



New medical imaging, Physics, Medical Need and Commercial Viability

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Things Change Slowly in Medical Land...

Pulse Oximeter



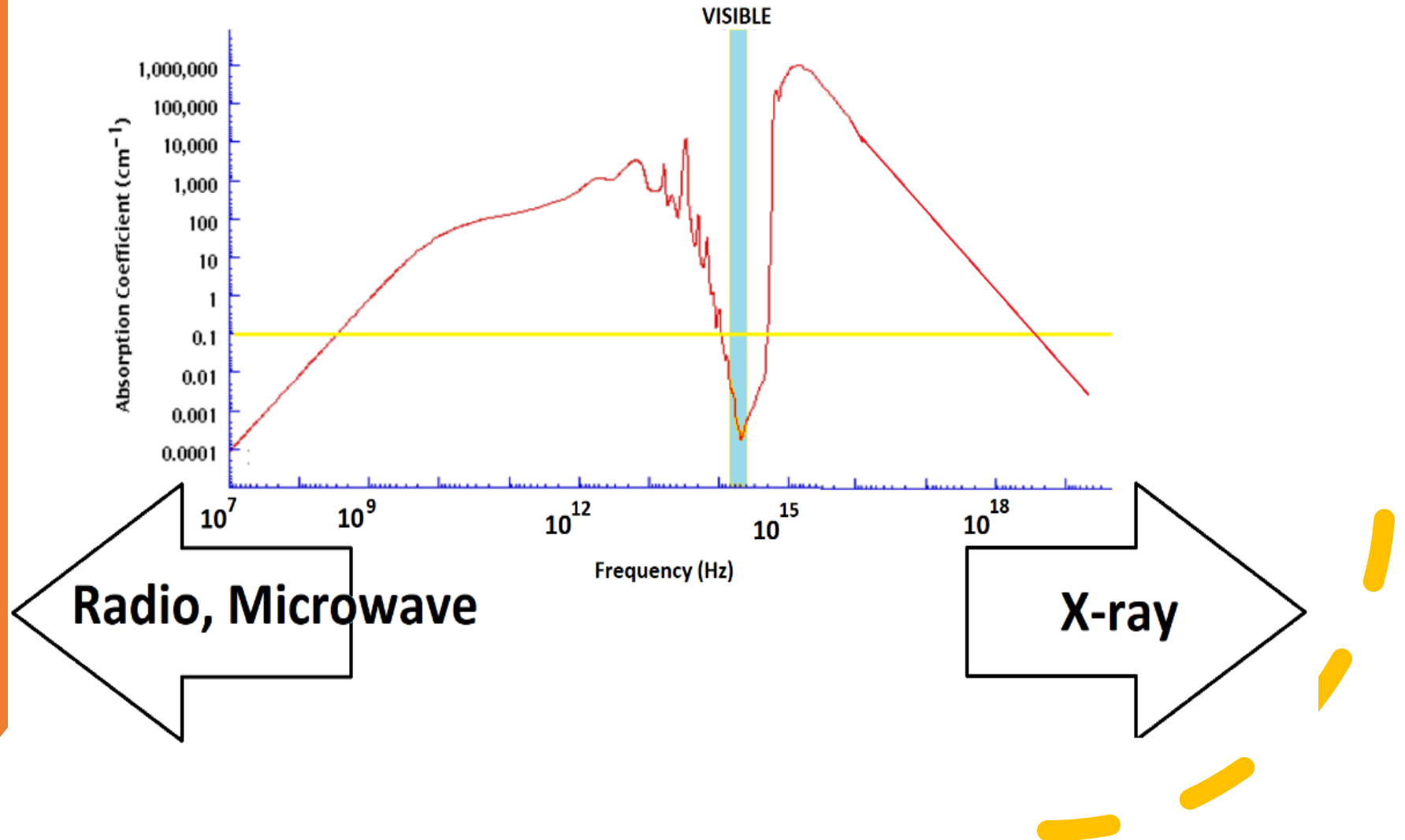
Things
Change
Slowly in
Medical
Land...

- **Nuclear Medicine – 1950's**
- **Ultrasound – 1960's**
- **CT – 1970's**
- **MRI - 1980's**

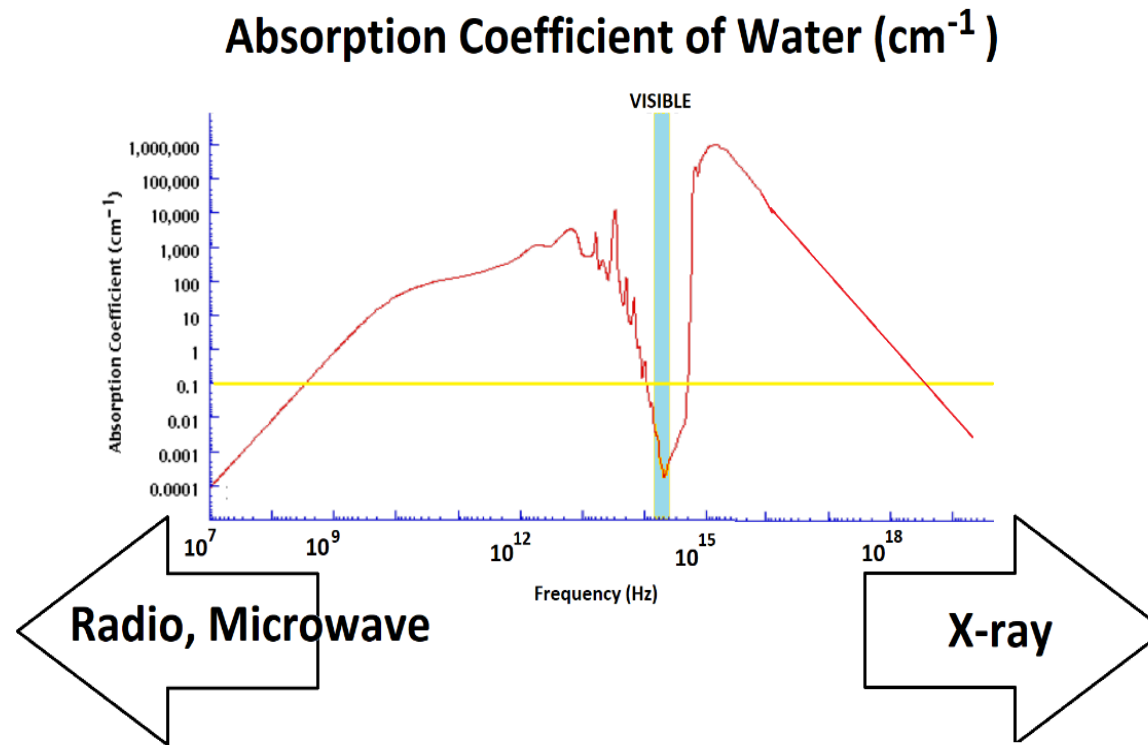


The dead
hand of
Physics

Absorption Coefficient of Water (cm^{-1})



The dead
hand of
Physics



Deep body imaging only with
frequencies under the yellow line
(absorption coefficient of $<0.1/\text{cm}$)

The dead
hand of
Physics

**Radio waves and microwaves are
utilised by electrocardiography,
electroencephalography and MRI**


**Diagnostic X-rays, CT scans,
Nuclear Scans**

A decorative graphic consisting of four yellow, thick, curved dashes arranged in a curved path from the bottom right towards the top right.

The dead
hand of
Physics

GHz, THz, Infrared frequencies

**Diagnostics of surface lesions,
destroying surface lesions like
melanoma – dial the depth of
destruction by selecting
frequency of the radiation.**



The dead
hand of
Physics

Ultrasound

Penetration decreases with increased frequency

Resolution increases with increased frequency

Air is a poor conductor of high frequencies (conductive gel, long time with trained operator, inconsistency)



Medical
Need

Core hydration meter






Medical Need

Techniques that replace a procedural intervention with an imaging modality

Of the patients with positive fecal occult blood test, 58% will have normal colonoscopy





Medical Need

**Techniques that improve
accuracy to avoid procedural
intervention**

**Accuracy of MRI for knee cartilage
lesions between 15% and 60%**





Medical Need

**Better techniques that show
how things work, not just how
they look**

**Cardiology is good at this, the rest not
so good – problems with field of view**



Commercial viability

The physics may be right, the need is there, but they will not pay!

MRI is expensive but they pay – the information is really important

What would I pay for a hydration meter?

\$100 ? Probably ...

\$10,000? Not likely...





The sweet spot

