

4D-Lung

Summary

This data collection consists of images acquired during chemoradiotherapy of 20 locally-advanced, non-small cell lung cancer patients. The images include four-dimensional (4D) fan beam (4D-FBCT) and 4D cone beam CT (4D-CBCT). All patients underwent concurrent radiochemotherapy to a total dose of 64.8-70 Gy using daily 1.8 or 2 Gy fractions.

4D-FBCT images were acquired on a 16-slice helical CT scanner (Brilliance Big Bore, Philips Medical Systems, Andover, MA) as respiration-correlated CTs with 10 breathing phases (0 to 90%, phase-based binning) and 3 mm slice thickness. 4D-FBCT images were acquired during simulation, prior to therapy, and used for therapy planning. In 14 of the 20 subjects, 4D-FBCTs were also acquired on the same scanner weekly during therapy. 4D-CBCT images were acquired on a commercial CBCT scanner (On-Board Imager™, Varian Medical Systems, Inc.). An external surrogate (Real-time Position Management, Varian Medical Systems, Inc.) was integrated into the CBCT acquisition system to stamp each CBCT projection with the surrogate respiratory signal through in-house software and hardware tools. Approximately 2500 projections were acquired over a period of 8-10 minutes in half-fan mode with half bow-tie filter. The technique was 125 kVp, 20 mA, and 20 ms in a single 360° slow gantry arc. Using the external surrogate, the CBCT projections were sorted into 10 breathing phases (0 to 90%, phase-based binning) and reconstructed with an in-house FDK reconstruction algorithm.

Audio-visual biofeedback was performed for all 4D-FBCT and 4D-CBCT acquisitions in all subjects. A single Radiation Oncologist delineated targets and organs at risk in all 4D-FBCT and a limited number of 4D-CBCT images, on all 10 phases per scan. Seven of the subjects had gold coils implanted as fiducial markers in or near the tumor.



For questions and information regarding this dataset, please [contact the TCIA Helpdesk](#).

Data collection and analysis was supported by NIH P01CA116602.

Data Access

Data Access

Click the **Download** button to save a ".tcia" manifest file to your computer, which you must open with the [NBIA Data Retriever](#). Click the **Search** button to open our Data Portal, where you can browse the data collection and/or download a subset of its contents.

Data Type	Download all or Query/Filter
Images and Radiation Therapy Structures (DICOM, 183GB)	 

Click the Versions tab for more info about data releases.

Detailed Description

Detailed Description

Collection Statistics	
Modalities	CT, RTSTRUCT
Number of Participants	20
Number of Studies	589
Number of Series	6,690
Number of Images	347,330

Image Size (GB)	183
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Supporting Documentation

The dataset is most fully described in detail in Balik et al.¹ Seven of the subjects had gold coils implanted as fiducial markers in or near the tumor. The implantation procedure and details of marker location are described in detail in Roman et al.²

i References

¹ S. Balik et al., “Evaluation of 4-Dimensional Computed Tomography to 4-Dimensional Cone-Beam Computed Tomography Deformable Image Registration for Lung Cancer Adaptive Radiation Therapy.” *Int. J. Radiat. Oncol. Biol. Phys.* **86**, 372–9 (2013) PMID: PMC3647023.

² N.O. Roman, W. Shepherd, N. Mukhopadhyay, G.D. Hugo, and E. Weiss, “Interfractional Positional Variability of Fiducial Markers and Primary Tumors in Locally Advanced Non-Small-Cell Lung Cancer during Audiovisual Biofeedback Radiotherapy.” *Int. J. Radiat. Oncol. Biol. Phys.* **83**, 1566–72 (2012).

Citations & Data Usage Policy

Citations & Data Usage Policy

Users of this data must abide by the [TCIA Data Usage Policy](#) and the [Creative Commons Attribution 3.0 Unported License](#) under which it has been published. Attribution should include references to the following citations:

i Data Citation

Hugo, Geoffrey D., Weiss, Elisabeth, Sleeman, William C., Balik, Salim, Keall, Paul J., Lu, Jun, & Williamson, Jeffrey F. (2016). Data from 4D Lung Imaging of NSCLC Patients. The Cancer Imaging Archive. <http://doi.org/10.7937/K9/TCIA.2016.ELN8YGLE>

i Publication Citation

Hugo, G. D., Weiss, E., Sleeman, W. C., Balik, S., Keall, P. J., Lu, J. and Williamson, J. F. (2017), A longitudinal four-dimensional computed tomography and cone beam computed tomography dataset for image-guided radiation therapy research in lung cancer. *Med. Phys.*, 44: 762–771. doi:[10.1002/mp.12059](https://doi.org/10.1002/mp.12059)

i Publication Citation

S. Balik et al., “Evaluation of 4-Dimensional Computed Tomography to 4-Dimensional Cone-Beam Computed Tomography Deformable Image Registration for Lung Cancer Adaptive Radiation Therapy.” *Int. J. Radiat. Oncol. Biol. Phys.* **86**, 372–9 (2013) PMID: [PMC3647023](https://pubmed.ncbi.nlm.nih.gov/23888888/).

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TCIA Citation

Clark K, Vendt B, Smith K, Freymann J, Kirby J, Koppel P, Moore S, Phillips S, Maffitt D, Pringle M, Tarbox L, Prior F. **The Cancer Imaging Archive (TCIA): Maintaining and Operating a Public Information Repository**, Journal of Digital Imaging, Volume 26, Number 6, December, 2013, pp 1045-1057. DOI: [10.1007/s10278-013-9622-7](https://doi.org/10.1007/s10278-013-9622-7)



Other Publications Using This Data

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Versions

Version 2 (Current): Updated 2016/10/19 .

Any download of this dataset prior to October 18 2016 contains data that was updated after that date by the investigators. It is recommended that you download a fresh copy before applying your analysis.

Data Type	Download all or Query/Filter
Images (DICOM, 183GB)	<div style="display: flex; gap: 10px;">   </div> <p>(Download requires the NBIA Data Retriever .)</p>

Version 1 : 2015/09/14

Data Type	Download all or Query/Filter
Images (DICOM, 183GB)	<div style="text-align: center;">  </div> <p>(Download requires the NBIA Data Retriever .)</p>