

AT HOME – PHYSICS APPLIED TO MEDICINE

THURSDAY 8 July 2010

This meeting has been organised by Cyril Isenberg

Programme

- Chairman Dr Cyril Isenberg
- 10.30 Coffee
- 11.00 Welcome and notices
- 11.05 Dr Francis A. Duck - A HISTORY OF MEDICAL PHYSICS
Medical Physics and Bioengineering Department, Royal United Hospital Bath and University of Bath
- 11.45 Professor Peter Wells - MEDICAL ULTRASONICS
School of Engineering, Institute of Medical Engineering and Medical Physics, Cardiff University
- 12.25 Dr David Bonnett - PHOTON PIXELS AND PARTICLES: CURRENT DEVELOPMENTS IN
RADIOTHERAPY
Director of Medical Research, Kent Oncology Centre, Maidstone and Tunbridge Wells NHS Trust
- 13.05 Lunch
- 14.30 Chairman Dr Alan Jennings
- 14.35 Dr Zenon Sienkiewicz - HEALTH EFFECTS OF RADIOFREQUENCY FIELDS
Health Protection Agency
- 15.20 Professor Bill Vennart - WHY HAS MRI SO MUCH TO OFFER MEDICINE
Head of Molecular Medicine (Sandwich), Pfizer Ltd.
- 16.05 Professor David Delpy - MEDICAL PHOTONICS
Chief Executive, EPSRC.
- 16.50 Tea and close

Institute of Physics, 76 Portland Place, W1B 1NT. The nearest underground stations are Oxford Circus and Regents Park.

This meeting is open to visitors. Please contact Reinalt Vaughan-Williams, reinaltw@googlemail.com, 21 Coombe Gardens, London, SW20 0QU, 020 8946 3399, 07758 085741 if you wish to attend.

Costs are £25 with lunch or £5 without lunch.

1

A HISTORY OF MEDICAL PHYSICS

Dr Francis A. Duck
Medical Physics and Bioengineering Department,
Royal United Hospital Bath and University of Bath

Medical Physics emerged in the 19th century when medical students were taught physics in Paris in the 1830's, and Arnett's *Elements of Physics, General and Medical* was a best seller in Britain. German experimental physiology, described by Fick in *die Medizinische Physik (1858)*, established the scope of the subject, giving a framework as new developments in physics such as radioactivity, X-rays and piezoelectricity became part of medical practice.

2

ULTRASONICS IN MEDICINE

Professor Peter Wells
School of Engineering
Institute of Medical Engineering and Medical Physics
Cardiff University

Ultrasound is used in medicine both for diagnosis (mainly for imaging, using pulse-echo techniques) and for therapy (exploiting ultrasonic bioeffects). Although many diagnostic technologies are mature (more than 20 per cent of imaging studies are ultrasound), new methods are continuously emerging; practicable therapeutic applications are, however, still quite novel.

3

PHOTONS, PIXELS AND PARTICLES: CURRENT DEVELOPMENTS IN RADIOTHERAPY

Dr David Bonnett
Director of Medical Physics at the Kent Oncology Centre
Maidstone and Tunbridge Wells NHS Trust

Over the past ten years there have been significant developments in radiotherapy with major impact from the increases in computing power, improved target identification of tumour using combinations of imaging modalities and technological advances that enable better conformation of high energy X-rays to the tumour volume. In addition developments in the use of photons and heavy charged particles have gathered momentum with the announcement of funding for a new high energy proton accelerator for radiotherapy in the UK. These developments are reviewed and discussed.

4

HEALTH EFFECTS OF RADIOFREQUENCY FIELDS

Dr Zenon Sienkiewicz
Radiation Effects Department, Chemicals and Environmental
Hazards, Health Protection Agency

This talk will describe some of the possible health effects associated with exposure of a variety of radiofrequency fields commonly used in medicine and everyday life, including MRI and mobile phones.

5

WHY HAS MRI SO MUCH TO OFFER MEDICINE?

Professor Bill Vennart
Head of Molecular Medicine (Sandwich), Pfizer Ltd

This talk will briefly review how magnetic-resonance images are formed, highlighting the key parameters measured. Illustrations of the application of MRI techniques to medicine will be given, focussing on both the fundamental and structural data that can be obtained. The potential for MR techniques to further influence medical research and health care will be discussed.

6

MEDICAL PHOTONICS

Professor David Delpy
Chief Executive EPSRC

Optical diagnosis of disease is as old as medicine, although before the mid 1800's the measures were of a qualitative and observational nature, doctors (whether knowingly or not!) using their eyes as the optical detector and spectral analyser. Over the last thirty years, the dramatic developments in lasers, optical fibres and semiconductors have now made it possible to use optical techniques (often in a non-invasive manner) to provide accurate and localised measurements of parameters such as blood oxygenation, volume and flow, tissue metabolism, biochemical makeup and structure. This talk will illustrate how we can now use 'mere light' to do everything from monitoring individual cell function to imaging the brain, all in a safe, non invasive manner and often at the bed side.
