Chest CT Scanning, Data Transmission & Data Retrieval

Lung Imaging Core
Data Coordinating Center
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Lung Imaging Core

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CT Protocol Options

- Routine contrast enhanced CT
- CT pulmonary angiogram (CTPA)
  Group 4 (CTEPH)
- Non contrast CT
  Group 3 (Lung Disease) & Controls
PVDOMICS Lung Imaging Protocol

- Preferred: Thin section 1mm non-contrast CT scan
- ***Acceptable: 3mm sections for all protocols

1 mm slice thickness

10mm slice thickness
Example of a Center-Specific Scanner Parameter

<table>
<thead>
<tr>
<th>Center Specific Scanner Parameters</th>
<th>Institution – Center 99 - Sample Medical Center</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scanner Make</td>
<td>GE</td>
</tr>
<tr>
<td>Scanner Model</td>
<td>Discovery CT750 HD</td>
</tr>
<tr>
<td>Scan Type</td>
<td>Helical</td>
</tr>
<tr>
<td>Rotation time (s)</td>
<td>&lt;5</td>
</tr>
<tr>
<td>Detector Configuration</td>
<td>64 x 0.625</td>
</tr>
<tr>
<td>kV</td>
<td>120</td>
</tr>
<tr>
<td>mA/mAs</td>
<td>BMI setting</td>
</tr>
<tr>
<td>Pitch</td>
<td>1.0</td>
</tr>
<tr>
<td>Reconstruction Algorithm Standard</td>
<td>Standard</td>
</tr>
<tr>
<td>Reconstruction Algorithm Lung</td>
<td>Lung</td>
</tr>
<tr>
<td>Additional Image Filters</td>
<td>None</td>
</tr>
<tr>
<td>Iterative Reconstruction</td>
<td>Do not use</td>
</tr>
<tr>
<td>Dose modulation</td>
<td>Off</td>
</tr>
<tr>
<td>Thickness (mm)</td>
<td>1.0</td>
</tr>
<tr>
<td>Interval (mm)</td>
<td>0.8</td>
</tr>
</tbody>
</table>

Individual center parameters provided in MOP Chapter 80 appendices
PVDOMICS steps per participant
5 steps

1. Verify no thin section CT images available for participant within last year
2. Provide form to CT technologist to scan participant using predefined parameters and breathing instructions
3. Upload and transmit DICOM data via TeraRecon Intuition Uploader to DCC radiology server
4. Access individual PVDOMICS account to transfer de-identified Final Radiology Report to designated secure portal
5. Enter scan information onto CT data transmittal Form #252 or #253 and into PVDOMICS database
CT Technologist Specs and Instructions

Table 1 - Effective mAs as a Function of BMI

<table>
<thead>
<tr>
<th>Body Size</th>
<th>BMI Range</th>
<th>Use as mAs Exponent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Large</td>
<td>30-49</td>
<td>1.6</td>
</tr>
<tr>
<td>Medium</td>
<td>20-30</td>
<td>1.5</td>
</tr>
<tr>
<td>Small</td>
<td>15-19</td>
<td>1.0</td>
</tr>
<tr>
<td>Extra Small</td>
<td>12-14</td>
<td>0.9</td>
</tr>
</tbody>
</table>

The following parameters must be implemented for performing chest CT scans at our center:

- **Center-Specific CT Scanner Parameters**
  - Scanner Make: Philips Brilliance
  - Scanner Model: 8000
  - Scan Type: Adult
  - Rotation Time: 0.63
  - Detector Configuration: 128 x 0.625
  - mAs: 120
  - Beam Hardness: 1.0
  - Reconstruction Algorithm: 400
  - Additional Image Filters: None
  - Iterative Reconstruction: None
  - Beam Hardness: 1.0
  - Thickness (mm): 0.9
  - Interval (mm): 0.8

**Scanning**

- Use these breathing instructions to perform the following:
  - Conduct a practice breathing session with participant.
  - Take several breaths to ensure the patient is comfortable.
  - Adjust the patient’s position as needed to position the FOV to cover the entire lung and avoid motion.
  - Take a deep breath to ensure the patient is comfortable.
  - Take a deep breath to ensure the patient is comfortable.
  - Now breathe all the way in.
  - Breath in and out.
  - Breath in and out.

**Breathing Instructions:**

- For chest scans, start by taking a couple of deep breaths in and out before you have your breath almost completely.

- Gently begin: take a deep breath.

- Let it out slowly.

- Take a deep breath.

- Let it out.

- Now breathe all the way in.

- Breath in and out.

**Notes:**

- Keep your breathing steady.

- Count 10 seconds (or as normal as possible).

- Breath and relax (as normal as possible).
Chest CT Scanning

- Refer to CT Technologist Instruction Form regarding imaging instructions

- DO NOT repeat spiral scans for any reason
CT Image: Post Processing

- CT technologist must reconstruct scan with identifiers specifying slice thickness and reconstruction kernel/algorithm.
- Example of labeling scheme for PVDOMICS reconstructions:
  - 1.0mm slice thickness B30/Standard kernel
  - 1.0mm slice thickness B60/Lung kernel
- Please try to only send these 2 scan reconstruction data sets through iUploader.
- All PVDOMICS reconstructions must be archived and stored at local site.
Lung Image Reconstructions

B60 Lung kernel

B30 Standard kernel
iNtuition Uploader

- **Purpose:** Transfer Data to LIC
- Configured by DCC LIC administrators, TeraRecon and local study coordinators
- Software provided by CC/TeraRecon administrators
Uploader Configuration

User Name: shared
Password: ********
Server: *
Enable SSL: ✔️
Anonymize: ✔️
Log level: 3
Send Email To: 
Compress Method: ZIP Compress
Monitored Folder: 
Monitor Incoming DICOM Store
Store AET: 
Store IP: 192.168.47.1
Retrieve From AQNet Server
Fetch: TR Derived Data
Days: 0
Routing Data To PACS
AE: 
Host: 
Port: 0
Route data to PACS when upload to AQNet server

OK
Cancel
Data Anonymization

An anonymize setup interface is shown with two rows:
- Group (0010,0010) and Element (0010,0020)
- Title:
  - Patient's Name
  - Patient ID
- Original Value:
  - AAA2
  - 53083
- Replacement Value:
  - ValueNotSet
  - ValueNotSet

Options for static anonymization include OK and Abort.
Data Anonymization and Assignment of ID #

• Ascribe ID# to CT study before de-identification occurs
  – CT_id#_alphacode_testdate.pdf

• Assure research ID# matches true patient ID and store in local research database (including MRN #, Accession #, Name and DOB etc.)

• Essential for retrieval of patient information for clinical purposes
Uploading Data

Option 1

Can be dragged from CT console, PACS, local drive or pre-anonymized CD

Option 2

Browse to a folder to upload the data
Transmitting Data

- Internet connection
- Anonymization occurs before data transfer
- Click on folder to submit and transfer
- Progress of data transfer on screen until complete
General Overview
Digital Workflow

Obtaining, uploading and transferring data:
1. Technologist performs CT scan and saves DICOM in destination folder
2. Study coordinator performs 1-click removal of patient information then drags and drops DICOM file into iNtuition Uploader folder
3. Study coordinator electronically submits data
4. Secure digital transfer of data
Complete Anonymization

• VERY IMPORTANT- must remove all DICOM files containing patient information
• Intuition uploader will automatically remove PHI attached to images
• Additional/separate files containing PHI in patient folder must be removed manually
PLEASE INDICATE WHETHER SCAN WAS RESEARCH, CLINICAL OR HISTORICAL

Final Radiology Report must be de-identified prior to transferring

Print hard copy of report

Black out all identifying information such as name, DOB, MRN, etc.

Enter participant’s PVDOMICS ID #, alphacode, date of CT scan on each page

Scan and save as a pdf

Name: 
DOB: 
MRN: 

PVDMICS ID#: CT_xxxxxx_ac_mmddyyyy

CHEST CT WITHOUT CONTRAST

Indication: Shortness of Breath
Technique: Spiral CT acquisition without contrast. 1 mm slice thickness. Dose reduction techniques were employed.
CT Dose-Length Product: 245 mGy*cm
Comparison: None Available

RESULTS:

1. Lungs, Tubes, and Devices: N/A
4. Neck base: N/A
5. Thoracic lymph nodes: No significant mediastinal adenopathy.
7. Upper abdomen: No acute upper abdominal abnormalities.

IMPRESSION:

Normal Chest CT.
Transferring Clinical Reports

- File naming convention is:
  
  "CT_xxxxxx_ac_mmddyyyy.pdf"

  | file content | PVDOMICS id # | alphacode | test date | file type |

- Log in to SSH with previously assigned account name and password
- Drag and drop file into DCC’s secure portal on SSH/WinSCP
- Include document transfer date on Form 252 (or 253)
- DCC will move file out of home directory for processing
- Please send DICOM data and emailed clinical report as close in time as possible with recorded dates for both
Ventilation Perfusion Imaging
VQ scan

- Not required if participant has accompanying CTA and CTA images are positive for CTEPH & provided to LIC
- Not required if V/Q has been performed within 4 years prior to enrollment
- Report only will be transmitted to LIC via secure DCC portal; V/Q images will not be transferred
Transferring VQ Reports

• Identical method to transmitting CT reports
• Final report must be de-identified, printed, re-identified with PVDOMICS ID #, scanned, saved as pdf and transmitted to DCC secure portal
• File name is: “VQ_xxxxxxx_ac_mmddyyyy.pdf”
Conclusion

• Simple, efficient and secure method of data upload, transmission and network sharing via TeraRecon iUploader, iNtuition Server, and iShare

• Study coordinator and CT technologist work together with minimal post-scanning/processing effort

• Will ensure accurate transmission of DICOM for post processing data analysis at Lung Imaging Core which will be essential to phenotyping patients in PVDOMICS study
Lung Imaging Core
@ Data Coordinating Center

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