Part I
Please rate the extent to which you agree with the following statements, where 1 is strongly disagree and 5 is strongly agree.

1. When considering the prostate to bladder connection in which 90% of patients have minimal urinary symptoms at ≥5 years after brachytherapy, post transurethral resection tamsulosin is usually ineffective.  

   1   2   3   4   5

2. It is essential to ensure that the eventual number of transverse images obtained at 5 mm intervals corresponds to the measured sagittal length when concerning measurement of the sagittal length of the prostate at the time of acquisition of ultrasound images for planning.

   1   2   3   4   5

3. With LDR prostate Brachytherapy in intermediate risk patients the long term results will be related to implant quality and experience of the brachytherapist.

   1   2   3   4   5

Part II

Question 1:
The prostate volume measured at radical prostatectomy can be predicted within 5% by the following imaging modalities:

   a) Ultrasound
   b) MRI
   c) CT
   d) 1,2,3
   e) 1,2
   f) 2,3

Feedback:
Both ultrasound and MRI volumes correlate well with post prostatectomy volumes, within 5% in the paper cited. CT volumes tend to grossly overestimate the volume. Matching the pre-implant MRI volume to the ultrasound planning volume limits over-estimation.

Reference:

Question 2: Please select the true statement about prostate apex anatomy:

a) The average length from the penile bulb to the apex is 1 cm
b) The external sphincter (smooth muscle component) extends up to 1.5 cm within the prostate to the verumontanum
c) **The range of distance from the penile bulb to apex is .5cm to > 3 cm**
d) The apex is 80% peripheral zone, and 20% transition zone

Feedback:
The average length form the apex to penile bulb is 1.5 cm. Both striated and smooth muscle components of the external sphincter extend into the prostate to the verumontanum. The actual apex to penile bulb varies widely, form .5 to>3cm. The apex is 100 % peripheral zone, while the base near the bladder neck is 100 % transition zone

Reference:
**Question 3:** To ensure that the rectal dose remains within acceptable limits (RV100< 1-1.3 cc), which of the following are important?

1. Contour the rectum on the planning US images and calculate the dose  
2. Ensure that the US probe is parallel to the posterior aspect of the prostate on sagittal images at the time of planning and at the time of implant  
3. Ensure that the Row 1 needles are at least 3-5 mm within the prostate, anterior to the prostate capsule  
4. Ensure at the time of planning that the measured sagittal length corresponds to the number of transverse slices  

The correct statements are:

A) 1 and 2  
B) All of the above  
C) None of the above  
D) 2, 3 and 4  

**Feedback:**

*The calculated rectal dose on planning US images has no relationship to the actual dose received by the rectum. The US probe pulls the rectum posteriorly and increases the distance between the prostate and the rectal wall. When the probe is removed, the prostate falls back into its normal relation to the rectum. Ensuring that the probe is parallel to the posterior aspect of the prostate, that the row needles are implanted at least 3-5 mm within the prostate at each level, and that the plan length is appropriate for the sagittal length of the prostate are all important.*

**Reference:**

Brachytherapy 8 (2009) 197-206


**Question 4:**

Concerning the margin around the prostate at the time of planning, which of the following statements are correct?

a) LDR prostate brachytherapy is planned without a margin. Peripherally placed seeds will treat an adequate distance beyond the prostate  
b) 3-5 mm margin is placed concentrically around the prostate in all directions  
c) No margin is added posteriorly at the rectal interface
Feedback:

Although peripherally placed seeds will treat a variable margin around the prostate, it is important to systematically add a margin and ensure that it is covered in your plan. The margin is not concentric as one does not add a margin at the rectal interface.

Reference:

Brachytherapy 8 (2009) 197-206


Question 5: For an Iodine-125 LDR implant, which set of preplan parameters is typical:

a) $V_{100} > 99\%, V_{150} 50-60\%, V_{200} 10-20\%, \text{Urethra max} < 130\%$

b) $V_{100} > 99\%, V_{150} 25-30\%, V_{200} < 10\%, \text{Urethra max} < 110\%$

c) $V_{100} > 99\%, V_{150} 60-75\%, V_{200} > 20\%, \text{Urethra max} > 150\%$

Feedback: $V_{100} > 99\%, V_{150} 50-60\%, V_{200} 10-20\%, \text{Urethra max} < 130\%$ is a typical preplan parameter.

Reference:

Brachytherapy 8 (2009) 197-206


Question 6: You have finished a Pd-103 implant on a patient and you measure the dose rate to be 0.6 mrem/hr at 1 meter. What NRC regulations apply?

a) The patient may leave, no precautionary instructions or records are necessary.

b) Give the patient instructions to keep the dose to others ALARA and keep a record of the measurement.

c) You cannot release the patient, the dose rate is too high and the effective dose rate equivalent to others may be > 0.5 rem.

d) The patient may leave without instructions, but you must keep a record of the measurement results, survey instrument used, and the name of the individual performing the survey.

Feedback: According to the US NRC’s regulatory guide “Release of patients administered Radioactive Materials.” the dose rate at 1 meter above which instructions are required to be given to the patient is 0.2 mrem/hr for I-125 and 0.7 mrem/hr for Pd-103. In the case that the dose rate at 1 meter is below this, because it is a derived dose (measurement inclusive of tissue attenuation) a record documenting the survey instrument used, the individual performing the survey and the results of the survey must be
maintained for 3 years. For Pd-103 implants if the dose rate is greater than 3 mrem/hr, the patient should not be released.


Question 7: The following statement regarding Pd-103 and I-125 is true:

a) Pd-103 has a shorter half-life than I-125 but higher energy
b) The half-life of Pd-103 is about one third that of I-125
   - Correct
   - The half-life of Pd-103 is 17 days, which is approximately 1/3 that of I-125 (60 days).


d) Conventional monotherapy Rx for Pd-103 is 145Gy
   - Incorrect
   - Conventional monotherapy Rx for Pd-103 is 145Gy

Question 8: The Air Kerma Strength (U) of a source

a) has units of cGy cm²/hr
   - Incorrect
   - has units of mCi cm²/hr

b) has units of mCi cm²/hr
   - Correct

b) has units of mCi cm²/hr
   - Correct

c) takes into account the attenuation by source encapsulation
   - Correct

d) is measured at the parallel bisector of the source
   - Correct

e) a and c
   - Correct

Feedback: The Air Kerma Strength of a source is the air kerma rate at a point in air along the perpendicular bisector of the source. It is a measurement which takes into account the attenuation by the source encapsulation. Historically source strength could be specified in terms of the activity of the source, but then the manufacturing differences of the source encapsulation needed to be taken into account as well.

Reference: AAPM TG-43
**Question 9:** Long term urinary function after LDR brachytherapy is:

a. 90% of the patient have minimal urinary symptoms at ≥ 5 years after brachytherapy  
b. 10-15% of the patient will never normalize their IPSS after the brachytherapy  
c. Acceptable stricture rate at 5 years is 1-3%  
d. Older patients will have more Gr. 2 and 3 urinary toxicity at ≥ 5 y after the brachytherapy  
e. **All of the above**  
f. A and B

**Feedback:**

It is important to understand that long term urinary outcomes after LDR prostate brachytherapy are very good and majority of patients have minimal or no symptoms.

**Reference:**


**Question 10:** Quality assurance in LDR brachytherapy include the following components.

a. Patient selection  
b. US and contouring and Planning  
c. OR Procedure and technique  
d. Dosimetric outcomes  
e. PSA Outcomes  
f. Program Procedure and policies  
g. **All of the above**  
h. All of the above except PSA outcomes

**Feedback:**

It is important to understand the quality assurance procedures in LDR brachytherapy, all components listed in the question are very important including long term disease outcomes.

**Reference:**