

CT Calcium Score

Updated
5/6/2024

Indications - hypertension, hyperlipidemia, hypercholesterolemia, family history of cardiovascular disease.

Do not perform calcium score on the following patients:

Patients with a history of CABG.

Patients who have had calcium score within past 12 months.

Bill under CT Cardiac Calcium Score.

GENERAL SCAN NOTES

Move the patient's arms over his/her head if possible. Remove any metal from the imaging field of view.

Topogram - lung apices through diaphragm (obtained during end inspiration).

Craniocaudal scan coverage - pop of aortic arch through apex of left ventricle.

Adjust FOV (field of view) on topogram to smallest without cropping anatomy.

Patient does not receive metoprolol or nitroglycerin for this protocol.

EKG gating:

For heart rate <75 bpm - use prospective scan parameters.

For heart rate ≥75 bpm - use flash scan parameters.

If scanner cannot do EKG gating - use non gated scan parameters.

IV Contrast: not given for this protocol.

For **GE scanners**, it is essential for the 1st recon thickness on the scanner to match the 1st recon thickness in this protocol book for the prescribed Noise Index to be valid. The 1st recon should generally be the thickest recon in the protocol.

CT Calcium Score

SIEMENS PARAMETERS & RECONS

For Non-Gated scans:

	Scan Mode	kV	mAs	Care Dose	Care kV & Lvl	Pitch	Acq	Coll	Rot Time	Scan Time
Go Up 32	spiral	130	12	on	on 19	0.31	32	0.7	0.8	17.3
Definition 64	spiral	120	40	on	on	0.18	64	0.6	0.3	13.0
Drive 128	spiral	120	80	on	on	0.17	128	0.6	0.285	6.5
Force 192	spiral	120	80	on	on	0.17	192	0.6	0.25	3.8

For EKG-Gated scans:

	Scan Mode	kV	mAs	Care Dose	Care kV & Lvl	Feed	Acq	Coll	Rot Time	Scan Time
Definition 64	sequential	120	40	on	on	17	16	1.2	0.3	2.6
Go Top 64	sequential	120	15	on	on 19	34.5	64	0.6	0.33	1.4
Drive 128	sequential	120	80	on	on	34.5	32	1.2	0.285	1.2
Force 192	sequential	120	80	on	on	48	48	1.2	0.25	0.8

For Flash scans:

	Scan Mode	kV	mAs	Care Dose	Care kV & Lvl	Pitch	Acq	Coll	Rot Time	Scan Time
Drive 128	spiral	120	80	on	on	3.4	128	0.6	0.285	0.3
Force 192	spiral	120	80	on	on	3.2	192	0.6	0.25	0.2

Name of Series	Thick	Interval	Kernel	Window	IR Lvl	Recon Direction
AX SOFT	3.0	1.5	Sa36	mediastinum	3	head/feet
AX LUNG	3.0	3.0	B159	lung	3	head/feet
SAG SOFT	3.0	3.0	Br40	mediastinum	3	left/right

CT Calcium Score

GE PARAMETERS & RECONS

Smart Scan Cine mode:

	Scan Type	SFOV	kV	Manual mA	Smart mA	Slice Thick	Beam Coll	Pitch / Speed	Rot Time	Dose Red	ASIR
LS VCT 64	axial	large body	120	430	off	2.5	20	8i	0.35	0	0

Name of Series	Thickness	Interval	Recon Algorithm	Window Width/Level	Recon Direction
AX SOFT	2.5	1.25	std full	400/40	head/feet
AX LUNG	2.5	2.5	lung	1600/-600	head/feet
SAG SOFT	2.5	2.5	std full	400/40	left/right

Must be first recon.

CTA Coronary Arteries

Updated
5/6/2024

Indications - chest pain, tachycardia, hypotension, shortness of breath, dyspnea, orthopnea, abnormal EKG, abnormal cardiovascular study, coronary atherosclerosis, ischemic cardiomyopathy, coronary artery dissection/aneurysm, coronary artery malformation, anomalous coronary artery origin.

Bill under CT Angio Coronary w/ Contrast charge.

GENERAL SCAN NOTES

Move the patient's arms over his/her head if possible. Remove any metal from the imaging field of view.

Topogram - lung apices through diaphragm (obtained during end inspiration).

Craniocaudal scan coverage:

No CABG history - above carina through apex of left ventricle (obtained during end inspiration).

Positive CABG history - lung apices through apex of left ventricle (obtained during end inspiration).

Adjust FOV (field of view) on topogram to smallest without cropping anatomy (target FOV 150-220 mm).

IV Contrast:

Administer **80 mL** Omnipaque-350 (<350 lbs) or **100 mL** Omnipaque-350 (>350 lbs).

Inject at **6 mL/sec** followed by 40 mL saline flush, 20-gauge or larger in AC fossa.

Bolus track off **ascending aorta** triggered at **100 HU + 5 secs**.

EKG Gating

MEDICATIONS

Heart Rate Control

At Home Medications

Metoprolol immediate-release 50 mg or diltiazem immediate-release 30 mg

One tablet the night before and one tablet the morning of the exam.

The prescription for this medication is the responsibility of whomever ordered the CTA.

Pre Exam Medications

Metoprolol 10 mg IV or diltiazem 0.25 mg/kg (up to 25 mg) IV given 5 mins before CTA portion.

Can repeat 5 mg metoprolol every 5 mins as needed.

Only given if patient's heart rate >70 bpm and systolic BP >100 mmHg.

CTA Coronary Arteries

Contraindications to metoprolol - COPD, asthma, 2nd or 3rd degree heart block, systolic BP <100 mm Hg or allergy to metoprolol.

Contraindications to diltiazem - 2nd or 3rd degree heart block (w/o pacemaker), systolic BP < 100 mm Hg or allergy to diltiazem.

Vasodilatation Medications

Nitroglycerin 0.4 mg tablet given 3-5 mins before CTA portion.

Can cause reflex elevated heart rate (which is blocked by metoprolol).

Given to all patients regardless of heart rate (unless contraindicated)

Contraindications to nitroglycerine - increased intracranial pressure, severe anemia, right-sided myocardial infarction or allergy to nitroglycerin.

CTA Coronary Arteries

SIEMENS PARAMETERS & RECONS

For Calcium Score scan:

Use technical parameters from calcium score protocol.

Perform calcium score scan in all patients except:

Patients with a history of CABG.

Patients who have had calcium score within past 12 months.

For CTA Coronary scan:

	Scan Mode	kV	mAs	Care Dose	Care kV & Lvl	Pitch	Feed	Acq	Coll	Rot Time	Scan Time
Go Top 64	spiral	100	54	on	on 64	0.31		64	0.6	0.33	4.2
Drive 128	sequential	120	282	on	on		34.5	128	0.6	0.285	1.2
Force 192	sequential	120	288	on	on		39	152	0.6	0.25	1.0

CALCIUM SCORE

Name of Series	Thick	Interval	Kernel	Window	IR Lvl	Recon Direction
AX SOFT	3.0	1.5	Sa36	mediastinum	3	head/feet

CTA CORONARY

AX SOFT	3.0	3.0	Bv40	cardiac	3	head/feet
AX THINS	0.6	0.3	Bv36	cardiac	3	head/feet
AX TRUESTACK	0.6	0.6	Bf44	cardiac	3	head/feet
*AX MULTI 20-80%	0.6	0.3	Bv36	cardiac	3	head/feet
AX LUNG	3.0	3.0	B159	lung	3	head/feet

* Ax Multi 20-80% series only applies with retrospective scans.

CTA TAVR

Updated
5/6/2024

Indications - pre operative evaluation for aortic valve stenosis.
Bill under CT Angio CAP w/ and w/o Contrast Charge.

GENERAL SCAN NOTES

Move the patient's arms over his/her head if possible. Remove any metal from the imaging field of view.

Topogram - lung apices through pubic symphysis (obtained during end inspiration).

Craniocaudal scan coverage:

Pre contrast - **chest only** (lung apices through lung bases) (obtained during end inspiration).

Cardiac phase - **heart only** (above carina through apex of left ventricle) (obtained during end inspiration).

Angio phase - **CAP** (lung apices through pubic symphysis) (obtained during end inspiration).

Venous phase - **abdomen/pelvis** (lung bases through pubic symphysis) (obtained during end inspiration).

Adjust FOV (field of view) on topogram to smallest without cropping anatomy.

EKG gating:

Only used for the angio phase of the chest.

IV Contrast:

Administer 100 mL **Omnipaque-350** at **4 mL/sec** then decrease rate to **2 mL/sec** for additional 25 mL contrast.

20-gauge or larger in forearm or more proximal.

Bolus track off aortic arch triggered at **100 HU**.

SIEMENS PARAMETERS & RECONS

For the **Pre Contrast** phase:

	Scan Mode	kV	mAs	Care Dose	Care kV & Lvl	Pitch	Acq	Coll	Rot Time	Scan Time
Go Top 64	spiral	100	62	on	on 70	1.50	64	0.6	0.33	1.7
Drive 128	spiral	120	66	on	on	1.20	128	0.6	0.5	3.3
Force 192	spiral	110	51	on	on	1.20	192	0.6	0.5	2.2

For the **Cardiac** phase:

Go Top 64	spiral	100	62	on	on 70	1.50	64	0.6	0.33	0.9
Drive 128	spiral	100	282	on	on	0.17	128	0.6	0.285	6.5
Force 192	spiral	100	288	on	on	0.15	192	0.6	0.25	4.3

For the **Angio** phase:

Go Top 64	spiral	100	101	on	on 115	1.50	64	0.6	0.33	4.6
Drive 128	spiral	100	120	on	on	2.35	128	0.6	0.285	2.5
Force 192	spiral	80	174	on	on	2.00	192	0.6	0.25	1.7

For the **Venous** phase:

Go Top 64	spiral	120	112	on	on 145	0.80	64	0.6	0.5	8.1
Drive 128	spiral	100	120	on	on	2.35	128	0.6	0.285	1.6
Force 192	spiral	80	174	on	on	2.00	192	0.6	0.25	1.1

CTA TAVR

PRE CONTRAST PHASE

Name of Series	Thick	Interval	Kernel	Window	IR Lvl	Recon Anatomy	Recon Direction
AX CHEST PRE	5.0	5.0	Br40	mediastinum	3	chest	head/feet

CARDIAC PHASE

AX HEART 65%	3.0	3.0	Br40	cardiac	3	heart	head/feet
COR HEART 65%	3.0	3.0	Br40	cardiac	3	heart	front/back
SAG HEART 65%	3.0	3.0	Br40	cardiac	3	heart	left/right
AX MULTI 20-80%	1.5	1.0	Br40	cardiac	2	heart	head/feet
AX HEART THINS	1.0	1.0	Br40	cardiac	2	heart	head/feet

ANGIO PHASE

AX ANGIO	3.0	3.0	Br40	mediastinum	2	CAP	head/feet
AX ANGIO THINS	1.0	1.0	Br40	mediastinum	2	CAP	head/feet
COR ANGIO CHEST	3.0	3.0	Br40	mediastinum	2	chest	front/back
SAG ANGIO CHEST	3.0	3.0	Br40	mediastinum	2	chest	left/right
COR ANGIO AP	3.0	3.0	Br40	mediastinum	2	AP	front/back
SAG ANGIO AP	3.0	3.0	Br40	mediastinum	2	AP	left/right

VENOUS PHASE

AX VENOUS	3.0	3.0	Br40	mediastinum	3	AP	head/feet
COR VENOUS	3.0	3.0	Br40	mediastinum	3	AP	front/back
SAG VENOUS	3.0	3.0	Br40	mediastinum	3	AP	left/right

CTA TMVR (Encircle)

Updated
5/6/2024

Indications - pre operative evaluation for mitral valve replacement.

Bill under CT Angio Cardiac w/ Contrast charge. Do not use CT Angio Coronary w/ Contrast charge.

GENERAL SCAN NOTES

Move the patient's arms over his/her head. Remove any metal from the imaging field of view.

Topogram - lung apices through diaphragm (obtained during end inspiration).

Craniocaudal scan coverage - top of aortic arch through bottom of heart (obtained during end inspiration).

Adjust FOV (field of view) on topogram to smallest without cropping anatomy (target FOV 150-220 mm).

Matrix must be 512 x 512 square.

EKG gating - always **retrospective**.

IV Contrast (triphasic protocol):

1st injection - 60 mL Omnipaque-350 at 4 mL/sec.

2nd injection - 40 mL 50:50 mixture Omnipaque-350 & normal saline at 4 mL/sec.

3rd injection - 20 mL normal saline at 4 mL/sec.

All three injections immediately after one another.

20-gauge or larger in forearm or more proximal.

Bolus track off **ascending aorta** triggered at **100 HU**.

SIEMENS PARAMETERS & RECONS

	Scan Mode	kV	mAs	Care Dose	Care kV & Lvl	Pitch	Acq	Coll	Rot Time	Scan Time
Go Top 64	spiral	100	54	on	on 64	0.31	64	0.6	0.33	4.2
Drive 128	spiral	100	282	on	on	0.17	128	0.6	0.285	6.5
Force 192	spiral	100	288	on	on	0.15	192	0.6	0.25	4.3

Name of Series	Thick	Interval	Kernel	Window	IR Lvl	Recon Direction
AX BEST DIA	0.6	0.4	Bv40	cardiac	3	head/feet
AX BEST SYS	0.6	0.4	Bv40	cardiac	3	head/feet
AX MULTI 20-80%	0.6	0.4	Bv40	cardiac	3	head/feet
AX SOFT	3.0	3.0	Br40	mediastinum	3	head/feet
COR SOFT	3.0	3.0	Br40	mediastinum	3	front/back
SAG SOFT	3.0	3.0	Br40	mediastinum	3	left/right
AX LUNG	3.0	3.0	B159	lung	3	head/feet

CTA Watchman

Updated
5/6/2024

Indications - pre and post operative evaluation for Watchman left atrial appendage occlusion.

This protocol includes patients in the Champion and Option clinical studies.

Bill under CT Angio Cardiac w/ Contrast charge. Do not use CT Angio Coronary w/ Contrast charge.

GENERAL SCAN NOTES

Move the patient's arms over his/her head if possible. Remove any metal from the imaging field of view.

Topogram - lung apices through diaphragm (obtained during end inspiration).

Craniocaudal scan coverage - top of aortic arch through diaphragm (**just have patient stop breathing**).

Adjust FOV (field of view) on topogram to smallest without cropping anatomy (target FOV 150-220 mm).

EKG gating:

Pre contrast phase - **prospective**.

Angio phase - **prospective** preferred (30-60% RR interval) for the angio phase.

Can use retrospective for patients with high or irregular heart rates.

Delay phase - **prospective**.

IV Contrast:

Administer weight-based Omnipaque-350 - **1 mL/kg** up to **100 mL**.

Inject at **5 mL/sec** followed by 40 mL saline flush, 20-gauge or larger in AC fossa.

Angio phase - bolus track off **left atrium** triggered at **150 HU**.

Delay phase - **50 secs** from start of injection.

SIEMENS PARAMETERS & RECONS

For the **Pre Contrast** phase:

	Scan Mode	kV	mAs	Care Dose	Care kV & Lvl	Pitch	Feed	Acq	Coll	Rot Time	Scan Time
Go Top 64	spiral	120	62	on	on 80	1.20		64	0.6	0.33	1.1
Drive 128	spiral	120	80	on	on		34.5	32	1.2	0.285	1.2
Force 192	sequential	120	80	on	on		38	38	1.2	0.25	1.0

For the **Angio** phase:

Go Top 64	spiral	100	65	on	on 64	0.31		64	0.6	0.33	22.2
Drive 128	spiral	100	282	on	on	0.17		128	0.6	0.285	6.5
Force 192	sequential	100	288	on	on		38.5	152	0.6	0.25	1.0

For the **Delay** phase:

Go Top 64	spiral	100	65	on	on 64	0.31		64	0.6	0.33	22.2
Drive 128	spiral	100	282	on	on	3.40		128	0.6	0.285	0.3
Force 192	sequential	100	288	on	on		38.5	152	0.6	0.25	1.0

CTA Watchman

PRE CONTRAST PHASE

Name of Series	Thick	Interval	Kernel	Window	IR Lvl	Recon Direction
AX SOFT PRE	3.0	3.0	Br40	mediastinum	2	head/feet
AX LUNG PRE	3.0	3.0	B159	lung	2	head/feet

ANGIO PHASE

AX ANGIO THINS	0.75	0.6	Br40	cardiac	3	head/feet
AX SOFT	3.0	3.0	Br40	mediastinum	3	head/feet
COR SOFT	3.0	3.0	Br40	mediastinum	3	front/back
SAG SOFT	3.0	3.0	Br40	mediastinum	3	left/right
AX LUNG	3.0	3.0	B159	lung	3	head/feet

DELAY PHASE

AX DELAY THINS	0.75	0.6	Br40	cardiac	3	head/feet
AX DELAY	3.0	3.0	Br40	mediastinum	3	head/feet

CTA Converge

Updated
5/6/2024

Indications - pre and post operative evaluation for atrial fibrillation.

Bill under CT Angio Cardiac w/ Contrast charge. Do not use CT Angio Coronary w/ Contrast charge.

GENERAL SCAN NOTES

Move the patient's arms over his/her head if possible. Remove any metal from the imaging field of view.

Topogram - lung apices through diaphragm (obtained during end inspiration).

Craniocaudal scan coverage - lung apices through the adrenal glands (**just have patient stop breathing**).

Adjust FOV (field of view) on topogram to smallest without cropping anatomy.

EKG gating:

IV Contrast:

Administer weight-based Omnipaque-350 - **1 mL/kg** up to **150 mL** (100 mL minimum).

Inject at **4 mL/sec** followed by 40 mL saline flush, 20-gauge or larger in AC fossa.

Bolus track off **pulmonary trunk** triggered at **180 HU**.

SIEMENS PARAMETERS & RECONS

	Scan Mode	kV	mAs	Care Dose	Care kV & Lvl	Pitch	Acq	Coll	Rot Time	Scan Time
Go Top 64	spiral	100	54	on	on 64	0.31	64	0.6	0.33	22.2
Drive 128	spiral	100	282	on	on	0.17	128	0.6	0.285	34.9
Force 192	spiral	100	288	on	on	0.15	192	0.6	0.25	23.1

Name of Series	Thick	Interval	Kernel	Window	IR Lvl	Recon Direction
AX LUNG	3.0	3.0	Br57	lung	3	head/feet
AX ANGIO	3.0	3.0	Br40	mediastinum	3	head/feet
AX ANGIO THINS	1.5	1.5	Br41	mediastinum	3	head/feet
COR SOFT	3.0	3.0	Br42	mediastinum	3	front/back
SAG SOFT	3.0	3.0	Br43	mediastinum	3	left/right
AX MIPS	5.0	3.0	Br44	mediastinum	3	head/feet
3D VRT (spin)	0.75	0.5	Bv36	CT angio		

CTA aMaze/Lariat

Updated
5/6/2024

Indications - pre and post operative evaluation for atrial fibrillation.

Bill under CT Angio Cardiac w/ Contrast charge. Do not use CT Angio Coronary w/ Contrast charge.

GENERAL SCAN NOTES

Move the patient's arms over his/her head if possible. Remove any metal from the imaging field of view.

Topogram - lung apices through diaphragm (obtained during end inspiration).

Craniocaudal scan coverage - lung apices through the adrenal glands (**just have patient stop breathing**).

Adjust FOV (field of view) on topogram to smallest without cropping anatomy (target FOV 150-220 mm).

Craniocaudal scan coverage:

Pre contrast - lung apices through adrenal glands (**just have patient stop breathing**).

Angio phase - above pulmonary artery through adrenal glands (**just have patient stop breathing**).

Delay phase - just through left atrium (**just have patient stop breathing**).

EKG gating:

Pre contrast phase - **non gated**.

Cardiac phase - **prospective** preferred (30-60% RR interval) for the angio phase.

Can use retrospective for patients with high or irregular heart rates.

Delay phase - **prospective**.

IV Contrast:

Administer weight-based Omnipaque-350 - **1 mL/kg** up to **150 mL** (100 mL minimum).

Inject at **4 mL/sec** followed by 40 mL saline flush, 20-gauge or larger in AC fossa.

Cardiac phase - bolus track off **pulmonary artery** triggered at **100 HU**.

Delay phase - **30 secs** from start of injection.

SIEMENS PARAMETERS & RECONS

For the **Pre Contrast** phase:

	Scan Mode	kV	mAs	Care Dose	Care kV & Lvl	Pitch	Acq	Coll	Rot Time	Scan Time
Go Top 64	spiral	120	62	on	on 80	1.20	64	0.6	0.33	1.1
Drive 128	spiral	120	66	on	on	1.20	128	0.6	0.5	1.6
Force 192	spiral	110	51	on	on	1.20	192	0.6	0.5	1.1

For the **Cardiac** phase:

Go Top 64	spiral	100	65	on	on 64	0.31	64	0.6	0.33	22.2
Drive 128	spiral	100	282	on	on	0.17	128	0.6	0.285	6.5
Force 192	spiral	100	288	on	on	0.15	192	0.6	0.25	4.3

For the **Delay** phase:

Go Top 64	spiral	100	65	on	on 64	0.31	64	0.6	0.33	22.2
Drive 128	spiral	100	282	on	on	3.40	128	0.6	0.285	0.3
Force 192	spiral	100	288	on	on	0.15	192	0.6	0.25	4.3

CTA aMaze/Lariat

PRE CONTRAST PHASE

Name of Series	Thick	Interval	Kernel	Window	IR Lvl	Recon Direction
AX SOFT PRE	3.0	3.0	Br40	mediastinum	2	head/feet
AX LUNG PRE	3.0	3.0	B159	lung	2	head/feet

CARDIAC PHASE

AX HEART 65%	3.0	3.0	Br40	cardiac	3	head/feet
COR HEART 65%	3.0	3.0	Bv36	cardiac	3	front/back
SAG HEART 65%	3.0	3.0	Bv36	cardiac	3	left/right
AX HEART THINS	1.0	1.0	Br40	cardiac	2	head/feet

DELAY PHASE

AX DELAY THINS	0.75	0.6	Br40	cardiac	3	head/feet
AX DELAY	3.0	3.0	Br40	mediastinum	3	head/feet