



# Real-Time Tomosynthesis For Radiation Therapy Guidance

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## SUMMARY

UCLA researchers in the Department of Radiological Sciences and Department of Radiation Oncology have developed a real-time tomosynthesis design that can produce sufficient contrast to guide radiation therapy of small lung tumors.

## BACKGROUND

Radiation therapy, especially stereotactic body radiation therapy (SBRT), uses highly concentrated radiation to kill tumor cells in a limited field of view. Real-time feedback on the tumor position is vital to adjust the treatment and improve conformality. Especially for SBRT treatments in the lung, respiratory motion also remains a large problem. Fluoroscopy has been a tool of choice because of its extremely fast imaging times. However, unless fiducials are used, the contrast obtained in fluoroscopy is often insufficient for SBRT. Tomosynthesis has been previously proposed, but existing system designs require seconds to acquire data and do not have the speed to compensate for respiratory motion. Better management of tumor motion is needed to increase conformality and decrease side effects.

## INNOVATION

The inventors have developed a system where real-time tomosynthesis imaging of lung tumors is feasible. It uses multiple small X-ray sources to illuminate a small field of view simultaneously, and therefore provides sufficient contrast for tumors. High quality visualization of the tumor and real-time feedback can be achieved. This technology is simple and leverages existing hardware already present on the treatment machine. This system could either be mounted directly to the linear accelerator or be used to augment auxiliary orthogonal kV imaging systems, which are already used in other indications (such as skull tracking for brain radiotherapy) but lack the contrast to adequately track lung tumors.

## APPLICATIONS

- ▶ Radiation therapy image guidance
- ▶ Improved chest x-ray imaging of suspicious regions

## ADVANTAGES

- ▶ Simple and inexpensive to build
- ▶ High image quality
- ▶ Direct visualization of the tumor
- ▶ Fast tracking (up to 30fps), possible for real-time feedback
- ▶ Low dose because of high contrast

## PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Issued Patent	10,850,128	12/01/2020	2017-699

## RELATED MATERIALS

- ▶ Hsieh, S.S. and Ng, L.W., 2017. Real-time tomosynthesis for radiation therapy guidance. Medical physics, 44(11), pp.5584-5595.

## CONTACT

UCLA Technology Development Group  
[ncd@tdg.ucla.edu](mailto:ncd@tdg.ucla.edu)  
tel: 310.794.0558.



## INVENTORS

- ▶ Hsieh, Scott

## OTHER INFORMATION

### KEYWORDS

radiation therapy, imaging, tomosynthesis, x-ray, real-time, contrast

### CATEGORIZED AS

- ▶ **Imaging**
  - ▶ Medical
- ▶ **Medical**
  - ▶ Devices
  - ▶ Imaging

### RELATED CASES

2017-699-0

UCLA Technology Development Group

10889 Wilshire Blvd., Suite 920, Los Angeles, CA 90095

<https://tdg.ucla.edu>

Tel: 310.794.0558 | Fax: 310.794.0638 | [ncd@tdg.ucla.edu](mailto:ncd@tdg.ucla.edu)

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