Dear Colleagues,

The AAPM Grand Challenge Data Repository has been updated to include the data that Mayo Clinic shared with participants in the **2016 Low-dose CT AAPM Grand Challenge** (McCollough, Cynthia H., et al. "Low-dose CT for the detection and classification of metastatic liver lesions: results of the 2016 low dose CT grand challenge." *Medical physics* 44.10 (2017): e339-e352). This is in response to continued requests for access to these data.

The dataset includes 30 contrast-enhanced abdominal CT patient scans, each acquired in the portal venous phase using a Siemens SOMATOM Flash scanner. The data are deindentified and the case ID's (Lxxx) are the same as were used in the Grand Challenge and subsequent publications. Data acquired at 120 kV and 200 quality reference mAs (QRM) are referred to as Full Dose (FD) data, and simulated data corresponding to 120 kV and 50 QRM are referred to as Quarter Dose Dose (QD) data. The provided data include:

1. Projection data for all 30 patient scans
    a. Training cases (10 cases, FD and QD)
    b. Testing cases (20 cases, **QD only)**

2. DICOM images for the 10 training cases: FD AND QD
    a. 1 mm thick, B30 reconstruction kernel
    b. 1 mm thick, D45 reconstruction kernel
    c. 3 mm thick, B30 reconstruction kernel
    d. 3 mm thick, D45 reconstruction kernel

3. DICOM images for the 20 testing cases: **QD ONLY**
    a. 1 mm thick, B30 reconstruction kernel
    b. 1 mm thick, D45 reconstruction kernel
    c. 3 mm thick, B30 reconstruction kernel
    d. 3 mm thick, D45 reconstruction kernel

4. Scans of the American College of Radiology's CT Accreditation Phantom
    a. Projection data acquired at 120 kV and 200 effective mAs (FD). No tube current modulation was used.
    b. Projection data acquired at 120 kV and 50 effective mAs (QD). No tube current modulation was used. *For the phantom data only, the 50 effective mAs are not simulated*.
    c. DICOM images for FD and QD using:
        i. 1 mm thick, B30 reconstruction kernel
        ii. 1 mm thick, D45 reconstruction kernel
        iii. 3 mm thick, B30 reconstruction kernel
        iv. 3 mm thick, D45 reconstruction kernel

An additional collection of 50 abdominal CT scans can be found on The Cancer Imaging Archive at https://www.cancerimagingarchive.net/ in a data collection called LDCT-and-Projection-data. Thirteen of these cases were used as Grand Challenge testing cases. However, the TCIA case numbers (Lxxx) are different than the case numbers used in the Grand Challenge. The mapping of the case numbers for these 13 cases is provided below:

TCIA case ID	Grand Challenge case ID
L014	L008
L145	L136
L187	L631
L123	L548
L186	L433
L056	L593
L219	L072

TCIA case ID	Grand Challenge case ID
L075	L541
L241	L061
L209	L254
L266	L123
L277	L106
L058	L057

The **2016 Low Dose CT Grand Challenge** projection data in the AAPM Grand Challenge Date Repository are identical to the data shared in the 2016 Low Dose CT Grand Challenge, with the following exceptions:

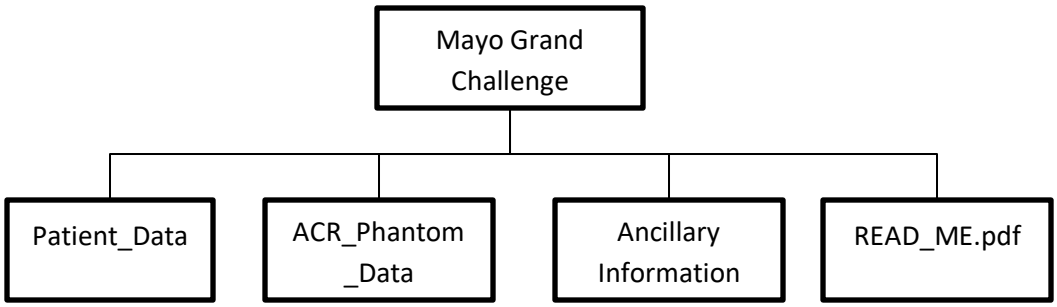
1. The format of the DICOM-CT-PD projection data has been updated to match the format used for the data on TCIA. The dictionary file that describes the DICOM tags has been modified accordingly and is available in the Ancillary Information folder.

2. Data in DICOM tag (7033,1065) called "PhotonStatistics", which describe the incident x-ray beam profile for each projection after passing through the bowtie filter, have been corrected by a factor of 1000 to match the methods described in Yu, et al. 2012 (J Comput Assist Tomogr. Jul-Aug 2012;36(4):477-87. doi: 10.1097/RCT.0b013e318258e891). The values given in the AAPM Data Repository are a factor of 1000 greater than in the corresponding DICOM tag in the files shared with the Grand Challenge participants. Since these data are typically used as statistical weighting factors to reflect the statistical uncertainty in an individual ray sum relative to each other, this factor of 1000 should not affect most statistical reconstruction approaches.

3. The clinical data describing the liver lesions, their locations, and diagnosis, and a hyperlinked image of each lesion, are provided in a spreadsheet similar to the one given on the TCIA website.

Data Organization

The Mayo Grand Challenge Repository contains this READ_ME file and three folders (Patient Data, ACR Phantom Data, and Ancillary Information).



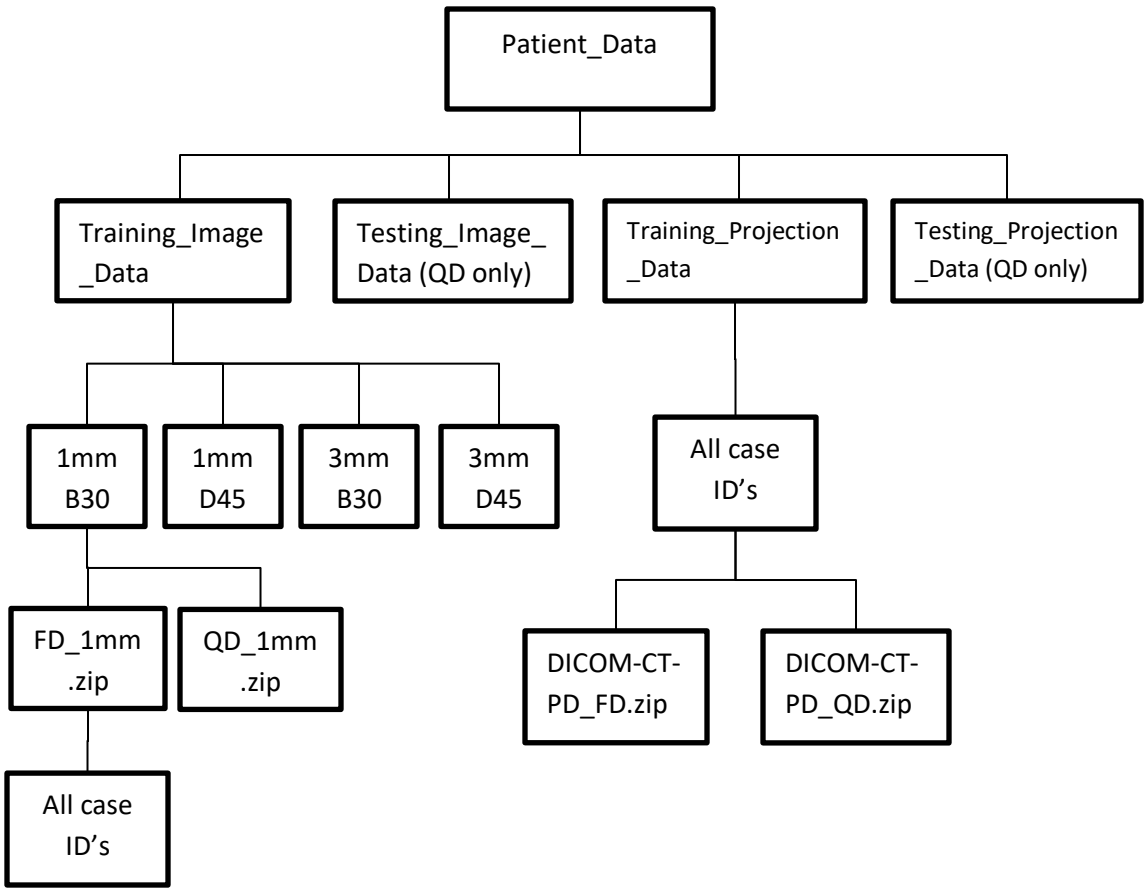
The Ancillary Information folder contains a folder called "DICOM-CT-PD_Information," which contains the DICOM-CT-PD user manual, dictionary file, and Matlab reader script. There is also a "Lesion_Information" folder that contains the clinical data spreadsheets and hyperlinked .tiff files for each reference lesion. The training and testing files are located in separate .zip files. To preserve the hyperlinks, download the .zip files and extract them to the local drive and keep the .tiff files and spreadsheet in the same folder.

The patient training and testing data are divided into image data and projection data folders (*see diagram on next page*).

For either the training or testing data, **image data** are placed into four different folders according to the four different reconstruction parameters combinations. Under each parameter configuration folder, there is a .zip file for each dose level. Opening either the FD or QD .zip file will allow the user to access the image files for each case ID.

For either the training or testing patient data, the **projection data** folder contains one folder for each patient ID. The folder for each patient ID is further divided into two separate folders, one folder containing a .zip file for the FD projection data and one containing a .zip file for the QD projection data.

The structure of the training and testing data folders are the same, with the exception that only QD data are provided for the testing data, just as was the case for the Grand Challenge participants. The ACR phantom data folder organization mirrors that of the patient data folders.



Please note that reconstruction or other software codes are not provided by the Mayo Clinic CT CIC. A number of reconstruction software tools are available online. In particular, FreeCT (http://cvib.ucla.edu/freect/index.html) takes into account the flying focal spot used in these projection datasets.

Questions regarding the datasets themselves should be directed to the CT Clinical Innovation Center (CT CIC) at the Mayo Clinic (CTCIC@mayo.edu).