

# **Fused Radiology-Pathology Prostate Dataset (Prostate Fused-MRI-Pathology)**

# Summary

## Redirection Notice

This page will redirect to <https://www.cancerimagingarchive.net/collection/prostate-fused-mri-pathology/> in about 5 seconds.

This collection comprises a total of 28 3 Tesla T1-weighted, T2-weighted, Diffusion weighted and Dynamic Contrast Enhanced prostate MRI along with accompanying digitized histopathology (H&E stained) images of corresponding radical prostatectomy specimens. The MRI scans also have a mapping of extent of prostate cancer on them [10.1002/jmri.24975]. Each surgically excised prostate specimen was originally sectioned and quartered resulting in 4 slides for each section. Each of these individual slides was digitized at 20x magnification using an Aperio slide scanner resulting in a set of 4 .svs images. Each of the 4 .svs images were then digitally stitched together to constitute a pseudo-whole mount section (.tiff) using the program in [PMCID: PMC4023035]. Annotations of cancer presence on the pseudo-whole mount sections were made by an expert pathologist. Slice correspondences were established between the individual T2w MRI and stitched pseudo-whole mount sections by the program in [10.1016/j.compmedimag.2010.12.003] and checked for accuracy by an expert pathologist and radiologist. Deformable co-registration [PMC3078156] was employed to spatially co-registered the corresponding radiologic and histopathologic tissue sections to map disease extent onto the corresponding MRI scans.

## Acknowledgement

- Data collection and analysis was provided by Anant Madabhushi, PhD, Case Western Reserve University and Michael D. Feldman, MD, PhD, Hospital at the University of Pennsylvania.
- This work was supported by NIH R01CA136535.

### Data Access

#### Data Access

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|--------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| Images (DICOM, 4.4 GB)                                                   | <a href="#">Download</a> <a href="#">Search</a><br>(Download requires the <a href="#">NBIA Data Retriever</a> )                                                       | CC BY 3.0 |
| Annotated Whole Slide Pathology Images & Annotations (Tiff, XML 76.8 GB) | <a href="#">Download</a> <a href="#">Search</a><br>(Download and apply the <a href="#">IBM-Aspera-Connect plugin</a> to your browser to retrieve this faspex package) | CC BY 3.0 |
| Fused Rad-Path Matlab Files (zip, 65 kB)                                 | <a href="#">Download</a>                                                                                                                                              | CC BY 3.0 |
| Correspondence tables (XLSX, 22 kB)                                      | <a href="#">Download</a>                                                                                                                                              | CC BY 3.0 |

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## Additional Resources for this Dataset

The NCI Cancer Research Data Commons (CRDC) provides access to additional data and a cloud-based data science infrastructure that connects data sets with analytics tools to allow users to share, integrate, analyze, and visualize cancer research data.

- [Imaging Data Commons \(IDC\)](#) (Imaging Data)

### Detailed Description

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| Collection Statistics  | Radiology Image Statistics | Pathology Image Statistics |
|------------------------|----------------------------|----------------------------|
| Modalities             | MRI                        | Pathology, Matlab          |
| Number of Participants | 28                         | 16                         |
| Number of Studies      | 28                         | N/A                        |
| Number of Series       | 324                        | N/A                        |
| Number of Images       | 32,508                     | 114                        |
| Image Size (GB)        | 4.4                        | 76.8                       |

## Supporting Documentation

The data set is fully described in the following publications:

1. Singanamalli, A. , Rusu, M. , Sparks, R. E., Shih, N. N., Ziober, A. , Wang, L. , Tomaszewski, J. , Rosen, M. , Feldman, M. and Madabhushi, A. (2016), **Identifying in vivo DCE MRI markers associated with microvessel architecture and gleason grades of prostate cancer.** J. Magn. Reson. Imaging, 43: 149-158. doi: <https://doi.org/10.1002/jmri.24975> (PMID:26110513).
2. Toth, R, Feldman, M, Yu, D, Tomaszewski, J, Madabhushi, A, **“Histostitcher™: An Informatics Software Platform for Reconstructing Whole-Mount Prostate Histology using the Extensible Imaging Platform (XIP™) Framework,”** Journal of Pathology Informatics, vol. 5, pg. 8, 2014 (PMID: 24843820, PMCID: PMC4023035). <https://doi.org/10.4103/2153-3539.129441>
3. Xiao, G, Bloch, N, Chappelow, J, Genega, E, Rofsky, N, Lenkinsky, R, Tomaszewski, J, Feldman, M, Rosen, M, Madabhushi, A, **“Determining Histology-MRI Slice Correspondences for Defining MRI-based Disease Signatures of Prostate Cancer,”** Special Issue of Computerized Medical Imaging and Graphics on Whole Slide Microscopic Image Processing, vol. 35[7-8], pp. 568-78, 2011 (PMID: 21255974). <https://doi.org/10.1016/j.compmedimag.2010.12.003>
4. Chappelow, J, Bloch, N., Rofsky, N, Genega, E, Lenkinski, R, DeWolf, W, Madabhushi, A, **“Elastic Registration of Multimodal Prostate MRI and Histology via Multi-Attribute Combined Mutual Information,”** Medical Physics, vol. 38[4], pp. 2005-2018, 2011 (PMID: 21626933). <https://doi.org/10.1118/1.3560879>

### Citations & Data Usage Policy

### Citations & Data Usage Policy

Users must abide by the [TCIA Data Usage Policy and Restrictions](#). Attribution should include references to the following citations:

**i Data Citation**

Madabhushi, A., & Feldman, M. (2016). **Fused Radiology-Pathology Prostate Dataset (Prostate Fused-MRI-Pathology)**. The Cancer Imaging Archive. doi; [10.7937/k9/TCIA.2016.tpmr1am](https://doi.org/10.7937/k9/TCIA.2016.tpmr1am)

**i Publication Citation**

Singanamalli, A. , Rusu, M. , Sparks, R. E., Shih, N. N., Ziober, A. , Wang, L. , Tomaszewski, J. , Rosen, M. , Feldman, M. and Madabhushi, A. (2016), **Identifying in vivo DCE MRI markers associated with microvessel architecture and gleason grades of prostate cancer**. J. Magn. Reson. Imaging, 43: 149-158. doi: [10.1002/jmri.24975](https://doi.org/10.1002/jmri.24975) (PMID:26110513).

**i Publication Citation**

Toth, R, Feldman, M, Yu, D, Tomaszewski, J, Madabhushi, A, “**Histostitcher™: An Informatics Software Platform for Reconstructing Whole-Mount Prostate Histology using the Extensible Imaging Platform (XIP™) Framework**,” *Journal of Pathology Informatics*, vol. 5, pg. 8, 2014 (PMID: 24843820, PMCID: PMC4023035). <https://doi.org/10.4103/2153-3539.129441>

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**i 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: <https://doi.org/10.1007/s10278-013-9622-7>

## Other Publications Using This Data

TCIA maintains [a list of publications](#) which leverage our data. If you have a publication you'd like to add, please [contact TCIA's Helpdesk](#).

1. Brunese, L., Mercaldo, F., Reginelli, A., & Santone, A. (2020). Formal methods for prostate cancer gleason score and treatment prediction using radiomic biomarkers. Magnetic resonance imaging, 66, 165-175. doi:<https://doi.org/10.1016/j.mri.2019.08.030>
2. Chatzoudis, P. (2018). MRI prostate cancer radiomics: Assessment of effectiveness and perspectives. (Master of Biomedical Engineering). Delft University of Technology, Delft, Netherlands. Retrieved from <http://resolver.tudelft.nl/uuid:b8459bdb-1761-4f17-8807-e3b1cf7da629>
3. Duran, A., Dussert, G., Rouviere, O., Jaouen, T., Jodoin, P. M., & Lartizien, C. (2022). ProstAttention-Net: A deep attention model for prostate cancer segmentation by aggressiveness in MRI scans. Medical image analysis, 77, 102347. doi:<https://doi.org/10.1016/j.media.2021.102347>

### Versions

#### Version 2 (Current): Updated 2023/04/10

| Data Type                                                                | Download all or Query/Filter                                                                                                                                       | License   |
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| Annotated Whole Slide Pathology Images & Annotations (Tiff, XML 76.8 GB) | <a href="#">Download</a> <a href="#">Search</a> (Download and apply the <a href="#">IBM-Aspera-Connect plugin</a> to your browser to retrieve this faspex package) | CC BY 3.0 |
| Fused Rad-Path Matlab Files                                              | <a href="#">Download</a>                                                                                                                                           | CC BY 3.0 |
| Correspondence tables (XLSX)                                             | <a href="#">Download</a>                                                                                                                                           | CC BY 3.0 |

Added a correspondence xlsx between MR and Pathology slides, imaging data are unchanged.

#### Version 1: Updated 2016/11/30

| Data Type                                                                | Download all or Query/Filter                                                                                                                                          |
|--------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Images (DICOM, 4.4 GB)                                                   | <a href="#">Download</a> <a href="#">Search</a><br>(Download requires the <a href="#">NBIA Data Retriever</a> )                                                       |
| Annotated Whole Slide Pathology Images & Annotations (Tiff, XML 76.8 GB) | <a href="#">Download</a> <a href="#">Search</a><br>(Download and apply the <a href="#">IBM-Aspera-Connect plugin</a> to your browser to retrieve this faspex package) |
| Fused Rad-Path MATLAB Files                                              | <a href="#">Download</a>                                                                                                                                              |

