### Cardiac CTA without and with IV Contrast

**Toshiba AquilionONE**
- Calcium Score Scan Mode: Gated Volume
- CTA Coronaries Scan Mode: Gated Volume

**Toshiba AquilionPRIME**
- Calcium Score Scan Mode: Gated Wide Volume
- CTA Coronaries Scan Mode: Gated Helical

<table>
<thead>
<tr>
<th>Patient Position</th>
<th>Supine, Feet First into Gantry, Heart Isocenter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scanogram</td>
<td>AP and Lateral</td>
</tr>
</tbody>
</table>

**A** Non-Contrast Calcium Score Scan  
ECG Gated Scan  
Position Volume over heart

For calcium scores > 600  
Contact the cardiac team resident or the radiology resident on call to determine need for contrast scan.

<table>
<thead>
<tr>
<th>Injection Rate</th>
<th>5 ml / sec</th>
</tr>
</thead>
<tbody>
<tr>
<td>IV Size and Location</td>
<td>20g minimum Right AC preferred</td>
</tr>
<tr>
<td>Contrast</td>
<td>Omnipaque 350</td>
</tr>
<tr>
<td>Saline</td>
<td>Amount equal to contrast amount</td>
</tr>
<tr>
<td>Respiration</td>
<td>Breath Hold</td>
</tr>
</tbody>
</table>

**AqONE**  
- Monitor position in center of volume  
- ROI on descending aorta  
- 0.5 mm thickness  
- 0.275 sec rotation / 0.35 sec rotation

**B** Contrast Scan  
ECG Gated  
Acquisition Specs  
0.5 mm thickness  
0.3 mm spacing

**ECG Gated Volume Scan**  
Place and size volume over chest to include carina through bottom of heart. Scan max length is 16 cm. May be reduced by increments of 2 cm.

**AqPRIME**  
- Monitor position at carina  
- ROI on descending aorta

**B** Contrast Scan  
ECG Gated  
Acquisition Specs  
0.5 mm thickness  
0.3 mm spacing

**ECG Gated Helical Scan**  
Start Thoracic Inlet  
End Bottom of heart

**AqONE**  
For prospectively triggered scan, set exposure range “To Next R”.  
Use retrospectively gated scan for heart rates that are too high for a 1 beat scan, for patients with cardiac history, and for heart transplant patients.
Reconstruction - Volumes and Images

A  Non-Contrast Calcium Score

Calcium Score Exposure and Auto Reconstruction:
Images will be reconstructed 75% or 40% depending on patient heart rate.
Post processing done at fX workstation or on Visage.

<table>
<thead>
<tr>
<th>Reconstruction built in protocol</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A</strong> Algorithm</td>
<td>Cardiac Ca Score</td>
</tr>
<tr>
<td><strong>R1</strong> Thickness</td>
<td>3 mm</td>
</tr>
<tr>
<td>Spacing</td>
<td>3 mm</td>
</tr>
<tr>
<td>FOV</td>
<td>220 mm</td>
</tr>
<tr>
<td>Transfer</td>
<td>PACS and PACS_CARD</td>
</tr>
</tbody>
</table>

B  Contrast CTA Coronary Arteries –

75% and “Best Phase” are programed in the protocol and will reconstruct automatically.
Reminder: Always check ECG for proper R indicators prior to programming reconstructions.

<table>
<thead>
<tr>
<th><strong>B</strong> Algorithm</th>
<th>Cardiac CTA</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>R1</strong> Thickness</td>
<td>0.5 mm</td>
</tr>
<tr>
<td>Spacing</td>
<td>0.25 mm</td>
</tr>
<tr>
<td>FOV</td>
<td>220 mm</td>
</tr>
<tr>
<td>Phase</td>
<td>Best Phase + Window</td>
</tr>
<tr>
<td></td>
<td>ImageXact –if needed</td>
</tr>
<tr>
<td>Transfer</td>
<td>PACS and PACS_CARD</td>
</tr>
</tbody>
</table>

For Functional Analysis if available
These are built in retrospective protocol

<table>
<thead>
<tr>
<th><strong>B</strong> Algorithm</th>
<th>Cardiac CTA</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>R2</strong> Thickness</td>
<td>1.0 mm</td>
</tr>
<tr>
<td>Spacing</td>
<td>1.0 mm</td>
</tr>
<tr>
<td>FOV</td>
<td>220 mm</td>
</tr>
<tr>
<td>Phase</td>
<td>CFA 0% - 90%</td>
</tr>
<tr>
<td></td>
<td>Every 10%</td>
</tr>
<tr>
<td>Transfer</td>
<td>PACS and PACS_CARD</td>
</tr>
</tbody>
</table>

Images for Large DFOV - must type Large DFOV or LDFOV in comment box.

<table>
<thead>
<tr>
<th><strong>B</strong> Algorithm</th>
<th>Cardiac CTA</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>R3</strong> Thickness</td>
<td>1 mm</td>
</tr>
<tr>
<td>Spacing</td>
<td>1 mm</td>
</tr>
<tr>
<td>FOV</td>
<td>320 mm</td>
</tr>
<tr>
<td>Phase</td>
<td>80%</td>
</tr>
<tr>
<td>Transfer</td>
<td>PACS and PACS_CARD</td>
</tr>
<tr>
<td>Series Description</td>
<td>Large DFOV</td>
</tr>
</tbody>
</table>
Generating the Calcium Score on the fX Workstation

For calcium scores > 600
Contact the cardiac team resident or the radiology resident on call to determine need for contrast scan.

Open the patient folder in the directory.
Load the calcium score series with 54 images and 3mm x 3mm thick/spacing.
This series may be named “CALCIUM SCORE Cardiac Ca Score” or simply “75%”.
Click “Load Volume”.

In the Gallery tab click “Pick” button on “2D Vscore with Color”.

Click on the appropriate vessel name in the left column. Use the cursor to circle calcium for each coronary vessel. Repeat this process for each axial slice of the scan.

When all calcium is identified, check that score is below 600. If score is above 600, contact the cardiac team or the resident on call to determine need for contrast scan.
Generating Calcium Score using Visage

**For calcium scores > 600**
Contact the cardiac team resident or the radiology resident on call to determine if the contrasted scan will be beneficial.

- Open the patient folder in the directory.
- Load the Calcium Score series.
- Single click on this series and click View. (Or double click on series.)

Note:
If the calcium scoring tool card does not automatically open, click on the Protocol tab on the top tool bar, and click on CT Cardiac.

![Image of calcium scoring tool card]

Click on the Calcium Scoring button in the Calcium tool card. Make sure that Multi Slice Mode is checked.

- Click on the appropriate vessel name in column.
- Left click on calcium in that vessel.
- Scroll through images making sure that all calcium is identified.
- Repeat this process for each coronary artery with calcium.

When all calcium is identified,
- Check that score in “Score (1)” column is below 600.
- If score is above 600, contact the cardiac team or the resident on call to determine need for contrast scan.
Key:

LM    Left Main
LAD   Left Anterior Descending
CX    Circumflex
RCA   Right Coronary Artery
PDA   Posterior Descending Artery
Guidelines for Medication Administration for Cardiac CTA

The target heart rate for cardiac CTA is 66bpm or less. Communication with the Cardiac Team is required for any deviation of these guidelines. Please call ext 45691 Monday through Friday, 8AM-4PM, and ext 44385 evening and night hours.

See Practice Guidelines, under the Patient Care tab at http://xray.ufl.edu for more information.

Out-patient Cardiac CTA  Monday through Friday

The out-patient scheduled for cardiac CTA is managed by our Radiology Department nursing staff. The cardiac team resident/attending will provide orders in EPIC for the following:

- Beta blocker: IV metoprolol  Dose: 4 doses, 5mg each  Administered by RN just prior to scan
- Sublingual nitroglycerine  Dose: 0.4mg  Administered 3-6 minutes prior to contrasted scan

In-patient Cardiac CTA – Weekdays  Monday through Friday, 8AM – 4PM

The in-patient scheduled for cardiac CTA is managed by our Radiology Department nursing staff. The charge technologist should contact the Radiology Care Unit to discuss availability of nursing staff. The cardiac team resident/attending will provide orders in EPIC for the following:

- Beta blocker: IV metoprolol  Dose: 4 doses, 5mg each  Administered by RN just prior to scan
- Sublingual nitroglycerine  Dose: 0.4mg  Administered 3-6 minutes prior to contrasted scan

In-patient Cardiac CTA – Weekends  Saturday and Sunday, 8AM – 4PM

The in-patient scheduled for cardiac CTA on the weekend is managed by the hospital floor/unit nursing staff. The ordering physician will provide orders for oral metoprolol.

- Beta blocker: Dose: 100mg
- Oral metoprolol given 1 hour prior to scan or until target heart rate of 66bpm is reached.

ED Patient with Chest Pain

The Emergency Department patient scheduled for cardiac CTA is managed by the ED nursing staff. The ordering physician will provide orders for oral metoprolol.

- Beta blocker: Dose: 100mg
- Oral metoprolol given 1 hour prior to scan or until target heart rate of 66 bpm is reached.
**Guidelines for In-Patient Cardiac CTA**

*See Practice Guidelines, under the Patient Care tab at [http://xray.ufl.edu](http://xray.ufl.edu) for more information. Or call Cardiac Reading Room: ext. 45691, Body Reading Room ext. 44385 with questions.*

**Criteria for Cardiac CTA**

Patient felt to be **low to intermediate** pretest likelihood of having coronary ischemia as a cause of chest pain.

**Appropriate Indications for Cardiac CTA**

- Chest pain in low to intermediate risk patient
- Chest pain in low to intermediate risk patient with borderline or mildly abnormal ETT
- Patient with possible coronary anomaly

**Ordering Cardiac CTA and Beta Blocker Administration**

Cardiac CTA order may be placed at any time. The exam will be performed 8AM – 4PM on weekdays and weekend days.

<table>
<thead>
<tr>
<th>Weekdays – Monday through Friday</th>
<th>Beta Blocker Administration Weekdays</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cardiac CTA in EPIC orderable:</td>
<td><strong>Beta blocker</strong>: IV metoprolol 4 doses, 5mg each</td>
</tr>
<tr>
<td>CT  Angio Cardiac Coronary Arteries  IMG 12017</td>
<td>Administered by radiology staff RN just prior to scan.</td>
</tr>
<tr>
<td>Radiology will place order in EPIC for IV metoprolol and sublingual nitroglycerine.</td>
<td>Sublingual nitroglycerine 0.4mg</td>
</tr>
<tr>
<td>The in-patient scheduled for cardiac CTA is managed by our Radiology Department nursing staff.</td>
<td>Administered by radiology staff RN 3-6 minutes prior to contrasted scan.</td>
</tr>
<tr>
<td>The charge technologist should contact the Radiology Care Unit or the nursing staff assigned to CT to discuss availability of nursing staff.</td>
<td></td>
</tr>
<tr>
<td>The exam will be coordinated by the CT charge tech and the floor or unit nursing staff.</td>
<td></td>
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<tr>
<th>Weekends – Saturday and Sunday</th>
<th>Beta Blocker Administration Weekends</th>
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<tr>
<td>Cardiac CTA in EPIC orderable:</td>
<td><strong>Beta blocker</strong>: 100mg oral metoprolol</td>
</tr>
<tr>
<td>CT  Angio Cardiac Coronary Arteries  IMG 12017</td>
<td>Until target rate of 66bpm is met.</td>
</tr>
<tr>
<td>The ordering physician will place order in EPIC for oral metoprolol. 100mg</td>
<td>The patient’s nurse will report to CT the time that the beta blocker was given.</td>
</tr>
<tr>
<td>The ordering physician will contact the radiology resident. Cardiac Reading Room: ext. 45691</td>
<td>The Cardiac CTA should be done when the target heart rate of 66bpm is met.</td>
</tr>
<tr>
<td>Body Reading Room: ext. 44385</td>
<td></td>
</tr>
<tr>
<td>The exam will be coordinated by the CT charge tech and the floor or unit nursing staff.</td>
<td></td>
</tr>
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</table>
**IV Access for Cardiac CTA**

18g PIV preferred, 20g PIV min

Order of location preference:
   - Right AC
   - Right mid forearm
   - Left AC
   - Left mid forearm

All other locations are unacceptable for contrast bolus delivery for cardiac CTA. Other lines or catheters must be approved by the Cardiac Imaging Team or the radiologist/resident on call.

Please see *IV Access Guidelines* under the Patient Care tab at [http://xray.ufl.edu](http://xray.ufl.edu) for more information.

**Contraindications for Cardiac CTA**

- Inability to hold breath or cooperate
- Cardiac CTA performed within the last year
- Increased cardiac enzymes
- Creatinine level > 1.8.
- Acute EKG changes
- Pregnancy
- History of severe contrast reaction
- Arrhythmia
- Renal insufficiency
- Multiple myeloma
- Sickle cell anemia
- Pheochromocytoma

**Calcium Score**

- For calcium score values below 600, the contrast scan will be completed and the patient returned to the floor
- For calcium score values above 600, the contrast scan may be cancelled by radiology
- The cardiac team or the radiology resident on call will notify ordering physician of this change

**Reporting of Results**

**Weekdays**
   - Monday – Friday, 0800 – 1600 hrs.............1 hour: full report available
   - Monday – Friday, 1600 – 0800 hrs.............1 hour: preliminary report available
      - After 0800: full report available

**Weekends**
   - Friday 1600 hrs – Monday 0800 hrs.............1 hour: preliminary report available
      - Full report available after daily read-out