SAMS Questions Stereotactic Ablative Radiotherapy

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1. Which of the following statements regarding dose response relationships for ablative radiotherapy delivery is FALSE:
   a. Dose response relationships are best determined by phase I clinical trials
   b. Small dose increase may result in large toxicity increase in the transition range of the dose response curve.
   c. The Maximum Tolerated Dose (MTD) corresponds to the most ideal therapeutic ratio.
   d. A negative therapeutic window results when efficacy is less likely than harm.

   Answer, c.
   The only variable in a phase I trial is dose making it an ideal platform for studying dose response effects. The slope of the dose response curve is greatest in the transition region. In contrast to most chemotherapy regimens, the widest therapeutic window for SABR in lung cancer occurred at a dose considerably lower than the MTD (slide 10). If response curves for efficacy and toxicity cross (e.g., at higher dose levels), the therapeutic window will be negative.

   Early stage lung cancer was the most common clinical model studied in clinical trials testing SABR at centers across the world.

2. The Indiana University trials demonstrated that treatments in the central chest were problematic for patients to tolerate likely related to:
   a. Impairment of the pulmonary toilet function of the central chest.
   b. Higher dose used for central tumors
   c. Larger tumors generally occurring in the central chest
   d. Differential tolerance of parallel vs. secular defined thoracic structures

   Answer a.
   Proximal airways facilitate the clearing of secretions within the lung by their expectorant and ciliary functions (slide 26). The Indiana University phase II trial used a narrow range of highly potent 3 fraction dose levels. Toxicity was observed both for T1 and T2 tumors. Ablative dose treatment shows distinct response between parallel and serial (not secular) structures.

3. Based on published reports, what factors would be most concerning for increased risk of toxicity after SABR?
   a. impaired spirometry
   b. peripheral lung location
   c. impaired DLCO
   d. advanced age

   Answer c.
   Published reports indicate that DLCO is compromised more than spirometry after SBRT (slide 21). The opposite is true for surgical resections.

4. The following are true statements about the outcome of patients with early stage lung cancer treated with SBRT?
   a. Local control for this treatment is predicted to be >80%.
   b. Risk of grade 3 or higher toxicity is around 20% at 3 years.
   c. Overall survival in most series is 60-75% at 2 years.
   d. All of the above

   Answer d.
The rationale and conduct for SABR treatment in metastatic cancer to the liver includes all of the following except:

a. Treatment intent is to improve survival, even cure.

b. **Previous chemotherapy clearly limits tolerance and is a contraindication to using SABR in patients with liver metastases.**

c. The University of Colorado multicenter trials used the critical volume methodology to avoid liver toxicity
d. Dose tolerance of the liver is similar to treatments in the lung.

Answer b.

Patients with oligometastases from metastatic cancers (e.g., colorectal cancer) can be cured with metastectomy. Most patients treated in clinical trials testing SABR had already progressed after 1st and 2nd line (even 3rd line) chemotherapy\(^3\)\(^-\)\(^12\) (slide 47). The critical volume is the volume of organ necessary to avoid a defined clinical insufficiency. The critical volume must be spared (ie, not exceed) a threshold dose. The University of Colorado studies used this model allowing dose escalation to potent tumorcidal dose, similar to the Indiana University phase I/II studies in lung cancer.

References: