RICOH
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Purpose and Summary

This protocol describes the guidelines for a CT and MRI scan intended for the creation of Ricoh 3D for Healthcare Abdominal (Hepatic, Renal, Gastrointestinal, Genitourinary) Anatomic Models.

Important

Use of this scanning protocol as a guideline will result in a more anatomic accurate model.

Preparation of the Patient

- Remove any non-fixed metal prosthesis or jewelry that might interfere with the region to be scanned.

- Non-metal dentures may be worn during the scan.

- Make the patient comfortable and instruct not to move during the procedure. Normal breathing is acceptable but any other movement, such as tilting and/or turning the head, can cause motion artifacts that compromise the reconstructed images, requiring the patient to be rescanned.

Reconstruction of the Images

- Reconstruct the images with a 512 × 512 matrix or 768 x 768 matrix.

- Only the axial images are required, no additional reformatting of the images must be done.

- Save the images in uncompressed standard DICOM format.

- Choose appropriate image modality during export of images. Non-corresponding modality can be a reason for rejection of images.

CT Scanning Instructions

- Use only primary axial images.

- Images scanned under a gantry tilt and oblique or reformatted images negatively influence the accuracy.

- All slices must have the same field of view, reconstruction center, and table height.

- Scan each slice in the same direction.

- Scan with the same slice spacing, less than or equal to the slice thickness. Non-overlapping axial slices may decrease the quality of reformatted images.

Patient Positioning
- Supine position, abdomen centered within the gantry

- Both arms elevated

In the Presence of Metal

- Check whether strategies of optimizing scan parameters to reduce metal artifacts seem beneficial, such as using thin slice collimation and reconstructing to slices of 1.25 mm, lowering pitch, and increasing kVp.
- Use a Metal Artifact Reducing algorithm/ filter, if available. Include this along with the standard scan.
- Increase the HU scan range by using a 16 bit or extended CT scale, if available.

Dose Optimization

- Use iterative reconstruction algorithms if available.
- Consider employing manufacturer-specific protocols for better results.
- Adjust expected CTDIvol and noise to patient size.
- Make use of automatic exposure control whenever possible.
- Consider reducing tube voltage in thin or pediatric patients.
- Try to use dual-energy and split-bolus protocols instead of multiple acquisitions if possible.

CT Scanning Parameters

Abdominal	
Scanner Type	Multi-detector row CT with number of detector rows ≥ 16
Scan Mode	Helical
Collimation	Slice thickness: 1.25 mm or smaller Slice increment: contiguous slices only (no overlap) slice increment ≤ slice thickness
Gantry tilt/oblique angle	No gantry tilt
kVp	≤120 kVp
mAs	Automatic tube current modulation
Rotation Time	Use 1-second or smaller
Pitch	Use 1 or smaller
Field of View (FOV)	350 mm (should be adjusted to increase in-plane resolution) arterial phase: diaphragm to the iliac crest (might be extended in some indications) venous phase: above the diaphragm to the symphysis
Matrix	Use a 512 x 512 matrix
Reconstruction Algorithm	Both soft tissue and bone kernel should be reconstructed as thin as possible and sent
HU Scale	If metal implants are present, us a HU scale of 16-bit.

MRI Scanning Parameters

Abdominal	
Scanner Type	Preferred on 1.5T
Scan Mode	Isotropic 3D volumetric scan is preferred
Collimation	Slice thickness: 1.25 mm or smaller Slice increment: contiguous slices only (no overlap) slice increment ≤ slice thickness
Field of View (FOV)	Fit to patient.
Matrix	Use a 512 x 512 matrix
Voxels	Nearly isotropic voxels (not standard)