

Chapter A: Pulsed Short Wave Diathermy (PSWD)

1. A junior intern asks you in OPD: “Ma’am/Sir, what is the single most accurate one-line definition of Pulsed Short Wave Diathermy?” Write the exact sentence you want in the case file.
2. PSWD uses the same radio frequency as continuous SWD. State the exact frequency and corresponding wavelength.
3. The biggest physical difference between Continuous SWD and Pulsed SWD is that in PSWD the high-frequency current is delivered in short bursts called _____.
4. Production of pulses: In most modern PSWD machines, the continuous 27.12 MHz wave is interrupted by a _____ generator (one word).
5. Name the THREE most important adjustable parameters in any PSWD machine (0.33 mark each).
6. A machine displays: Pulse repetition rate (PRR) = 200 Hz Pulse duration = 400 μ s Calculate the duty cycle in percentage.
7. Mean power (average power) in PSWD is calculated as: Mean power = Peak pulse power $\times$ _____ $\times$ _____ (fill the two factors).
8. If peak pulse power is 200 W and duty cycle is 10%, what is the mean power output?
9. Non-thermal (athermal) effects of PSWD become prominent when mean power is kept below _____ W (give the classic number taught).
10. Clinical scenario: Day-3 acute ankle sprain with massive swelling. You choose PSWD. Which parameter will you keep LOW to avoid any thermal effect? (a) PRR (b) Pulse duration (c) Peak power (d) Mean power $\rightarrow$ choose and justify in one line.
11. The most widely accepted physiological effects of PSWD in athermal mode are (name any THREE – 0.33 each).
12. Evidence-based indications: Name FOUR conditions where PSWD is clearly superior to continuous SWD.
13. Absolute contraindications of PSWD are almost the same as continuous SWD, but ONE additional precaution is often highlighted in recent guidelines. What is it? (one word/phrase)
14. Dosage practical: Write the classic “starting safe settings” for acute soft-tissue injury using a modern PSWD unit (give PRR, pulse duration, and mean power).
15. A patient asks: “Doctor, will this pulsed machine burn me like the old continuous one?” Give the single most convincing one-sentence answer based on physics.

ANSWER KEY:

1. Pulsed Short Wave Diathermy is the therapeutic application of interrupted (pulsed) high-frequency (27.12 MHz) electromagnetic energy that allows non-thermal or minimally thermal effects.
2. Frequency = 27.12 MHz; Wavelength = 11 metres.
3. Pulses (or bursts).
4. Pulse / Modulator generator.
5. (i) Pulse repetition rate (PRR) / Pulse frequency (ii) Pulse duration (PD) / Pulse width (iii) Peak pulse power (PPP)
6. Duty cycle = $(400 \mu\text{s} \times 200) / 1,000,000 \times 100 = 8\%$
7. Duty cycle $\times$ Peak pulse power (or PRR $\times$ Pulse duration $\times$ Peak power)
8. Mean power = $200 \times 0.1 = 20 \text{ W}$
9. Below 5 W (most textbooks mention $\leq 3\text{--}5 \text{ W}$ mean power for purely athermal effects).
10. (d) Mean power – because only mean power determines total heat delivered to tissues.
11. Any three:
 - Increased cell membrane permeability
 - Enhanced phagocytosis & tissue repair
 - Re-absorption of haematoma/oedema
 - Pain relief (non-thermal gate mechanism)
 - Reduced acute inflammation
12. Any four:
 - Acute soft tissue injuries (sprains, contusions)
 - Recent haematoma
 - Post-operative swelling
 - Acute sinusitis
 - Trigeminal neuralgia
 - Early pressure sores
13. Active implanted electronic devices (modern pacemakers/ICDs) – because pulses can interfere with device circuitry even at low mean power.
14. Classic safe starting setting for acute injury: PRR = 80–150 Hz, Pulse duration = 400 μs (or maximum available), Mean power = 3–5 W (or lowest possible).

15. “No, because the heat is delivered only for tiny fractions of a second with long cooling gaps, so the average heat is too low to cause burns.”