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Propositions

Be it hereby proposed...

1. With the assistance of Monte Carlo (MC) simulations in nano-scale geometries, the debate over whether dose to medium or dose to water-in-medium is a better specifier of radiobiological effect will end at last, ultimately falling on the side of dose to water-in-medium.

2. Treatment planning systems for kilovoltage beams and brachytherapy units will provide a "sliding scale" to allow the user to visualize how converted dose to water-in-medium varies with the dimensions of the cavity considered.

3. Full linac head simulations or manufacturer-supplied phase space data will be used with MC simulations in clinical treatment planning systems instead of the current parameterized beam models.

4. The steady increase in computing power will mean that routine clinical treatment planning using open source general purpose Monte Carlo algorithms becomes a reality.

5. As patents and licenses on the current fast MC algorithms in commercially available TPSs lapse, smaller companies will emerge providing their own TPS algorithms based on this newly-available software. Many of these will be web-based applications with links to a large database of radiotherapy treatment protocols.

6. Accurate and efficient treatment planning will increase the frequency of multi-modality treatment protocols (*e.g.* proton + photon, or "phroton," therapy).

7. As an alternative to Grays (Gy), radiotherapy dose will be specified in units of RBE (radiobiological effect)–phonetically pronounced "ERB" in honour of F. Herbert Attix–where 1 RBE represents 1 log decrease in the surviving fraction of cells.

8. In Magnetotherapy, electromagnetic redirection of charged particles within the patient will either: a) direct particles to multiple tumour sites during the application of a single treatment beam or b) direct charged particles away from surrounding healthy tissue.

9. Collaborations between medical physicists, radiobiologists and tumour biologists will result in targeted molecules that: a) increase malignant cell sensitivity to ionizing radiation and/or b) result in a DNA-level protection of healthy cells against radiation.

10. The increased frequency of multidisciplinary collaborations will lead to patient-centred holistic approaches to cancer treatment that include not only advanced treatment technology but also optimizing psychosocial factors influencing patient response to therapy.

11. Monte Carlo algorithms will be employed to predict cosmic phenomena, such as asteroid near-misses with Earth.