

SIEMENS Healthineers

Technique and Quality of Coronary CTA

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ECG and Scan temporal resolution

How fast I can get?

Physical **Physical DSCT** **Reconstructed**

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ECG and Scan temporal resolution

The right moment (1)

SYSTOLIC **DIASTOLIC** **SYSTOLIC**

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ECG and Scan temporal resolution

The right moment (2)

R **T** **P** **R**

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ECG and Scan temporal resolution

Knowing my limits

Heart rate	R-R length (ms)	Isovolumetric relaxation length (ms)	Diastasis length (ms)	Desired temporal resolution
50 BPM	1200 ms	± 100 ms	± 435 ms	250 ms
60 BPM	1000 ms	± 100 ms	± 295 ms	250 ms
65 BPM	923 ms	± 100 ms	± 240 ms	200 ms
70 BPM	857 ms	± 100 ms	± 195 ms	150 ms
75 BPM	800 ms	± 100 ms	± 155 ms	150 ms
80 BPM	750 ms	± 100 ms	± 120 ms	100 ms
90 BPM	667 ms	± 100 ms	± 62 ms	100 ms

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CCTA Procedure

The most important step : **Preparation**

- Good Preparation lead to good images !!
- Patient preparation is a **Must** for Cardiac Examination
- Prepared patient will reduce the repeated scan incidence

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CCTA Procedure : Preparation



Interview The Patient :

- Ask : history of allergic
- Explain :
 - a. The procedure
 - b. What the patient need to do / feel : no motion, breath holding, injection

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CCTA Procedure : Preparation



Start Monitor patient heart rate before entering the scan room

- The lower the better !! put 55 BPM to 65 BPM as a target
- Beta block if HR is high and not going down with a breath hold

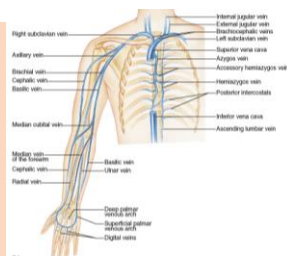
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CCTA Procedure : Preparation



Place the IV line before enter the scan room

- 18 G on right Antecubital vein is preferred



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CCTA Procedure : Preparation



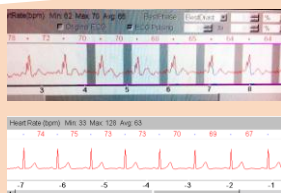
Place the ECG in correct position and securely attached to skin while patient lying and arms are up

Monitor the heart rate and the wave

- See if something seen unusual
- Good Wave = Good Images

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CCTA Procedure : Patient Preparation



Too many noise, bad signal or bad ECG. do not scan and fix the ECG placement / contact

Good signal

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CCTA Procedure : Patient Preparation



Noise in ECG may created artifact !!

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CCTA Procedure : Patient Preparation



- Always use Good ECG lead to maintain good skin contact
- Shaved patient chest if they have excessive body hair
- Clean patient skin before attaching the lead
- Adding a little amount water based Gel in ECG lead before attaching to the Skin might enhance the ECG Signal
- Don't bend the ECG Cable
- Don't re-attached the ECG lead

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CCTA Procedure : Patient Preparation



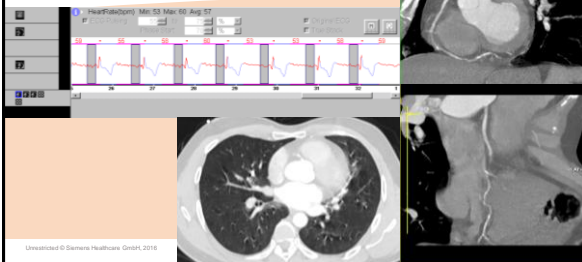
Practice breathing instruction, do it several times

- Use Long Breath hold Command :
"Breath in – Breath out – Breath in – Hold Breath"
- Practice until become patient's nature (6 times)
- **Breathing Instruction is crucial → spent sometimes to get it right**

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CCTA Procedure : Patient Preparation

Patient breathing during scan is disaster !



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CCTA Procedure : Scan Plan



Typical CCTA Protocol will look like :

- Topogram
- Calcium Score
- Test Bolus
- Coronary CT Angiography

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CCTA Procedure : Scanning and Injection



Position of Patient : Supine, arms up

Scan Range :

Calcium Score : From Below Carina to end of the heart

Coronary CTA : from level of pulmonary trunk to end of the heart

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CCTA Procedure : Scan plan



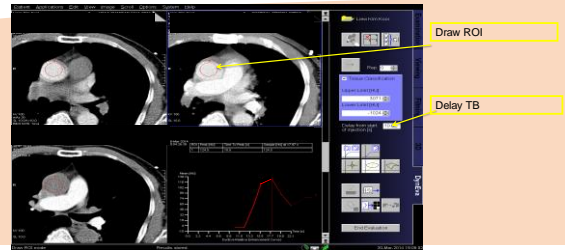
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CCTA Procedures: Injection

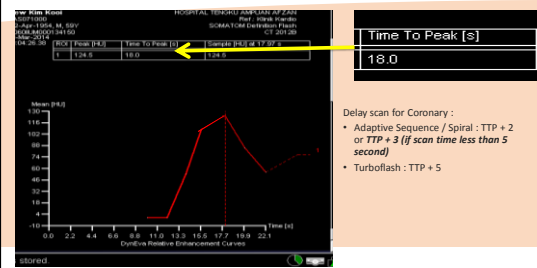
Test Bolus Recommendation :

- Flow = 5 - 6 ml/s (same as main bolus Injection)
- Contrast = 10 ml
- Saline = 50 ml
- Test bolus at Ascending Aorta (position at the same level with CCTA start point)
- Use Long Breath Hold Command :
"Breath in – Breath Out – Breath in – Hold Breath"
- Get the TTP (time to peak) to calculate scan delay time

The basic of coronary CTA : Injection



The basic of coronary CTA : Injection



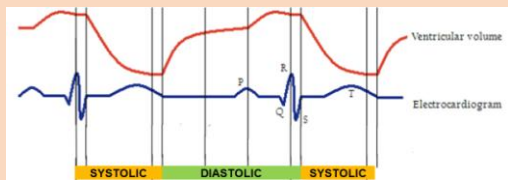
The basic of coronary CTA : Injection

Main Injection

- Flow = same as Test Bolus
- Contrast Volume = 50 cc
- Saline = 50 ml
- Use Long Breath Hold Command :
"Breath in – Breath Out – Breath in – Hold Breath"

The basic of coronary CTA : Reconstruction

Where am I supposed to:



The basic of coronary CTA : Reconstruction

When it is low :

Systole (isovolumetric relaxation) : Narrow

Diastole (diastasis) : **Wide**

The basic of coronary CTA : Reconstruction



As Heart speed up:

Systole (isovolumetric relaxation) : constant !!

Diastole (diastasis) : **Narrowing**

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The basic of coronary CTA : Reconstruction



As Heart gone bad :

Systole (isovolumetric relaxation) : constant !!

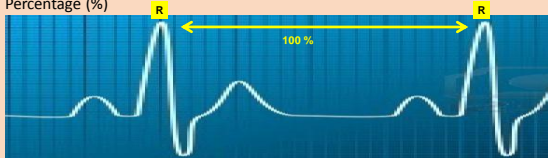
Diastole (diastasis) : **Vary !**

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CCTA Procedures : Reconstruction, the absolute and Relative



Percentage (%)



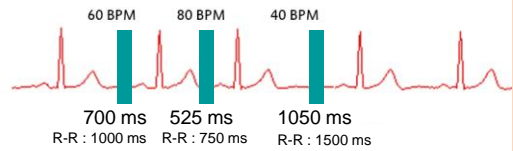
- Define the position by percentage (%) is called as **relative position**, because the distance of that position from R is located in XX % of R – R distance.

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CCTA Procedures: Reconstruction, the absolute and Relative



Example Position : 70 %



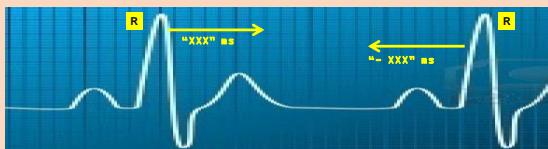
- This percentage position make the position changes if the heart rate (R-R Distance) changes

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CCTA Procedures: Reconstruction, the absolute and Relative



Absolute (ms / millisecond)



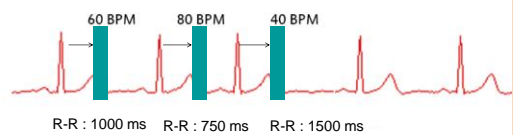
- Define the position by millisecond is called as **absolute position**, because the distance of that position from R is fixed for "XXX" ms (to the right of R) or "-XXX" ms (to the left of R)

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CCTA Procedures : ECG, the absolute and Relative



Example Position : 300 ms (300 ms from the R to the right)



- This absolute position make the position stay in the same location even if the heart rate (R-R Distance) changes

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CCTA Procedures: Reconstruction, the absolute and Relative



Relative / Percentage :

- Relatives position from R peak
- Good for reconstruct images in stable heart rate

Absolute / Milli second :

- Absolute position from R peak
- Good for reconstruct images in high / unstable heart rate

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CCTA Procedures: Reconstruction, the absolute and Relative



Conclusion :

Low HR (remember your temporal resolution !!)

- Stable → diastolic, %
- Unstable → systolic, ms

High HR (remember your temporal resolution !!):

- stable → systolic, %
- Unstable → systolic, ms

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Thank you !



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