*Table 1. Estimated number of patients eligible for MRI Linac according to stage and type of lung cancer.*

| Disease & Stage | Estimated number for MRI Linac |
|---|---|
| **NSCLC** | |
| Stage 2 | 94 |
| Stage 3a | 169 |
| Stage 3b | 45 |
| **SCLC** | |
| Limited | 52 |
| Total | 360 |

**Conclusion:** The potential cohort is estimated at 796 eligible patients for MRI Linac in lung and prostate cancer. In the context of lung and prostate cancer, we estimate during the initial research phase that we will treat around 180 patients per year on one machine. Therefore, the estimated number of eligible patients far exceeds the estimated throughput for a single MRI Linac machine. This has positive implications for its use as a research tool. Even after accounting for patients who will inevitably decline entry to clinical trials, the estimated eligible patient population is such that trials should still have sufficient recruitment; this is especially important for rare indications such as superior sulcus tumours.

**PO-0789**

**Treatment time in breast irradiation: a trade-off between positioning and complexity.**

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**Purpose or Objective:** In whole breast irradiation (WBI), different approaches are used to spare the organs at risk, including intensity modulation and altered positioning. These may however come at the cost of longer treatment times, which in turn may slow down adoption in daily clinical practice. To document the impact of different approaches, time measurements were performed, following a strict protocol.

**Material and Methods:** A time-and-motion study was carried out using a 'continuous timing' method (running chronometer with defined intervals), according to the following protocol:
- Positioning time: Patient in bunker - Start Cone Beam CT (CBCT)
- CBCT recording time: Start CBCT - Stop CBCT
- Adaptations: Stop CBCT - Beam on
- Irradiation time: Beam on - Beam off
- Patient recovery time: Beam off - Patient exits bunker

Time measurements were categorized per position, technique and target. Positioning time is reported over all patients, irradiation time per category, in absolute time and, to correct for dose and volume differences, in Irradiation Time per 100MU's (ITcMU). Statistical analysis was performed using parametric testing, i.e. the One Way Anova.

**Results:** Registration was performed in 86 patients, of which 47 in prone and 39 in supine position. Positioning time was measured in 74 patients, and irradiation time in 86. Results are listed in table 1.

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Treatment characteristics (n=86)** | | | | | | | | |
| Supine | | | | Prone | | | | |
| 39 | | | | 47 | | | | |
| Without lymph node irradiation | | | | With Lymph nodes | | | | |
| 65 | | | | 21 | | | | |
| WBI | | SIB | | Thoracic Wall | | Tumorbed | | |
| 36 | | 28 | | 12 | | 10 | | |
| IMRT without table rotation | | IMRT with table rotation | | VMAT | | Single-arc VMAT | | |
| 52 | | 21 | | 6 | | 7 | | |
| **Positioning time (per fraction) (n=74)** | | | | | | | | |
| Supine (n=28) | | | | Prone (n=42) | | | | Significance (One way Anova) |
| 00:03:52 | | | | 00:05:03 | | | | p=0,01 |
| WBI (n=32) | | SIB (n=19) | | Thoracic wall (n=9) | | Tumorbed (n=10) | | |
| 00:04:45 | | 00:04:49 | | 00:03:44 | | 00:04:18 | | p=0,5 |
| Without Lymph nodes (n=56) | | | | With Lymph nodes (n=14) | | | | |
| 00:04:46 | | | | 00:03:49 | | | | p=0,1 |
| **Irradiation time (ITcMU) (n=86)** | | | | | | | | |
| Supine (n=37) | | | | Prone (n=45) | | | | p=0,002 |
| 00:00:53 | | | | 00:01:10 | | | | |
| WBI (n=34) | | SIB (n=27) | | Thoracic wall (n=11) | | Tumorbed (n=10) | | p=0,1 |
| 00:01:06 | | 00:00:54 | | 00:01:02 | | 00:01:11 | | |
| IMRT without table rotation (n=48) | | IMRT with table rotation (n=21) | | VMAT (n=6) | | Single-arc VMAT (n=7) | | p<0,001 |
| 00:01:02 | | 00:01:11 | | 00:01:18 | | 00:00:29 | | |
| No LNI (n=37) | LNI (n=11) | No LNI (n=17) | LNI (n=4) | No LNI (n=5) | LNI (n=1) | No LNI (n=3) | LNI (n=4) | |
| 00:00:59 | 00:01:10 | 00:01:14 | 00:00:57 | 00:01:20 | 00:01:07 | 00:00:22 | 00:00:34 | |
| **"WBI only" irradiation time (ITcMU) (n=32)** | | | | | | | | |
| Supine (n=5) | | | | Prone (n=27) | | | | p=0,8 |
| 00:01:03 | | | | 00:01:05 | | | | |
| IMRT without table rotation (n=28) | | | IMRT with table rotation (n=4) | | | VMAT (n=1) | | p=0,08 |
| 00:01:04 | | | 00:01:21 | | | 00:00:40 | | |
| **"WBI only" irradiation time (per fraction dose 2,67Gy) (n=32)** | | | | | | | | |
| Supine (n=5) | | | | Prone (n=27) | | | | p=0,02 |
| 00:04:38 | | | | 00:02:59 | | | | |
| IMRT without table rotation (n=27) | | | IMRT with table rotation (n=4) | | | VMAT (n=1) | | p=0,08 |
| 00:03:07 | | | 00:04:34 | | | 00:01:30 | | |
| **"Overall" irradiation time (per treatment) (n=55)** | | | | | | | | |
| No LNI | | | | | | LNI | | |
| Hypofractionation WBI | | Hypo-fractionation SIB | Acceleration SIB | | | Hypofractionation TxW | Acceleration TxW | |
| Supine (n=5) | Prone (n=19) | Prone (n=4) | Supine (n=11) | Prone (n=4) | | Supine (n=9) | Supine (n=3) | |
| 01:09:39 | 00:43:35 | 01:16:56 | 00:35:37 | 00:35:46 | | 01:35:16 | 00:41:55 | |
| Acceleration (5 fractions) | | | | Hypofractionation (15 fractions) | | | | |
| IMRT (n=9) | IMRT with table rotations (n=3) | VMAT (n=1) | Single-arc VMAT (n=3) | | IMRT (n=28) | IMRT with table rotations (n=8) | VMAT (n=3) | |
| 00:36:50 | 00:43:20 | 00:40:40 | 00:17:10 | | 00:46:46 | 01:12:45 | 01:09:45 | |

**Abbreviations:** WBI = Whole breast irradiation; SIB = Simulatineously integrated boost; IMRT = Intensity modulated radiotherapy; VMAT = Volumetric modulated arc therapy; ITcMU = irradiation time per 100 monitor units.

Positioning time per session was on average 1'11" longer for prone than for supine. This difference is confirmed in "WBI only", simultaneous integrated boost (SIB) and tumor bed irradiation, all three predominantly performed in prone, in contrast to two purely supine positions: thoracic wall and "lymph node included" irradiation.
ITcMU was 17" faster for supine versus prone positioning. Looking into hypofractionated WBI only, no difference was observed in ITcMU, but irradiation time per fraction was 1'40" longer for supine versus prone position. The mean number of gantry positions for prone and supine position was respectively 2 and 5, signifying less complex planning in prone to obtain equivalent dosimetric results.
Single-arc Volumetric Modulated Arc Therapy (VMAT) resulted in less than half of the irradiation time needed compared to IMRT or normal VMAT used for similar target or position.

**Conclusion:** Prone position comes at the cost of longer positioning time, but reduces irradiation time as a result of less need for complex planning, especially for WBI and sequential boosting. Although fraction time increases when using acceleration, overall irradiation time decreases, which compensates for potentially higher time demands of more complex treatment techniques. Single-arc VMAT reduces longer fraction times. These data will be used for balancing the costs and effects of the different approaches.