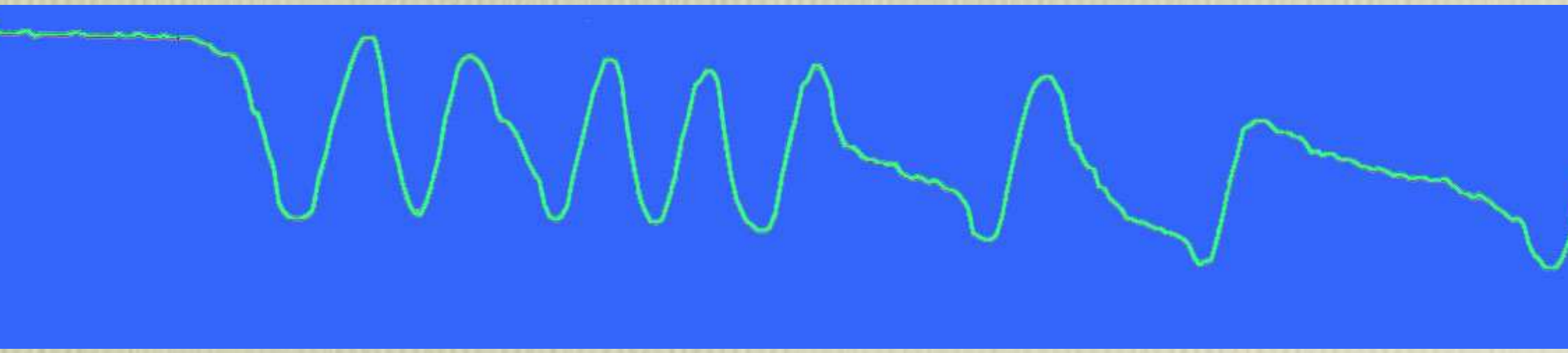
Research & Higher Degree Opportunities in Biomedical Engineering



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School of IT &

Scope of Presentation:

- Biomedical Engineering
- Study options at tertiary level
- Projects and examples

Definition

Biomedical Engineering is the application of engineering principles to problems in the field of biomedicine. It uses the theoretical background from the physical, chemical and computational sciences to achieve solutions. The goal of this branch of engineering is to provide a healthier future for society.

encompasses many diverse areas

- Biomechanics, prostheses
- Artificial organs, implanted materials
- Medical imaging x-ray, MRI ...
- Clinical measurement ECG, EEG ...
- Hospital, clinical engineering
- Research & teaching

Qualifications

- Undergraduate degree (4 years) Bachelor of Engineering + major in biomedical, Bachelor of Medical Engineering
- Master of Engineering ME (Biomedical)
  - Course work (+ project)
  - Project based
- Masters of Philosophy MPhil (2 year)

Programs from which RHD can be completed

- Electrical Engineering
- Computer Systems Engineering
- Chemical Engineering
- Mathematics
- CS or IT degree

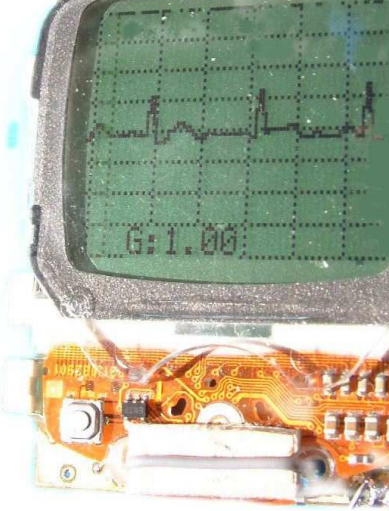
Local Realities

- Need $upport !
- Usually, APRS
  - Competitive, Honours IIa
  - ~$20k (top-ups)
  - *Influenced heavily* by local interests/support
- Look to the web

Projects

- Heart rate and analysis
- Chaos theory and breathing
- Space, microgravity & muscle research
- MRI projects, cardiac image analysis

Ambulatory ECG



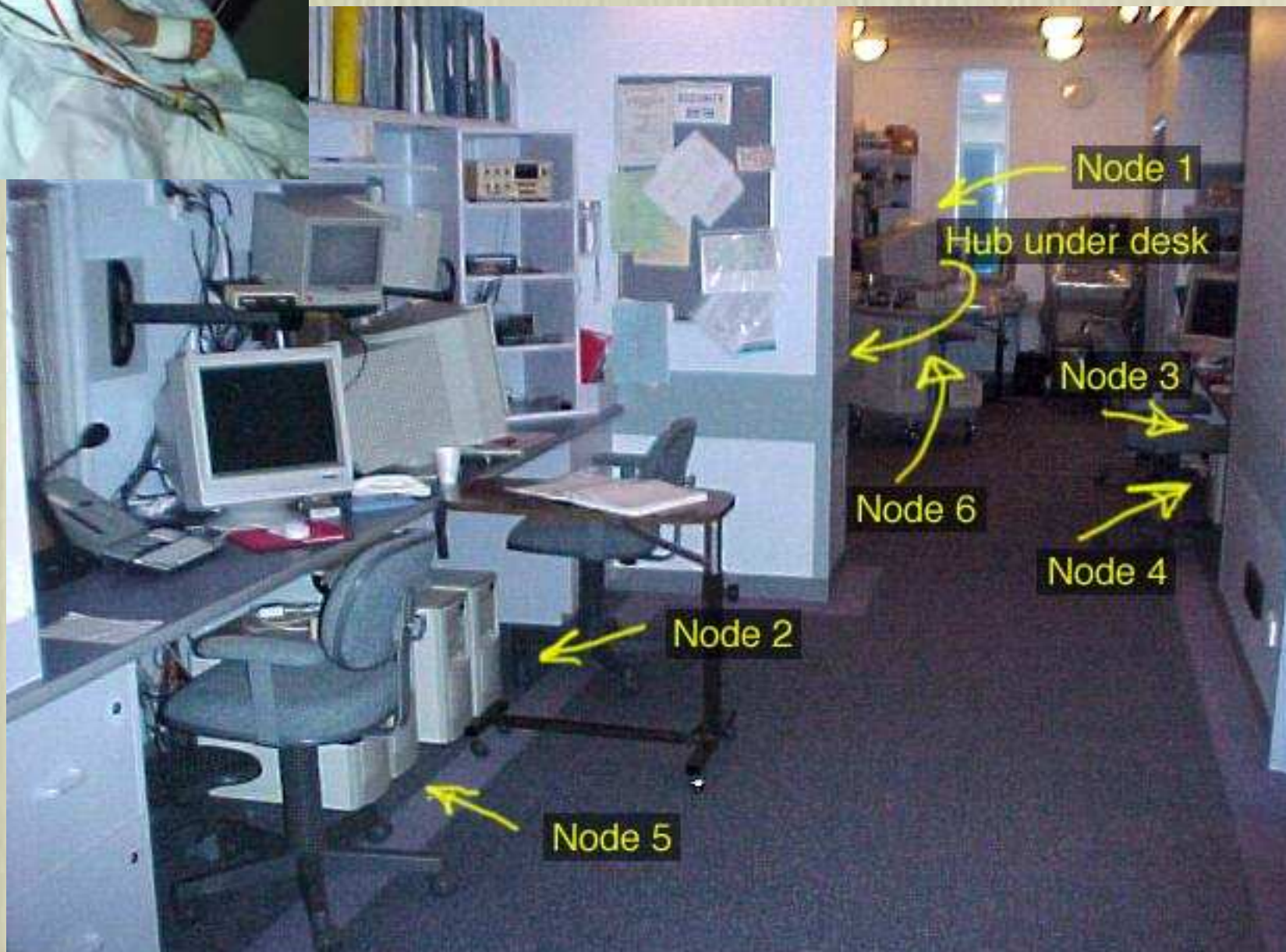
Wearable ECG monitor, for logging and analysis

PC based host S/W for nonlinear analysis

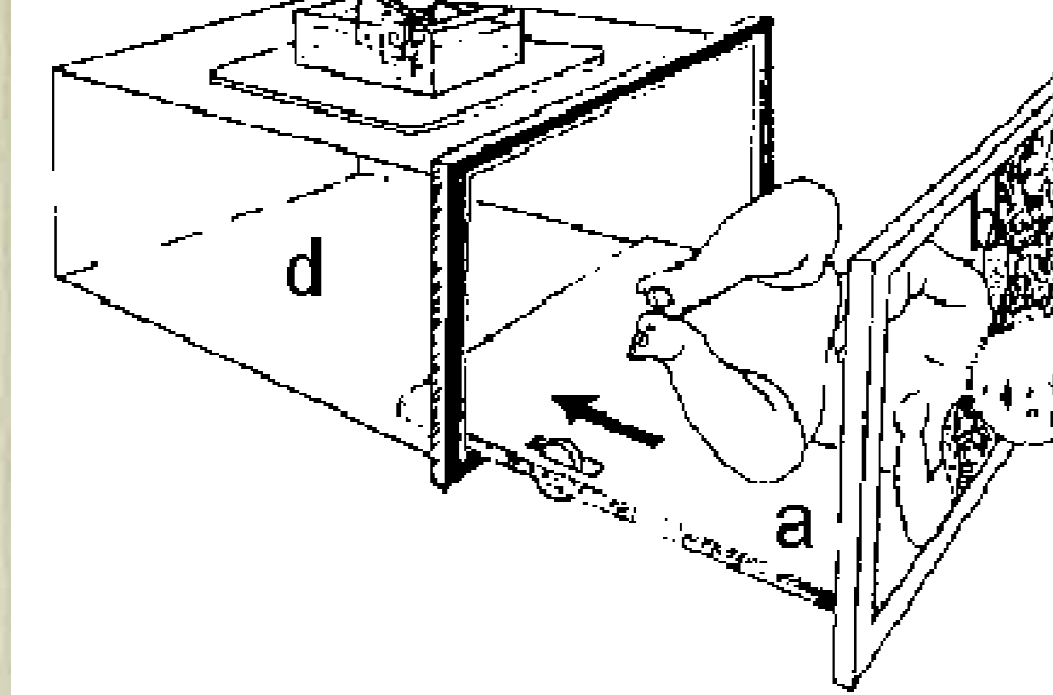
haos and Breathing

Can measuring chaos in
reathing patterns tell us about
our health?

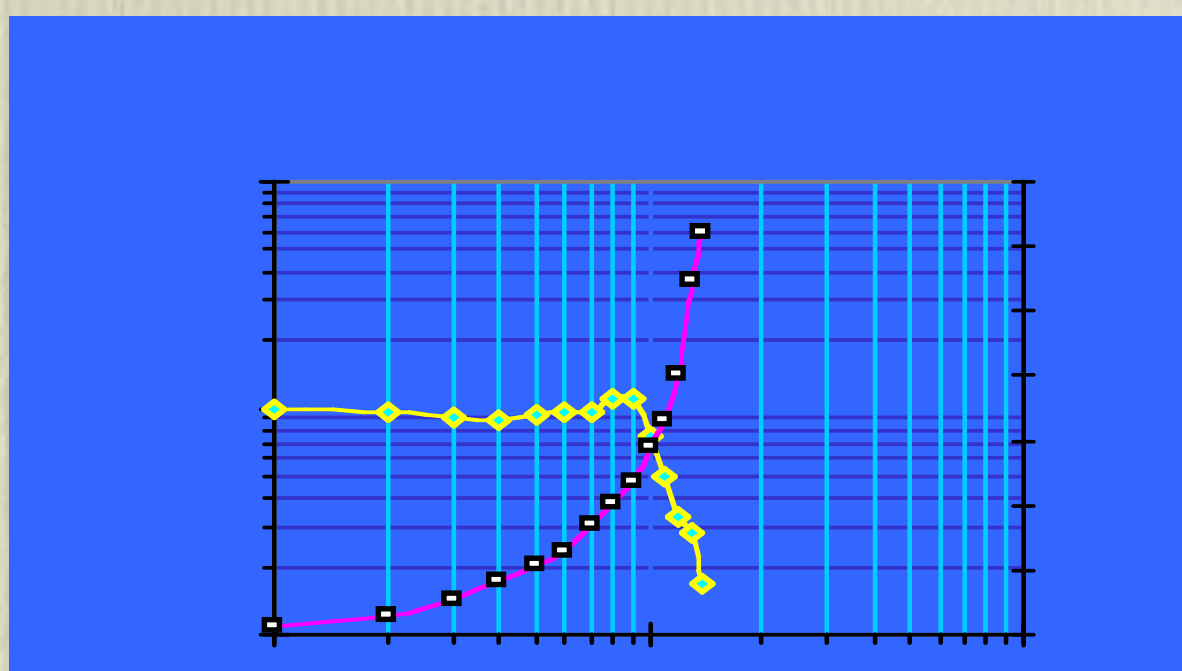
Phase plots
Poincare plots
Recurrence plots


Node 1
Hub under desk
Node 3
Node 6
Node 4
Node 2
Node 5

tung capacity (FRC)
easurement in infants

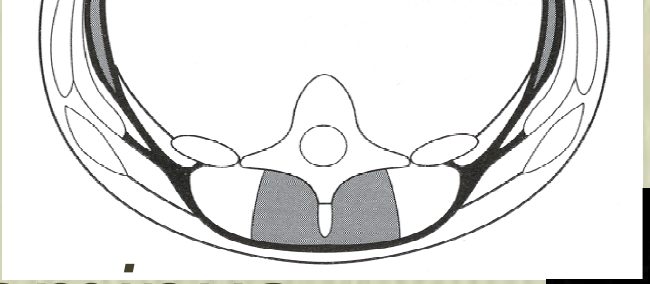


olume Displacement
ethysmograph (VDP)

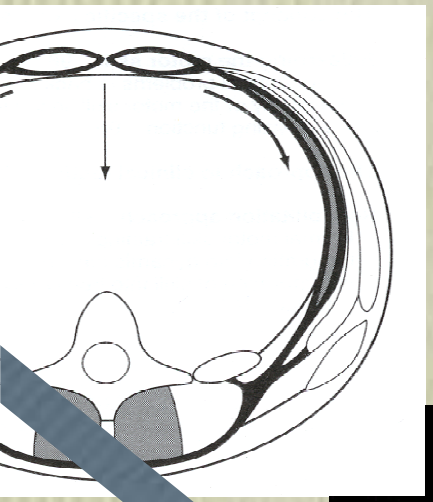


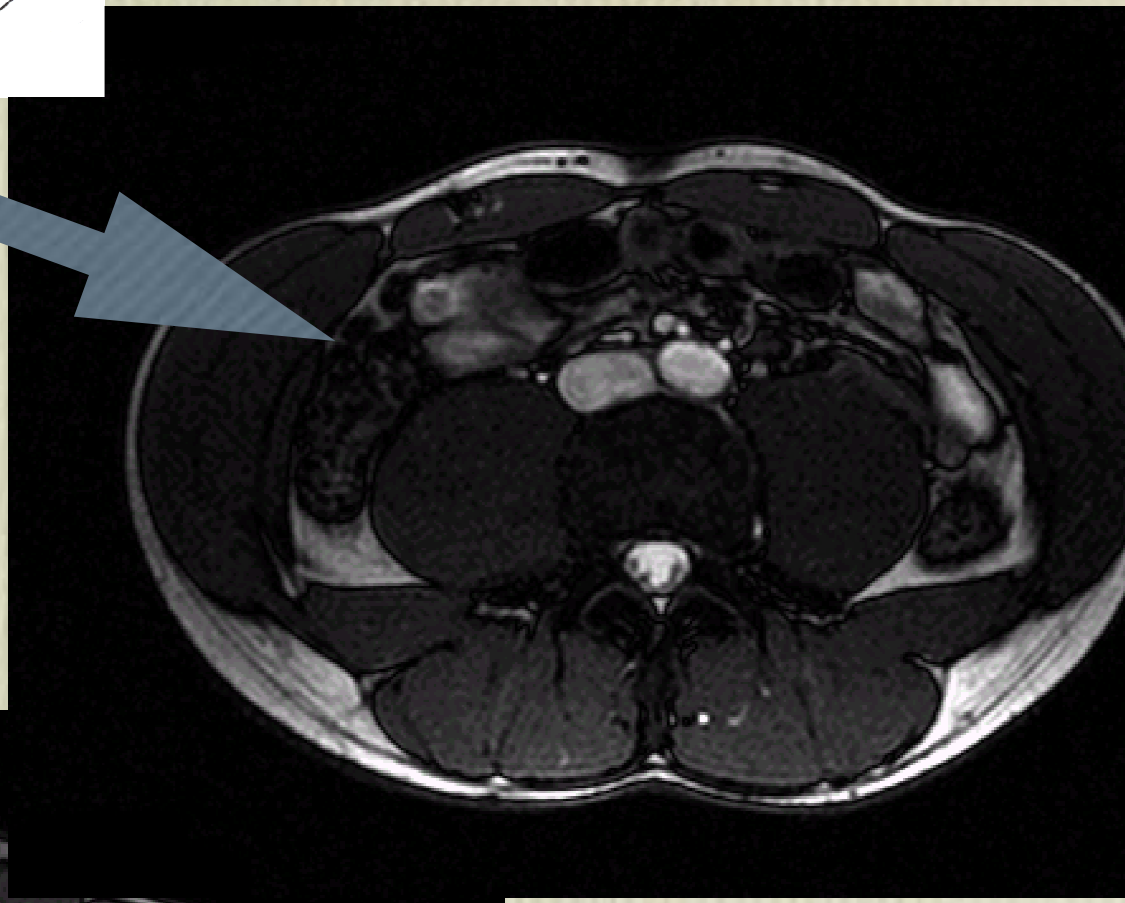
Microgravity & Muscle Function

- Low back stability requires abdomina pressure.
- Antigravity muscle groups waste
- Tremendous terrestrial application fo noninvasive measures of antigravity function.



sversus Abdominus

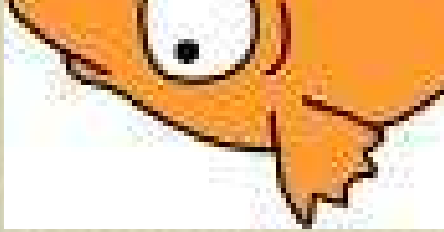




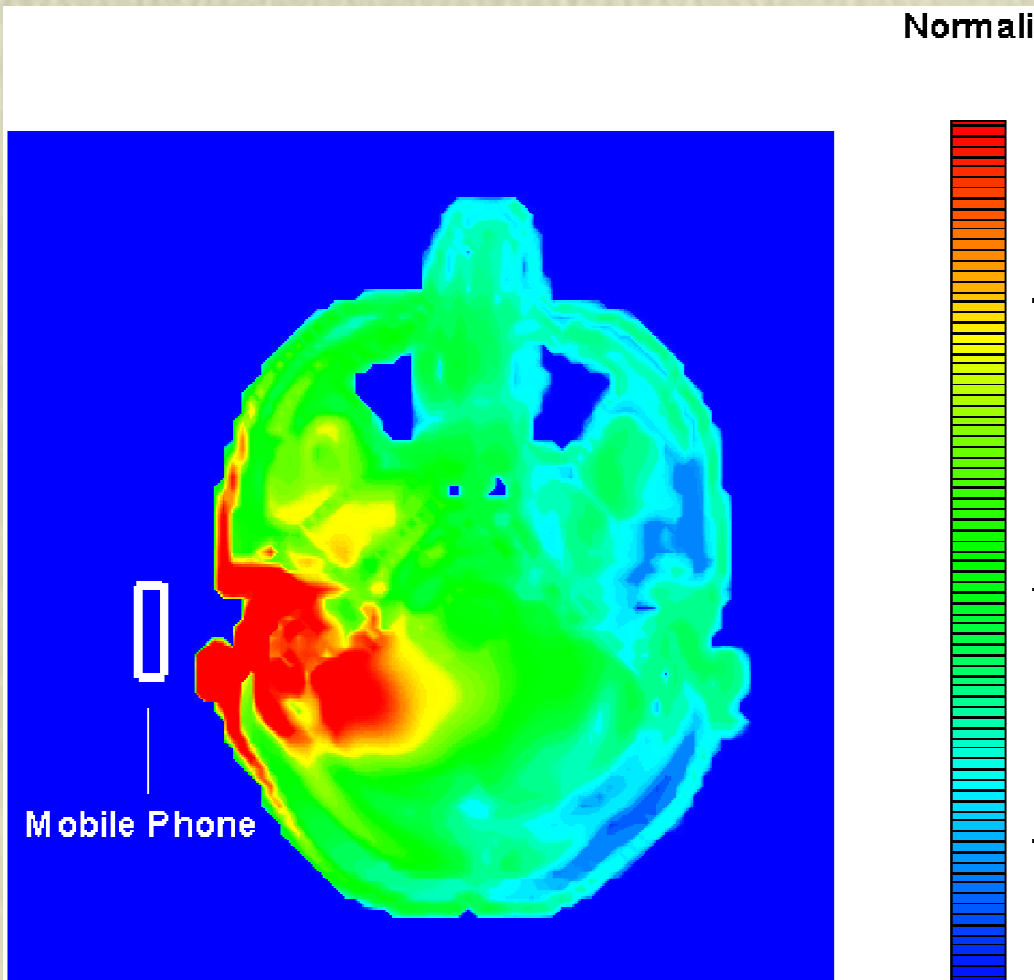
Berlin Bed Rest Study

A sponsored multi
eam investigation

Bio-electromagnetics

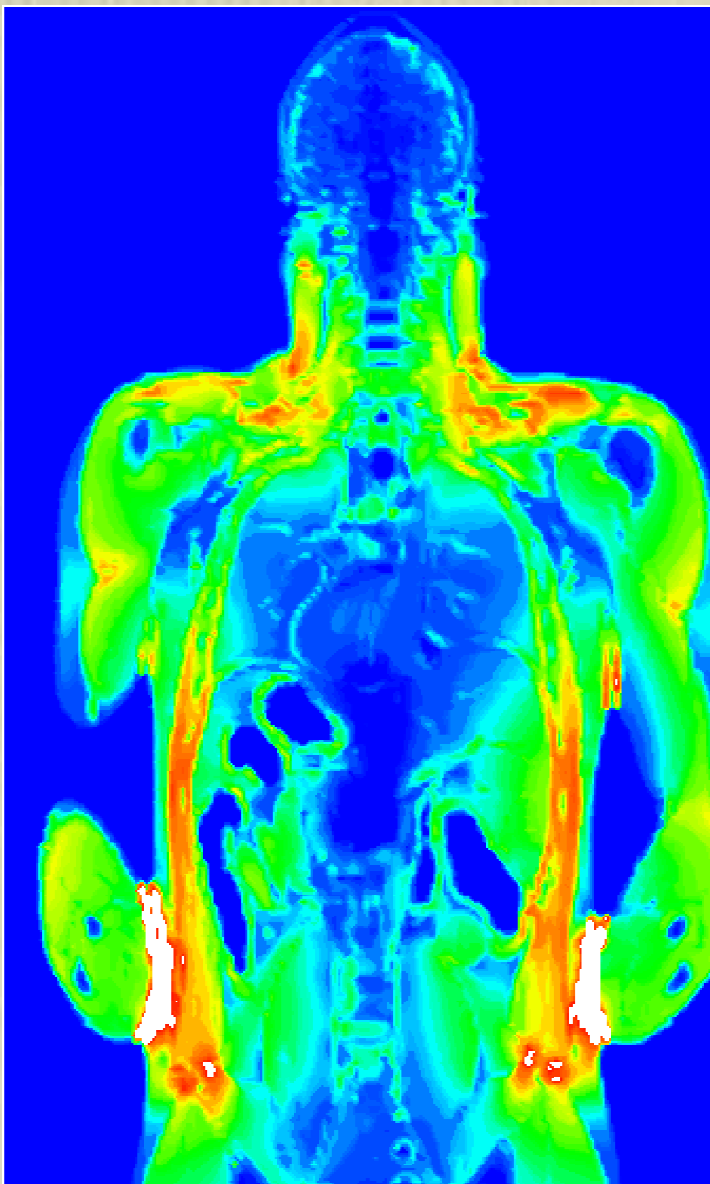


- What are the effects of radio frequency signals on human tissue?
- MRI, mobile telephones



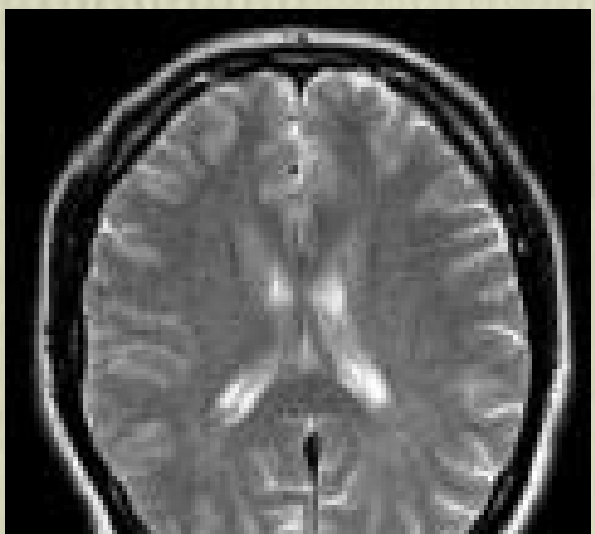
Bio-electromagnetics

Cancer treatment with hyperthermia



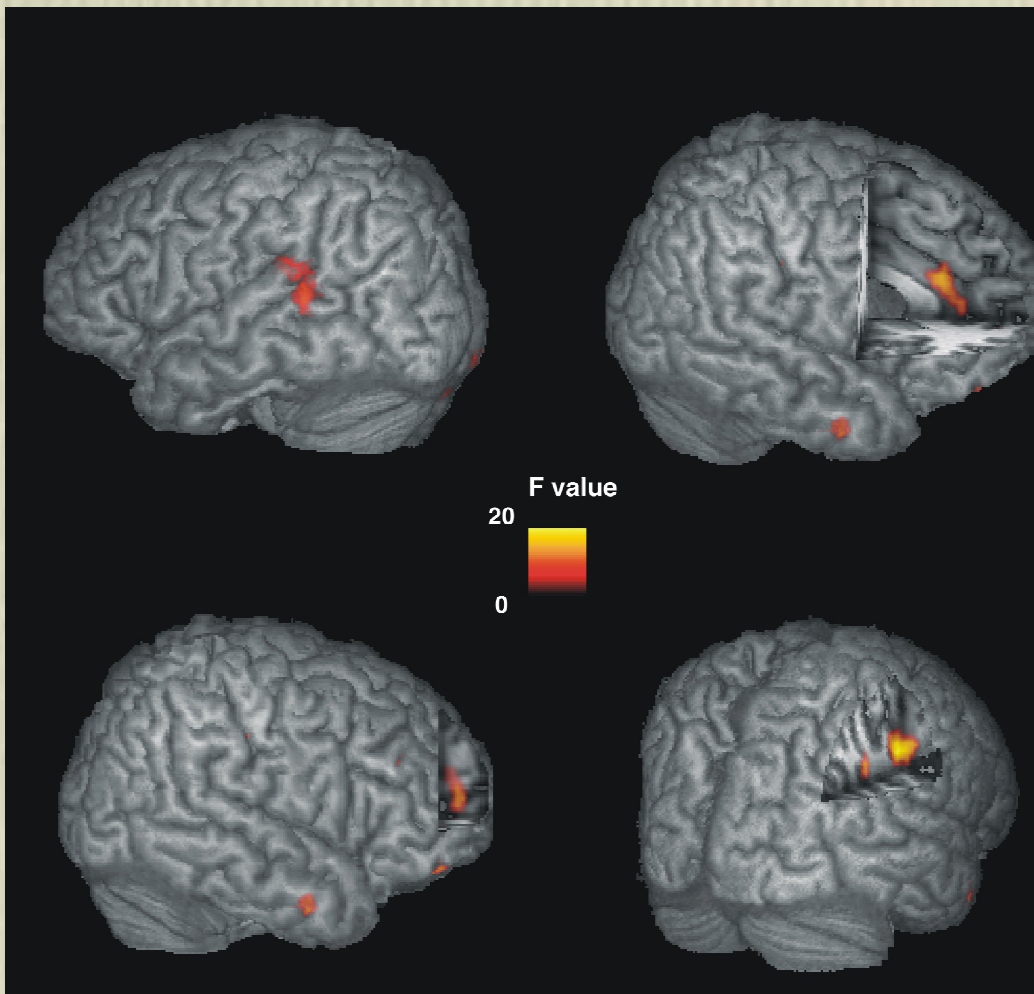
Magnetic Resonance Imaging

- Relatively new technology
- Local groups active in this area



functional MRI

- *See**ing*** the brain think



Questions ?