研究介紹
生物醫學超音波影像實驗室

李百祺

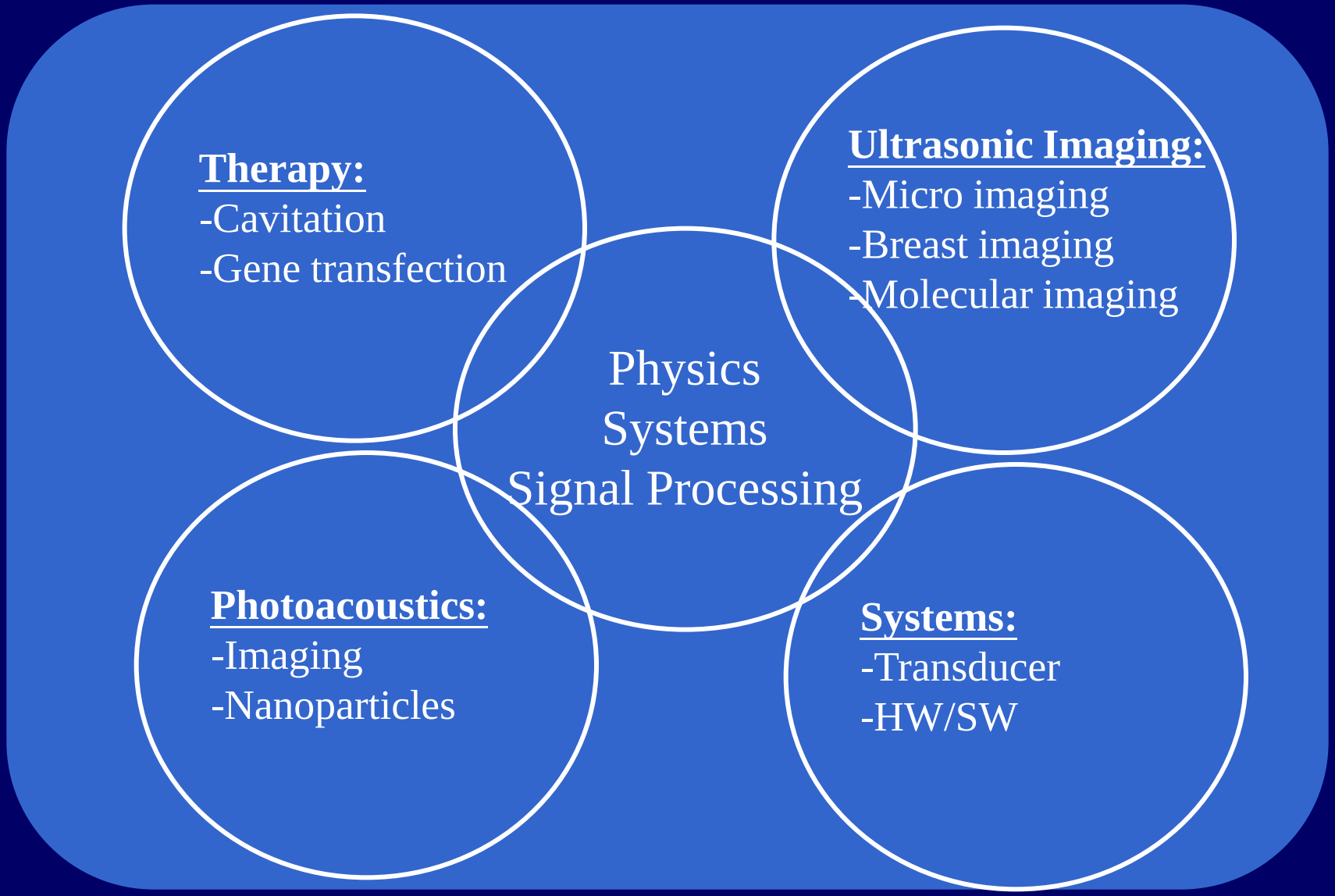
多元化學習！

結合生物醫學與電子資訊科技已是前瞻研究趨勢！

- 跨領域研究
  - 很有趣
  - 很有意義
  - 很有挑戰性

What is Biomedical Engineering?

- Interdisciplinary area of *Biology, Medicine and Engineering*.
- Prevention, diagnosis and therapy of diseases.
- Science, engineering and clinical applications.
- Full of innovations and combination of the state of the arts.

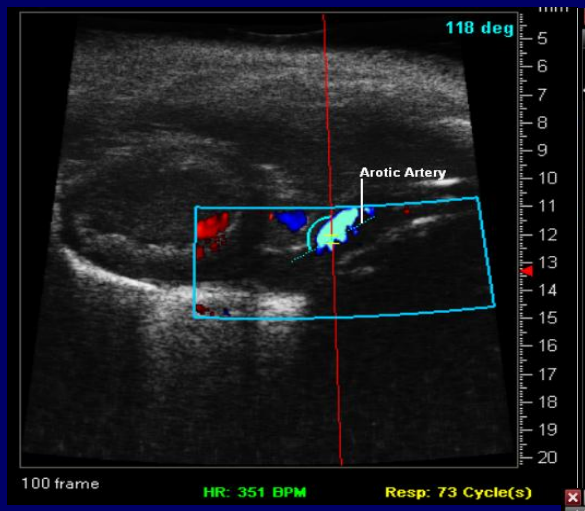


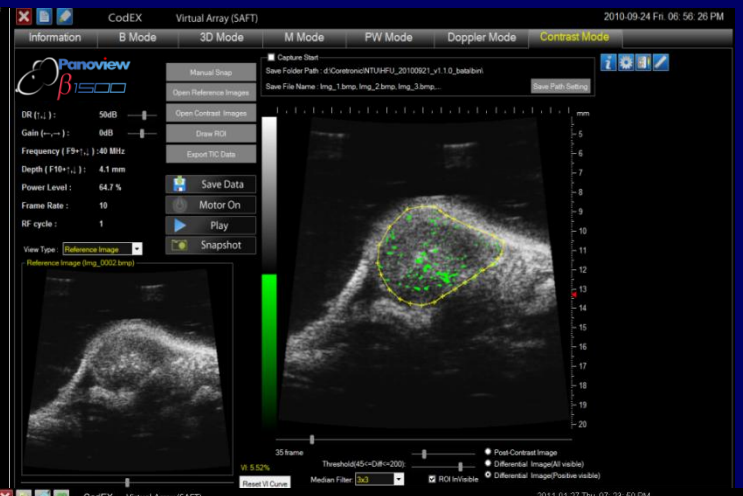
合作團隊： 臺大醫學院、生命科學院、基因體中心、奈米中心、國家衛生院、成大、師大、中正、暨南,…等單位。

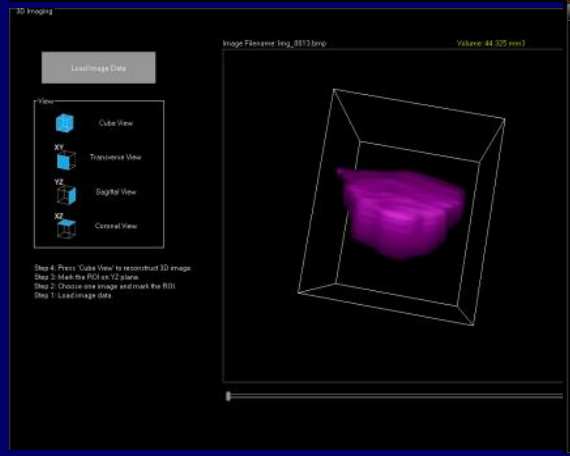
跨領域研究： 電子、物理、醫學、生命科學、化學、奈米材料。

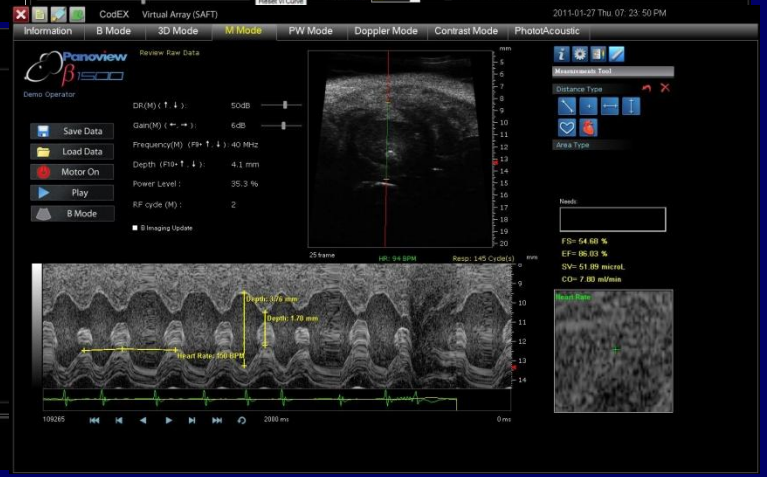
Ultrasonic Micro-Imaging

From Research to Commercialization

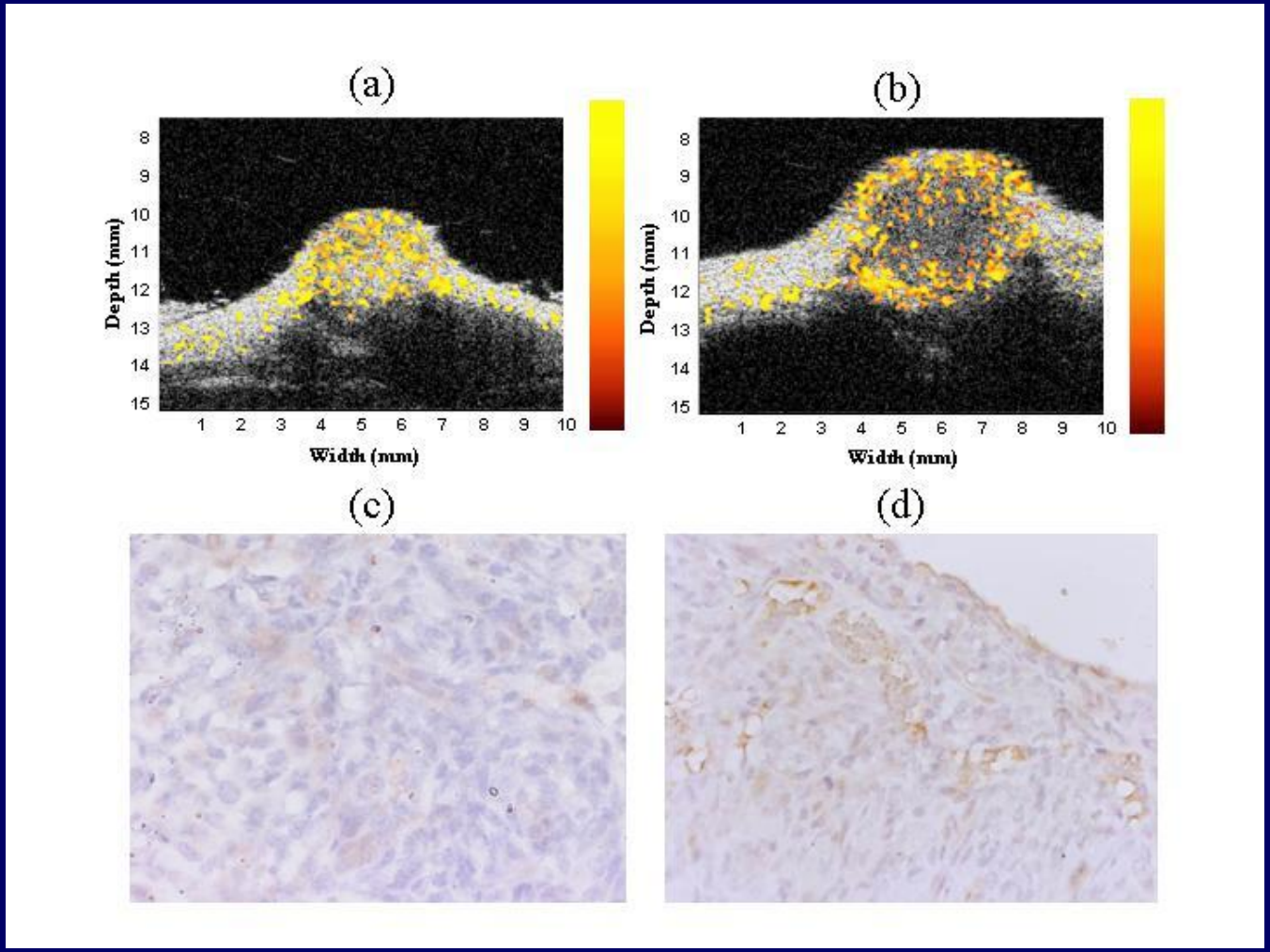








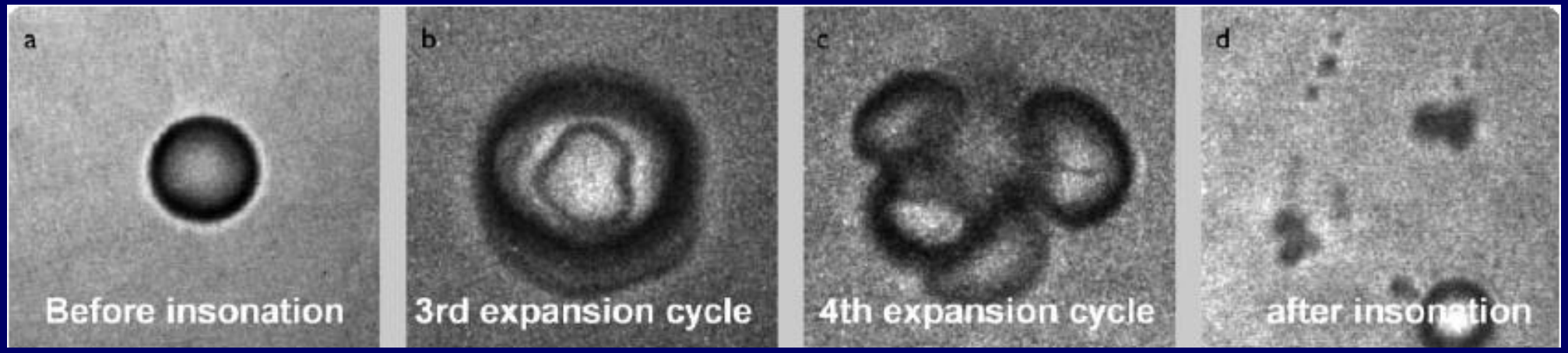
Mouse Tumor Micro-Imaging



Cover of IEEE Trans. on UFFC, Jan. 2004

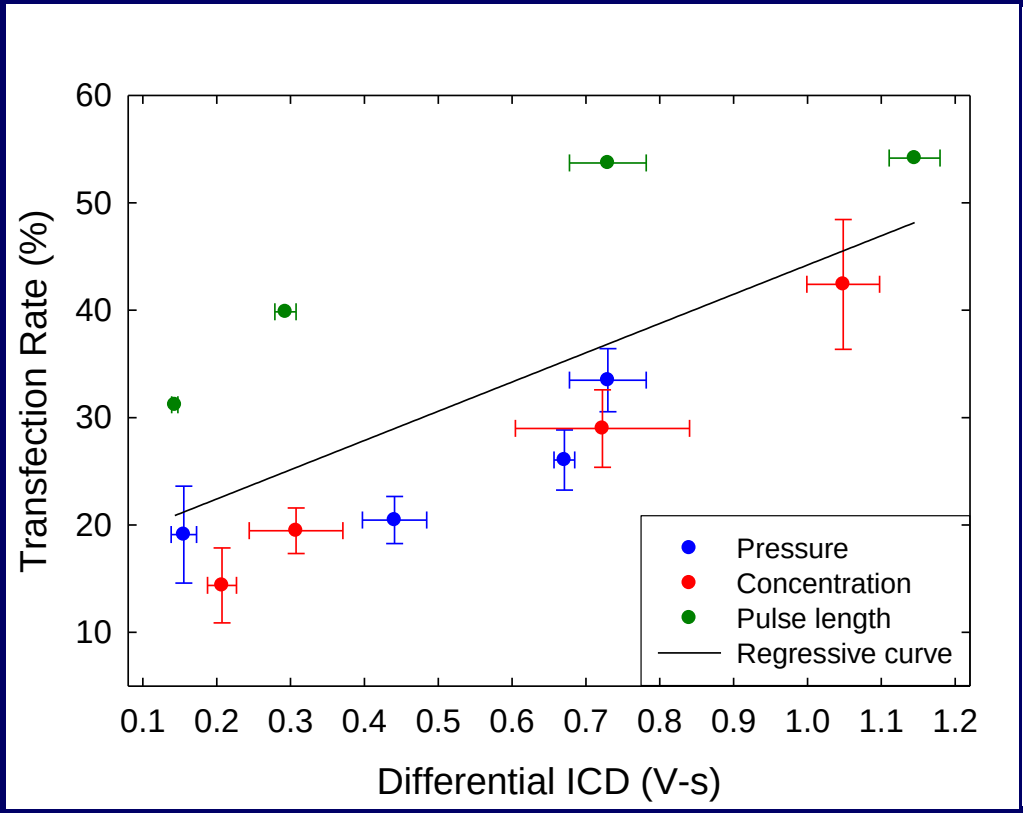
Ultrasound Assisted Therapy

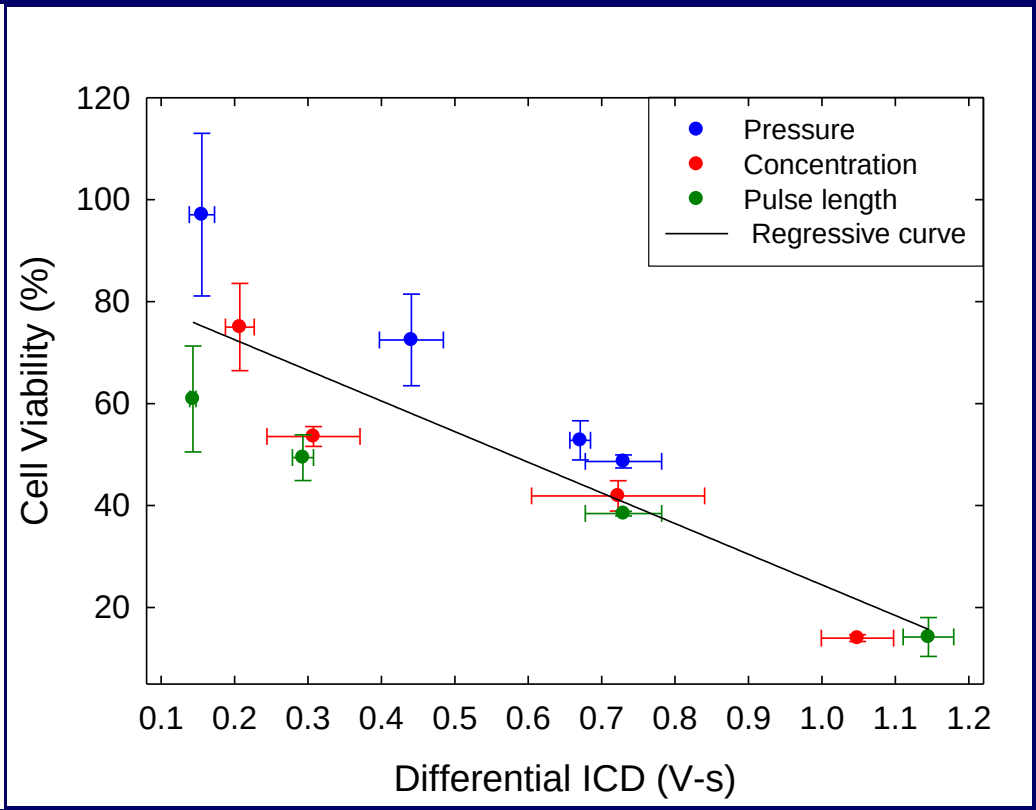
Microbubbles and Cavitation



From UC Davis

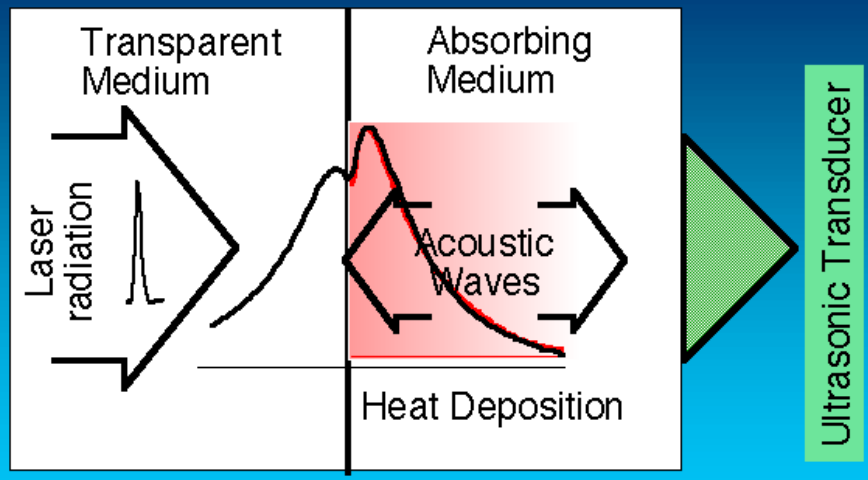
Cavitation vs. Gene Transfection/Cell Viability



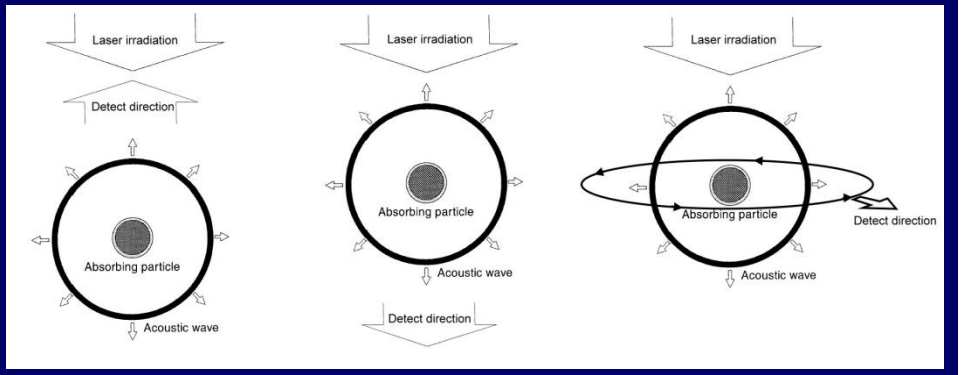


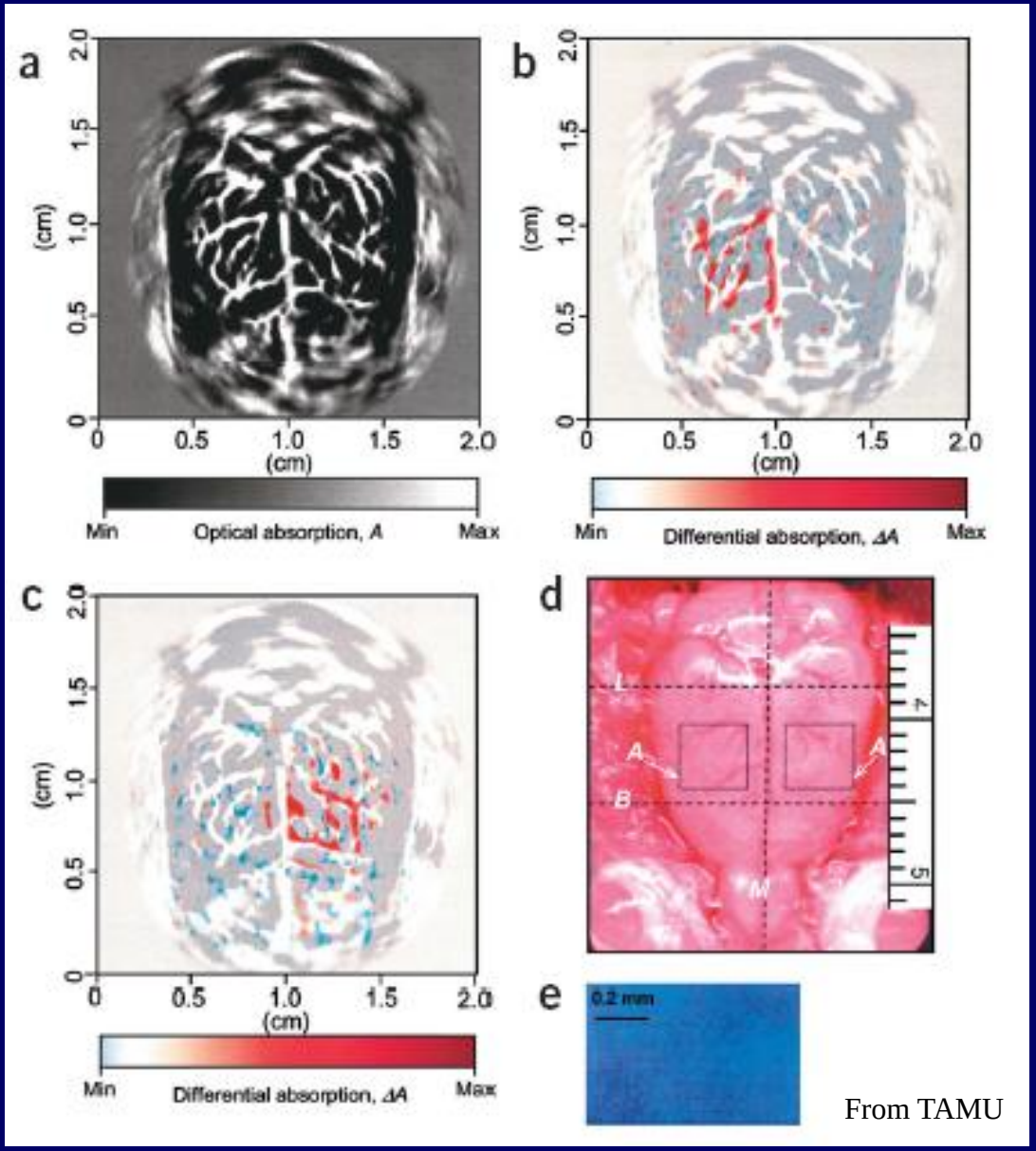
Photoacoustic Imaging and Gold Nanoparticles

Optoacoustic (Photoacoustic) Imaging



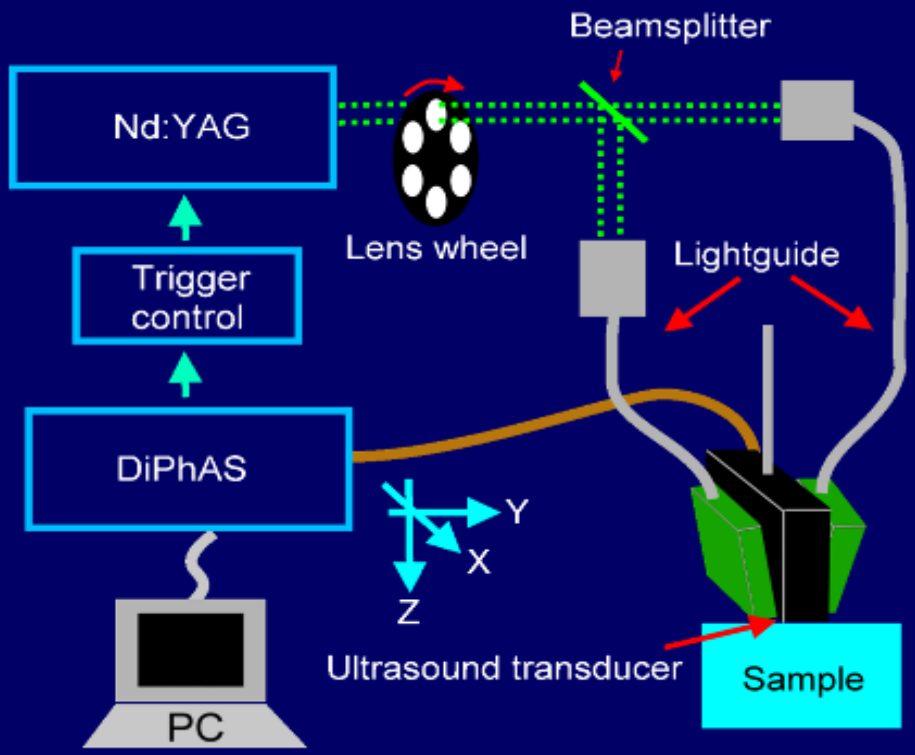
From Fairway

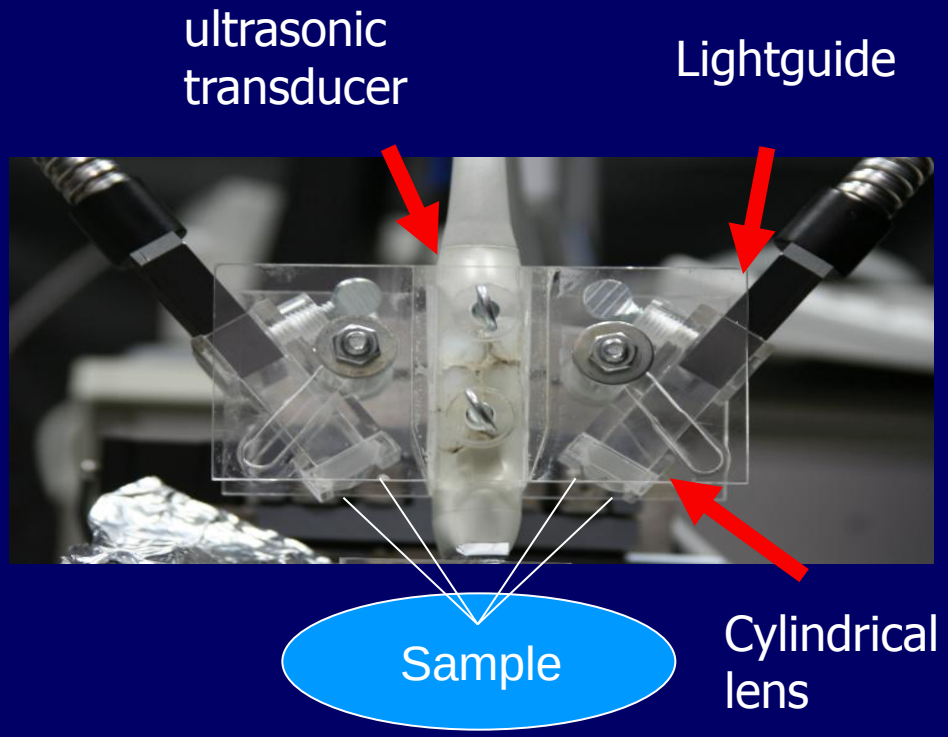




From TAMU

High frame rate photoacoustic imaging system





Laser system: Q-switched Nd:YAG

(wavelength 1064 nm, pulse duration 8 ns

Pulse repetition freq. **15 frames/s**)

Lightguides: fiber bundle (15,000 fibers)

(output: 3 mm X 30 mm illumination area)

Photoacoustic probe:

Optical: Light guide with cylindrical lens

Acoustic: Linear array with 128 channels

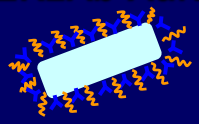
(pitch : 0.3 mm, f_c = 5 MHz)

Reflecting foil: 9 μm

Nanoprobe Designs

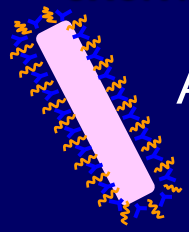
A

HER2Ab-AuNR$_{785}$



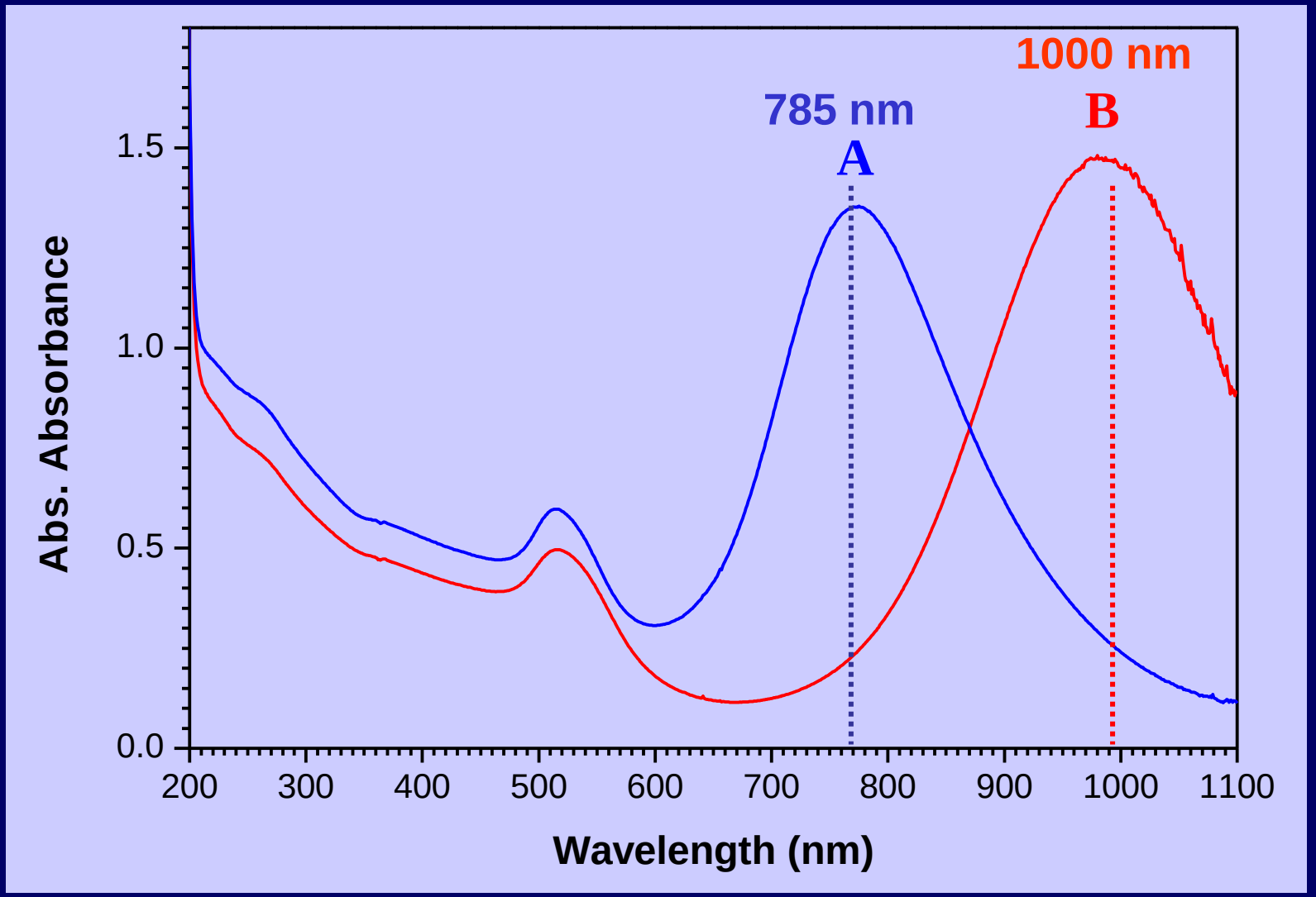
A.R.=3.7

CXCR4Ab-AuNR$_{1000}$

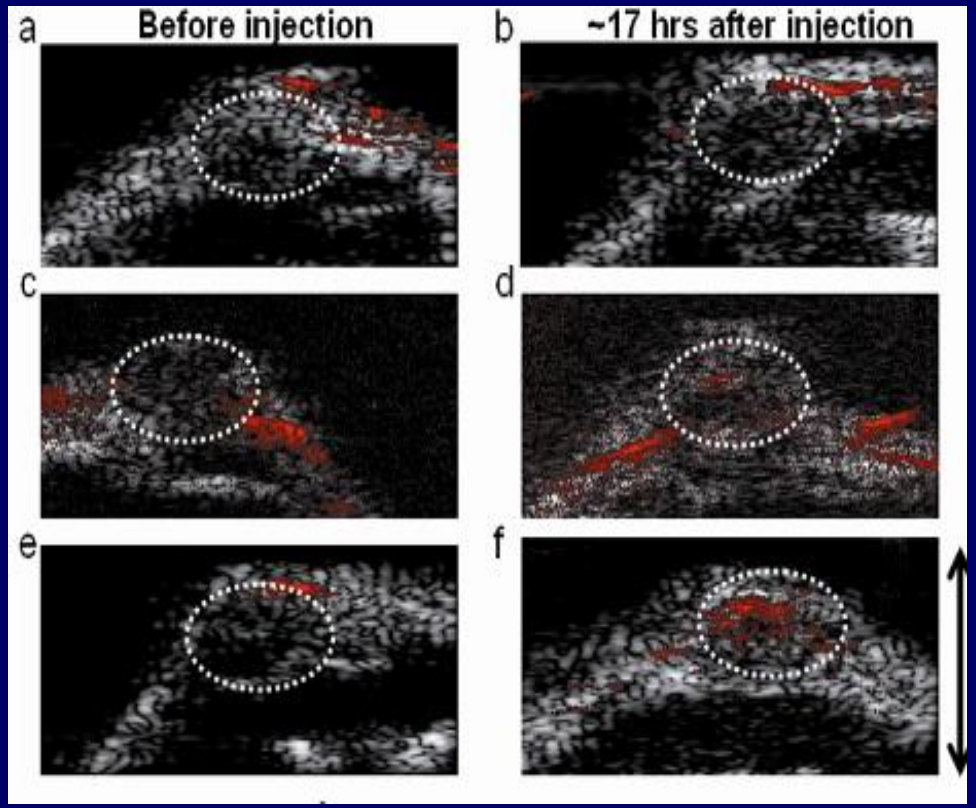


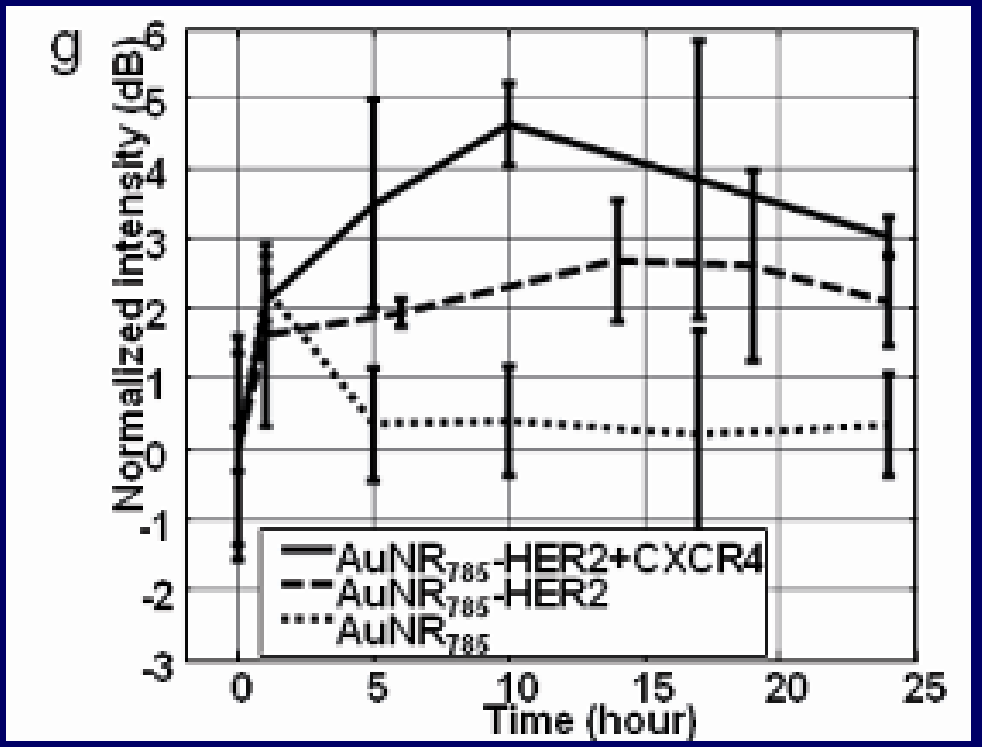
A.R.=5.9

B

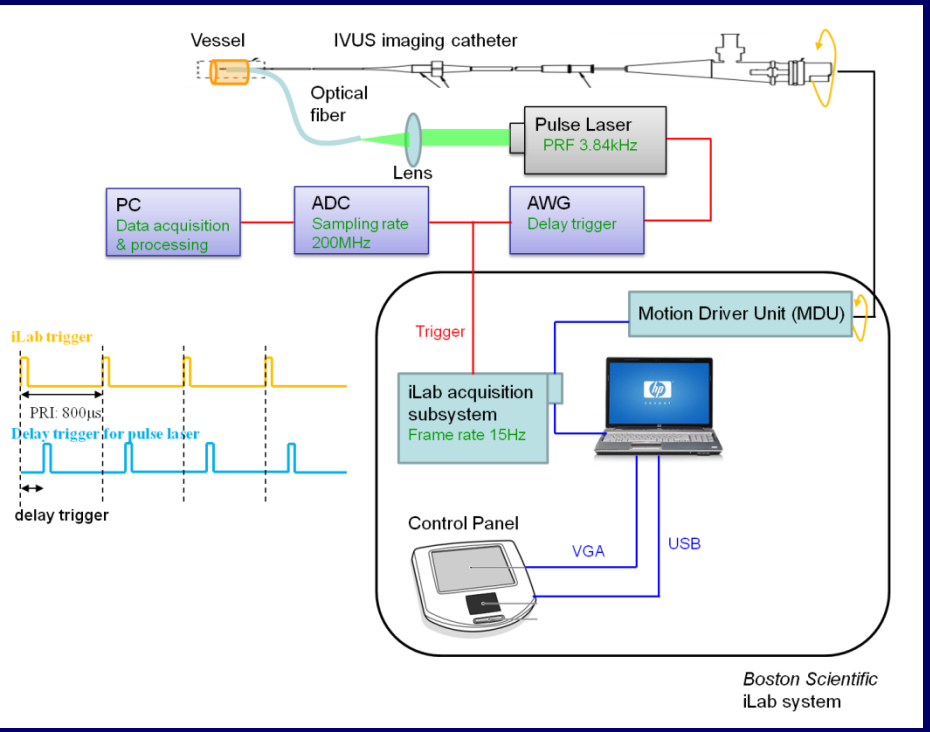


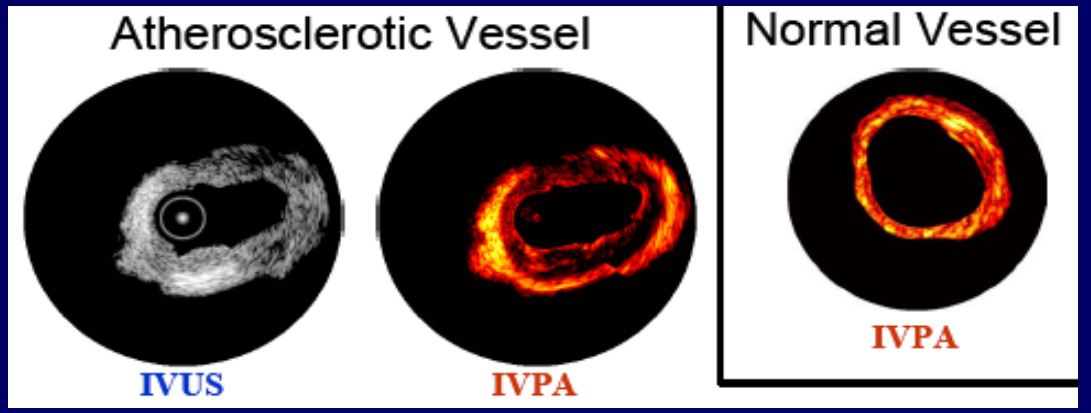
Molecular Imaging with Two Targets



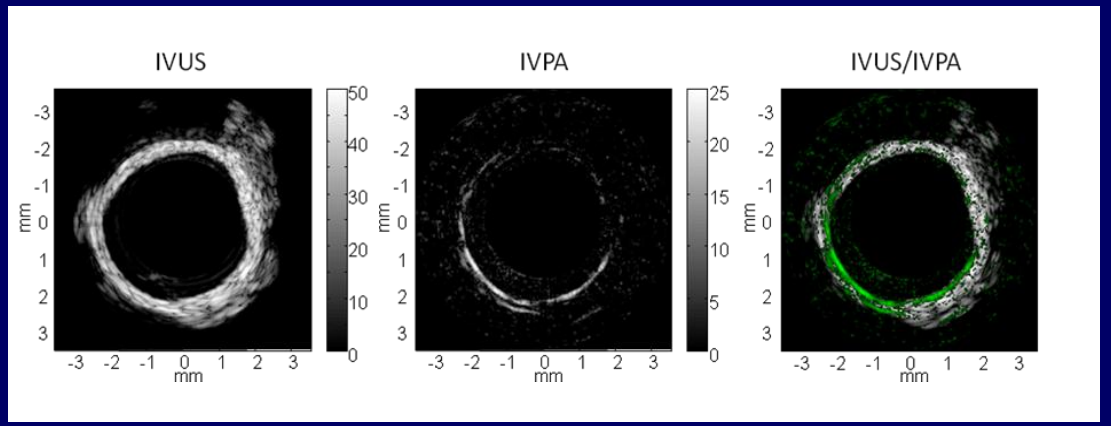


Intravascular PA Imaging



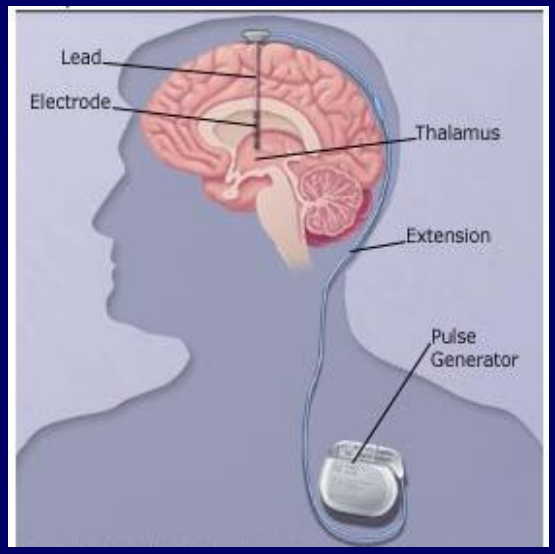


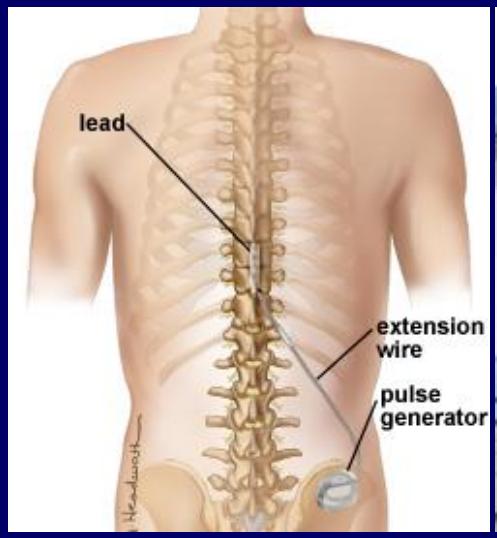
IEEE Ultrasonics Symposium, 2006

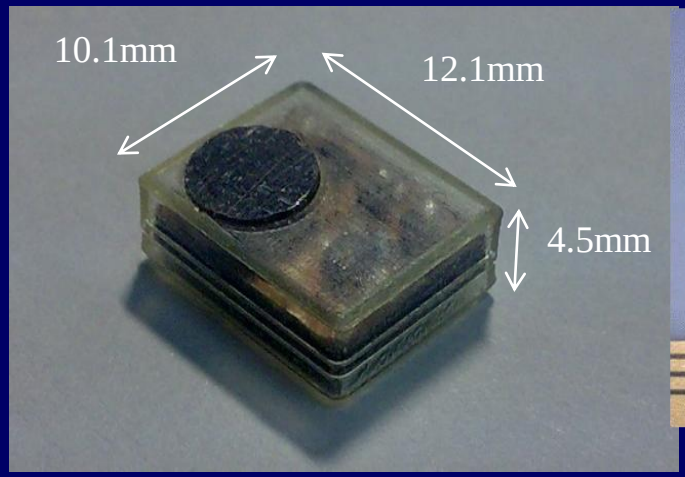


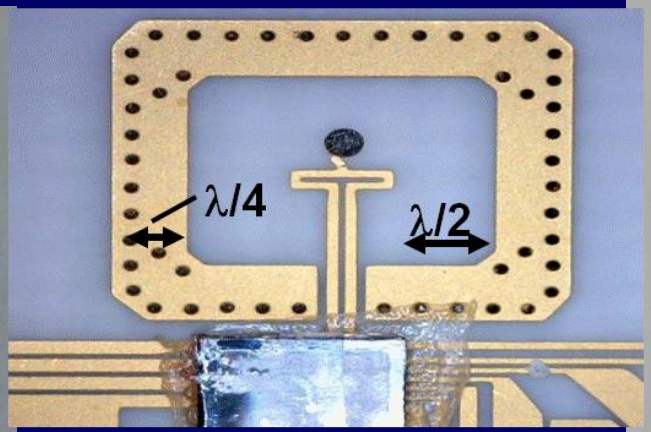
Wireless Medical Devices:

- Transcranial Doppler
- Neural Stimulator


Lead
Electrode
Thalamus
Extension
Pulse
Generator


lead
extension
wire
pulse
generator


10.1mm
12.1mm
4.5mm


λ/4
λ/2

Chip


Pulse
PA0700NL
1038-S CHINA

- 跨領域研究
  - 很有趣
  - 很有意義
  - 很有挑戰性
- 電機系的同學，在跨領域的環境中，發揮自己的專長
  - *n*VIDIA for Medical Imaging
  - 無線神經電刺激器
  - 血管內的影像世界
  - ,…

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