

Chapter A: Short Wave Diathermy (SWD)

1. A 45-year-old factory worker with chronic low back pain walks into your physiotherapy OPD. What is the single most accurate one-sentence definition of Short Wave Diathermy (SWD) you would write in his case file?
2. The patient asks, “How does this machine actually heat my tissues without burning the skin?” Write the principle of SWD in ≤ 25 words (exact scientific wording expected).
3. Before switching ON the machine, you must rule out contraindications. List any FOUR absolute contraindications of SWD (1/4 mark each).
4. The same patient has a metal implant in his lumbar spine from previous surgery. Is this an absolute contraindication or a relative one? Justify in one sentence.
5. Your junior intern asks the difference between “heating” and “deep heating”. State the exact depth (in cm) up to which SWD produces effective therapeutic heating in muscle tissue.
6. SWD produces heat by two bio-physical mechanisms. Name both methods (0.5 mark each).
7. In the Capacitor (Condenser) Field Method: (a) Which tissue has the highest resistance and therefore heats the MOST? (b) Which tissue heats the LEAST?
8. A patient has marked subcutaneous fat (obese). Which electrode placement method (Capacitor or Inductance) will cause more discomfort and why? (15 words max)
9. In the Inductance (Cable/Magnetic field) Method: The heating is maximum in tissues having high _____ (fill the property).
10. You are treating a tennis elbow (lateral epicondylitis). Which method (Capacitor or Inductance) is preferred and which specific electrode/application technique will you use? (e.g., monopolar, coplanar, cable, drum)
11. Continuous SWD versus Pulsed SWD: In continuous mode the frequency is fixed at 27.12 MHz. What is the usual pulse frequency and duty cycle used in modern Pulsed Short Wave Diathermy (PSWD) machines for non-thermal effects?
12. A patient with acute ankle sprain (Day 2) is referred for SWD. Will you use Continuous SWD or Pulsed SWD and why? (one line)
13. Dosage dilemma: Your old SWD machine has only four settings: I (mild), II (moderate), III (strong), IV (severe). For chronic osteoarthritis knee, which dose is classically recommended and what is the usual duration?
14. Historical evidence: The FCC (Federal Communications Commission) allocated three ISM band frequencies for medical diathermy. 27.12 MHz is the most common. Name the other two frequencies ever used for SWD.

15. Safety check: While applying SWD using the capacitor method with pad electrodes, you notice sparks between the skin and the pad. What is the most common cause and immediate remedy? (one cause + one remedy)

ANSWER KEY:

1. Short Wave Diathermy is the therapeutic heating of body tissues by means of an oscillating electromagnetic field of 27.12 MHz frequency (wavelength 11 metres).
2. High-frequency (27.12 MHz) alternating current produces an electromagnetic field that causes molecular oscillation/rotation in tissues → conversion of electromagnetic energy into thermal energy.
3. Any four:
 - Metal implants / pacemakers
 - Malignant tumours
 - Active haemorrhage / haemorrhagic tendency
 - Pregnancy (pelvis/lower abdomen)
 - Active tuberculosis
 - Impaired thermal sensation
 - Acute infection / fever
 - Venous thrombosis / DVT
 - Growing epiphysis in children
4. Absolute contraindication because eddy currents induced in metal can cause severe localized burns.
5. Effective therapeutic heating up to 3–5 cm depth in muscle.
6. (1) Capacitor / Condenser / Electric field method (2) Inductance / Cable / Magnetic field method
7. (a) Fat (poor conductor → highest resistance → maximum heating) (b) Muscle (good conductor → least heating)
8. Capacitor method → more discomfort because fat heats excessively due to high resistance.
9. High electrical conductivity (or high electrolyte content)
10. Inductance (cable) method preferred → wrap cable around elbow or use monode/circumferential technique → selective heating of muscle/tendon.
11. Pulse frequency: 100–500 Hz (commonly 145 Hz or 200 Hz) Duty cycle: usually 1:3 or 2 ms ON, 6 ms OFF (25–33%)
12. Pulsed SWD → to get non-thermal (athermal) effects like re-absorption of haematoma without aggravating acute inflammation.
13. Dose III (strong/heavy heating) for 20–30 minutes (chronic OA needs vigorous heating).

14. 13.56 MHz and 40.68 MHz (27.12 MHz is the most widely used).
15. Cause: Air gaps due to poor contact / insufficient electrode gel. Remedy: Apply more conductive gel / re-adjust electrode position / use spacing pads.