

**18<sup>TH</sup> ANNUAL CANADIAN ECHO WEEKEND**  
**APRIL 7-9, 2016**  
**TORONTO, ON**

**Session Title:** **My Patient has Chest Pain**  
Adding Contrast – Will it Suffice?  
A Case Based Presentation

**Presenter/Author:** **Harald Becher**

**OBJECTIVES:** What questions or points will participants learn or discuss?

1. **Why contrast agents are useful in the majority of patients referred for assessment of myocardial ischemia**

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2. **Imaging Protocols for clinical practice which make you confident with the findings**

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3. **Criteria for normal/abnormal findings when state-of-the-art echo machine with very low MI contrast settings are used**

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**DISCUSSION:** Please provide a summary of the discussion and/or include 3 to 6 key presentation slides.

**Low and Very Low Mechanical Index (MI)**  
**Imaging Techniques for Contrast Echo**

Descriptor	Company Manufacturer(s)	Advantage(s)	Disadvantage(s)
Pulse-inversion Doppler and very low MI*	Philips Epiq/ iE33 Toshiba Aplio/Xario GE 1.5-, 1.6- and 1.7-MHz transducers	High resolution	Attenuation and dynamic range
Power modulation and very low MI*	Philips Sonos /iE33 GE 2.1- and 2.4 MHz transducers	High sensitivity	Resolution, image quality and dynamic range
Contrast pulse sequencing and very low MI*	Siemens Acuson	Image quality and high sensitivity	Attenuation and dynamic range
Low MI† harmonic (LVO)	All vendors	Image quality	Decreased contrast sensitivity, apical swirling and no perfusion

\*Very low MI, <0.2.  
†Low MI, <0.3.

**Recommended**

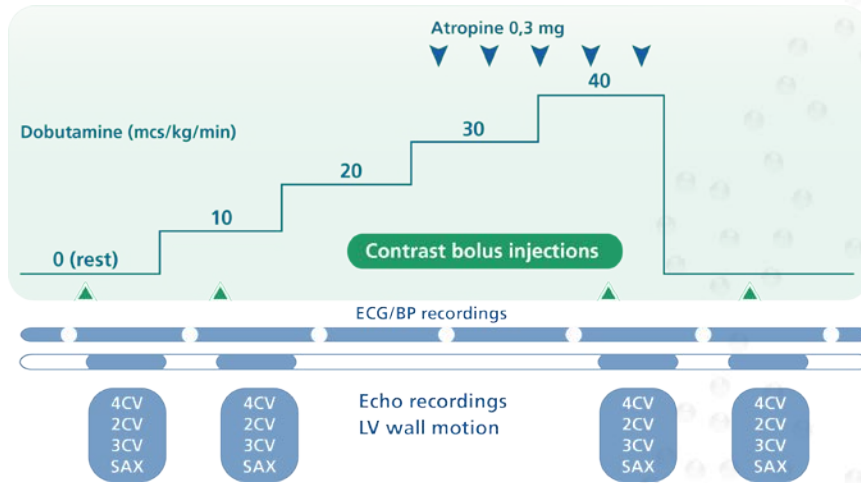
*ASE sonographer guidelines 2014*



**Protocol with bolus injections of the contrast agent:** for example 1 ml of

diluted Definity (0.3 ml in 10 ml saline) or SonoVue 0.5 ml

## Dobutamine 2D Contrast Stress Echo for assessment of ischemia



\* Additional echo recordings may be performed at intermediate stress (70% of target heart rate)

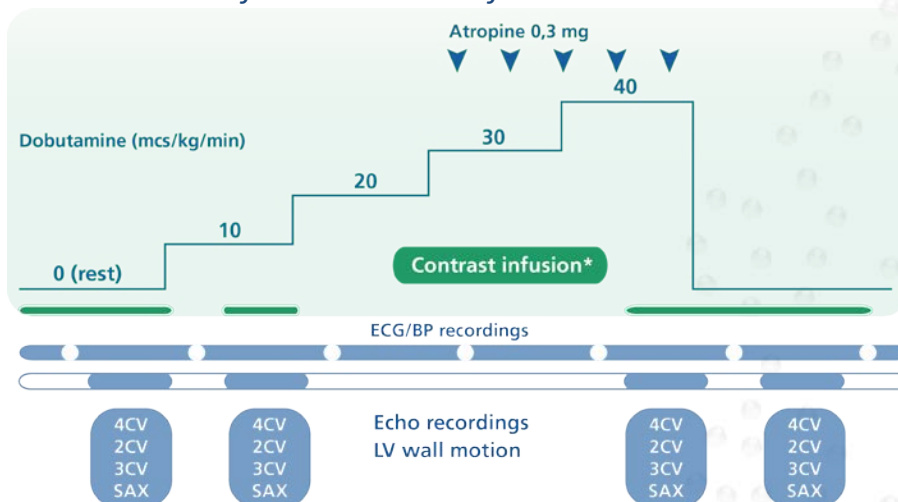
Use of contrast enhanced ultrasound in echocardiography

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**RECOMMENDED Protocol with infusion of the contrast agent:** for example 1ml/min of 1 vial Definity diluted in 30 ml or SonoVue infusion

## Dobutamine 2D Contrast Stress Echo for assessment of ischemia



\* Additional echo recordings may be performed at intermediate stress (70% of target heart rate)

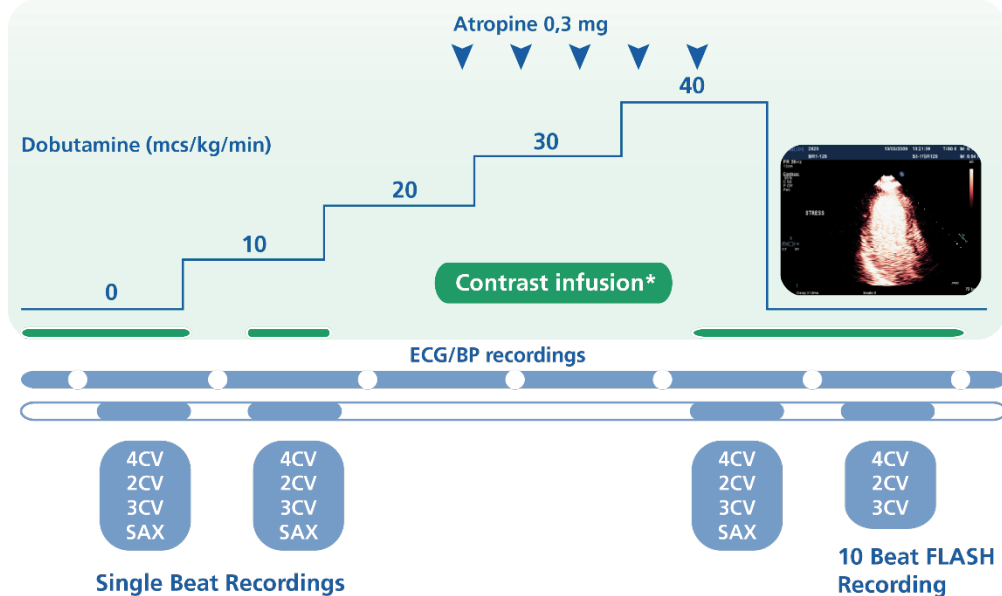
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## Modified Protocol to obtain information of myocardial perfusion needs

1. infusion of the contrast agent
2. very low MI contrast setting
3. Recording of Flash-Replenishment sequences in recovery instead of the usual 1 beat loops



## FLASH replenishment

A flash sequence allows us to get an estimate of myocardial blood flow, which is reduced in patients with epicardial coronary stenosis and impaired microcirculation.

The contrast in the myocardium is wiped out by the flash which is available as a preset on scanners with very low MI contrast settings.

The time to refill the myocardium is an indicator of myocardial blood flow.

The flash-replenishment sequences are loops of at least 10 consecutive beats.

First the 4 chamber view is scanned – the patient is asked to hold the breath and the acquisition is started. After 2 beats the flash button is pressed and then another 8 beats are recorded. Then the same procedure is performed for the 2 and 3 chamber view.

## Normal myocardial perfusion

1. homogeneous opacification of the segments and
2. replenishment within 2 s after the flash

## Abnormal myocardial perfusion

subendocardial perfusion defect which takes longer than 2 s to refill after the flash – usually associated with wall motion abnormality in the same segment or in a segment supplied by the same coronary vessel

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**CONCLUSIONS:**

1. The use of contrast agents in stress echocardiography is recommended irrespective of the image quality of the native echocardiogram
2. Very low MI contrast settings are recommended for stress echocardiography because of the superior image quality and the possibility to supplement the assessment of wall motion by information on myocardial perfusion
- 3.

**REFERENCES:** (journals, websites, etc.)

- 1 Porter T et al. Guidelines for the Cardiac Sonographer in the Performance of Contrast Echocardiography: A Focused Update from the American Society of Echocardiography J Am Soc Echocardiogr 2014;27:797-810.
- 2 Larsson MK et al. The potential clinical value of contrast enhanced echocardiography beyond current recommendations. Cardiovascular Ultrasound (2016) 14:2
- 3 Helfen A, Becher H. Contrast Echocardiography – Educational Tool. 2016 Springer