**Docket #:** S17-451

# A novel integrated quality assurance phantom for radiographic and non-radiographic radiotherapy localization and positioning systems

Stanford researchers have developed a novel phantom which can integrate quality assurance (QA) procedures for radiofrequency tracking system, surface mapping system, Winston-Lutz test, the imaging system isocenter test and laser verification. By combining these QA tests into a single phantom, this product provides an independent QA method from the vendor, reduces the number of phantoms required for QA, reduces the time required of a medical physicist to perform these QA tasks, and increases the reproducibility of phantom placement. Moreover, this phantom is the first and only phantom which can QA the rotational accuracy of the radiofrequency tracking system and surface mapping system. Most importantly, it is feasible to evaluate the deviation of isocenter between the individual systems.

**Figure**

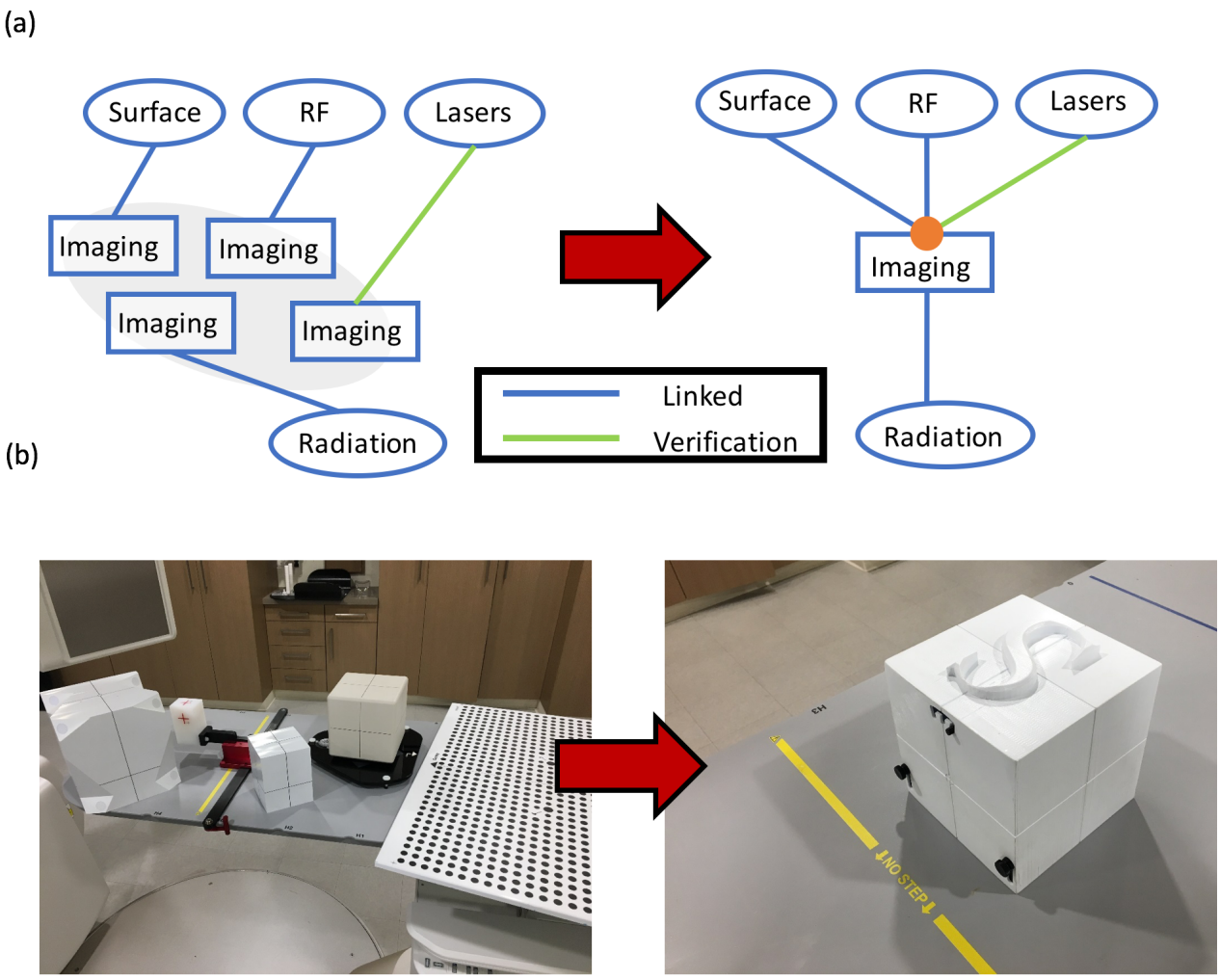



**Figure description -** The improvement of the integrated phantom. (a) Uncertainty introduced by the reproducibility of quality assurance (QA) phantom setup (left) and the reduction of uncertainty with the single isocentric QA phantom and procedure (right). With the use of this integrated phantom, it is possible to reveal the deviation of the isocenters from each system. (b) The space to store the QA phantoms can grow very quickly with the number of phantoms required for the QA procedures (left) compared to one single phantom can do it all (right). Note: RF: radiofrequency tracking system, Surface: surface mapping system, and Radiation: Winston-Lutz test.

**Stage of Research**

- Prototype completed
- Studies showed promising results as compared to vendor's phantoms
- Scope of pending patent has exclusive quality assurance coverage of the listed radiotherapy technologies

## Applications

- **Radiotherapy QA** – An integrated phantom will streamline the QA procedure for different localization and positioning systems

## Advantages

- **Integrated system** for QA of multiple systems
- **Significant cost and time savings**
- **Reduces set-up and performance time** - no need to set up the phantom for each system
- **Reduces storage space**
- **New features:**
  - can verify the rotation accuracy of optical surface monitoring system and RF beacon tracking systems
  - can measure physical distance between each system

## Publications

- Fowler TL, Yu Amy S. "A novel integrated quality assurance phantom for radiographic and non-radiographic radiotherapy localization and positioning systems", *Medial Physics Letters*.

## Patents

- Published Application: 20190175951
- Issued: 10,702,718 (USA)

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