Activity Outline

FDA Grand Rounds:
Assessing the safety and effectiveness of new and emerging therapeutic ultrasound technologies

November 9, 2017
12:00 PM-1:00 PM
FDA White Oak CSU 2031

Series Description

The FDA Grand Rounds is webcast every other month to highlight cutting-edge research underway across the agency and its impact on protecting and advancing public health. Each session features an FDA scientist presenting on a key public health challenge and how FDA is applying science to its regulatory activities.

Session Description

Ultrasound has a long history as a medical tool, with investigative devices dating back to the 1940s. Today, diagnostic ultrasound's ability to image in real-time, along with its excellent safety record and modern-day portability, has led to its prominence worldwide. Meanwhile, the use of high-intensity ultrasound as a minimally invasive therapeutic tool is accelerating. Marketed devices now permit the treatment of certain cancers, uterine fibroids, and essential tremor, while investigations into the treatment of many other brain disorders and various cancers are ongoing.

Given its long presence in medicine, it may be surprising that many of ultrasound bioeffects remain poorly understood. This has clear implications in assessing both the safety and effectiveness of high intensity therapeutic devices. For example, investigative devices are now using ultrasound for targeted opening of the blood-brain-barrier (BBB), yet the full mechanisms and bioeffects are not completely known. Likewise, significant interest has recently emerged in the use of ultrasound for neuromodulation, while once again the exact mechanisms have yet to be established.

FDA's Ultrasonics Lab is undertaking projects aimed at a better understanding of ultrasound bioeffects. The lab further seeks to identify more accurate metrics for quantifying ultrasound safety and straightforward procedures to assess these metrics. Active work for high intensity therapeutic ultrasound (HITU) includes:

- Developing experimental and computational methods to accurately estimate dosage and targeting accuracy of high-intensity therapeutic ultrasound.
- Advancing safety and effectiveness of microbubbles, which are also used in diagnostic applications as contrast agents, in therapeutic applications for drug delivery, opening the BBB, and thrombolysis.
- Developing computational methods to model ultrasound propagation through skull in order to advance safety and effectiveness of transcranial ultrasound for diagnostic imaging, neuromodulation, and high-intensity therapeutic ultrasound therapy.
- Researching potential harmful bioeffects of ultrasound neuromodulation in order to ensure safety of new neuromodulation devices.

Session References:

1. D. Weintraub and W. J. Elias, "The emerging role of transcranial magnetic resonance imaging–guided focused ultrasound in functional neurosurgery," Mov. Disord., vol. 32, no. 1, pp. 20–27, Jan. 2017.
2. A. Kyriakou, E. Neufeld, B. Werner, M. M. Paulides, G. Szekely, and N. Kuster, "A review of numerical and experimental compensation techniques for skull-induced phase aberrations in transcranial focused ultrasound," Int. J. Hyperthermia, vol. 30, no. 1, pp. 36–46, Feb. 2014.

3. A. Fasano, A. M. Lozano, and E. Cubo, “New neurosurgical approaches for tremor and Parkinson’s disease,” Curr. Opin. Neurol., vol. 30, no. 4, pp. 435–446, Aug. 2017.
4. R. F. Dallapiazza et al., “Noninvasive neuromodulation and thalamic mapping with low-intensity focused ultrasound,” J. Neurosurg., pp. 1–10, Apr. 2017.
5. Z. I. Kovacs et al., “Disrupting the blood–brain barrier by focused ultrasound induces sterile inflammation,” Proc. Natl. Acad. Sci., vol. 114, no. 1, pp. E75–E84, Jan. 2017.

Series Objectives:

1. Discuss the research conducted at the FDA.
2. Explain how FDA science impacts public health.

Session Learning Objectives After completion of this activity, the participant will be able to:

1. Identify the role of microbubbles in HITU, as well as the special safety considerations they introduce.
2. Describe the range of approved and prospective high-intensity therapeutic ultrasound applications.
3. Talk about the concept of thermal dose for assessing high-intensity therapeutic ultrasound applications and identify methods the FDA is developing to improve its estimation.
4. Explain the limits of what is known on the bioeffects of ultrasound on certain cells, (i.e. endothelial cells and neurons).
5. Recognize the basic methodology behind transcranial therapeutic ultrasound, identify its unique safety considerations, and discuss FDA development of improved modeling of ultrasound propagation through the skull.

Target Audience

This activity is intended for physicians, pharmacists, nurses and other scientists within the agency and external community.

About the Presenter

Gregory Clement, PhD joined FDA’s Ultrasonics Laboratory as a physicist in January of this year. For over 25 years he has been developing new methods for ultrasound imaging and therapy, most notably for transcranial brain applications. He came to FDA from Cleveland Clinic, where he was principal investigator and Director of the Clinic Ultrasound Laboratory. Previously, he was Associate Professor of Radiology at Harvard Medical School, Head of Imaging for the National Center for Image Guided Therapy, and Technical Director of the Focused Ultrasound Laboratory at Brigham and Women's Hospital. A Fellow of the Institute of Physics, Dr. Clement is an Associate Editor of IEEE Transactions on Ultrasonics Ferroelectrics and Frequency Control, and sits on the editorial boards of the journals Physics in Medicine and Biology and Ultrasound in Medicine and Biology.

Schedule

Date/Time/Place	Lecture Title	Lecturer
Thursday, November 9, 2017 12:00 PM-1:00 PM FDA White Oak CSU 2031	FDA Grand Rounds: Assessing the safety and effectiveness of new and emerging therapeutic ultrasound technologies	Greg Clement, PhD

Continuing Education Accreditation

In support of improving patient care, FDA Center for Drug Evaluation and Research is jointly accredited by the Accreditation Council for Continuing Medical Education (ACCME), the Accreditation Council for Pharmacy Education (ACPE), and the American Nurses Credentialing Center (ANCC) to provide continuing education for the healthcare team.

CME

FDA Center for Drug Evaluation and Research designates this live activity for a maximum of 1 *AMA PRA Category 1 Credit(s)*™. Physicians should claim only the credit commensurate with the extent of their participation in the activity.

CPE

This application-based activity has been assigned ACPE Universal Activity Number 0601-0000-17-138-L04-P, for 1 contact hour(s).

CNE

FDA Center for Drug Evaluation and Research designates this activity for 1 contact hour(s).

Requirements for receiving CE credit

Physicians, pharmacists, nurses and those claiming non-physician CME: attendance is verified by a sign-in sheet and completion of the final activity evaluation. For multi-day activities, participants must sign in every day. Final activity evaluations must be completed within two weeks after the activity.

Pharmacy participants: partial credit cannot be awarded therefore you must attend the entire activity to receive CPE credit. No exceptions. Pharmacists will need their NABP e-profile ID number as well as their DOB in MMDD format in order to claim CE credit.

Statements of Credit

Physicians and Nurses Statements of Credit for CE will be issued 10 weeks after the last session of this activity. Pharmacists should log into the CPE monitor 10 weeks after the last session of the activity to obtain their CE credit.

Disclosure

Faculty

Gregory Clement, PhD, Staff Fellow, FDA, discloses the following: "I was the primary inventor on three patents licensed to InSightec Inc. Since joining the FDA I have transferred 100% of future royalty payments to a charitable source." Presentation may include off-label discussion of FDA approved products.

Planning Committee

Christine Lee, PharmD, PhD, Health Scientist, FDA/CDER, has nothing to disclose.
Virginia Giroux, MSN, ARNP, CE Program Administrator, CDER/DLOD, has nothing to disclose.
Eileen Parish, MD, Medical Officer, FDA/OC/OCS/OSPD, has nothing to disclose.
Leslie Wheelock, MS, RN, Director OSPD, FDA/OC/OCS/OSPD, has nothing to disclose.

CE Consultation and Accreditation Team

Traci Bryant, MAT, Education Specialist, FDA/CDER/OEP/DLOD, has nothing to disclose.

Karen Zawalick, CE Team Leader, FDA/CDER/OEP/DLOD, has nothing to disclose.

Registration Fees and Refunds
Registration is complimentary therefore refunds are not applicable.

Requirements for Certificate of Completion (Non CE)
Must attend 80% of the lectures (verified by a sign-in sheet).

Remote Access Instructions:

Webcast Registration: To register for the webcast, please click the link below and then follow the instructions on the registration page. After you register you will receive a link via email to access the live webinar. You must log in with your username and password which you create when you register. Please pre-register at least one day before the event to ensure you receive the access link email and outlook invitation for the session.
https://collaboration.fda.gov/nov92017grandroundsreg/event/registration.html

For technical assistance please contact Jeffery Rexrode at Jeffery.Rexrode@fda.hhs.gov.

LMS Registration link:
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