

High Dose Rate Brachytherapy

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Learning objectives

The participant should be able to:

1. distinguish among LDR, PDR and HDR brachytherapy
2. describe several advantages of HDR over LDR
3. describe disadvantages of HDR
4. identify isotope(s) used for HDR, including significant properties such as half-life, specific gamma-ray constants and energies of emissions
5. describe the technology used for HDR apparatus
6. describe several applications of HDR
7. describe essential periodic QA of HDR apparatus
8. describe emergency procedures for HDR

Questions (*denotes questions cribbed from Raphex)

*1. An HDR treatment has a total treatment time of 282 seconds on May 1st. If the Ir-192 source is not changed, the same treatment scheme will take ___ seconds on May 15.

- A. 322
- B. 302
- C. 296
- D. 264
- E. 247

*2. An HDR treatment planning system uses optimization to deliver an even dose at a radius of 1 cm from a bronchial applicator. The dwell times will be:

- A. Higher at the ends than in the center.
- B. Alternately high and low.
- C. All approximately equal.
- D. Higher in the center than at the ends.

*3. Which of the following is the most important advantage of brachytherapy over teletherapy?

- A. There is no repair of sublethal injury.
- B. A more homogeneous dose is delivered.
- C. The oxygen enhancement ratio is reduced.
- D. The volume of normal tissue treated is minimized.
- E. Radiation exposure to personnel is less.

4. A patient is sent to a nursing home with a 3.7 Ci Ir-192 source in her body. 93 hours later, after the patient dies, the source is removed and put in a waste container. What is the approximate dose to the patient's tissue at a distance of 10 cm from the source?

- A. 15 Gy
- B. 150 Gy

- C. 1500 Gy
- D. 15000 Gy

5. Positional accuracy, the difference between the indicated and actual source position, must be within ____ mm.

- A. 0.5
- B. 1
- C. 2
- D. 5
- E. 10

6. Positional accuracy must (minimum interval) be checked:

- A. At a source change
- B. Quarterly
- C. Monthly
- D. Daily
- E. Before any treatment

7. Which of the following source localization techniques is least likely to produce accurate results?

- A. Stereo-shift films
- B. CT
- C. Orthogonal films
- D. Localization jig films
- E. Variable angle films

8. A typical Ir-192 HDR source has a source strength of

- A. 10 microCuries
- B. 10 milliCuries
- C. 10 Curies

9. HDR has not been used for the following treatment scenario:

- A. IORT of pancreas
- B. Bile duct intraluminary
- C. Skin lesion plaque
- D. Suit-Fletcher cervix intracavitary
- E. None of the above

10. During an emergency procedure when an HDR source did not retract, a resident spends ten minutes at a distance of 30 cm from a 5 Ci Ir-192 source. What is his/her approximate whole-body dose?

- A. 4 microGy
- B. 4 milliGy
- C. 4 centiGy
- D. 4 Gy