

RIDER Collections

Summary

The Reference Image Database to Evaluate Therapy Response (RIDER) is a targeted data collection used to generate an initial consensus on how to harmonize data collection and analysis for quantitative imaging methods applied to measure the response to drug or radiation therapy.

The long term goal is to provide a resource to permit harmonized methods for data collection and analysis across different commercial imaging platforms to support multi-site clinical trials, using imaging as a biomarker for therapy response. Thus, the database should permit an objective comparison of methods for data collection and analysis as a national and international resource as described in the first RIDER white paper report (2006):

- [RIDER White Paper: Executive Summary PDF](#)
- [RIDER White Paper: Editorial in Nature.com](#)

All the image data are DICOM compliant. The data collection has two phases as described below, which have resulted in several distinct image Collections.

RIDER Contracts (2007-Beyond)

The National Cancer Institute (NCI) has exercised a series of contracts with specific academic sites for collection of repeat "coffee break," longitudinal phantom, and patient data for a range of imaging modalities (currently computed tomography [CT] positron emission tomography [PET] CT, dynamic contrast-enhanced magnetic resonance imaging [DCE MRI], diffusion-weighted [DW] MRI) and organ sites (currently lung, breast, and neuro). The goals are as follows:

1. Develop a consensus on requirements for quantity assurance methods on longitudinal studies using phantom data as applied to each modality above.
2. Develop a consensus on the stability of imaging platforms using repeat and longitudinal phantom measurements over the time period that therapy would be exercised.
3. Develop a consensus on methods to measure the minimum change that can be measured using repeat and longitudinal patient or volunteer studies.
4. Provide access to results of measurements performed on these databases by each academic site to encourage a comparison on methodologies.
5. Provide consensus-based juried publications to encourage a broad acceptance of the methods described above.
6. Provide a resource for NCI research networks that address quantitative imaging such as the Quantitative Imaging Network (QIN): <http://grants.nih.gov/grants/guide/pa-files/PAR-11.150.html>.

The databases are being provided within an 18-month time frame from the time the contract was initiated, and the results are published within less than 2 years. The methods for data collection, analysis, and results are described in the new Combined RIDER White Paper Report (Sept 2008):

- [RIDER White Paper: Combined contracts report \(Sept 2008\) PDF](#)

The RIDER project will be replaced when the QIN initiative is fully implemented. This research network will create database resources collected from phase 1-3 clinical trials, where clinical outcomes will be included in the metadata: <http://grants.nih.gov/grants/guide/pa-files/PAR-11-150.html>.

ACADEMIC SITE COLLECTIONS: Focus on Methods for Data Analysis

RIDER Lung CT: MSKCC

- Repeat CT Measurements: Human subjects: Lung.
- Download the related lesion notes: [MSKCC RepeatCT Lesion notes for RIDER.xls](#).
- Download the related publication: [Evaluating Variability in Tumor Measurements from Same-day Repeat CT Scans of Patients with Non-Small Cell Lung Cancer, 2009](#).
- **2012-10-18 Update:** It was brought to our attention that the RIDER-8509201188 patient contained 2 identical image series rather than the correct secondary/repeat series. The duplicate series has been removed (UID: 1.3.6.1.4.1.9328.50.1.64033480205396366773922006817138551096), but we are unable to obtain the correct series at this point.

Lung CT Statistics	Updated 11/14/2013
Modalities	CT

Number of Participants	32
Number of Studies	46
Number of Series	63
Number of Images	15,419
Images Size (GB)	7.55

RIDER Phantom PET-CT: UNIVERSITY OF WASHINGTON

- Repeat measurements: PET/CT phantoms.
- Consists of repeat measurement PET/CT phantom scan collections carried out under the aegis of the Society of Nuclear Medicine (SNM) to discern the uniformity of clinical imaging instrumentation at various sites. They were obtained in cooperation with SNM as a resource for increased quantitative understanding of machine acquisition, analytic reproducibility and image processing.
- **2015-01-26 Update:** Additional annotation data about this collection can be viewed in the following document: [Ge68Phantom_2015.doc](#).

Phantom PET-CT Collection Statistics	
Modalities	CT, PT
Number of Participants	20
Number of Studies	20
Number of Series	60
Number of Images	2,231
Images Size (MB)	689

RIDER Lung PET-CT: UNIVERSITY OF WASHINGTON

- Longitudinal PET/CT human studies: Lung.
- **2012-02-22 Update:** It was brought to our attention that RIDER-1817358092 and RIDER-2617411955 appeared to be the same patient. We have gone back to University of Washington and confirmed this is to be true. For now, we will leave both patients in place but plan to eventually delete RIDER-1817358092. RIDER-2617411955 contains some additional series not found in the other patient ID and is what we would advise users to utilize in their research.

Lung PET CT Statistics	Updated 11/14/2013
Modalities	CT, PT
Number of Participants	244
Number of Studies	275
Number of Series	1349

Number of Images	269,511
Images Size (GB)	78.7

RIDER NEURO MRI: DUKE UNIVERSITY

- Repeat human subject studies: Neuro,
- Dynamic Contrast Enhanced studies: DCE MRI.
- Diffusion weighted imaging: DWI MR.
- Diffusion tensor imaging: diffusion tensor (DT) MRI.

Neuro MRI Statistics	
Modalities	MR
Number of Participants	19
Number of Studies	108
Number of Series	368
Number of Images	70,220
Images Size (GB)	7.3

RIDER Breast MRI: UNIVERSITY OF MICHIGAN

- Repeat measurements: Human subjects: Breast.
- DCE MRI.
- [ISMRM 2009 poster](#) demonstrates how each of the "coffee break" exams were used as an estimate of each patient's null hypothesis, i.e. distribution associated with no change, and thus supports the estimate of the nulls 97.5 percentile for subsequent estimation of early response to neoadjuvant chemotherapy on an individual patient basis.

Breast MRI Statistics	Updated 2011/11/08
Modalities	MR
Number of Participants	5
Number of Studies	10
Number of Series	40
Number of Images	1500

RIDER PHANTOM MRI: MDACC

- Repeat measurement: Phantom studies.
- DCE MRI.
- [RIDER_MR_Phantom_Data_Summary.pdf](#) provides a summary of the images in this collection.

- [RIDER_PhantomMR_Key.pdf](#) provides a key for understanding their presentation in NBIA.

Phantom MRI Statistics	
Modalities	MR
Number of Participants	10
Number of Studies	13
Number of Series	45
Number of Images	7,061
Images Size (GB)	3.4

ACADEMIC SITE COLLECTIONS: Focus on harmonized methods for data collection

MULTI SITE STUDY (Total of 20 sites): Organized under a contract with the University of Michigan

- Repeat measurements.
- DWI
- Phantom measurements.
- Human subjects.
- White Paper: <http://www.neoplasia.com/pdf/manuscript/v11i02/neo081328.pdf>.

SOCIETY DATA COLLECTIONS

RSNA QIBA AND NCI (RIDER and IRAT)

- Multi Site DCE MRI phantom studies using a modified ADNI phantom (<http://www.loni.ucla.edu/ADNI/>)
- <http://www.rsna.org/QIBA/>

OTHER FEDERAL AGENCIES

FDA CDRH: Partly funded by NCI and NIBIB

- [Phantom FDA](#)

NIST

- The National Institute of Standard and Technology has NCI National Biological Imaging Archive data and data from other data sources.
- See Biochange 2008.
- <http://www.itl.nist.gov/iad/894.05/biochange2008/Biochange2008-webpage.htm>

RIDER Pilot (2005-2007)

This data collection was originally supported under supplemental funding for the Lung Image Database Consortium (LIDC) U01 project and focused on the collection of longitudinal studies using X-ray CT for monitoring the response to therapy. The data came primarily from the M.D. Anderson Cancer Center and several of the LIDC academic sites. The data is not annotated and is not hosted in The Cancer Imaging Archive but can be downloaded from the [NBIA](#).

Pilot Statistics	
Modalities	CT, DX
Number of Participants	322
Number of Studies	1,779
Number of Series	4,930
Number of Images	384,535