Propositions accompanying the thesis

Modeling and MR-thermometry for Adaptive Hyperthermia in Cervical Cancer

Iva Vilas-Boas Ribeiro

1. The predictive value of HTP can be improved by matching the patient's position and anatomy in the HTP to the real position in the hyperthermia device during treatment. (This thesis)

2. SAR-based optimization is more robust against changes in position and anatomy than temperature-based optimization (This thesis)

3. Air motion severely disturbs MR thermometry during treatment, which can be quantified using the Jaccard similarity coefficient applied to the air in two subsequent MRI scans before treatment and correlates to MR thermometry accuracy (This thesis)

4. After applying a reproducible exclusion method, MR thermometry accuracy in the remaining data was improved to within the desired clinical requirements for most patients receiving HT treatment for locally advanced cervical cancer. (This thesis)

5. POD–Kalman filtering improved temperature monitoring accuracy in highly corrupted data from 2.2°C (MR thermometry) to 0.9°C (POD-Kalman temperatures). (This thesis)

6. Progress in monitoring the thermal dose distribution is fundamental to understanding the relative contributions of the various thermal mechanisms responsible for treatment efficacy.

7. Understanding model uncertainties will reduce the clinician's skepticism about modeling-supported results.

8. The emerging technological developments in MRI guidance for hyperthermia should be encouraged since it provides the gateway to introducing personalized thermotherapy.

9. Excellence is never an accident. It is always the result of high intention, sincere effort, and intelligent execution; it represents the wise choice of many alternatives. (Aristoteles)

10. A goal without a plan is just a wish. (Antoine de Saint-Exupéry)

11. If you do not know what color to take, take black. (Pablo Picasso)