Due to a shift in the effective point of measurement using plane parallel chambers, %DD curves must be shifted upstream to match reality.

- True
- False

When measuring photons with an ion chamber one directly measures the %DD curve.

- True
- False

TG #51 allows reference dosimetry to be performed in a solid water phantom.

- True
- False

Plane parallel chambers used for electron dosimetry should be cross-calibrated with a cylindrical chamber in the highest available energy electron beam as outlined by TG-39.

- True
- False

Please select which of the following equations is the appropriate form for calculating the P_{TP} correction factor for TG-51 reference dosimetry?

- $P_{TP} = \frac{760\,mmHg}{P_{current}} * \frac{(273.2 + T_{current})}{295.2}$
- $P_{TP} = \frac{P_{current}}{760\,mmHg} * \frac{295.2}{(273.2 + T_{current})}$

Inserting a 1 mm lead filter in the beam for high energy %DD measurements functions to remove contaminant electrons from the beam which, in turn, decreases the %DD curve compared to an open beam.

- True
- False

When using an ion chamber for electron beam scans, the measured curves are %DD curves.

- True
- False

Which of the following are true when performing TG-51 reference dosimetry on 18 MV photons. (Choose all that apply)

- [ ] If you do not have a lead foil TG-51 allows you to make measurements without its use
- [ ] %DD measurements for obtaining k_Q should be made without a lead foil placed in the beam
- [ ] Output measurements obtained at 10 cm depth should be corrected to d_{max} using the %DD with lead in the beam
- [ ] %DD measurements for obtaining k_Q should be taken using 1 mm of lead in the beam
- [ ] Output measurements should be

The function of k_{ecal} is to take an electron beam of your specific energy and relate the chamber response to an electron beam of the reference energy of 4 MeV.

- True
- False

TG-51 absolute output measurements can be obtained in either a 100 cm SSD setup or 100 cm SAD setup.

- True
- False

The effective point of measurement is shifted upstream of the center of cylindrical chambers for both photons and electrons. So, which way would you shift your chamber if you wanted to put the chamber's effective point of measurement where the point of measurement currently is?

- Shallower
- Deeper

When performing a TG-51 measurement if P_{pol} is outside of _____ then you should get another chamber.

- 1.0+/-0.005
- 1+0.003
- 1.0+/-0.003
- 1-0.005

P_{ion} should always be less than one.

- True
- False

TG-51 %DD curves can be obtained either with a 100 cm SAD setup or 100 cm SSD setup.

- True
- False

What are the minimum allowable water tank dimensions for reference dosimetry according to TG #51?

- 40x40x40 cm^3
- 50x50x50 cm^3
- 20x20x20 cm^3
- 30x30x30 cm^3

The shift in the effective point of measurement for photons is?

- 0.6 r_{cav} Upstream
- 0.6 r_{cav} Downstream
- 0.5 r_{cav} Upstream
- 0.5 r_{cav} Downstream

What is the function of TG-51's value of k_Q for photon measurements? (Choose all that apply)

- [ ] It correct for ionic recombination within the chamber.
- [ ] It functions to relate your chamber's response in a Co-60 beam to the response of a beam of your specific energy.
- [ ] It corrects for the effective point of measurement of the chamber.
- [ ] It corrects for chamber polarity effects.

According to AAPM's TG-51 Addendum (published in 2014), which of the following is likely to be the single largest contributor to reference dosimetry uncertainty? (Assuming properly performed reference dosimetry).

- ( ) kQ determination
- ( ) $N_{D,W}^{Co\text{-}60}$
- ( ) Charge Collection
- ( ) Chamber Positioning

According to the AAPM's TG-51 Addendum report (published in 2014), which of the following values corresponds to the reported error in measurement per every centimeter of missetting field size.

- 5% per 1 cm Error in Field Size Setting.
- There is no observed error per centimeter is missetting field size.
- 1% per 1 cm Error in Field Size Setting.
- 10% per 1 cm Error in Field Size Setting.
- 0.1% per 1 cm Error in Field Size Setting.

AAPM's TG-51 Addendum delves deeper into P_{ion} than the original report and defines it as: $P_{ion} = 1 + C_{init} + C_{gen} D_{pp}$. It is suggested that the by solving this equation for the general recombination C_{gen} one can compare this value to that used by the ADCL in their Co^{60} beam as a further check of proper chamber functioning.

- True
- False

Which of the following correction factors are likely to be significantly larger in Flattening Filter Free (FFF) beams than in beams utilizing a flattening filter? (AAPM's TG-51 Addendum formalism)

- [ ] P_{pol}
- [ ] P_{ion}
- [ ] P_{rp}
- [ ] P_{leak}

For the following list of photon beams, select all those that the AAPM's TG-51 Addendum report published in 2014 requires a lead foil be used when measuring $\%dd(10)_X$.

- [ ] 10X Flattening-Filter-Free Photons
- [ ] 6 MV Flat Beam Photons
- [ ] 18 MV Flat Beam Photons

AAPM's TG-51 Addendum (published in 2014) suggests that, given proper adherance to TG-51 protocol and with proper experimental care, the total uncertainty associated with reference dosimetry is around [ ] %.

(Round to the nearest whole number)

The following options represent measurement volumes of cylindrical chambers. Select all of the volumes in this list that would qualify, according to the TG-51 Addendum, as micro or pinpoint ionization chambers (and should therefore not be used for clinical reference dosimetry). (Select all that apply).

- [ ] 0.01 cm^3
- [ ] 0.5 cm^3
- [ ] 0.045 cm^3
- [ ] 0.1 cm^3