**Table T1.** The TMAs in the SI, LR and AP directions for the two groups. (Mean ± 1SD, mm)

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|   |   | Group A |   |   |   | Group B |   |
|   | SI | LR | AP |   | SI | LR | AP |
| TMAorg | 3.5±2.7 | 1.9±1.7 | 3.1±2.1 |  | 12.1±6.8 | 2.7±2.4 | 2.8±2.7 |
| TMAbs | 2.7±2.5 | 1.4±1.3 | 2.2±1.8 |  | 10.3±5.8 | 2.0±2.1 | 1.8±1.7 |
| TMA4D | 2.7±2.7 | 0.9±0.9 | 1.3±1.2 |   | 9.3±4.1 | 1.1±0.9 | 1.9±1.4 |

Abbreviations: SI Superior-Inferior, LR Left-Right, AP Anterior-Posterior

**Table T2.** The intra- and interfraction TMVs in the SI, LR and AP direction for the two groups. (Mean ± 1SD, mm)

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|   |   | Group A |   |   |   | Group B |   |
|   | SI | LR | AP |   | SI | LR | AP |
| Intrafraction TMV | 0.7±0.6 | 0.4±0.4 | 0.6±0.5 |  | 2.7±1.9 | 0.6±0.6 | 0.6±0.6 |
| Interfraction TMV | 0.8±0.6 | 0.6±0.6 | 0.7±0.7 |   | 1.7±1.0 | 0.9±1.0 | 0.8±0.8 |

Abbreviations: SI Superior-Inferior, LR Left-Right, AP Anterior-Posterior

**Table T3.** Summary of systematic and random errors in the treatment of the two groups. (Mean ± 1SD, mm)

|  |  |  |  |
| --- | --- | --- | --- |
|   | Group A |   | Group B |
|   | SI | LR | AP |   | SI | LR | AP |
| TMAbs-TMA4D |  |  |  |  |  |  |  |
| system error | 1.6 | 1.1 | 1.3 |  | 3.5 | 2.0 | 1.4 |
| random error | 0.6 | 0.6 | 0.7 |  | 1.0 | 1.0 | 0.8 |
| TMAorg-TMA4D |  |  |  |  |  |  |  |
| system error | 1.6 | 1.3 | 1.6 |  | 4.3 | 2.2 | 2.0 |
| random error | 0.6 | 0.9 | 0.7 |  | 1.5 | 1.2 | 1.3 |
| intra-TMV |  |  |  |  |  |  |  |
| system error | 0.5 | 0.3 | 0.4 |  | 1.5 | 0.4 | 0.4 |
| random error | 0.2 | 0.2 | 0.2 |  | 0.4 | 0.3 | 0.3 |
|  Baseline shift within 10 mins |  |  |  |  |  |  |  |
| system error | 0.7 | 0.3 | 0.5 |  | 1.9 | 0.7 | 1.1 |
| random error | 0.3 | 0.3 | 0.4 |  | 1.0 | 0.5 | 0.5 |
| Baseline shift within 20 mins |  |  |  |  |  |  |  |
| system error | 0.9 | 0.7 | 0.9 |  | 2.4 | 0.7 | 1.6 |
| random error | 0.5 | 0.6 | 0.5 |  | 1.2 | 0.5 | 0.9 |
| Baseline shift within 30 mins |  |  |  |  |  |  |  |
| system error | 0.9 | 0.8 | 1.0 |  | 3.0 | 0.9 | 1.9 |
| random error | 0.5 | 0.7 | 0.5 |   | 1.2 | 0.6 | 1.0 |

Abbreviations: SI Superior-Inferior, LR Left-Right, AP Anterior-Posterior



**Figure S1.** The schematic for calculating tumor motion amplitude from target position trajectory (a), and peak-to-peak distance (b).



**Figure S2.** Relationship between the intra- and interfraction TMV and mean TMAbs in the SI direction(a, c), and the histogram representation of the intra- and interfraction TMVbs in the SI direction (b, d).





**Figure S3.** The baseline shifts in the SI, LR and AP directions as a function of time. The black points (and error bars) are the mean (and one standard deviation) baseline shifts over all fractions at the specific time.



**Figure S4.** Relationship between the mean TMA and the baseline shift for the SI direction.