

The Joint Task Force on CEUS Curriculum in Sonographer Schools

**Educational Resource Guide
for Contrast Enhanced Ultrasound (CEUS):**

Echocardiography



Joint Task Force Member Organizations:

American Institute of Ultrasound in Medicine (AIUM)
American Registry of Diagnostic Medical Sonographers (ARDMS)
American Society of Echocardiography (ASE)
International Contrast Ultrasound Society (ICUS)
Intersocietal Accreditation Commission (IAC)
Society of Diagnostic Medical Sonographers (SDMS)

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1. Introduction to CEUS

a) What is CEUS?

ICUS webpage with a brief description of CEUS, including the ultrasound contrast agents are available.

<http://icus-society.org/what-is-ceus/>

b) Introduction to CEUS for Echocardiography

ICUS webpage introducing CEUS in echocardiography and how it may benefit patient care

<http://icus-society.org/heart/>

Webinar (IAC & ICUS) - Presented by Pam Burgess, ACS, BS, RDCS, RDMS, RVT, FASE

https://www.youtube.com/watch?v=KQla_iDeeTM

c) Basic concepts of CEUS

1 hour webinar (ICUS & Hammersmith Echocardiology Conference) - Presented by Mark Monaghan, MSc, PhD

<http://icus-society.org/hammersmith-cardiovascular/>

d) Role of Qualified sonographers in CEUS

ICUS scope of practice policy recommendation: ROLE OF QUALIFIED SONOGRAPHERS IN CEUS

http://www.icus-society.org/wp-content/uploads/2018/08/ICUS-Policy-Statement_-_Sonographer-Administration-of-CEUS82139072_8-c.pdf

2. CEUS vs. other CV imaging

a) Potential uses and benefits of CEUS

ICUS webpage explaining potential benefits of CEUS -- i.e., there is no ionizing radiation, and it is often cheaper, safer, faster, more convenient and at least as reliable as other forms of diagnostic imaging.

<http://icus-society.org/benefits-of-ceus/>

b) CEUS vs other CV Imaging Options

An overview of some of the strengths and weaknesses of contrast echocardiography as compared to other modalities.

½ hour webinar (ICUS & MedMentor) - Presented by Sharon Mulvagh, MD

<https://vimeo.com/568928695>

3. Ultrasound Enhancing Agents (UEAs) - aka Ultrasound Contrast Agents or “Microbubbles”

a) Basics of Bubbles and CEUS

The Basics (ASE) - What are microbubbles, and more
<https://www.asecho.org/contrast-zone/the-basics/>

b) Basics of Using Contrast

1 hour webinar (IAC & ICUS) - Presented by Pam Burgess, ACS, BS, RDCS, RDMS, RVT, FASE
https://www.youtube.com/watch?v=KQla_iDeeTM

c) Basics of Bubbles: What the Clinician Needs to Know

Webinar (ASE) -- Presented by Mark Monaghan, MSc, PhD
<https://www.youtube.com/watch?v=sd4bOjcPKjI>

d) What UEAs are approved for use around the world?

Interactive world map (ICUS): <http://icus-society.org/>
Product labels (ICUS website): <http://icus-society.org/product-labels/>

e) Identification of Need for Ultrasound Enhancing Agent Study (the IN-USE Study)

Fraiche et al., Journal of the American Society of Echocardiography, Vol. 33, Number 12 (December 2020)
[https://www.onlinejase.com/article/S0894-7317\(20\)30475-2/abstract](https://www.onlinejase.com/article/S0894-7317(20)30475-2/abstract)

f) Protocols for CEUS exams of the heart

ICUS webpage reflects clinical CEUS protocols and practices in many medical centers throughout the world.
<http://icus-society.org/heart/heart-exam-protocol/>

g) Additional references

- <http://icus-society.org/benefits-of-ceus/>
- <http://icus-society.org/comparative-effectiveness-of-ceus/>
- <https://www.asecho.org/wp-content/uploads/2018/07/Contrast-Echo-On-Label-Summary-FINAL-rev.pdf>

4. When should you use an Ultrasound Enhancing Agent (UEA)?

a) Recommended Laboratory Practices

Comprehensive recommendations for echocardiography laboratories (ASE)

<https://www.asecho.org/wp-content/uploads/2021/03/ASE1338-Contrast-Playbook-FNA.pdf>

b) Implementing Guideline-Defined Contrast Echo in Daily Clinical Practice

An overview of important uses of contrast to improve echocardiographic imaging.

2 hour webinar (ICUS) - Roxy Senior MD, Sharon Mulvagh MD, Mark Monaghan MSc, PhD

<https://dentons.zoom.us/rec/play/EqKx8bbJ10YoQLvQWw6TpDn00Hlf6GeI2KradpJfeXlBvPquQrRu3uHob8JyD1x3gJMb4iTSyfpa7Qh.qSVRNDC3UarmWwjW>

c) Clinical Applications of Ultrasonic Enhancing Agents in Echocardiography

1 hour webinar (ASE) - Tom Porter, MD

<https://www.youtube.com/watch?v=MoQuxuilJg8&feature=youtu.be>

d) CEUS in the Echo Lab

½ hr webinar (ICUS) - Sharon Mulvagh, MD

<https://vimeo.com/568920340>

e) CEUS and Stress Echo

➤ *A review of how UEAs can enhance and improve cardiovascular stress testing.*

½ hour webinar (ICUS) - Sharon Mulvagh, MD

Learning Objective: Identify techniques you can use in performing stress echo with UEA.

<https://vimeo.com/568924648>

➤ *LVO Rest & treadmill/bicycle and dobutamine stress echo*

1.5 hr webinar (ICUS) - Tom Porter, MD

<http://icus-society.org/ceus-chicago-2019-livestream-archive-cardiovascular/>

➤ *Stress echocardiography with contrast for the diagnosis of coronary artery disease: an evidence-based analysis*

Conclusions: Stress ECHO with contrast has a higher diagnostic accuracy in the diagnosis of CAD than stress ECHO (without contrast). Stress ECHO with contrast seems to have a similar diagnostic accuracy to 99 technetium SPECT. The addition of contrast to ECHO in patients with suboptimal ECHO results significantly improves interpretability of the results. There is not a statistically significantly higher mortality rate in patients who receive contrast compared to those who do not.

<https://pubmed.ncbi.nlm.nih.gov/23074387/>

f) Myocardial perfusion: When, How and Why It Matters

2 hour webinar (ICUS) - Andrew Appis MD, Tom Porter MD and Steven Feinstein MD.
https://dentons.zoom.us/rec/play/cYT_ILvCQ7IMneoFYm46B784dmHAGFgwdmt3VKqUI-wQINuCeZTL_a6x1bDRexMu2SH-Zqqv-Y5BsR0i.fDI5laxgG3jF_1PJ

5. Role of the sonographer in performing CEUS

a) How to Get Started

1 hour webinar (IAC and ASE) - Laura Johnson, RDCS
<https://www.youtube.com/watch?v=4kvaZzGiM4U&t=16s>

b) IV Insertion by a Sonographer

Webinar (IAC and ICUS) - Pam Burgess, ACS, BS
<https://www.youtube.com/watch?v=dQr8vQ8PT9g&feature=youtu.be>

c) Guidelines for the Cardiac Sonographer in the Performance of Contrast Echocardiography

1 hour webcast (ASE) - Thomas Porter, MD
<https://www.youtube.com/watch?v=ChCbiP1ytGs>

d) What images for Echo?

- *A brief overview of some of the key images to acquire when doing contrast echocardiography.*

½ hour webinar (ICUS and MedMentor) - Ben Lin, MD
<https://vimeo.com/568932031>

- *Contrast Echocardiography: The Bubbles and How We Image Them*

1 hour webinar (ASE) - Jonathan Lindner, MD
<https://www.youtube.com/watch?v=6ixXljzPbSc&t=8s>

e) Additional References

- Scope of Practice and Clinical Standards for the Diagnostic Medical Sonographer (SDMS)
<https://www.sdms.org/about/who-we-are/scope-of-practice>
- Echocardiography Standards and Guidelines (IAC)
<https://www.intersocietal.org/echo/standards/IACAdultEchocardiographyStandards2017.pdf>
- ICUS RECOMMENDATION: Role of Qualified Sonographers in CEUS
http://www.icus-society.org/wp-content/uploads/2018/08/ICUS-Policy-Statement_-_Sonographer-Administration-of-CEUS82139072_8-c.pdf

6. Safety of UEAs

a) Ultrasound Enhancing Agent Safety

- ***The safety and clinical utility of UEAs, including their safety in the general population and special subsets of patients***

½ hour webinar (ASE) -- Kevin Wei, MD

<https://www.youtube.com/watch?v=9D0lO-ofgzk&feature=youtu.be>

- ***Microbubbles In Practice: Safety, Efficacy, and the Use of Ultrasound Enhancing Agents in the Clinic***

Webinar - Jordan Strom, MD

<https://vimeo.com/568943715>

- ***Ultrasound Enhancing Agents in the COVID-19 ERA: Protocols, Safety, & Impact***

Webinar - Jonathan Lindner MD, Thomas Porter MD, Michelle Bierig, RDCS

<https://vimeo.com/568944725>

- ***Hypersensitivity to UEA's Update on ASE Recommendations on Safety and Echo Lab Policy***

Webinar - Jonathan Lindner MD

<https://vimeo.com/568936396>

b) FDA Approved Applications of UEAs

Summary includes information from ASE Guidelines and Standards Documents

<https://www.asecho.org/wp-content/uploads/2018/07/Contrast-Echo-On-Label-Summary-FINAL-rev.pdf>

7. Miscellaneous: Setting up the lab, coding and payment, future applications

a) Setting up a CEUS Lab

A review of some of the important factors and considerations in setting up a contrast ready echocardiography lab.

¾ hour webinar (ICUS) - Thomas Porter, MD

<https://vimeo.com/568926574>

b) Coding and Payment

ICUS 2021 Coding and Payment Chart

<http://icus-society.org/wp-content/uploads/2021/03/ICUS-CY-2021-Coding-and-Payment.pdf>

c) Future Applications: CEUS and Therapy

An overview of how contrast ultrasound can be used as a therapeutic agent in certain clinical conditions.

½ hour webinar (ICUS) - Presented by Thomas Porter, MD

<https://vimeo.com/568912272>