland

Under the Independent Health Care Regulations (Northern Ireland) 2005, made under the Health and Personal Social Services (Quality, Improvement and Regulation) (Northern Ireland) Order 2003, class 3B and 4 laser and intense light treatment are listed services, and the establishment registers with the **Regulation and Quality Improvement Authority (RQIA)** as an independent hospital. Healthcare professionals such as physiotherapists using only a class 3B laser are exempt. A certificated LPA must be appointed. RQIA expects a register of authorised users, a treatment protocol, local rules, a named LPS, a treatment register, a current LPA risk assessment, update training for users, and notification of serious incidents.

Scotland

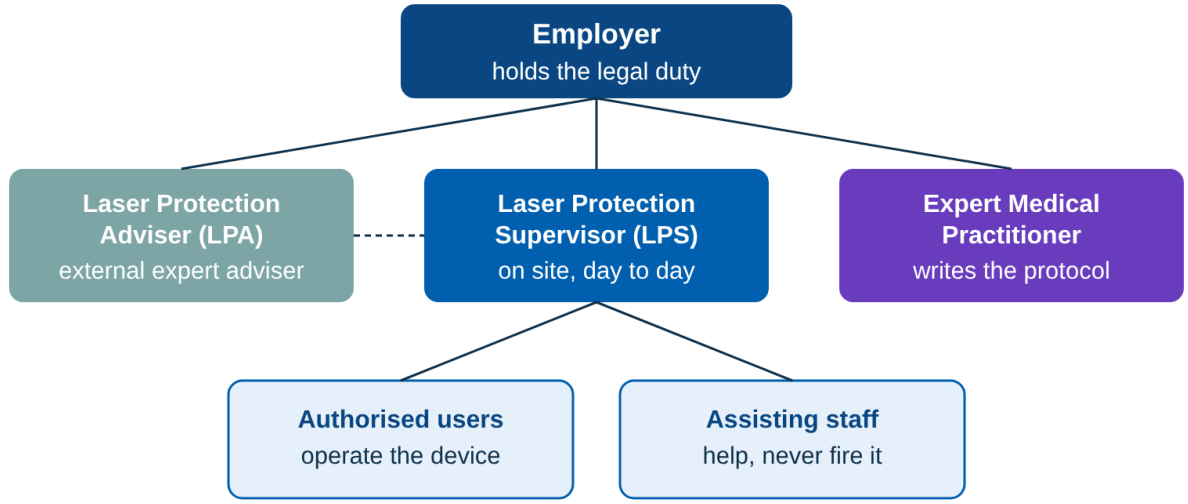
Since 2016, independent clinics provided by doctors, dentists, nurses and midwives register with **Healthcare Improvement Scotland (HIS)**. For everyone else, the position has changed in 2026:

- The Civic Government (Scotland) Act 1982 (Licensing of Non-surgical Procedures) Order 2026 (SSI 2026/87), in force from 13 February 2026, makes **non-ablative laser and light treatment** a licensable activity. A local authority licence is needed from **6 September 2027**; if you apply before that date you may carry on while your application is decided. Premises registered with HIS are excepted.
- The Non-surgical Procedures and Functions of Medical Reviewers (Scotland) Act 2026 (asp 13), which received Royal Assent on 12 May 2026, lists **ablative laser treatment** among the procedures it restricts. When its main provisions come into force (not before 6 September 2027 for the premises rule), these procedures may not be given to anyone under 18 and may be carried out only in specified settings.

The Order does not define "light treatment", so check with your council whether your IPL or LED device is covered.

The safety roles

Who does what



The LPA advises on safety, not on clinical treatment. The LPS has a named deputy for absences.

In a small clinic one person may hold several roles, often the owner as employer and LPS. Drawn for this manual.

Role	What they do
Employer	Holds the legal duty for safety: makes sure the risk assessment and local rules are drafted and followed, and that staff are trained, supervised and equipped. Can delegate tasks, not responsibility.
Laser Protection Adviser (LPA)	An expert in laser and IPL safety, usually external, responsible to the employer. Advises; does not manage the clinic and does not provide clinical governance.
Laser Protection Supervisor (LPS)	On site, day to day: makes sure the local rules are followed, supervises the equipment and the people who use it, and is the link with the LPA. Has a named deputy for absences.
Laser Safety Officer (LSO)	A term from BS EN 60825-1, which recommends appointing one where class 3B or 4 lasers are used. The MHRA guidance treats the LSO and LPS roles as broadly the same; some places use LSO instead of LPS.

Role	What they do
Authorised user	The person permitted to operate the device: named on the register, trained in Core of Knowledge, the device and the treatment, and signed up to the local rules.
Assisting staff	Help during treatment but do not fire the device. Trained in what the equipment is for, its labels, its hazards, the controls, the local rules, the emergency plans and the QA checks; authorised by the LPS or LPA.
Other staff	Anyone else who may be in the controlled area: given basic laser and IPL safety awareness and required to follow the local rules.
Expert Medical Practitioner (EMP)	A doctor (or in some schemes another registered healthcare professional) with relevant laser expertise, who writes and signs the treatment protocols.

The Laser Protection Adviser

The LPA's duties are set by the employer and usually include: planning advice for new or refurbished rooms and purchase advice; the laser and IPL risk assessment; defining the controlled area; specifying eyewear; overseeing commissioning (acceptance testing); making sure local rules are drafted; safety training; regular safety reviews and audits; and investigating incidents.

> **Three things your LPA provides that you cannot easily do yourself**
>
> 1. Advice on, and approval of, your local rules.
> 2. The hazard calculations (MPE, NOHD) and the eyewear specification for your device and room.
> 3. Commissioning checks and regular safety audits of the installation, controls and records.

Is an LPA required? The MHRA guidance considers it good practice in England to consult an LPA wherever class 3B or 4 lasers or IPL are used; it is not a general legal requirement, but many licensing councils and insurers require it.

Northern Ireland requires a certificated LPA; Wales expects one as part of registration; in Scotland the MHRA guidance describes it as good practice for clinics outside HIS registration. There are no fixed criteria for LPA competence; certification schemes include those run by RPA 2000 and the Association of Laser Safety Professionals, and the technical report PD CLC/TR 50448 describes the levels of competence for laser safety roles.

The Laser Protection Supervisor

The LPS role is agreed between the employer and the LPA and written down. Their duties typically include: making sure the local rules are followed; keeping the register of authorised users and the signed statements that each user has read the local rules, with copies to the LPA; making sure only authorised users operate the device; arranging servicing and quality assurance checks; keeping training and equipment records; telling the LPA at once about any incident or any planned change; and suggesting changes to the local rules. The LPS should attend a Core of Knowledge course and keep it up to date.

Local rules, protocols and records

Local rules

Local rules are the written safety instructions for a particular device in a particular room. They form part of the employer's means of complying with the Health and Safety at Work etc. Act 1974 and the Control of Artificial Optical Radiation at Work Regulations 2010. They are drafted by the LPS with the LPA's advice (or by the LPA), agreed by the employer and approved by the LPA. Every authorised user, and anyone else who works in the controlled area, reads them, has them talked through, and signs to say they understand and will follow them.

The MHRA guidance lists what local rules should cover, directly or by reference:

- the management safety structure
- contact details for the LPS and LPA
- the register of authorised users
- safe keeping and issue of keys
- the controlled area and its limits
- the nature of the hazard
- controlled and safe access
- training for users and helpers
- the authorised user's responsibilities
- safe working, including equipment layout
- pre-use safety checks
- PPE, especially eyewear
- preventing unauthorised use
- adverse event and fault procedures and logs
- loan or demonstration equipment
- temporary staff and visiting engineers

They are kept in the treatment area, reviewed at least every year and whenever anything changes, and carry the review date, the reviser's name and a version number. Old versions are withdrawn, and staff re-read and re-sign after any change. A template is in Section 7.

The treatment protocol

A **treatment protocol** sets out how each laser or IPL treatment is to be carried out. Under the BMLA standards it is written by an expert registered healthcare professional (often called the Expert Medical Practitioner), who must have verifiable expertise in that treatment; it is signed and dated, reviewed when treatments or evidence change, and there is a separate protocol for each treatment. It is required for registration in Wales and Northern Ireland and by many licensing councils. It must cover:

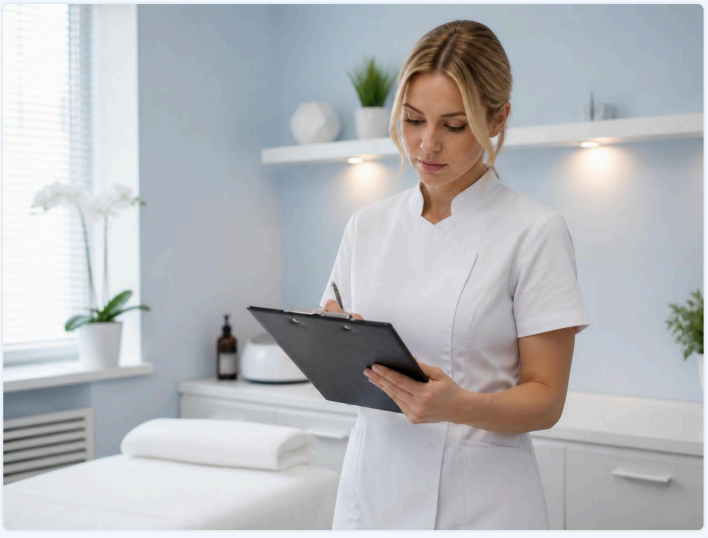
- contraindications
- technique
- obtaining consent
- records and the step-by-step process
- cleanliness and infection control
- pre-treatment tests
- aftercare
- recognising treatment-related problems
- what to do if anything goes wrong
- permitted variation in the settings

The protocol is about clinical practice. The LPA's role is safety; it does not replace the protocol or the clinical support of its author.

The treatment register and consent

An entry is made in the **treatment register** every time the laser or IPL is used, recording: the client's name and a second identifier such as date of birth; the date and time; the operator's name and signature; the treatment given; the treatment parameters; and any accident or adverse effect. Valid written consent is obtained before treatment, with the risks, benefits and possible complications explained; additional arrangements apply to anyone under 18. Records contain health information, which is special category data under the UK GDPR and the Data Protection Act 2018: keep them secure, accurate and only as long as necessary.

Records made at the time



If it is not written down and dated, it did not happen. Generated image commissioned by Skintastic, not a photograph.

The laws that apply

Apart from the Control of Artificial Optical Radiation at Work Regulations, there is no single law about lasers and IPL. General health and safety law applies, with product, consumer and data law alongside it. Appendix A gives the official reference for each.

Law	What it requires of you
Health and Safety at Work etc. Act 1974 (in Northern Ireland, the Health and Safety at Work (Northern Ireland) Order 1978)	The framework. Employers must ensure, so far as reasonably practicable, the health and safety of employees and of others affected, including clients and visitors. Employees must take reasonable care and co-operate. Manufacturers and suppliers must make sure articles they supply are safe and come with information for safe use.
Control of Artificial Optical Radiation at Work Regulations 2010	Assess the risk to employees' eyes and skin from optical radiation, including lasers, IPL and LEDs (regulation 3); remove or reduce it, keeping exposure below the exposure limit values (regulation 4); inform and train employees (regulation 5); and provide health surveillance where needed (regulation 6).
Management of Health and Safety at Work Regulations 1999	A suitable and sufficient written risk assessment (regulation 3), acted on, with competent help appointed. Your LPA and LPS are part of that help.
Provision and Use of Work Equipment Regulations 1998 (PUWER)	Equipment suitable for its use, maintained, inspected, and used only by trained people; maintenance logs kept up to date.
Personal Protective Equipment at Work Regulations 1992	Provide suitable PPE, free of charge, where risks cannot be controlled otherwise, and train people to use it.
Control of Substances Hazardous to Health Regulations 2002 (COSHH)	Assess and control exposure to hazardous substances: plume, laser dyes, cryogens and cleaning chemicals.
Electricity at Work Regulations 1989	Electrical equipment kept safe; regular testing is the usual way to show it.
Health and Safety (Safety Signs and Signals) Regulations 1996	Safety signs wherever a risk cannot be controlled by other means, such as laser and IPL warning signs.
Workplace (Health, Safety and Welfare) Regulations 1992	A safe working environment: space, ventilation, lighting, temperature and cleanliness.

Law	What it requires of you
Manual Handling Operations Regulations 1992	Avoid or assess hazardous lifting and moving, such as heavy devices.
Reporting of Injuries, Diseases and Dangerous Occurrences Regulations 2013 (RIDDOR)	Report certain work-related injuries and incidents to the HSE (see "Reporting" later in this section).
Regulatory Reform (Fire Safety) Order 2005	A fire risk assessment, fire precautions and procedures.

Medical devices and product safety

A **medical device** is a product intended by its manufacturer for a medical purpose, such as diagnosing, preventing, monitoring or treating disease or injury. Many aesthetic lasers and IPLs are sold for medical purposes and are medical devices; others are sold only for cosmetic use and are not. What the manufacturer says the device is for decides which it is, so a cosmetic device advertised for a medical purpose raises questions about which rules apply.

- In Great Britain, medical devices are regulated by the **MHRA** under the Medical Devices Regulations 2002, as amended (which originally put the EU Medical Devices Directive into UK law). A manufacturer based outside the UK must appoint a **UK Responsible Person** (regulation 7A) and the device must be registered with the MHRA. CE-marked medical devices continue to be accepted in Great Britain under transitional arrangements; check gov.uk for the current position. In Northern Ireland, the EU Medical Devices Regulation (EU) 2017/745 applies, and it also covers lasers and IPL sold for cosmetic skin treatment, such as hair or tattoo removal, even where there is no medical purpose.
- For devices that are not medical devices, general product safety law applies, enforced by Trading Standards.
- A CE or UKCA mark is the manufacturer's own declaration that the product meets the rules. It is not a quality rating and not an approval by any UK body. Nothing is "MHRA approved".
- Approval by the US Food and Drug Administration (FDA) is not a UK requirement and says nothing about UK compliance.
- If you import a device yourself, you may take on the legal duties of an importer, and a non-compliant device may affect your insurance.

CE, UKCA, and the mark that is neither

Beware of a look-alike mark, sometimes called the "China Export" mark, with letters of a similar shape spaced closer together. It means nothing. When you buy equipment, ask for the Declaration of Conformity and the standards it cites, and, if it is a medical device from outside the UK, who the UK Responsible Person is. A supplier who cannot produce them is telling you something.

Before you buy, borrow or accept a demonstration device

Before you buy, borrow or accept a demonstration device

- Talk to your LPS and LPA first
- Declaration of Conformity and the standards it cites
- UK Responsible Person, if it is a medical device from outside the UK
- Class, wavelength and output on the labels match the manual
- Operator manual in English; installation needs (power, room, cooling)
- Training offered, servicing and spare parts in the UK
- Accessories made for this make and model
- Eyewear specified for every wavelength it emits

If you import a device yourself, you may take on the importer's legal duties.

Questions to ask before any device enters your clinic. Drawn for this manual.

Consumer, data and equality law

- **Consumer Rights Act 2015:** services carried out with reasonable care and skill.
- **Digital Markets, Competition and Consumers Act 2024:** since 6 April 2025 this sets the rules on unfair commercial practices, replacing the Consumer Protection from Unfair Trading Regulations 2008. Advertising must not mislead, by what it says or by what it leaves out, and fake reviews are banned.
- **UK GDPR and the Data Protection Act 2018:** client records and photographs are personal data, and health information is special category data.
- **Equality Act 2010:** no discrimination, and reasonable adjustments for disabled clients and staff.

The Advertising Standards Authority and the CAP Code apply to every advert, including social media. Never promise results, and never describe a device as "MHRA approved".

Older laws and bodies you may still see named

- **Care Standards Act 2000** and the **Private and Voluntary Health Care (England) Regulations 2001:** required registration of clinics using class 3B and 4 lasers and IPL in England until October 2010. Wales still uses the 2000 Act framework.
- **National Minimum Standards (Department of Health, 2002):** included laser and IPL standards; their content lives on in the BMLA Essential Standards. Today's regulators are CQC, HIW, RQIA and HIS.
- **Healthcare Commission** (England) and the **Care Commission** (Scotland): replaced by CQC and by HIS and the Care Inspectorate.
- **RIDDOR 1995:** replaced by RIDDOR 2013.
- **Medical Devices Directive 93/42/EEC:** implemented in the UK by the Medical Devices Regulations 2002.
- **Personal Protective Equipment Regulations 2002:** the old law on supplying PPE (including eyewear to EN 207), now revoked; PPE supply is now governed in Great Britain by Regulation (EU) 2016/425 as it applies in UK law.
- **Care Quality Commission (Registration) Regulations 2009:** still in force, setting out registration requirements for regulated activities in England.
- **Public Health England:** replaced in 2021 by the UK Health Security Agency. **Health Education England:** became part of NHS England in April 2023.

Standards

The standards behind the safety rules

The device	Eyewear	Guidance
BS EN 60825-1: laser classes BS EN 60601-1: medical electrical BS EN 60601-2-22: medical lasers BS EN 60601-2-57: IPL and LED BS EN 62471: lamp risk groups	EN 207: laser eyewear EN 208: alignment eyewear BS ISO 12609-1 and -2: IPL eyewear	MHRA 2015 guidance PD IEC TR 60825-14: user guide, MPE PD CLC/TR 50448: competence BMLA Essential Standards

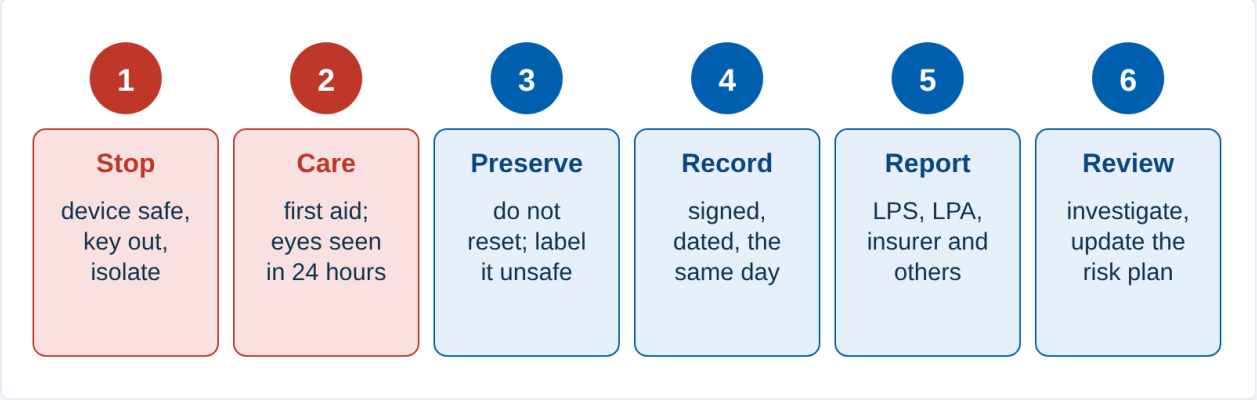
Standards are revised: check for the current edition. Drawn for this manual.

Document	What it covers
BS EN 60825-1 (2014 edition)	Safety of laser products: classification, labels and manufacturer requirements; recommends a laser safety officer
PD IEC TR 60825-14	A user's guide to laser safety, including MPE calculations
BS EN 60601-1	General safety of medical electrical equipment
BS EN 60601-2-22	Particular requirements for surgical, cosmetic, therapeutic and diagnostic laser equipment (IEC edition 4, 2019)
BS EN 60601-2-57	Particular requirements for non-laser light source equipment, including IPL and LED (IEC edition 2, 2023)
BS EN 62471	Photobiological safety of lamps: the risk groups used for IPL and LED
EN 207	Laser eye protection (filters and eye protectors); a newer standard, EN ISO 19818-1, has also been published
EN 208	Eye protectors for laser alignment work
BS ISO 12609-1 and -2	Eyewear for protection against intense light sources: the product, and guidance for use (ISO 12609-1 2021 edition)
PD CLC/TR 50448	Guide to the levels of competence required in laser safety
MHRA guidance (September 2015)	Lasers, intense light source systems and LEDs: guidance for safe use in medical, surgical, dental and aesthetic practices
BMLA Essential Standards (2017)	Essential standards for class 3B and 4 lasers and intense light sources in non-surgical applications

Emergencies and adverse incidents

Sooner or later something will go wrong. What matters is what you do in the first hour, and what you can show afterwards.

Six steps after an incident



The order matters: make safe and care for the person first. Drawn for this manual.

Step	Action
1	**Stop.** Stop treatment, press the emergency stop if needed, put the device in standby, remove the key, and isolate it at the mains if it is faulty. If there is a fire, raise the alarm.
2	**Care for the person.** First aid: for a burn, cool running water for 20 minutes. For any suspected eye exposure, send the person to an eye casualty department straight away: the MHRA guidance says an ophthalmologist should examine the eye within 24 hours. Send with them the device type, wavelength, settings and exposure details (an "emergency grab pack" prepared in advance helps).
3	**Preserve the evidence.** Do not reset or adjust the device. Note the settings, leave the room as it is where you can, photograph with consent, and label the device "do not use".
4	**Record.** Write a full, signed, dated account the same day on the incident report (Section 7), countersigned by the LPS.
5	**Report.** To your LPS and LPA; your insurer, promptly; and the others listed below.
6	**Review.** Decide with the LPS and LPA whether the device stays out of service; investigate; update the risk assessment and local rules; retrain if needed; follow up the client in writing.

Who to report to

- **Your LPS and LPA**, as soon as possible, for every incident and every near miss.
- **Your insurer**, promptly: late notification can affect cover.
- **The MHRA**, through the Yellow Card scheme, for any incident in which a medical device may have been at fault, including poor performance, a design or labelling problem, or a near miss.
- **The HSE, under RIDDOR,** where it applies: for a worker, specified injuries include any injury likely to lead to permanent loss or reduction of sight, and a burn covering more than 10% of the body or causing significant damage to the eyes; for a client or member of the public, an accident at work that results in them being taken from the scene directly to hospital for treatment.
- **Your regulator or licensing authority** where you are registered or licensed: CQC, HIW, RQIA, HIS or your council.

> **What counts as a serious adverse incident**
>
> Any eye injury; a full-thickness or deep partial-thickness burn; permanent scarring or pigment change; a fire; an electric shock; and any injury needing hospital treatment. A **near miss**, something that could have caused harm but did not, is recorded and investigated in the same way, because it is the cheapest lesson you will ever get.

Training and educational standards

Training for laser and IPL work has three strands, and you need all three before you treat anybody:

1. **Safety training:** Core of Knowledge, this course, for the hazard.
2. **Equipment training:** from the manufacturer or supplier, for the specific device, repeated when it is upgraded or replaced.
3. **Procedural (clinical) training:** a treatment qualification for each procedure, with supervised practice.

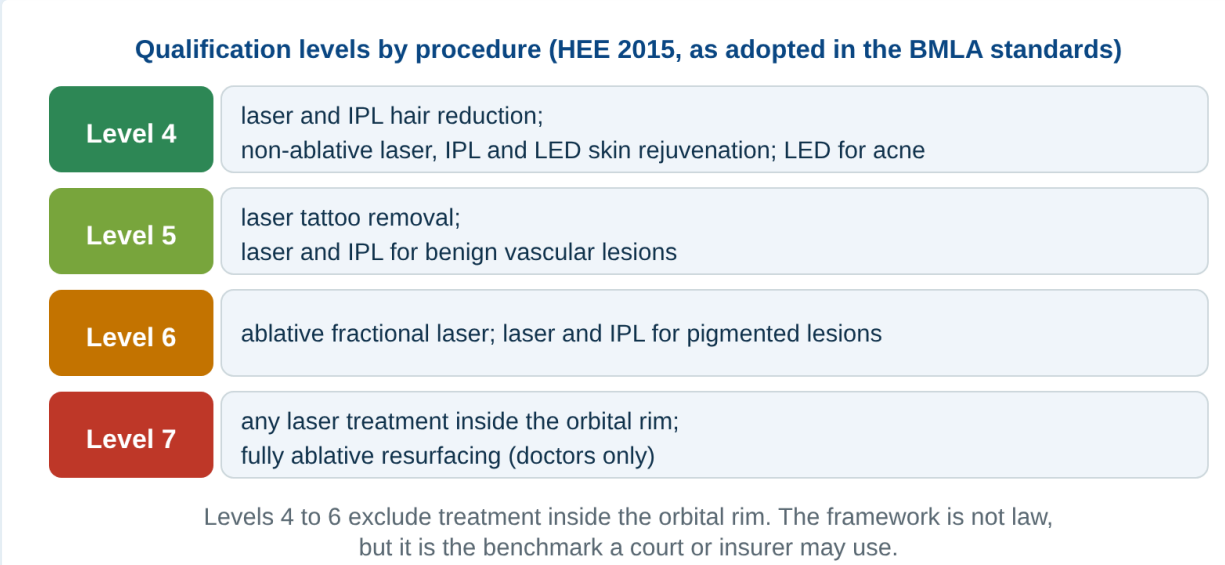
Assisting staff need at least equipment and safety training for their role. Anyone telling you one strand covers the others is wrong. Keep your certificates, record your hours, and keep a record of continuing professional development (CPD) that reflects changes in equipment and practice.

> ### How often is Core of Knowledge repeated?
>
> The MHRA guidance, the BMLA, IPEM and SRP syllabus and the BMLA Essential Standards all say re-attend at least every five years, and sooner after an extended absence or a significant change in equipment or practice. Your insurer, your LPA, your licensing authority or your regulator may require more frequent updates, and RQIA expects regular update training, so do not treat five years as a ceiling. The certificate for this course is valid for three years.

Qualification levels

In 2015 Health Education England (now part of NHS England) published qualification requirements for non-surgical cosmetic procedures. The BMLA Essential Standards accept compliance with them as meeting the training requirement. They are not law, but they are a benchmark.

Qualification levels by procedure



As set out in the BMLA Essential Standards, Standard 2.5. Drawn for this manual.

Ofqual-regulated qualifications at Levels 4 and 5, manufacturer and supplier training, accredited CPD courses and online or blended courses all have a place. Voluntary registers, such as those of the Joint Council for Cosmetic Practitioners (JCCP) and the Cosmetic Practice Standards Authority (CPSA), set competency standards for practitioners.

If a claim is made

In a civil claim for negligence the court decides, on the balance of probabilities, whether you acted as a reasonably competent practitioner would have. Expert witnesses will compare what you did with recognised guidance such as the MHRA guidance and the BMLA standards. Your qualifications, your Core of Knowledge and device training, your CPD, your local rules and protocols, and your treatment records are the evidence that you did.

Before you start: a checklist

☐ Check with your council (and in Wales, Scotland or Northern Ireland, your regulator) whether you need to register or hold a licence.

☐ Insurance that names each laser or IPL treatment you offer.

☐ Core of Knowledge, device training and a treatment qualification for each procedure.

☐ An LPA appointed; a site visit and laser risk assessment done.

☐ Local rules signed by the employer, the LPA and every authorised user.

☐ Treatment protocols from a suitably qualified expert, where your area requires them.

☐ An LPS and a deputy named; the register of authorised users in place.

☐ The controlled area set up: signs, door, windows, eyewear for everyone.

☐ Device documents, servicing, electrical safety test and QA records on file.

☐ Consent forms, medical history, treatment register and incident report ready.

☐ Fire risk assessment, first aid and an extinguisher.

☐ A clear rule to refer anything medical, including any mark you are unsure of, to the client's GP.

Check your understanding

Answer in your own words. These questions are part of your evidence (Section 6).

Over to you: management, law and incidents

1. Who appoints the Laser Protection Supervisor, and what does the role involve day to day?

2. Name three services a Laser Protection Adviser provides, and one thing the LPA does not do.

3. A colleague is moving her laser clinic from Southampton to Cardiff. What changes for her?

4. What will a laser and light business in Scotland that is not run by a doctor, dentist, nurse or midwife need from 6 September 2027?

5. Explain the difference between a regulation and a standard, and name one standard that applies to laser eyewear.

6. Name four things a treatment protocol must cover, and say who writes it.

7. Give two examples of a serious adverse incident and say who you would report each one to.

8. Why should you not adjust the device after an adverse incident?

9. How often should Core of Knowledge be refreshed, and when sooner?

Notes on Section 5

Appendix A Legislation and official references

Learning outcomes

This appendix is for reference. By using it you will be able to:

- Find the official reference for each law named in this manual and read its current wording for yourself

Every item below is named in Sections 1 to 5. The official reference lets you find the current wording on legislation.gov.uk. Laws change: always check the version in force. References were checked on legislation.gov.uk in October 2026.

Health and safety

Legislation	Official reference	Enforced by
Health and Safety at Work etc. Act 1974	1974 c. 37	HSE or local authority
Health and Safety at Work (Northern Ireland) Order 1978	SI 1978/1039 (NI 9)	HSENI or district council
Management of Health and Safety at Work Regulations 1999	SI 1999/3242	HSE or local authority
Control of Artificial Optical Radiation at Work Regulations 2010	SI 2010/1140	HSE or local authority
Provision and Use of Work Equipment Regulations 1998	SI 1998/2306	HSE or local authority
Personal Protective Equipment at Work Regulations 1992, as amended	SI 1992/2966; SI 2022/8	HSE or local authority
Control of Substances Hazardous to Health Regulations 2002	SI 2002/2677	HSE or local authority

Legislation	Official reference	Enforced by
Electricity at Work Regulations 1989	SI 1989/635	HSE or local authority
Health and Safety (Safety Signs and Signals) Regulations 1996	SI 1996/341	HSE or local authority
Workplace (Health, Safety and Welfare) Regulations 1992	SI 1992/3004	HSE or local authority
Manual Handling Operations Regulations 1992	SI 1992/2793	HSE or local authority
Reporting of Injuries, Diseases and Dangerous Occurrences Regulations 2013	SI 2013/1471	HSE
Regulatory Reform (Fire Safety) Order 2005	SI 2005/1541	Fire and rescue authority

Registration, licensing and regulation

Legislation	Official reference	Regulator
Health and Social Care Act 2008 (Regulated Activities) Regulations 2014	SI 2014/2936	CQC (England)
Care Quality Commission (Registration) Regulations 2009	SI 2009/3112	CQC (England)
Health and Care Act 2022, section 180 (licensing of non-surgical cosmetic procedures, not yet in force)	2022 c. 31	Local authorities (when in force)
London Local Authorities Act 1991, Part II (special treatment licences)	1991 c. xiii	London boroughs
Independent Health Care (Wales) Regulations 2011	WSI 2011/734	HIW
Independent Health Care Regulations (Northern Ireland) 2005	NISR 2005/174	RQIA
Health and Personal Social Services (Quality, Improvement and Regulation) (Northern Ireland) Order 2003	SI 2003/431 (NI 9)	RQIA
Civic Government (Scotland) Act 1982 (Licensing of Non-surgical Procedures) Order 2026	SSI 2026/87	Scottish councils
Non-surgical Procedures and Functions of Medical Reviewers (Scotland) Act 2026	2026 asp 13	Scottish Ministers; HIS

Products, consumers and data

Legislation	Official reference	Enforced by
Medical Devices Regulations 2002, as amended (UK Responsible Person: regulation 7A)	SI 2002/618	MHRA
Regulation (EU) 2017/745 on medical devices (Northern Ireland)	EU 2017/745	MHRA
Regulation (EU) 2016/425 on personal protective equipment, as it applies in Great Britain	EU 2016/425	HSE; Trading Standards
Consumer Rights Act 2015	2015 c. 15	Trading Standards; courts
Digital Markets, Competition and Consumers Act 2024 (from 6 April 2025, replacing the Consumer Protection from Unfair Trading Regulations 2008)	2024 c. 13	Trading Standards; CMA
Data Protection Act 2018, with the UK GDPR	2018 c. 12	Information Commissioner's Office
Equality Act 2010	2010 c. 15	Courts; EHRC

BS EN 60825-1 and the other standards in Section 5 are published standards, not legislation. They are available from the British Standards Institution.

Section 6 Assessment

Learning outcomes

This section is your assessment. To be certificated you must:

- Show your knowledge through the multiple choice questions
- Show your understanding through the short written answers
- Apply what you have learned to a real treatment room in the scenario

This is how you show what you know. The questions are based on the MHRA guidance on lasers, intense light source systems and LEDs (2015) and the BMLA Essential Standards (2017), as taught in Sections 1 to 5. Answer in your own words, in this workbook.

Write your answers in this workbook first, then enter them in the online assessment on the course page. Write enough to show your reasoning, not just a single word. Part A is marked automatically, and the correct answers to any you miss are emailed to you: write them in the Notes section of this book. Your written answers are read with the help of an AI assistant and you receive feedback by email.

How you are assessed

- **Part A:** thirty-six multiple choice questions.
- **Part B:** eleven short written answers.
- **Part C:** a scenario: setting up a treatment room safely, and responding to an accidental exposure.

The "Check your understanding" questions at the end of Sections 1 to 5 are part of your evidence too.

> **Key fact: what you must pass**
>
> - **Part A:** the pass mark is 26 out of 36. Questions 1, 11, 12, 15 and 28 are about eye safety, so read the answers to any you miss with extra care.
> - **Part B:** every answer must show the key points. It is marked for substance, not wording: where a wavelength, a law or a role is needed, it must be there.
> - **Part C:** you must identify every hazard in the room that would put someone at risk, give a correct control for each, and set out the steps after an exposure in the right order.

> **If an answer is "not yet"**
>
> A "not yet" is not a failure. The feedback email tells you exactly which questions or points were not met, and you may answer those again once you have reviewed the section. Your certificate is available once every lesson and quiz is complete.

How the assessment maps to the learning outcomes

Every learning outcome in this manual is assessed. Part A question numbers are shown as A:, Part B answers as B: and the scenario as C:. The "Check your understanding" questions for each section are also evidence.

Section 1. Light, lasers and intense light sources: learning outcomes	Written evidence
• Describe optical radiation and its ultraviolet, visible and infrared bands, and say which part of the spectrum is most dangerous to the eye • Explain wavelength, frequency, power, energy, pulse duration, fluence and irradiance, and work out a fluence from a spot size • Explain how a laser produces its beam, name the types of laser by active medium, and describe the properties of laser light • Describe the emission modes of lasers, including continuous wave, gated, pulsed, Q-switched and picosecond output • Explain how an intense pulsed light (IPL) source and an LED work, how ultraviolet is removed from an IPL, and why a worn flashlamp is a hazard • Describe laser and IPL delivery systems and why beam profile and working distance matter	A: 1 to 6 B: 2 Check your understanding, questions 1 to 8

Section 2. The hazards: eyes, skin and classification: learning outcomes	Written evidence
• Describe how lasers, IPL and LEDs can injure the eye, which part of the eye each band of wavelengths reaches, and the difference between central and peripheral retinal damage • Explain how the eye's aversion responses work and why they cannot be relied on • Describe the laser classes from 1 to 4, explain how IPL is classified, and explain the meaning of the warning labels on equipment • Explain the Maximum Permissible Exposure, the Nominal Hazard Zone and the Nominal Ocular Hazard Distance, and how they are used • Choose, check and care for protective eyewear, and read its markings • Describe the skin hazards and the risks from reflections	A: 1, 7 to 15 B: 3 C: part b Check your understanding, questions 1 to 8

Section 3. Controlling the hazards in your treatment room: learning outcomes	Written evidence
• Set up and run a laser or IPL controlled area, including access, signs, windows and reflective surfaces • Carry out a laser and IPL risk assessment, and apply the hierarchy of control • Describe the built-in safety features of a laser or IPL and the safe ways of working before, during and after use • Describe the non-beam hazards (plume, fire, electrical and others) and the hazards to the client, and how each is controlled • Explain equipment management and quality assurance: acceptance checks, routine checks, servicing, the fault log, modifications and accessories • Plan for non-routine situations and carry out a simple safety audit	A: 16 to 22 B: 4 to 6 C: part a Check your understanding, questions 1 to 8

Section 4. How laser and intense light affect tissue: learning outcomes	Written evidence
• Explain what happens to light when it meets skin, and why it must be absorbed to have any effect • Explain chromophores, absorption and penetration depth, and how wavelength, spot size and pulse duration are chosen • Explain selective photothermolysis and thermal relaxation time • Describe the photothermal, photomechanical, photochemical and photoablative effects, and photobiomodulation • Explain how the common laser, IPL and LED treatments work, and the safety point that goes with each • Recognise the main adverse effects on skin and eyes, tell an expected reaction from a complication, and say what to do	A: 23 to 28 B: 1, 7, 8 Check your understanding, questions 1 to 8

Section 5. Safety management, the law and standards: learning outcomes	Written evidence
• Explain the registration and licensing requirements for lasers and IPL in England, Wales, Scotland and Northern Ireland • Describe the roles of the employer, the Laser Protection Adviser, the Laser Protection Supervisor, the Laser Safety Officer, authorised users, assisting staff and the Expert Medical Practitioner • Explain what local rules, a treatment protocol and a treatment register contain, and how they are kept up to date • Explain the main health and safety, product and consumer laws that apply to a laser or IPL clinic, and the difference between a law, a standard and guidance • Name the main safety standards for lasers, IPL and protective eyewear • Take the right emergency action after an accident or adverse incident, and report it to the right people • Describe the training and educational standards for laser and IPL work, including how often Core of Knowledge is refreshed	A: 28 to 36 B: 8 to 11 C: parts a and b Check your understanding, questions 1 to 9

Appendix A. Legislation and official references: learning outcomes	Written evidence
• Find the official reference for each law named in this manual and read its current wording for yourself	A: 36 B: 11

Part A: Multiple choice questions

Tick one answer for each question. The section each question comes from is shown in brackets.

Learner name: _____ **Date:** _____

Part A score (out of 36): _____ **Date checked:** _____

1. Which band of wavelengths is the retinal hazard region? (Sections 1 and 2)

- ☐ a) 100 to 400 nm
- ☐ b) 400 to 1400 nm
- ☐ c) 1400 to 3000 nm
- ☐ d) Above 3000 nm

2. In the definitions used for the Control of Artificial Optical Radiation at Work Regulations 2010, visible light runs from: (Section 1)

- ☐ a) 100 to 280 nm
- ☐ b) 280 to 380 nm
- ☐ c) 380 to 780 nm
- ☐ d) 780 to 1400 nm

3. A pulse of 7.85 J is delivered through a 10 mm spot (area 0.785 cm^2). What is the fluence? (Section 1)

- ☐ a) 2.5 J/cm^2
- ☐ b) 7.85 J/cm^2
- ☐ c) 40 J/cm^2
- ☐ d) 10 J/cm^2

4. Q-switched laser pulses are typically measured in: (Section 1)

- ☐ a) Nanoseconds
- ☐ b) Milliseconds
- ☐ c) Seconds
- ☐ d) Minutes

5. How is hazardous ultraviolet kept out of an IPL output? (Section 1)

- ☐ a) The client's eyewear absorbs it
- ☐ b) The coupling gel blocks all of it
- ☐ c) The lamp envelope is doped to absorb UV, and a cut-off filter removes the remaining short wavelengths
- ☐ d) It does not need to be removed, because IPL produces no UV

6. As an IPL lamp ages and its output falls, what should you do? (Section 1)

- ☐ a) Turn the energy up to compensate
- ☐ b) Track the shot count and replace the lamp as the manufacturer directs, then patch test again
- ☐ c) Use a lower cut-off filter
- ☐ d) Nothing, the output does not change

7. Which laser class is hazardous to the eye from diffuse reflections as well as the direct beam, and is a fire hazard? (Section 2)

- ☐ a) Class 1
- ☐ b) Class 2
- ☐ c) Class 3R
- ☐ d) Class 4

8. Under which standard are IPL and LED sources placed in risk groups (exempt, 1, 2 and 3)? (Section 2)

- ☐ a) BS EN 60825-1
- ☐ b) IEC (BS EN) 62471
- ☐ c) EN 207
- ☐ d) BS EN 60601-2-22

9. The Maximum Permissible Exposure (MPE) depends on: (Section 2)

- ☐ a) The wavelength, the exposure time, the tissue at risk and, for 400 to 1400 nm, the size of the retinal image
- ☐ b) The client's age only
- ☐ c) The price of the device
- ☐ d) The colour of the treatment room walls

10. What does the Nominal Ocular Hazard Distance (NOHD) describe? (Section 2)

- ☐ a) The distance between the couch and the door
- ☐ b) The distance at which the beam falls to the MPE
- ☐ c) The working distance of the handpiece
- ☐ d) The size of the treatment spot

11. The blink reflex takes approximately: (Section 2)

- ☐ a) 0.025 seconds
- ☐ b) 0.25 seconds
- ☐ c) 2.5 seconds
- ☐ d) 25 seconds

12. A burn to the macula and fovea causes: (Section 2)

- ☐ a) Loss of central vision, the sharp detailed vision used for reading and recognising faces
- ☐ b) A temporary gritty feeling that settles within a day
- ☐ c) Loss of night vision only
- ☐ d) No change, because the brain fills in the gap

13. On laser eyewear marked "DIR 1064 LB7", what does LB7 tell you? (Section 2)

- ☐ a) The frame size
- ☐ b) The protection level at 1064 nm
- ☐ c) The number of pairs in the set
- ☐ d) The year it was made

14. Which type of reflection is the most hazardous? (Section 2)

- ☐ a) Diffuse
- ☐ b) Scattered
- ☐ c) Absorbed
- ☐ d) Specular

15. Which statement about IPL eyewear is correct? (Section 2)

- ☐ a) It protects against any laser
- ☐ b) It is chosen by the colour of the lens
- ☐ c) It is designed for broadband intense light, marked to BS ISO 12609, and must not be used for laser work
- ☐ d) It is only needed for the client

16. Which regulation requires an employer to carry out a suitable and sufficient risk assessment? (Section 3)

- ☐ a) Regulation 3 of the Management of Health and Safety at Work Regulations 1999
- ☐ b) The Regulatory Reform (Fire Safety) Order 2005
- ☐ c) The Consumer Rights Act 2015
- ☐ d) The Data Protection Act 2018

17. In the hierarchy of control, personal protective equipment comes: (Section 3)

- ☐ a) First, because it protects the individual
- ☐ b) Before administrative controls
- ☐ c) Last, after engineering and administrative controls
- ☐ d) It is not part of the hierarchy

18. What is the main control for laser plume? (Section 3)

- ☐ a) An open window
- ☐ b) A surgical mask alone
- ☐ c) Room air freshener
- ☐ d) A dedicated smoke evacuator with its nozzle close to where the plume forms

19. Which extinguisher should be kept for an electrical fire? (Section 3)

- ☐ a) Water
- ☐ b) Carbon dioxide (CO_2)
- ☐ c) Foam
- ☐ d) Wet chemical

20. A sales representative wants to leave a demonstration IPL with you for a week. What must happen before it is used? (Section 3)

- ☐ a) Nothing, a demonstration device is the supplier's responsibility
- ☐ b) Use it only on staff
- ☐ c) Talk to your LPS and LPA, and complete a risk assessment, local rules and eyewear for it before first use
- ☐ d) Use it only after 6 pm

21. Who signs an entry in the equipment fault log? (Section 3)

- ☐ a) Nobody, it is not signed
- ☐ b) The person who saw the fault, countersigned by the LPS or another named person
- ☐ c) The client
- ☐ d) The insurer

22. Which of these is a weekly quality assurance check in the MHRA guidance? (Section 3)

- ☐ a) Checking eyewear lenses, blinds, doors, warning lights and interlocks
- ☐ b) Replacing the device
- ☐ c) Renewing your Core of Knowledge
- ☐ d) A full electrical safety test by an engineer

23. The three main chromophores in skin are: (Section 4)

- ☐ a) Collagen, elastin and keratin
- ☐ b) Melanin, collagen and water
- ☐ c) Haemoglobin, sebum and keratin
- ☐ d) Melanin, haemoglobin and water

24. Thermal relaxation time is: (Section 4)

- ☐ a) The time a target takes to lose about half its heat
- ☐ b) How long a treatment takes
- ☐ c) The cooling time between clients
- ☐ d) The time before a blister forms

25. Which wavelength is generally safest for hair reduction on Fitzpatrick type VI skin? (Section 4)

- ☐ a) 532 nm
- ☐ b) 694 nm
- ☐ c) 755 nm
- ☐ d) 1064 nm

26. Tattoo ink particles are broken up mainly by which effect? (Section 4)

- ☐ a) Photothermal
- ☐ b) Photomechanical
- ☐ c) Photochemical
- ☐ d) Photobiomodulation

27. Which tissue effect is produced when ultraviolet from an excimer laser breaks molecular bonds directly? (Section 4)

- ☐ a) Photothermal
- ☐ b) Photomechanical
- ☐ c) Photoablative
- ☐ d) Photobiomodulation

28. After a suspected eye exposure, the MHRA guidance says the eye should be examined by an ophthalmologist within: (Sections 4 and 5)

- ☐ a) 1 hour
- ☐ b) 24 hours
- ☐ c) 7 days
- ☐ d) One month

29. A laser clinic in Wales using a class 4 laser must register with: (Section 5)

- ☐ a) Healthcare Inspectorate Wales (HIW)
- ☐ b) The Care Quality Commission (CQC)
- ☐ c) The MHRA
- ☐ d) The British Medical Laser Association

30. In Scotland, a local authority licence for non-ablative laser and light treatment is required from: (Section 5)

- ☐ a) 1 January 2026
- ☐ b) 13 February 2026
- ☐ c) 6 April 2027
- ☐ d) 6 September 2027

31. Who draws up the local rules? (Section 5)

- ☐ a) The manufacturer
- ☐ b) The client
- ☐ c) The Laser Protection Supervisor with the advice of the LPA (or the LPA), agreed by the employer
- ☐ d) The insurer

32. A treatment protocol is written by: (Section 5)

- ☐ a) The receptionist
- ☐ b) An Expert Medical Practitioner (an expert registered healthcare professional)
- ☐ c) The device's sales representative
- ☐ d) The client

33. A device fault may have contributed to an injury. Where do you report it? (Section 5)

- ☐ a) The MHRA, through the Yellow Card scheme, as well as your LPS, LPA and insurer
- ☐ b) Nowhere, if the client recovers
- ☐ c) Only to the supplier
- ☐ d) Only on social media

34. The MHRA guidance and the BMLA standards say Core of Knowledge should be refreshed: (Section 5)

- ☐ a) Every year without exception
- ☐ b) At least every 5 years, and sooner after a long absence or a change of equipment or practice
- ☐ c) Every 10 years
- ☐ d) Never

35. Which standard covers the safety of IPL (non-laser light source) equipment? (Section 5)

- ☐ a) BS EN 60601-2-57
- ☐ b) BS EN 60601-2-22
- ☐ c) EN 208
- ☐ d) BS EN 60825-1

36. Since 6 April 2025, which law sets the rules on unfair commercial practices in your advertising? (Section 5 and Appendix A)

- ☐ a) The Consumer Protection from Unfair Trading Regulations 2008
- ☐ b) The Electricity at Work Regulations 1989
- ☐ c) The Digital Markets, Competition and Consumers Act 2024
- ☐ d) RIDDOR 2013

Part B: Short written answers

Answer each question in your own words. Short answers are fine, as long as they show you understand the reason behind the rule, not just the rule.

B1. Selective photothermolysis. Explain the principle of selective photothermolysis and the three things it depends on. (Section 4)

B2. Emission modes and the aiming beam. Describe continuous wave, gated and Q-switched output, and say why the aiming beam must be checked before use. (Section 1)

B3. Eyewear. Explain why the eyewear you use for one device may not protect you with another, and say what you would check on a pair before using it. (Section 2)

B4. Controls in the room. Describe the controls you would put in place in your treatment room before using a class 4 device. (Section 3)

B5. Non-beam hazards. Name four non-beam hazards and give one control for each. (Section 3)

B6. Equipment management. Describe the acceptance checks, the routine quality assurance checks (daily, weekly and yearly) and the fault log for a laser or IPL. (Section 3)

B7. Melanin and darker skin. Explain why melanin is called a competing chromophore, and what you would change when treating a client with Fitzpatrick type V skin. (Section 4)

B8. A blister during treatment. A client develops a blister during a hair reduction treatment. Describe what you would do, in order, and who you would tell. (Sections 4 and 5)

B9. Safety roles. Explain the difference between the roles of the Laser Protection Supervisor and the Laser Protection Adviser, and say what assisting staff need to know. (Section 5)

B10. Registration and training across the UK. Explain how the registration or licensing of a cosmetic laser and IPL clinic differs between England, Wales, Scotland and Northern Ireland, and name the qualification level the HEE framework sets for laser hair reduction and for laser tattoo removal. (Section 5)

B11. The law. Set out what the Control of Artificial Optical Radiation at Work Regulations 2010 require of an employer, and name two other health and safety laws that apply to a laser clinic, with what each requires. (Section 5 and Appendix A)

Part C: Scenario

> ### Scenario
>
> You have taken on a new treatment room at the back of a salon in England. It has a window onto the car park, a large wall mirror, a glass-topped trolley, and a door onto the corridor with no lock. You have a class 4 diode laser (810 nm) for hair reduction, one pair of goggles, and a new junior member of staff who will be assisting you. Nobody has yet been appointed as Laser Protection Adviser. (Sections 2, 3 and 5)

a) Set out everything you would put right before you treat your first client, and say why each one matters.

b) Three weeks later your assistant walks into the room mid-treatment without eyewear and says she saw a flash. Set out what you do, in order, and who you tell.

Your notes

Write the correct answers to any Part A questions you miss here, next to the section they come from. Add your own reminders too.

Section 7 Templates for your clinic

These templates are yours to copy and use, or ask us for editable versions. They are a starting point, not a legal document: have your local rules and risk assessment checked and signed off by your Laser Protection Adviser before you rely on them. Everything in here is evidence: if you ever have to answer to an inspector, an insurer or a solicitor, these are the documents that will speak for you.

Template	Use it for	Section
1. Local rules	Each device in each room, signed by every user	3, 5
2. Risk assessment	Each device and room; reviewed yearly	3
3. Register of authorised users	Who may operate, and who assists	5
4. Quality assurance log	Daily and weekly checks	3
5. Protective eyewear register	Every pair, and its condition	2
6. Equipment fault log	Every fault, signed and countersigned	3
7. Pre-treatment checklist	Every client, every session	3
8. Treatment register	Every time the device is used	5
9. Safety audit	At least once a year	3
10. Adverse incident report	Every incident and near miss, on the day	5

Large-print copies of every form are available on request.

Template 1 (page 1 of 3)

Local rules

Complete one set for each laser or IPL, in each room. Have it checked and approved by your Laser Protection Adviser. Every authorised user, assisting staff member and anyone else who works in the controlled area reads it, has it talked through, and signs it. Review it at least every year and whenever anything changes. The headings follow the MHRA guidance.

1. The establishment and the device

Clinic name and address: _____

Room (controlled area): _____ **Version number:** _____

Manufacturer and model: _____ **Serial number:** _____

Laser class, or IPL: _____ **Wavelength or filter range:** _____

Maximum output: _____ **Pulse duration range:** _____

Date installed: _____ **Date of acceptance checks:** _____

2. Management safety structure and contacts

Employer or registered manager: _____ **Telephone:** _____

Laser Protection Supervisor: _____ **Telephone:** _____

LPS deputy: _____ **Telephone:** _____

Laser Protection Adviser: _____ **Telephone:** _____

Expert Medical Practitioner (protocols): **Service engineer:** _____

3. The nature of the hazard

This device can injure the eyes and skin from the direct beam and from reflected and scattered radiation, and can cause fire. Add anything specific to this device (for example, invisible beam, plume, high voltage):

Template 1 (page 2 of 3)

Local rules, continued

4. The controlled area and access

Extent of the controlled area and its boundary:

Door controlled by: ☐ Knock and wait ☐ Lock that opens from outside ☐ Keypad ☐ Interlock

Windows covered with a rated blind: ☐ Yes ☐ No ☐ No windows

Warning sign at every entrance, displayed only while in use: ☐ Yes ☐ No

Reflective items removed or covered (list them):

5. Keys and preventing unauthorised use

Key, card or password held by: _____ **Stored at:** _____

When the device is unattended it is switched off and the key removed by the authorised user.

6. Protective eyewear and other PPE

Eyewear marking required (wavelength and protection level): _____

Number of pairs: _____ **Kept:** _____

Patient eye protectors or shields for facial work: ☐ Yes ☐ No ☐ N/A

7. Training

Authorised users: Core of Knowledge (renewed at least every 5 years), device training, treatment qualification. Assisting staff: equipment and safety training. Other staff: safety awareness.

Template 1 (page 3 of 3)

Local rules, continued

8. Authorised users' responsibilities and safe working

Only authorised users fire the device. Standby whenever not firing. One laser or IPL switched on at a time. Beam directed only at the treatment site. Everyone in eyewear. Number of people kept to a minimum. Set out the equipment layout and normal operating procedure, step by step:

9. Pre-use safety checks

The daily and weekly checks in the quality assurance log are completed and recorded before treatment. Revisions: new version number and date, old copies withdrawn, all users re-sign.

10. Adverse incidents, near misses and equipment faults

Stop and make safe; care for the person (eye examined within 24 hours); preserve the evidence and label the device; record on the incident report or in the fault log; report to the LPS, LPA, insurer and others as set out in the incident procedure. Emergency grab pack kept at:

11. Non-routine situations

Arrangements for loan or demonstration equipment, temporary staff, visiting engineers, cleaning and out of hours:

12. Declaration

I have read and understood these local rules, they have been talked through with me, and I agree to work in accordance with them.

Name	Role	Signature	Date

13. Approval and review

Employer signature: _____ **Date:** _____

LPA name: _____ **LPA signature and date:** _____

Next review due: _____ **Revised by:** _____

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Template 2 (page 1 of 2)

Laser and IPL risk assessment

Use the HSE five steps: identify the hazards; decide who might be harmed and how; evaluate the risks and decide on precautions; record and implement; review. Cover the equipment, the people (authorised users, other staff, cleaners, maintenance staff, contractors, visitors, clients), the procedures and the location. Rate each risk L, M or H after your controls.

Carried out by: _____ **Date:** _____

Device and room: _____ **Review date:** _____

Hazard	Who might be harmed, and how	Controls in place	Risk	Further action
Beam to the eye (direct or reflected)				
Beam to the skin				
Specular reflection				
Unauthorised entry				
Plume				
Fire				
Electrical				
Hot surfaces				
Blood and tissue spatter				
Infection				
Slips, trips, spills and lifting				
Loan or demonstration device				
Servicing and cleaning				
Lone working, out of hours				

Template 2 (page 2 of 2)

Risk assessment, continued

Contingency arrangements

What happens if the device fails mid-treatment, the power goes off, the fire alarm sounds, or the LPS is absent:

Health effects on staff

Is any member of staff at particular risk (for example photosensitive)? ☐ Yes ☐ No

If yes, action taken and health surveillance arranged:

Sign-off

Employer signature: _____ **Date:** _____

LPA signature: _____ **Date:** _____

Review this assessment every year (LPS) and at least every two years with the LPA, and at once after any change or incident.

Template 3

Register of authorised users

No one operates the device unless they appear on this register. Assisting staff are listed separately at the foot.

Device: _____ **Room:** _____

Name	Core of Knowledge date	Device training date	Local rules signed	Refresher due	Authorised by

Assisting staff (do not fire the device)

Name	Safety training date	Equipment briefing date	Local rules signed	Authorised by

Template 4

Quality assurance log

Daily: complete before the first treatment. Weekly: complete on the first working day of the week. Tick each item, or write X and record the fault in the fault log.

Device: _____ **Month:** _____

> **Daily:** E = eyewear present and undamaged; K = key controlled; S = emergency stop tested; R = output stops on switch release; A = aiming beam aligned (if fitted); F = filter, aperture and light guide clean, unscratched; C = cables, connectors and cooling sound; T = self-test or calibration passed; D = door secured and sign up.

Date	E	K	S	R	A	F	C	T	D	Initials

Weekly

Week starting	Eyewear lenses and frames	Blinds, windows, doors	Warning lights and signs	Interlocks	Initials

Yearly or six-monthly: electrical safety, output and calibration, shutter, timer, filters and emergency cut-off, by an engineer. Date of last check: _____ Next due: _____

Template 5

Protective eyewear register

One line for each pair. Inspect before every use; withdraw any pair that is scratched, crazed, pitted, cracked or damaged that day.

Pair ref.	Device it is for	Marking (wavelength and protection level)	Date into use	Last inspected	Condition

Withdraw, do not tolerate

A damaged pair is taken out of service that day and replaced, not put back in the drawer for someone else to pick up. Never choose eyewear by its colour: read the marking.

Template 6

Equipment fault log

One log for each laser or IPL, kept where the LPA, the service engineer and an inspector can see it. Each fault is signed by the person who saw it and countersigned by the LPS or another named person.

Device: _____ **Serial number:** _____

Date	Fault seen (error codes, alarms)	Action taken	Device out of use?	Signed	Countersigned

Template 7

Pre-treatment checklist

One per client, per session. Keep it with the treatment record.

Client name: _____ **Date:** _____

Operator: _____ **Treatment area:** _____

The room

Check	Result
Door secured; warning sign displayed	☐ Yes ☐ No ☐ N/A
Windows covered	☐ Yes ☐ No ☐ N/A
Reflective items removed or covered	☐ Yes ☐ No ☐ N/A
Plume extraction ready (if needed)	☐ Yes ☐ No ☐ N/A
Extinguisher and first aid to hand	☐ Yes ☐ No ☐ N/A

The equipment

Check	Result
Daily checks completed	☐ Yes ☐ No ☐ N/A
Correct eyewear for this device for everyone present	☐ Yes ☐ No ☐ N/A
Eyewear inspected, undamaged	☐ Yes ☐ No ☐ N/A
Handpiece, filter and light guide clean	☐ Yes ☐ No ☐ N/A
Cooling working	☐ Yes ☐ No ☐ N/A

The client

Check	Result
Consultation and medical history completed	☐ Yes ☐ No ☐ N/A
Contraindications and medication checked today	☐ Yes ☐ No ☐ N/A
Patch test carried out and reviewed	☐ Yes ☐ No ☐ N/A
Written consent signed	☐ Yes ☐ No ☐ N/A
Jewellery, make-up and products removed; tattoos and permanent make-up covered	☐ Yes ☐ No ☐ N/A
Eye protection fitted and checked	☐ Yes ☐ No ☐ N/A

Operator signature: _____

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Template 8

Treatment register

An entry every time the laser or IPL is used, as the BMLA Essential Standards require. Health information: keep it secure.

Device: _____ **Room:** _____

Date and time	Client name and date of birth	Treatment and area	Settings (wavelength or filter, fluence, pulse, spot)	Adverse effects	Operator name and signature

Template 9

Safety audit checklist

Carry this out at least once a year, and before an LPA visit or inspection. Record what needs doing and by when.

Carried out by: _____ **Date:** _____

Item	Satisfactory	Action needed, by whom, by when
Local rules current, signed by employer, LPA and every user, review date in date	☐ Yes ☐ No	
Risk assessment current and reviewed in the last year; LPA audit within two years	☐ Yes ☐ No	
LPS and deputy named; register of authorised users up to date	☐ Yes ☐ No	
Training records: Core of Knowledge within 5 years; device and treatment training	☐ Yes ☐ No	
Controlled area: signs, door control, window covers, reflective items	☐ Yes ☐ No	
Eyewear: enough pairs, marked correctly, register up to date, condition good	☐ Yes ☐ No	
Daily and weekly QA logs complete for the period	☐ Yes ☐ No	
Servicing and electrical safety test in date; fault log reviewed and countersigned	☐ Yes ☐ No	
Treatment register complete for every use	☐ Yes ☐ No	
Sample of 5 treatment records: settings, consent, patch test and aftercare recorded	☐ Yes ☐ No	
Incident reports reviewed; actions completed	☐ Yes ☐ No	
Treatment protocols in place and signed, where required	☐ Yes ☐ No	
Insurance, registration or licence current	☐ Yes ☐ No	

Signed: _____ **Date:** _____

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Template 10 (page 1 of 2)

Adverse incident report

Complete on the day, including near misses. Do not adjust the device before you have recorded the settings.

Date and time: _____ **Reported by:** _____

Person affected: _____ **Role (client, staff, visitor):** _____

Device: _____ **Serial number:** _____

Settings at the time

Wavelength or filter: _____ **Fluence or energy:** _____

Pulse duration: _____ **Spot size:** _____

Cooling: _____ **Distance from source:** _____

What happened, in your own words:

Immediate action and first aid:

Eye exposure suspected: ☐ Yes ☐ No If yes, eye casualty attended (time): _____ (within 24 hours)

Template 10 (page 2 of 2)

Adverse incident report, continued

Reported to

Reported to	Yes / No / N/A	Date
Laser Protection Supervisor	☐ Yes ☐ No ☐ N/A	
Laser Protection Adviser	☐ Yes ☐ No ☐ N/A	
Insurer	☐ Yes ☐ No ☐ N/A	
MHRA, Yellow Card (device fault suspected)	☐ Yes ☐ No ☐ N/A	
HSE under RIDDOR	☐ Yes ☐ No ☐ N/A	
Regulator or licensing authority	☐ Yes ☐ No ☐ N/A	
Client referred for medical attention	☐ Yes ☐ No ☐ N/A	

Device taken out of service and labelled "do not use": ☐ Yes ☐ No

Investigation findings and action to prevent it happening again:

Signed: _____ **Date:** _____

Countersigned by LPS: _____ **Date:** _____

Course completion

Learner course feedback

Your feedback helps us improve the course. Please be honest, and send this page with your assessment.

Please rate (1 is poor, 5 is very good)	1	2	3	4	5
The course content met my expectations	☐	☐	☐	☐	☐
The manual was clear and easy to follow	☐	☐	☐	☐	☐
The diagrams helped me understand	☐	☐	☐	☐	☐
The assessment was fair	☐	☐	☐	☐	☐
I feel more confident about laser and IPL safety	☐	☐	☐	☐	☐
I would recommend this course	☐	☐	☐	☐	☐

What did you find most useful?

What could we do better?

Any other comments

Name (optional): _____ **Date:** _____

Your continuing professional development

CPD reflective record

Use this page to reflect on what you learned and to log your CPD. Keep it with your certificate in your professional portfolio.

Name: _____ **Date completed:** _____

Activity	Provider	Hours	CPD credits
Core of Knowledge: Laser and IPL Safety CPD Course (The CPD Group activity 1005546)	Skintastic Aesthetic Lasers Ltd	3	3

What have I learned that I did not know before?

What will I change in my clinic as a result?

What do I still need to learn, and how will I do it?

Core of Knowledge refresher due (no later than): **Signature:** _____

Course completion: Core of Knowledge: Laser and IPL Safety CPD Course

Your record of course completion

Keep this page as your own record. Your accredited CPD certificate is available on the course page, and in your account, once every lesson and quiz is complete. Skintastic keeps learner records for at least five years.

Learner name: _____

Date started: _____

Date completed: _____

Certificate number: _____

Refresher due (no later than): _____

Course: Core of Knowledge: Laser and IPL Safety CPD Course. Provider: Skintastic Aesthetic Lasers Ltd, 26 The Avenue, Southampton, SO17 1XL. Accredited CPD, The CPD Group activity 1005546, 3 CPD credits. Delivery: online, self-paced, 3 hours.

Notes

Certificate details: what your certificate will show

SkinTastic Aesthetic UK

Certificate of Completion

This is to certify that

_____

has successfully completed the

Core of Knowledge: Laser and IPL Safety CPD Course

Laser, IPL and LED safety, delivered online by Skintastic Aesthetic Lasers Ltd and assessed in writing

Hours:	3 hours, theory
CPD credits:	3 CPD credits, The CPD Group activity 1005546
Date of completion:	_____
Valid until:	three years from the date of completion
Certificate number:	_____

_____

Carla Cooper-Gale, Course author
Managing Director, IQA, Assessor, Level 5 DET
Skintastic Aesthetic Lasers Ltd, 26 The Avenue, Southampton, SO17 1XL

THE CPD GROUP APPROVED PROVIDER #777800 Verify @ https://thecpdregister.com

Thank you

Thank you for studying with Skintastic

Thank you for studying with us. Everything in this manual is yours to keep and to use: take the templates in Section 7 into your own clinic, and do get in touch if a question comes up once you are working. We would far rather answer it than have you guess.

Your certificate is available once every lesson and quiz is complete.

Important

This manual is a training document. It is not a substitute for your device manufacturer's instructions, your Laser Protection Adviser's advice, medical advice or legal advice. Regulation is changing: check current requirements with your local authority, your regulator, your insurer and official sources.

Skintastic Aesthetic Lasers Ltd

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Stay safe, and keep everyone in the room safe.
Carla Cooper-Gale

Sources and further reading

Checked in October 2026. Guidance and law in this field are revised, so check for a newer version before you rely on any of them.

No.	Source	Why it is here, and where to find it
1	Medicines and Healthcare products Regulatory Agency. Lasers, intense light source systems and LEDs: guidance for safe use in medical, surgical, dental and aesthetic practices. MHRA, September 2015 (replaces DB 2008(03)).	The main UK guidance, and the basis of the assessment. gov.uk/government/publications/guidance-on-the-safe-use-of-lasers-intense-light-source-systems-and-leds
2	British Medical Laser Association, Institute of Physics and Engineering in Medicine and Society for Radiological Protection. Core of Knowledge syllabus and Laser/IPL Safety Awareness syllabus. Advice notice, July 2014.	The syllabus this course follows. ipem.ac.uk
3	British Medical Laser Association. Essential Standards regarding Class 3B and Class 4 Lasers and Intense Light Sources in Non-surgical Applications. BMLA, May 2017.	Protocols, local rules, treatment register, training and qualification levels. bmla.co.uk
4	Directive 2006/25/EC on the minimum health and safety requirements regarding the exposure of workers to risks arising from physical agents (artificial optical radiation).	The definitions of the optical bands applied by the 2010 Regulations. legislation.gov.uk/eudr/2006/25
5	UK legislation listed in Appendix A.	legislation.gov.uk
6	Health and Safety Executive. RIDDOR: specified injuries to workers.	What must be reported. hse.gov.uk/riddor/specified-injuries.htm

No.	Source	Why it is here, and where to find it
7	Health and Safety Executive. Risk assessment: steps needed to manage risk.	The five steps. hse.gov.uk/simple-health-safety/risk
8	Department of Health and Social Care. The licensing of non-surgical cosmetic procedures in England: consultation response. 7 August 2025.	Where England is heading. gov.uk
9	NHS. Burns and scalds: treatment.	Burns first aid. nhs.uk/conditions/burns-and-scalds
10	British Standards Institution: BS EN 60825-1; BS EN 60601-1; BS EN 60601-2-22; BS EN 60601-2-57; BS EN 62471; EN 207; EN 208; BS ISO 12609-1 and -2; PD IEC TR 60825-14; PD CLC/TR 50448.	The standards in Section 5. bsigroup.com
11	Anderson RR, Parrish JA. Selective photothermolysis: precise microsurgery by selective absorption of pulsed radiation. Science. 1983;220(4596):524-527. PMID 6836297.	Selective photothermolysis (Section 4).
12	Altshuler GB, Anderson RR, Manstein D, Zenzie HH, Smirnov MZ. Extended theory of selective photothermolysis. Lasers in Surgery and Medicine. 2001;29(5):416-432. PMID 11891730.	The extended theory for hair (Section 4).
13	Garden JM, O'Banion MK, Bakus AD, Olson C. Viral disease transmitted by laser-generated plume (aerosol). Archives of Dermatology. 2002;138(10):1303-1307. PMID 12374535.	Viable material in plume (Section 3); cited in the MHRA guidance.
14	Betts JG and others. Anatomy and Physiology. OpenStax, Rice University, 2013.	Figures 5.2, 5.8 and 5.11. openstax.org

Originality, copyright and image credits

Declaration

This manual was written by Carla Cooper-Gale for Skintastic Aesthetic Lasers Ltd. The text is original. It is written against the Core of Knowledge syllabus approved by the British Medical Laser Association, the Institute of Physics and Engineering in Medicine and the Society for Radiological Protection, the MHRA guidance (2015) and the BMLA Essential Standards (2017), which are named and credited wherever they are used. Short quotations are marked and attributed.

No passage has been reproduced from another training provider's materials, and no manufacturer's copyright material has been used.

Images

Images	Origin	Notes
All diagrams marked "Drawn for this manual": the spectrum, wavelengths, fluence, laser, flashlamp, filters, pulses, delivery, eye, classes, labels, eyewear marking, controlled area, risk, plume, fire, quality assurance, absorption, depth, tissue effects, roles, nations, incidents and standards	Original diagrams drawn for Skintastic in October 2026	Copyright Skintastic Aesthetic Lasers Ltd. Each was checked for accuracy against the MHRA guidance and the other sources listed. They replace the earlier course slides, which contained errors.
The laser warning symbol	Redrawn	The standard hazard symbol defined in BS EN 60825-1, redrawn.
The layers of the skin; melanin in lighter and darker skin; the hair follicle	OpenStax, Anatomy and Physiology (2013), figures 5.2, 5.8 and 5.11	Creative Commons Attribution 4.0 (CC BY 4.0), credited in each caption.
Clinic scenes: the diode laser screen, the controlled-area door, asking about medicines, servicing, cleaning down, records and reading the rules	Generated images commissioned by Skintastic	Not photographs, and captioned as such. No real person, client or brand is shown.
Carla Cooper-Gale in the Skintastic clinic	Photograph	© Carla Cooper-Gale, Skintastic Aesthetic Lasers Ltd.
The CPD Group approved provider badge	The CPD Group	Used as supplied to Skintastic, provider number 777800.

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Skintastic Aesthetic Lasers Ltd
Advanced Aesthetic Training Academy

Thank you

for studying with Skintastic on the Core of Knowledge: Laser and IPL Safety CPD Course

Everything in this manual is yours to keep and to use. Take the templates into your own clinic, refresh your Core of Knowledge at least every five years, and get in touch if a question comes up. We would far rather answer it than have you guess.

Contact us

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If you need this manual in large print or another format, please ask us.

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