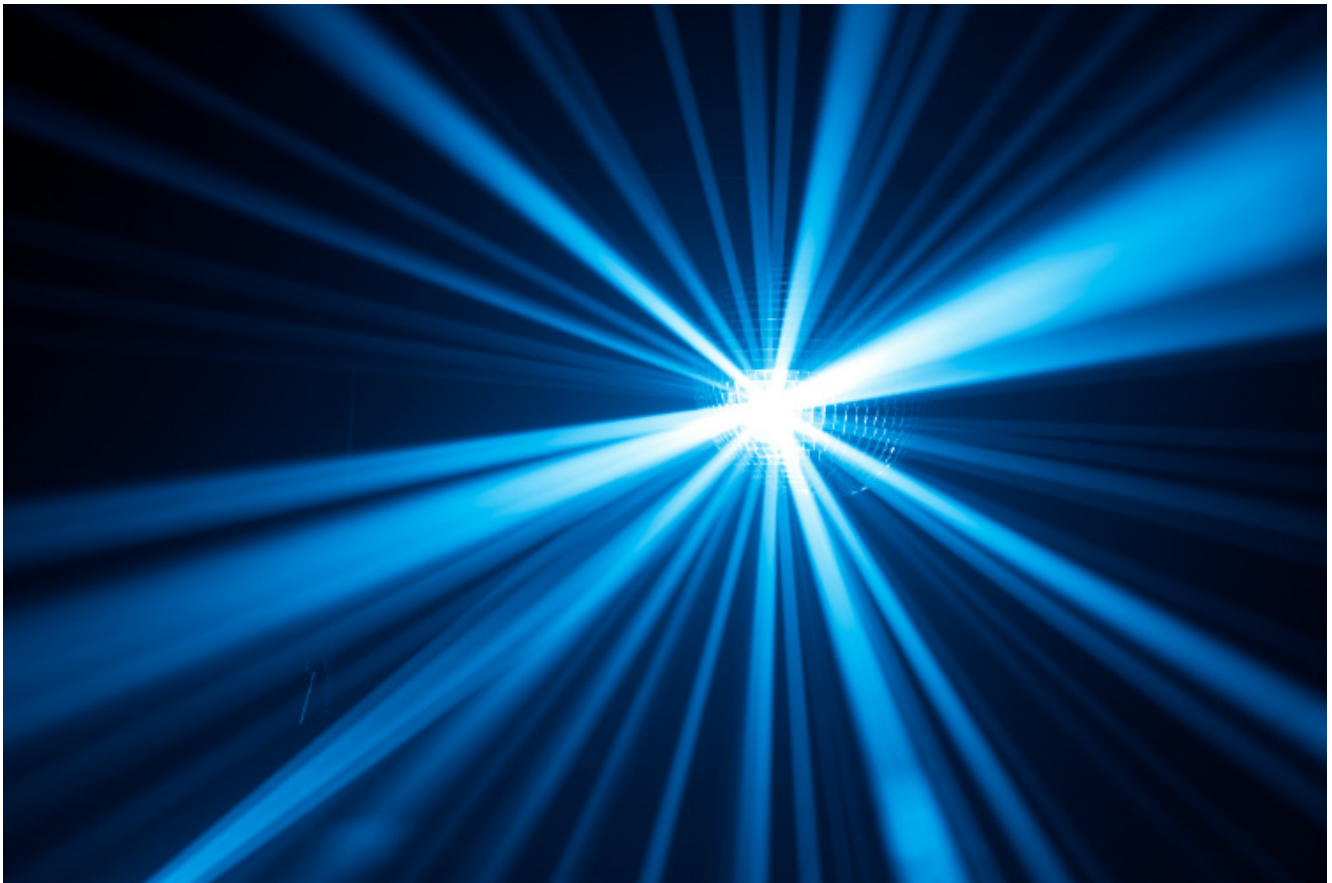


Need-to-know terms for chiropractic laser therapy

Rob Berman, June 2, 2016



More and more chiropractors are exploring laser as part of your portfolio of healing modalities.

Here are the definitions of some of the key laser terms and laser classifications to offer clarity and elevate your knowledge of lasers.

Laser term definitions

Average power: Refers to the average power that a laser emits during the treatment, measured in watts (W).

Duty cycle: Ratio of “on” duration compared to “off” during one period. A period is the time it takes to complete an on-and-off cycle.

Continuous Wave Pulsed Laser: Produces a fixed level of power during the emission time but can be modulated down or momentarily shut off to reduce heat build-up. When operating in continuous wave or pulsed (CW) mode, usually a by-product is a thermal effect. Therefore, the laser hand piece should be regularly moved to minimize heat buildup and risk of tissue damage, which allows for treating a larger target area.

Effective Dose: Is the dose or amount that produces a therapeutic response or desired effect.

Energy: Commonly used to characterize laser output, measured in joules (J).

Energy Density/Fluence: The energy density expresses the total amount of energy delivered per unit area, in joules per square centimeter (J/cm²).

Hertz (Hz): Unit of frequency, i. e. “pulses per second”, listed in Hz.

Joule (J): A unit of energy describing the work required to produce one watt of power for one second (one watt-second).

Joule cm² (J cm²): A unit of radiant exposure used in measuring the amount of energy per unit area of absorbing surface or per unit area of a laser beam. Also called the dose.

Peak Power: The maximum pulse power output of a laser and it is fixed by the laser manufacturer.

Power: The time rate at which energy is transferred. Usually expressed in watts (joules per second); also called radiant flux.

Power Density: The intensity of the laser beam, average power divided by size of beam (“spot size”); relates to the dose.

Pulse Mode: The pulse energy is simply the total optical energy content of a pulse. Pulse mode is operation of a laser when the beam is intermittently on in fractions of a second.

Superpulsed Laser: Produces high power impulses of light for a very brief duration to more effectively drive light energy into the target tissue. There are no or minimal thermal effects in the tissue because the pulses are of extremely short duration on the order of 200 billionths of a second, thus emitting low average power relative to CW pulsed lasers. Therefore, the laser may be held in specific targeted areas without movement and no risk of injuring tissue with heat buildup. The generally accepted minimum for pulses is 30,000 hertz.

Watt (W): The unit of power; equivalent to one joule per second.

Watt cm² (W cm²): A unit of irradiance used in measuring the amount of power per area of absorbing surface, or per cross-sectional area of a laser beam. Also called power density.

Laser classifications

Class 1	Safe under reasonable operation
Class 1M	Generally Safe - Some Precaution Required
Class 2	< 1mW average power, visible light low power - Blink response limits risk
Class 2M	UV or IR light at low average power, generally safe LED systems
Class 3R(A)	Safe for viewing with the unaided eye
Class 3a	1-5mW of average power
Class 3b	5-500mW of average power, viewing beam is hazardous, diffuse reflections are safe
Class 4	>500mW average power all the way to industrial megawatts; hazardous under all conditions to eyes

Note: Class is based on safety, not clinical performance

Safety classifications explained

Our less technical explanations for the laser classifications:

- **Class 1:** Low-power lasers incapable of causing eye damage and are exempt from any control measures. Example: a barcode reader. Safety goggles not required.
- **Class 2:** Low-power lasers that operate in the visible spectrum that are incapable of causing eye damage unless they are viewed directly for an extended period (greater than 1,000 seconds). Examples: laser pointers and LEDs. Safety goggles not required.
- **Class 3a:** Lasers that normally would not produce a hazard if viewed for only momentary periods <0.25 seconds with the unaided eye (blink reflex). They may present a hazard if viewed using collecting optics. Safety goggles **required**.
- **Class 3b:** Lasers that can produce a hazard if viewed directly. This includes intrabeam viewing of specular reflections. Many low level lasers or “LLLT” lasers fall into this category. Safety goggles **required**.
- **Class 4:** Lasers capable of causing severe eye damage with short-term duration (<0.25 seconds) exposures to direct, specularly reflected, or diffusely reflected beams. Safety goggles **required**. Please remember that Class 4 *Therapy* lasers are different from Class 4 *Surgical* lasers.

Knowing what these laser terms and classifications are will help you when shopping for your first laser or to upgrade your current laser.



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