



# QIN Breast DCE-MRI

## 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  $10^\circ$  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

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 (DICOM + NIFTI, 15.8GB)	 
Images (Matlab, 8.4GB)	 
Pathological Response (XLS)	
Population-averaged AIF timecourse (XLS X)	

Click the Versions tab for more info about data releases.

### 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
  - 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](#)

contact [help@cancerimagingarchive.net](mailto:help@cancerimagingarchive.net) who can direct you to Dr. Huang with further scientific questions.

### 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:

### Data Citation

Huang, Wei, Tudorica, Alina, Chui, Stephen, Kemmer, Kathleen, Naik, Arpana, Troxell, Megan, Oh, Karen, Roy, Nicole, Afzal, Aneela, Holtorf, Megan. (2014). Variations of dynamic contrast-enhanced magnetic resonance imaging in evaluation of breast cancer therapy response: a multicenter data analysis challenge. The Cancer Imaging Archive. <https://doi.org/10.7937/k9/tcia.2014.a2n1ixox>

### Publication Citation

Huang W, Li X, Chen Y, Li X, Chang MC, Oborski MJ, Malyarenko DI, Muzi M, Jajamovich GH, Fedorov A, Tudorica A, Gupta SN, Laymon CM, Marro KI, Dyvorne HA, Miller JV, Barbodiak DP, Chenevert TL, Yankeelov TE, Mountz JM, Kinahan PE, Kikinis R, Taouli B, Fennessy F, Kalpathy-Cramer J. Variations of dynamic contrast-enhanced magnetic resonance imaging in evaluation of breast cancer therapy response: a multicenter data analysis challenge. *Trans Oncol* 2014;7:153-166. PubMed PMID: 24772219; PubMed Central PMCID: PMC3998693. <https://dx.doi.org/10.1593/tlo.13838>

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

## Other Publications Using This Data

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

### Versions





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

Data Type	Download all or Query/Filter
Images (DICOM + NIFTI, 15.8GB)	 
Images (Matlab, 8.4GB)	 
Population-averaged AIF timecourse (XLS X)	

Added AIF Spreadsheet at the request of the PI

#### Version 1 : Updated 2014/07/02

Downloads require the [NBIA Data Retriever](#) .

Data Type	Download all or Query/Filter
Images (DICOM + NIFTI, 15.8 GB)	 
Images (Matlab, 8.4 GB)	 
Pathological Response (XLS)	<a href="#">Variations of dynamic contrast-enhanced magnetic resonance imaging in evaluation of breast cancer therapy response: a multicenter data analysis challenge</a>