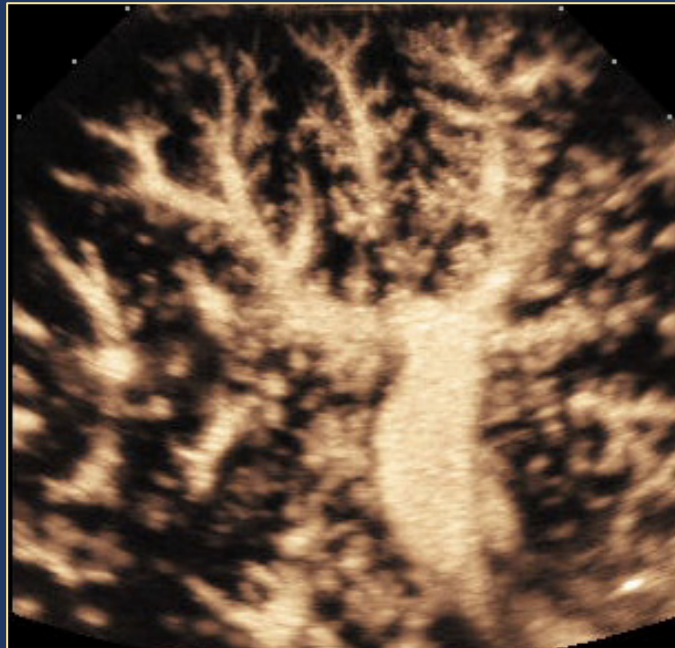


The Joint Task Force on CEUS Curriculum in Sonographer Schools

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

General Sonography



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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Additional Resources

1. Introduction to CEUS

a) Introduction to CEUS for General Sonography

ICUS Course “Essentials of Abdominal CEUS: The Basics and Beyond”

Tips of the trade: How to perform excellent CEUS

Stephanie Wilson, MD

<http://icus-society.org/ceus-chicago-2019-livestream-archive-abdominal/#ygfiiimXAYu0>

ICUS and IAC:” Introduction to Contrast Enhanced Ultrasound for Abdominal Applications”

Cyndi Peterson, MPH, RT, RDMS, RVT

<https://www.youtube.com/watch?v=BFnmmrYwLbM>

b) Benefits of CEUS

ICUS webpage “Benefits of CEUS”

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

c) Abdominal CEUS Technique and Instrumentation

ICUS Course “Essentials of Abdominal CEUS: The Basics and Beyond”

Microbubbles: What are they, how do you Image them, and are they Safe?

Andrej Lyschik, MD, PhD

<http://icus-society.org/ceus-orlando-2019-livestream-archive/#d96wXklPQQU>

d) Ultrasound Scanner settings and CEUS artifacts

ICUS Course “Essentials of Abdominal CEUS: The Basics and Beyond”

What can go wrong and to fix it

Richard Barr, MD, PhD

<http://icus-society.org/ceus-chicago-2019-livestream-archive-abdominal/#ToSCYgybzgs>

e) CEUS vs Contrast-enhanced CT and MRI

An overview of CEUS as compared to other imaging modalities

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

ICUS Course “Essentials of Abdominal CEUS: The Basics and Beyond”

CEUS as compared to CECT and CEMR / HCC imaging and CEUS LI-RADS

Stephanie Wilson, MD

<http://icus-society.org/ceus-chicago-2019-livestream-archive-abdominal/#50VCnyMOiak>

2. Starting a CEUS program for general ultrasound

a) ICUS: Getting Started

<http://icus-society.org/how-to-set-up-a-contrast-ultrasound-lab/>

<http://icus-society.org/wp-content/uploads/2020/03/implementing-liver-contrast-program-in-sonography-laboratory.pdf>

b) How to Setup your CEUS Lab

ICUS Course “Essentials of Abdominal CEUS: The Basics and Beyond”

How to setup a CEUS lab

Richard Barr, MD, PhD

<http://icus-society.org/ceus-chicago-2019-livestream-archive-abdominal/#L4rSC6hIuf8>

How to Develop a Contrast-Enhanced Ultrasound Program

Richard Barr, MD, PhD

<https://doi.org/10.7863/ultra.16.09045>

How to perform Contrast-Enhanced Ultrasound (CEUS)

Dietrich C. et al

<https://www.ncbi.nlm.nih.gov/pmc/articles/pmid/29423461/>

c) IV Insertion by a Sonographer

IAC and ICUS webcast

Pam Burgess, ACS, BS

<https://www.youtube.com/watch?v=dQr8vQ8PT9g&feature=youtu.be>

3. CEUS Guidelines

a) Overview of CEUS guidelines

ICUS Course “Essentials of Abdominal CEUS: The Basics and Beyond”

CEUS Guidelines

Stephanie Wilson, MD

<http://icus-society.org/ceus-chicago-2019-livestream-archive-abdominal/#1LHNKHdkn9I>

b) ACR/AIUM/SRU

ACR–AIUM–SRU Practice Parameter for the Performance of Contrast Enhanced Ultrasound

<https://www.acr.org/-/media/ACR/Files/Practice-Parameters/CEUS.pdf>

c) ACR

ACR Manual On Contrast Media

https://www.acr.org/-/media/ACR/files/clinical-resources/contrast_media.pdf

d) SRU:

Contrast -Enhanced Ultrasound State of the Art in North America

<https://journals.lww.com/ultrasound->

[quarterly/Abstract/2020/09000/Contrast_Enhanced_Ultrasound_State_of_the_Art_in.3.aspx](https://journals.lww.com/ultrasound-quarterly/Abstract/2020/09000/Contrast_Enhanced_Ultrasound_State_of_the_Art_in.3.aspx)

e) EFSUMB:

Guidelines and Good Clinical Practice Recommendations for Contrast Enhanced Ultrasound (CEUS) in the Liver – Update 2020 – WFUMB in Cooperation with EFSUMB, AFSUMB, AIUM, and FLAUS

<https://www.thieme-connect.de/products/ejournals/pdf/10.1055/a-1177-0530.pdf>

The EFSUMB Guidelines and Recommendations for the Clinical Practice of Contrast-Enhanced Ultrasound (CEUS) in Non-Hepatic Applications: Update 2017

<https://www.thieme-connect.com/products/ejournals/pdf/10.1055/a-0586-1107.pdf>

f) SDMS

Scope of Practice and Clinical Standards for the Diagnostic Medical Sonographer ()

<https://www.sdms.org/about/who-we-are/scope-of-practice>

g) ICUS

Scope of practice policy recommendation:

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

4. Safety of Ultrasound Contrast Agents

a) ASE

The safety and clinical utility of UEAs

Kevin Wei, MD.

<https://www.youtube.com/watch?v=9D0l0-ofgzk&feature=youtu.be>

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

<https://vimeo.com/568936396>

b) ICUS

ICUS Course "Essentials of Abdominal CEUS: The Basics and Beyond"

Microbubbles: What are they, how do you Image them, and are they Safe?

Andrej Lyshchik, MD, PhD

<http://icus-society.org/ceus-orlando-2019-livestream-archive/#d96wXkIPQQU>

c) Northwest Imaging Forums

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

Jordan B. Strom, MD

<https://vimeo.com/568943715>

d) SDMS

Ultrasound Enhancing Agents In the COVID-19 Era: Protocols, Safety, & Impact

<https://vimeo.com/568944725>

5. Coding and Payment

a) ICUS 2021 Coding and Payment Chart

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

6. Liver CEUS

a) Basics of liver CEUS

ICUS Course “Essentials of Abdominal CEUS: The Basics and Beyond” Fundamentals of interpretation of Liver CEUS

Stephanie Wilson, MD

<http://icus-society.org/ceus-chicago-2019-livestream-archive-abdominal/#ikkMKTHAm9c>

b) Liver CEUS technique, protocol and Lexicon

Contrast-enhanced ultrasound of the liver: technical and lexicon recommendations from the ACR CEUS LI-RADS working group

Andrej Lyshchik, MD, PhD et al.

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC29151131/>

c) Liver CEUS interpretation in general population

Guidelines and good clinical practice recommendations for Contrast Enhanced Ultrasound (CEUS) in the liver - update 2012: A WFUMB-EFSUMB initiative in cooperation with representatives of AFSUMB, AIUM, ASUM, FLAUS and ICUS

[https://linkinghub.elsevier.com/retrieve/pii/S0301-5629\(12\)00543-1](https://linkinghub.elsevier.com/retrieve/pii/S0301-5629(12)00543-1)

d) Liver CEUS interpretation in patients at risk for HCC (LI-RADS)

ICUS Course “Essentials of Abdominal CEUS: The Basics and Beyond”

HCC Diagnosis and LI-RADS

Andrej Lyshchik, MD, PhD

<http://icus-society.org/ceus-orlando-2019-livestream-archive/#dGXSwGOUxjY>

Additional resources

ICUS

Liver imaging education resources

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

EFSUMB

Guidelines and Good Clinical Practice Recommendations for Contrast Enhanced Ultrasound (CEUS) in the Liver – Update 2020

<https://www.thieme-connect.de/products/ejournals/pdf/10.1055/a-1177-0530.pdf>

CEUS Textbook

Specialty Imaging: Fundamentals of CEUS - 1st Edition

<https://www.us.elsevierhealth.com/specialty-imaging-fundamentals-of-ceus-9780323625647.html>

7. Renal CEUS

a) Basics of renal CEUS

ICUS Course “Essentials of Abdominal CEUS: The Basics and Beyond”

Renal CEUS

Richard Barr, MD, PhD

<http://icus-society.org/ceus-orlando-2019-livestream-archive/#q0RSxWcBugc>

b) Renal CEUS protocol

ACR–AIUM–SRU Practice Parameter for the Performance of Contrast Enhanced Ultrasound

<https://www.acr.org/-/media/ACR/Files/Practice-Parameters/CEUS.pdf>

c) Renal CEUS Interpretation

Evaluation of indeterminate renal masses with contrast-enhanced US: a diagnostic performance study

Richard Barr, MD, PhD, et al

<https://pubmed.ncbi.nlm.nih.gov/24475802/>

EFSUMB 2020 Proposal for a Contrast-Enhanced Ultrasound-Adapted Bosniak Cyst Categorization - Position Statement

<https://www.thieme-connect.com/DOI/DOI?10.1055/a-1300-1727>

Additional resources

ICUS

Renal imaging education resources

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

EFSUMB

The EFSUMB Guidelines and Recommendations for the Clinical Practice of Contrast-Enhanced Ultrasound (CEUS) in Non-Hepatic Applications: Update 2017

<https://www.thieme-connect.com/products/ejournals/pdf/10.1055/a-0586-1107.pdf>

CEUS Textbook

Specialty Imaging: Fundamentals of CEUS - 1st Edition

<https://www.us.elsevierhealth.com/specialty-imaging-fundamentals-of-ceus-9780323625647.html>

8. Interventional CEUS

a) CEUS applications in Interventional Radiology

ICUS Course “Essentials of Abdominal CEUS: The Basics and Beyond”

CEUS in Interventional Radiology

Andrej Lyshchik, MD, PhD

<http://icus-society.org/ceus-orlando-2019-livestream-archive/#krxHFh1zyNs>

b) Imaging protocol

ACR–AIUM–SRU Practice Parameter for the Performance of Contrast Enhanced Ultrasound

<https://www.acr.org/-/media/ACR/Files/Practice-Parameters/CEUS.pdf>

c) Assessment of liver tumor response to locoregional therapies

Contrast-enhanced ultrasound (CEUS) in HCC diagnosis and assessment of tumor response to locoregional therapies

Eisenbrey JR et al.

<https://dx.doi.org/10.1007/s00261-021-03059-y>

d) CEUS applications in Interventional Oncology

Contrast-enhanced ultrasonography in interventional oncology

Gummadi S et al

<https://www.ncbi.nlm.nih.gov/pmc/articles/pmid/29632993/>

Additional resources

SRU

Contrast-enhanced Ultrasound-State of the Art in North America: Society of Radiologists in Ultrasound White Paper

<https://doi.org/10.1097/RUQ.0000000000000515>

EFSUMB

The EFSUMB Guidelines and Recommendations for the Clinical Practice of Contrast-Enhanced Ultrasound (CEUS) in Non-Hepatic Applications: Update 2017

<https://www.thieme-connect.com/products/ejournals/pdf/10.1055/a-0586-1107.pdf>

CEUS Textbook

Specialty Imaging: Fundamentals of CEUS - 1st Edition

<https://www.us.elsevierhealth.com/specialty-imaging-fundamentals-of-ceus-9780323625647.html>

9. Other abdominal applications of CEUS

a) Other CEUS applications in abdominal imaging

ICUS Course “Essentials of Abdominal CEUS: The Basics and Beyond”

CEUS applications beyond the liver and kidney

Stephanie Wilson, MD

<http://icus-society.org/ceus-chicago-2019-livestream-archive-abdominal/#ji3t1a5HS3s>

b) Imaging protocol

ACR–AIUM–SRU Practice Parameter for the Performance of Contrast Enhanced Ultrasound

<https://www.acr.org/-/media/ACR/Files/Practice-Parameters/CEUS.pdf>

c) Vascular CEUS Interpretation

A Narrative Review on Contrast-Enhanced Ultrasound in Aortic Endograft Endoleak Surveillance

Gummadi S et al

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC29596299/>

d) Bowel CEUS Interpretation

Role of contrast-enhanced ultrasound in evaluation of the bowel

Medellin A et al.

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC29260278/>

e) Scrotal CEUS Interpretation

Contrast-Enhanced Ultrasonography of the Testes

Ounali JS. Et al

<https://www.sciencedirect.com/science/article/pii/S1556858X13000625?via%3Dihub>

Additional resources

ICUS

Bowel imaging education resources

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

EFSUMB

The EFSUMB Guidelines and Recommendations for the Clinical Practice of Contrast-Enhanced Ultrasound (CEUS) in Non-Hepatic Applications:

<https://www.thieme-connect.com/products/ejournals/pdf/10.1055/a-0586-1107.pdf>

CEUS Textbook

Specialty Imaging: Fundamentals of CEUS - 1st Edition

<https://www.us.elsevierhealth.com/specialty-imaging-fundamentals-of-ceus-9780323625647.html>

10. Pediatric CEUS

a) Pediatric Contrast Enhanced Voiding Urosonography (CEVUS)

ICUS Course “Essentials of Abdominal CEUS: The Basics and Beyond”

Pediatric Contrast Enhanced Voiding Urosonography (CEVUS)

Kassa Darge, MD, PhD

<http://icus-society.org/ceus-orlando-2019-livestream-archive/#1VxCFEhFDhg>

b) Pediatric Intravenous CEUS

ICUS Course “Essentials of Abdominal CEUS: The Basics and Beyond”

Pediatric Intravenous Contrast-Enhanced Ultrasound

Kassa Darge, MD, PhD

<http://icus-society.org/ceus-orlando-2019-livestream-archive/#SnES9NJllc>

c) Imaging protocol

ACR–AIUM–SRU Practice Parameter for the Performance of Contrast Enhanced Ultrasound

<https://www.acr.org/-/media/ACR/Files/Practice-Parameters/CEUS.pdf>

Additional resources

ICUS

Pediatric CEUS imaging education resources

<http://icus-society.org/pediatric-imaging/>

SPR

The Society of Pediatric Radiology Contrast-Enhanced Ultrasound Taskforce

<https://www.pedrad.org/Specialties/CEUS>

CEUS Textbook

Specialty Imaging: Fundamentals of CEUS - 1st Edition

<https://www.us.elsevierhealth.com/specialty-imaging-fundamentals-of-ceus-9780323625647.html>