Variations of dynamic contrast-enhanced magnetic resonance imaging in evaluation of breast cancer therapy response: a multicenter data analysis challenge (QIN Breast DCE-MRI)

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Summary

This collection of breast dynamic contrast-enhanced (DCE) MRI data contains images from a longitudinal study to assess breast cancer response to neoadjuvant chemotherapy. Images were acquired at four time points: prior to the start of treatment (Visit 1, V1), after the first cycle of treatment (Visit 2, V2), at midpoint of treatment course (Visit 3, V3), and after completion of treatment (prior to surgery) (Visit 4, V4). The value of this collection is to provide clinical imaging data for the development and validation of quantitative imaging methods for assessment of breast cancer response to treatment. Data is provided by Oregon Health & Science University, PI Dr. Wei Huang.

The MRI data consist of DCE-MRI images, which were acquired using a Siemens 3T TIM Trio system with the body coil and a four-channel bilateral phased-array breast coil as the transmitter and receiver, respectively. Following pilot scans and pre-contrast T_2-weighted MRI with fat-saturation and T_1-weighted MRI without fat-saturation, axial bilateral DCE-MRI images with fat-saturation and full breast coverage were acquired with a 3D gradient echo-based TWIST (Time-resolved angiography WIth Stochastic Trajectories) sequence, which employs the strategy of k-space undersampling during acquisition and data sharing during reconstruction. DCE-MRI acquisition parameters included 10^o flip angle, 2.9/6.2 ms TE/TR, a parallel imaging acceleration factor of two, 30-34 cm FOV, 320x320 in-plane matrix size, and 1.4 mm slice thickness. The total acquisition time was ~10 minutes for 32-34 image volume sets of 112-120 slices each with 18-20 s temporal resolution. The contrast agent Gd(HP-DO3A) [ProHance] IV injection (0.1 mmol/kg at 2 mL/s) by a programmable power injector was timed to commence after acquisition of two baseline image volumes, followed by a 20-mL saline flush.

A total of 20 data sets from this collection have been used for a multi-QIN center challenge, in which each participating site performed pharmacokinetic analysis of the breast DCE-MRI data using software tools/algorithms available to them. The shared data sets are from the V1 and V2 studies of 10 patients (BreastChemo 1, 5, 6, 8, 10, 12, 13, 14, 15, and 16) – 3 pathologic complete responders (pCRs) and 7 non-pCRs. The goal of the challenge was to evaluate variations in DCE-MRI assessment of breast cancer response to neoadjuvant chemotherapy caused by differences in software tools /algorithms only.

About the NCI QIN

The mission of the QIN is to improve the role of quantitative imaging for clinical decision making in oncology by developing and validating data acquisition, analysis methods, and tools to tailor treatment for individual patients and predict or monitor the response to drug or radiation therapy. More information is available on the Quantitative Imaging Network Collections page. Interested investigators can apply to the QIN at: Quantitative Imaging for Evaluation of Responses to Cancer Therapies (U01) PAR-11-150.

Data Access

Data Access

Data Type	Download all or Query/Filter	License
Images (DICOM + NIFTI, 15.8GB)	*Download* *Search* (Download requires the NBIA Data Retriever)	CC BY 3.0
Images (20 files, modality KO, datatype Matlab + DICOM, 8.4GB)	*Download* *Search*	CC BY 3.0
Pathological Response (XLS, 10 kB)	*Download*	CC BY 3.0

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Population-averaged AIF timecourse (XLSX, 24 kB)	*Download*	CC BY 3.0

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

Detailed Description

Collection Statistics	
Modalities	MR, KO
Number of Participants	10
Number of Studies	20
Number of Series	672
Number of Images	76,328
Image Size (GB)	49.5

Matlab and NIFTI Data

As part of the multi-QIN center challenge additional files were created to help facilitate participation. There are essentially two versions of the data available. These files are available inside of TCIA alongside the DICOM data.

1. Matlab - contains all relevant information including the raw image data, DICOM header info, and all other relevant parameters necessary to analyze the data for the challenge. There is no need to download the raw DICOM data if you prefer this format.
2. DICOM + NIFTI - useful if you'd prefer to work in 3D Slicer or some other application which supports DICOM and NIFTI formats

Clinical Data

Pathologic response status for the patients:

- Complete response
  - QIN-Breast-DCE-MRI-BC05
  - QIN-Breast-DCE-MRI-BC06
  - QIN-Breast-DCE-MRI-BC15
- Non-complete response
  - QIN-Breast-DCE-MRI-BC01
  - QIN-Breast-DCE-MRI-BC08

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- QIN-Breast-DCE-MRI-BC10
- QIN-Breast-DCE-MRI-BC12
- QIN-Breast-DCE-MRI-BC13
- QIN-Breast-DCE-MRI-BC14
- QIN-Breast-DCE-MRI-BC16

For inquiries on AIF (Arterial Input Function) used for pharmacokinetic analysis of the breast DCE-MRI data, users are encouraged to start here:

- QIN+Breast+DCE-MRI_AIF.xlsx

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:

Data Citation

Huang, W., Tudorica, A., Chui, S., Kemmer, K., Naik, A., Troxell, M., Oh, K., Roy, N., Afzal, A., & Holtorf, M. (2014). **Variations of dynamic contrast-enhanced magnetic resonance imaging in evaluation of breast cancer therapy response: a multicenter data analysis challenge (QIN Breast DCE-MRI) (Version 2) [Data set]**. The Cancer Imaging Archive. https://doi.org/10.7937/k9/tcia.2014.a2n1ixox

Publication Citation

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TCIA Citation

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Other Publications Using This Data

TCIA maintains a list of publications which leverage our data. If you have a manuscript you'd like to add, please contact TCIA's Helpdesk.

Versions

Version 2 (Current): Updated 2019/04/18

Data Type	Download all or Query/Filter
Images (DICOM + NIFTI, 15.8GB)	*Download* *Search* (Download requires the NBIA Data Retriever)
Images (Matlab, 8.4GB)	*Download* *Search* (Download requires the NBIA Data Retriever)
Population-averaged AIF timecourse (XLSX)	*Download*

Added AIF Spreadsheet at the request of the PI

Version 1 : Updated 2014/07/02

Data Type	Download all or Query/Filter
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Images (Matlab, 8.4GB)	*Download* (Download requires the NBIA Data Retriever)
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