

# History of Ultrasound and Technological Advances



**Jim Tsung, MD, MPH**  
**New York, USA**

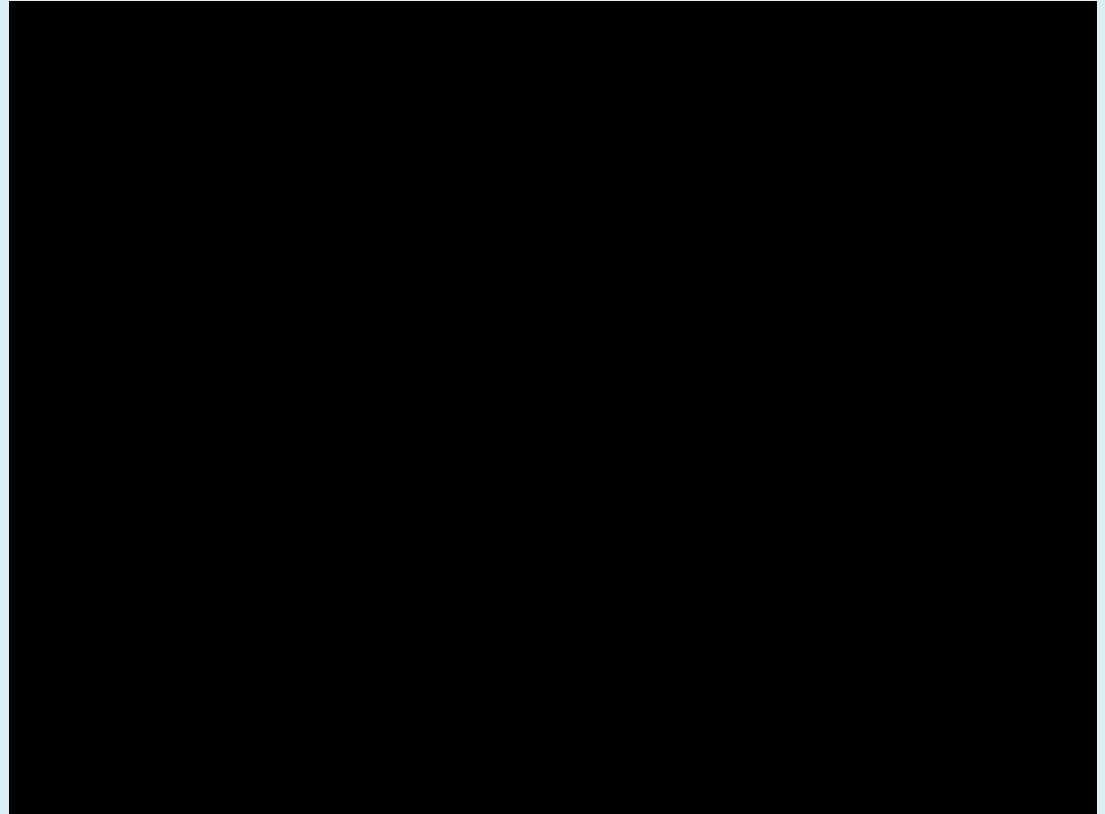
# **3 Themes**

- Asking a question
- Making an observation
  - Solving a problem



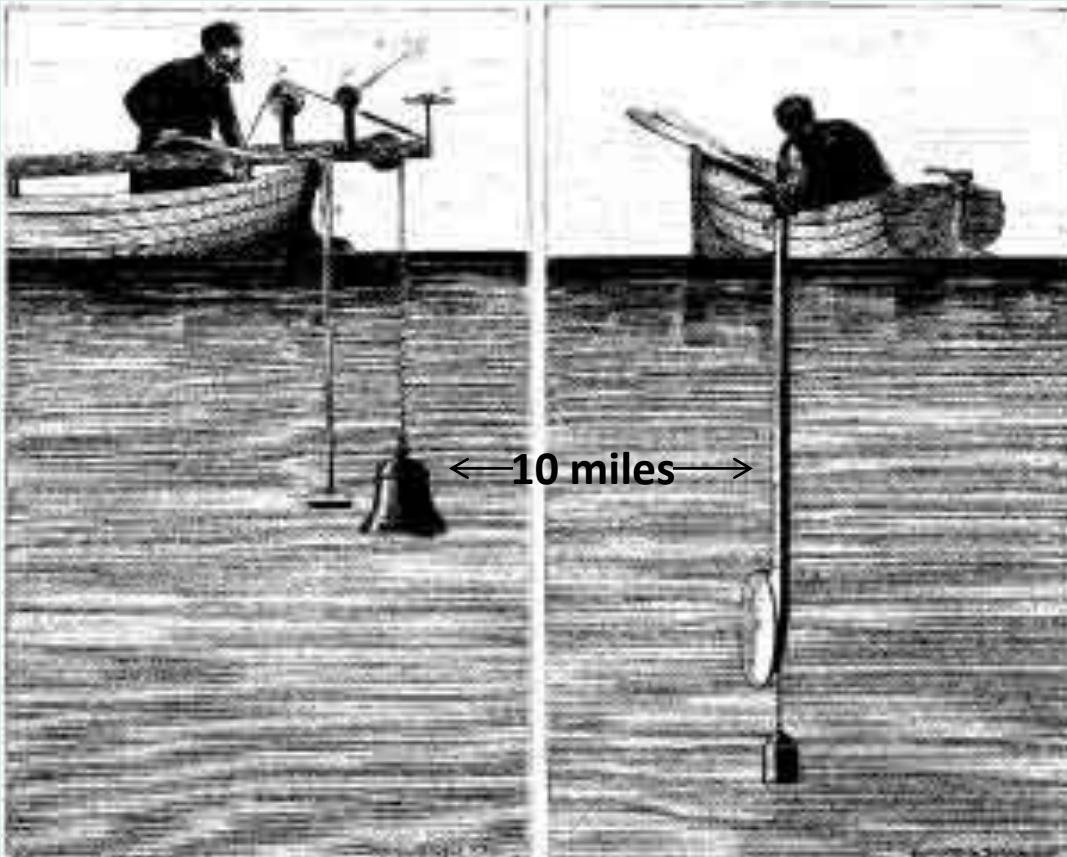
# 1794: Lazzaro Spallanzani - Physiologist

First to Study Ultrasound Physics by Deducing Bats used to ultrasound to navigate by echolocation



# 1826: Jean Daniel Colladon – Physicist

Uses Under-Water Church Bell (early ultrasound “transducer”) Under Water to calculate Speed of Sound through Water Prove Sound Travelled Faster through Water than Air.



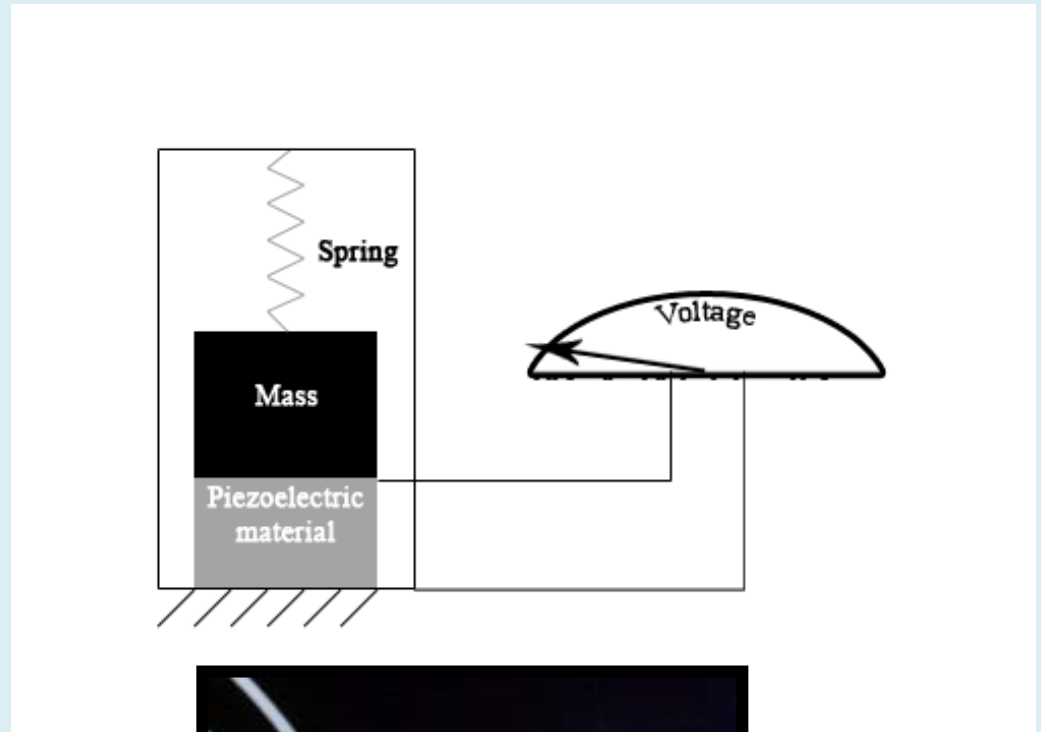
# 1880: Pierre & Jacques Curie discover the Piezo-Electric Effect



Pierre



Jacques





# 1915: Paul Langevin – Physicist

After Titanic Sinking (1912) Invents  
Hydrophone (1<sup>st</sup> Transducer) to detect Icebergs  
and Submarines during WW1

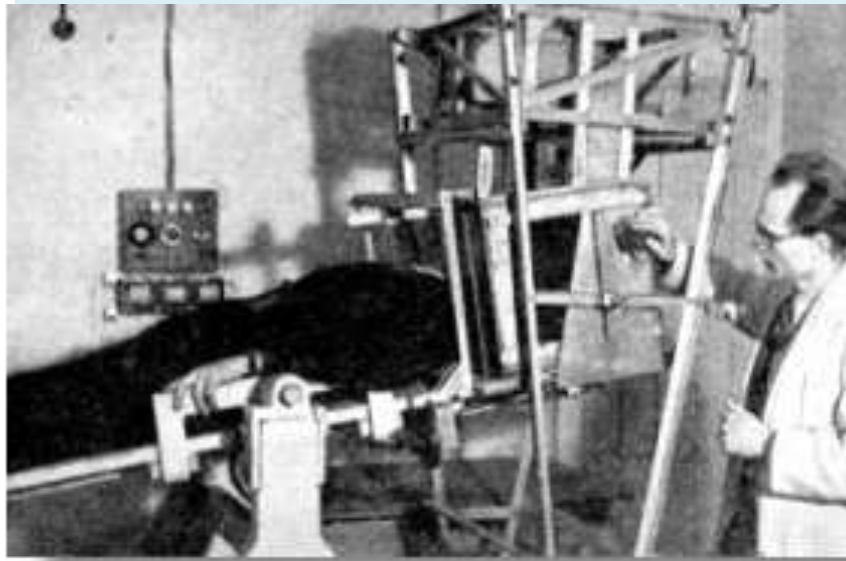




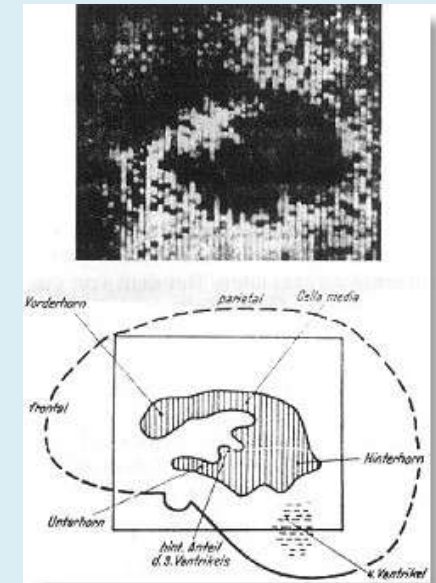
# 1942: Karl Dussik, Neurologist and Psychiatrist at the University of Vienna, generally regarded as the first physician to use ultrasound for medical diagnosis (of brain tumors)




Karl Theo (Theodore) Dussik  
1908 - 1968



Dussik and his ultrasonic apparatus in 1946

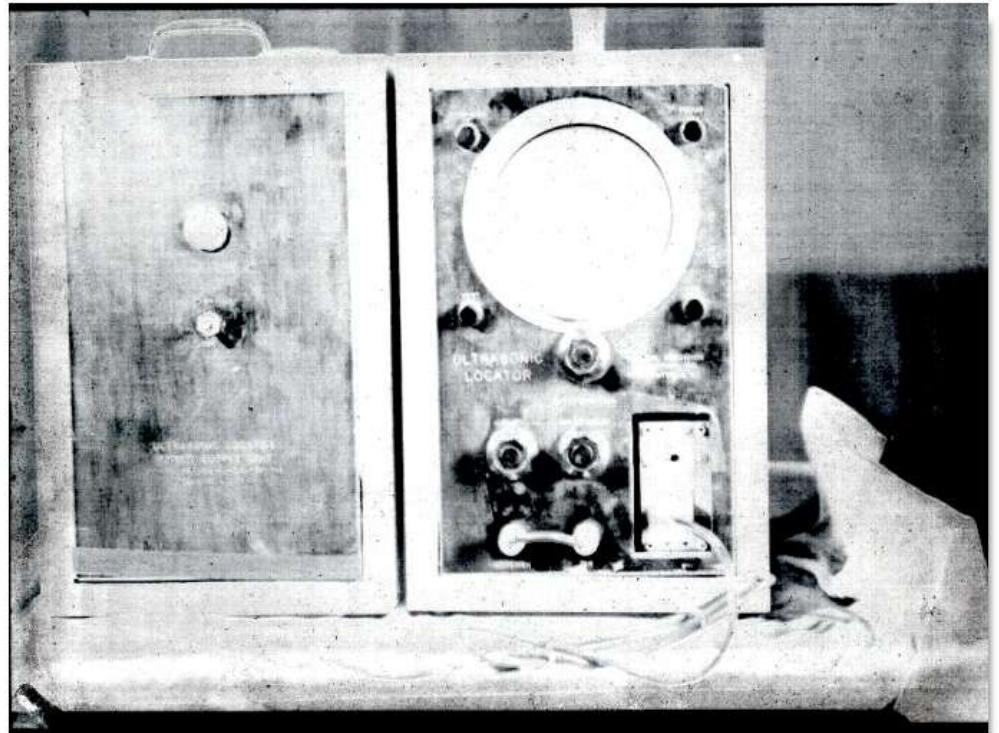


The hyperphonogram was thought to depict the ventricles

 **1948: George Ludwig M.D.,- Internist**  
first described the use of ultrasound to  
diagnose gallstones



George D. Ludwig  
1922 - 1973

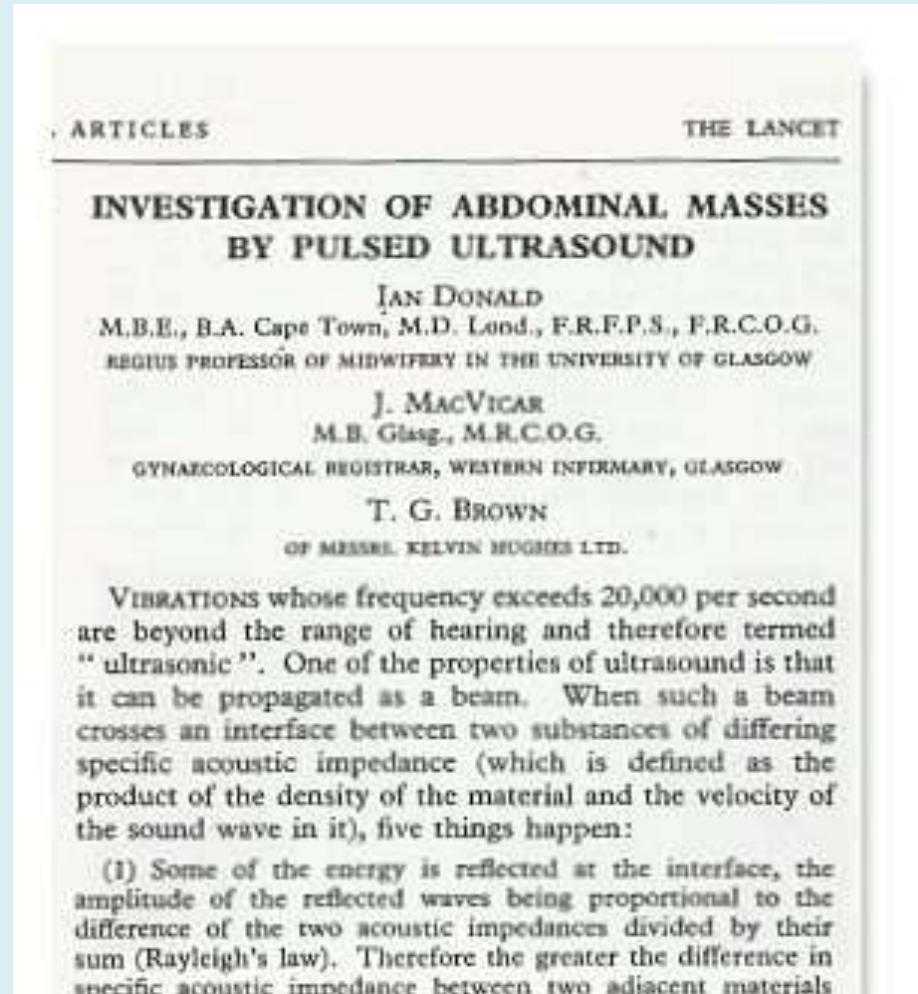


Ludwig, G.D. and Struthers, F.W. Considerations underlying the use of Ultrasound to detect Gallstones and Foreign Bodies in Tissue. Naval Medical Research Institute Reports, Project #004 001, Report No. 4, June 1949.





# 1958: Ian Donald Pioneers OB-GYN Ultrasound

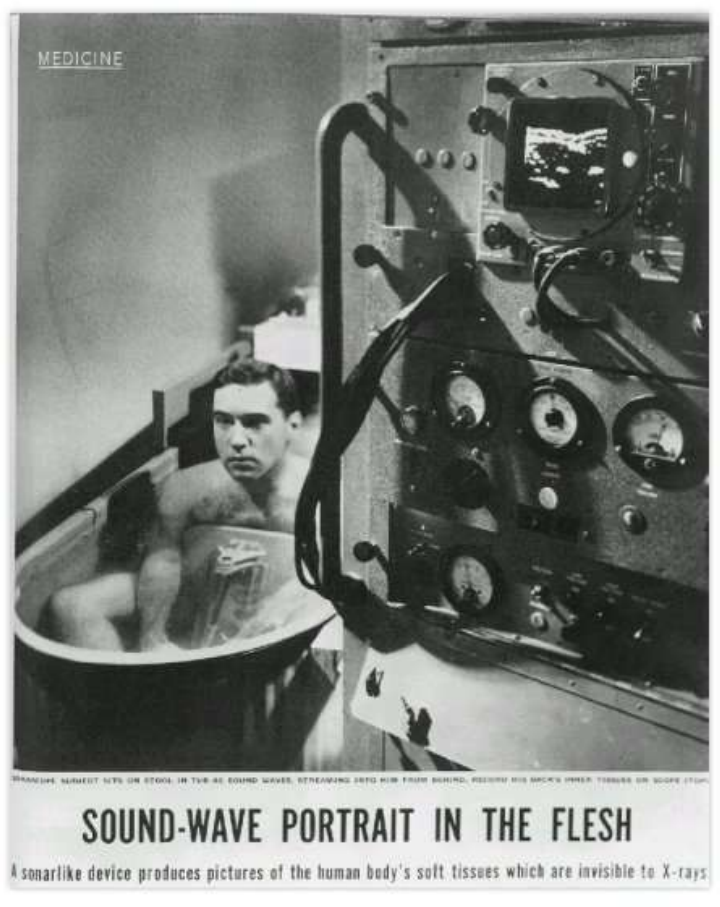


# 1950s: Douglass Howry & Joseph Holmes

pioneer 2D B-mode Ultrasound at the Univ. of Colorado



Douglass Howry, late 1960s



## SOUND-WAVE PORTRAIT IN THE FLESH

A sonarlike device produces pictures of the human body's soft tissues which are invisible to X-rays




The pan-scanner in 1957



Joseph H Holmes  
1902 - 1982

# Social Networks & World Events

 Lazzaro Spallanzani


 Jean-Daniel Colladon

Gabriel Lippman

Pierre Curie

Alexander Belm

 Sergei Sokolov  
N Selesneva

 Ian Donald




**WW1**

Reginald Fessenden



Kenji Tanaka

Toshio Wagai

 Chih-Chang Hsu

Constantin Chilowsky

Paul Langevin




George Ludwig

H Thomas Ballantine

Karl Dussik

Richard Bolt

 Heinrich Netheler

John Wild

John Reid

W Guttner Theodore Hueter

Wolf-Dieter Keidel

Douglas Howry

Joseph Holmes

 Carl Hertz

Inge Edler

Bertil Sunden

*Ink Jet  
Printing*







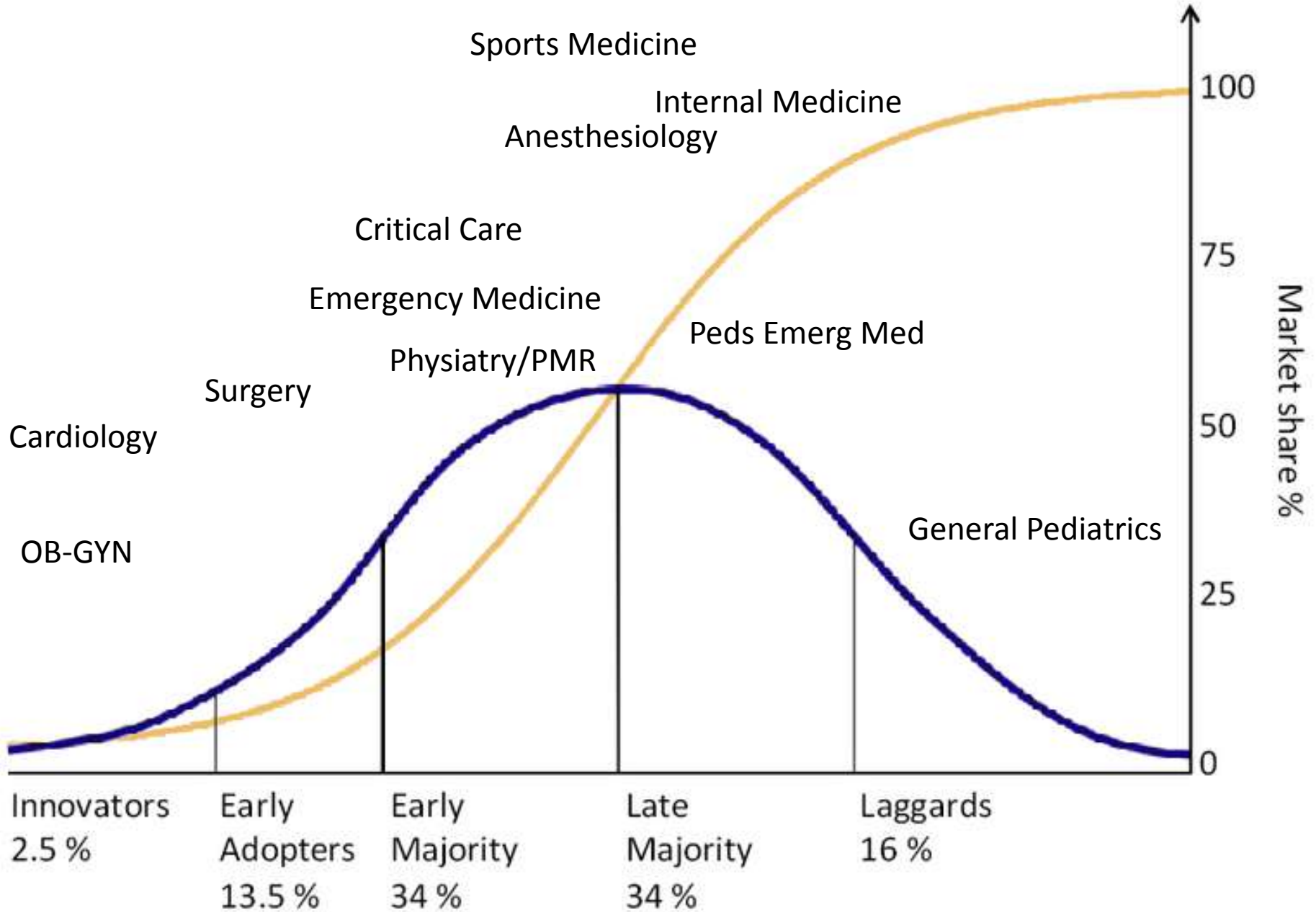


Courtesy Dr. David Zar

# STAR TREK



# Diffusion of Ultrasound Through Medical Specialties







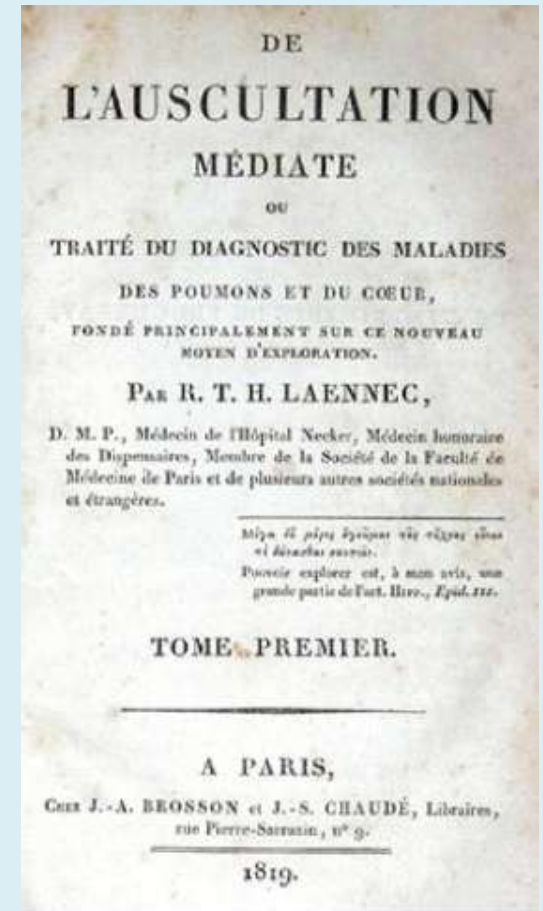
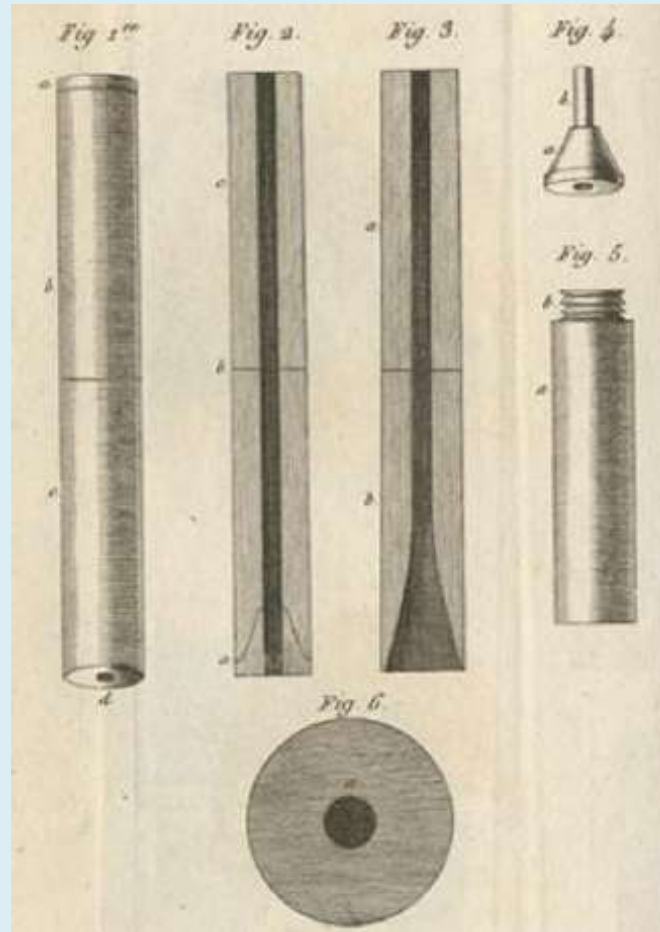


# 1816-1819: Rene T. H. Laennec

Invents the Stethoscope and Publishes “De L’Auscultation Mediate”



1781-1826



“That it will ever come into general practice, I am extremely doubtful; because its beneficial application requires much time and gives a good bit of trouble both to the patient and the practitioner”

**J. Forbes, 1823**

**Preface to the First English Edition of Laennec’s “Treatise”**

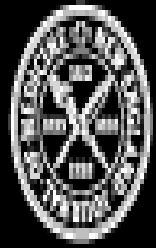
# 1924: Lewis A. Connor M.D.

## Founding President of the American Heart Association



1867 - 1950

- “Cornell’s Osler”
- Cornell Chair of Medicine 1916-1932
- Founding President of the New York Heart Association in 1915



NEJM Feb 2006; 354(6); 548-551

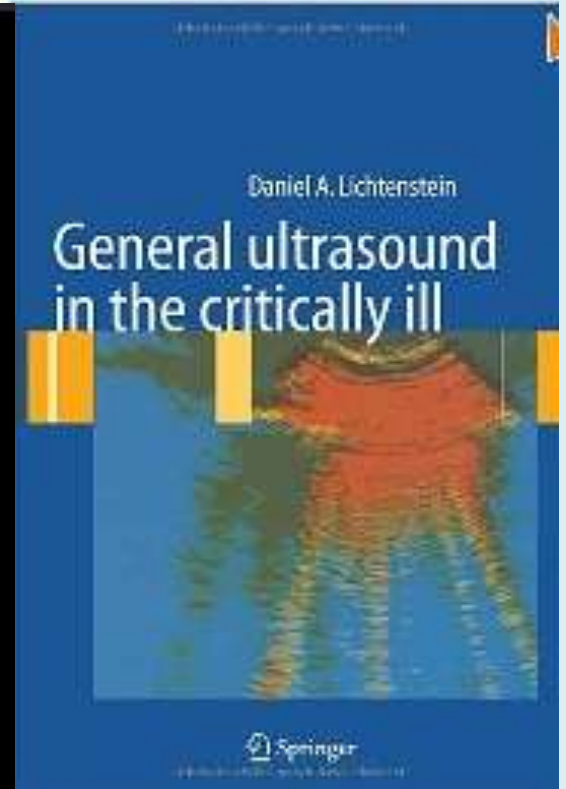
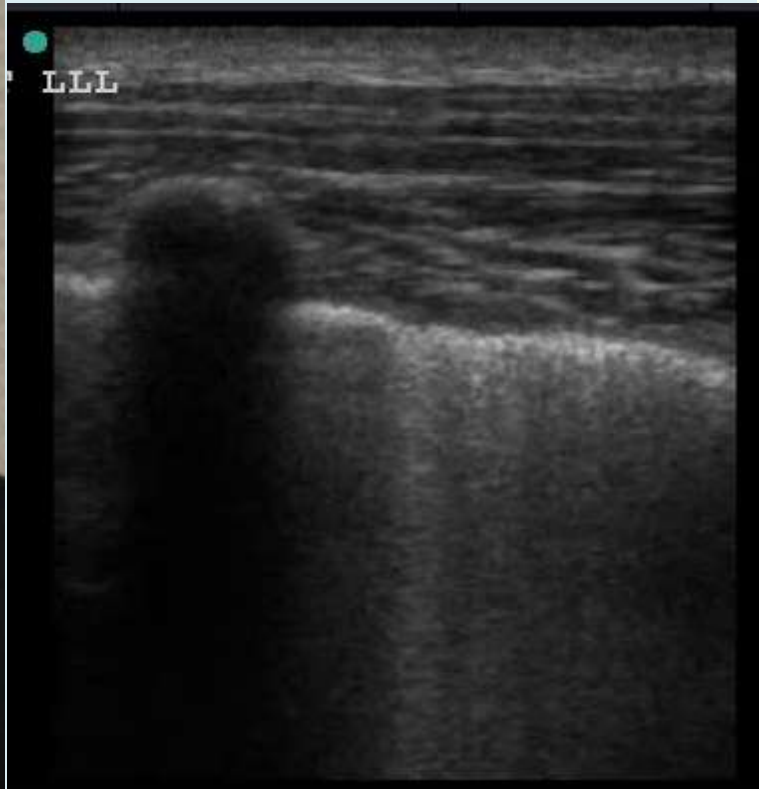


Physical Exam Vs. CXR as Gold Standard:  
N=52; Sensitivity 47-69% /Specificity 58-75%

Wipf et al. Diagnosing Pneumonia by Physical  
Exam: Relevant or Relic?  
Arch Intern Med 1999

Point-of-Care Ultrasound as a stethoscope replacement?

**1989: Daniel Lichtenstein pioneers point-of-care lung ultrasound in the ICU**  
“Ultrasound is the real stethoscope”



The WHO Estimates that Up to 75% of the world's population has no access to any diagnostic imaging



WINFOCUS

World Interactive Network Focused on Critical UltraSound

# **An integrated ultrasound curriculum (iUSC) for medical students: 4-year experience**

**Critical US J 2010**

Richard A. Hoppmann • Victor V. Rao • Mary Beth Poston • Duncan B. Howe • Patrick S. Hunt • Stanley D. Fowler • Lance E. Paulman • James R. Wells • Nancy A. Richeson • Paul V. Catalana • Lynn K. Thomas • L. Britt Wilson • Thomas Cook • Shaun Riffle • Francis H. Neuffer • James B. McCallum • Brian D. Keisler • Rachel S. Brown • Anthony R. Gregg • Kerry M. Sims • Caroline K. Powell • Matthew D. Garber • James E. Morrison • William B. Owens • Kevin A. Carnevale • William R. Jennings • Sarah Fletcher

# **A Pilot Study of Comprehensive Ultrasound Education at the Wayne State University School of Medicine**

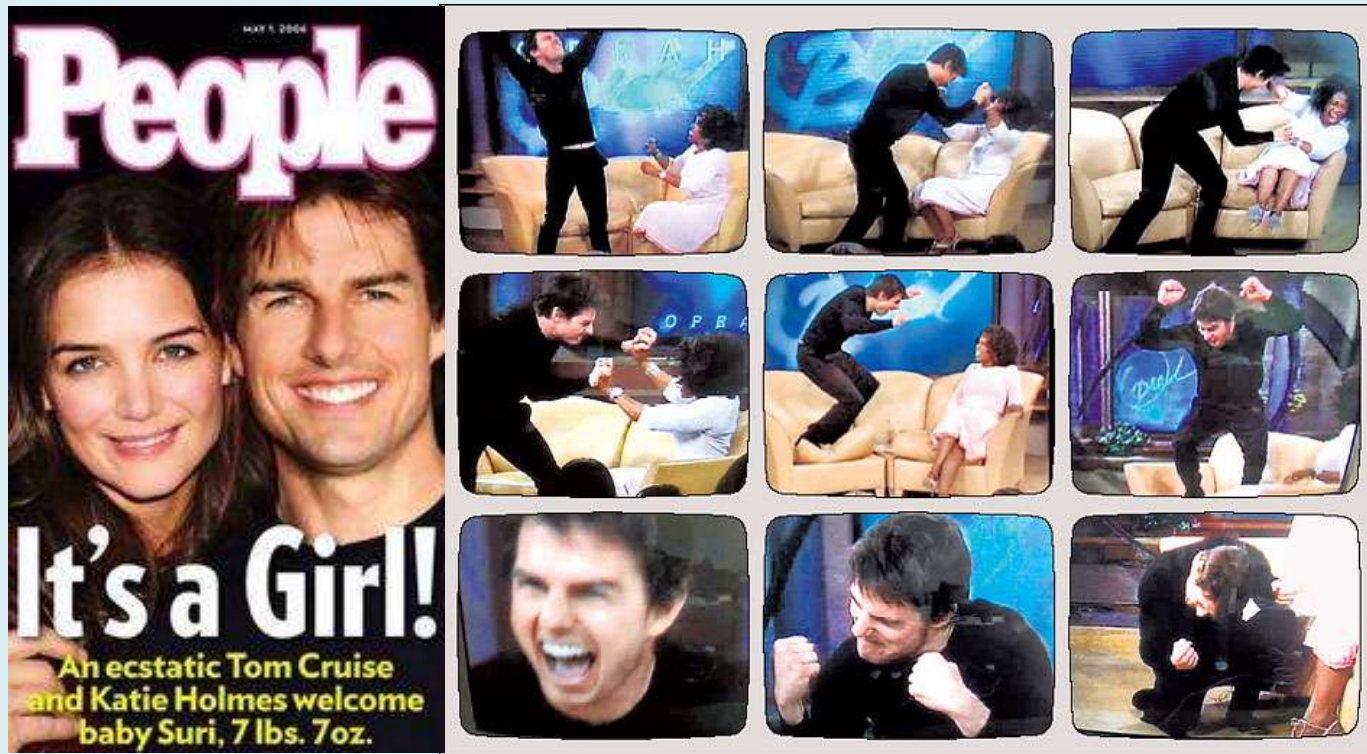
**A Pioneer Year Review**

**J Ultrasound Med 2008**

*Sishir Rao, BA, Lodewijk van Holsbeeck, BA, Joseph L. Musial, PhD,  
Alton Parker, MD, J. Antonio Bouffard, MD, Patrick Bridge, PhD,  
Matt Jackson, PhD, Scott A. Dulchavsky, MD, PhD*



# 2004: Tom: 'I Bought a Sonogram Machine' for Katie



“A fool with a stethoscope will be a fool with an ultrasound machine”

-Dr. Justin Bowra

# Solutions: Freely Available Internet Resources

**[www.sonoguide.com](http://www.sonoguide.com)**



**[www.SinaiEM.US](http://www.SinaiEM.US)**



bringing technology to the bedside for improved patient care

**[www.hqmeded.com](http://www.hqmeded.com)**



# Solutions: Telesonography

## Cost-Effective Remote iPhone-Teathered Telementored Trauma Telesonography

### J Trauma

*Paul B. McBeth, MD, Trevor Hamilton, MD, and Andrew W. Kirkpatrick, MD, FRCSC, FACS*



Skype™ [2] - andrew.kirkpatrick@mc  
Skype Contacts Conversation Call View Tools Help

Andrew Kirkpatrick

Paul B McBeth

Remote Tele-Ultrasound  
Lake Louise, AB

test

65456  
Abd  
C60

2010-04-24 12:56:19

98  
12  
cm

2010Apr24 12:24

18,718,792 people online

Call phones  
Directory  
Shop

Did you know?  
You can use your Skype Credit to send cheap text (SMS) messages

End call 14:19 Mute Turn on video

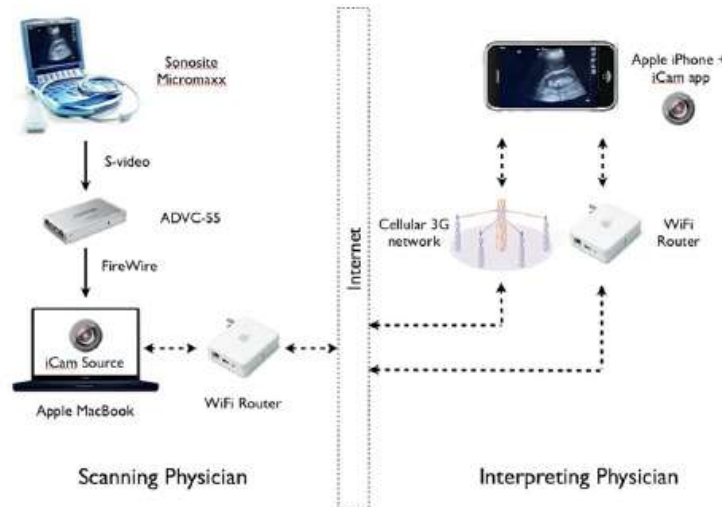
# Virtual guidance: a new technique to empower point-of-care ultrasound in remote or extreme environments

R. Mercado-Young · D. S. Martin · T. Caine ·  
K. O'Connell · K. Garcia · A. Sargsyan ·  
S. Platts · S. A. Dulchavsky



# Real-time video transmission of ultrasound images to an iPhone

Andrew S. Liteplo · Vicki E. Noble · Ben Attwood

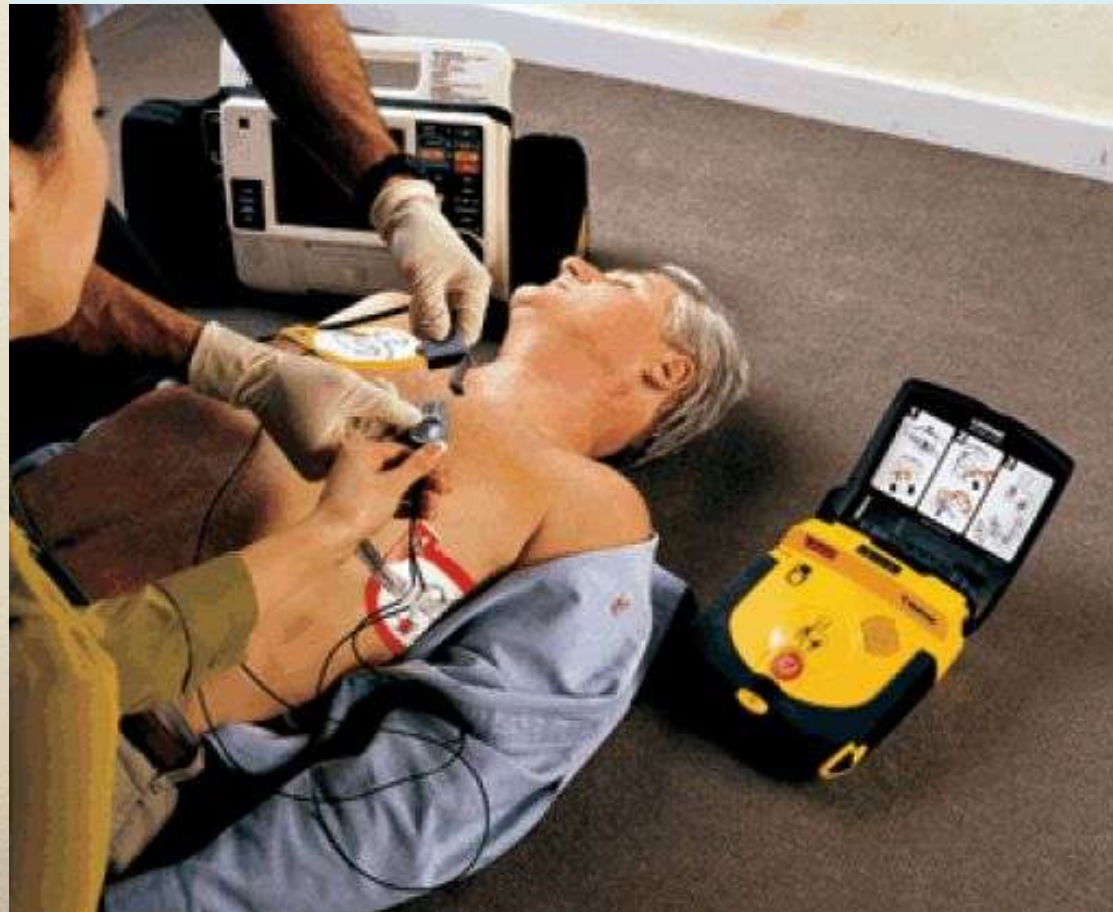


# Solutions: Simulation

- Technology:
  - Enable pattern recognition training by intensive video learning and simulation.



# Public Access Defibrillator Model



# WORLD CONGRESS



## ULTRASOUND IN MEDICAL EDUCATION

- Ask a question
- Make an observation
  - Solve a problem

**Thank You!**