Physics in Medicine

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Introduction

• What is the public perception of Physics?
• Google search: “physics”.

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• What is the public perception of medicine?
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Introduction

• Amongst the general public, physics is not typically associated with medicine.

• Similarly, medicine not typically associated with physics.

Physics is integral to modern medicine!
Modern medical equipment is based on important physical laws
1. Medical imaging

- In medicine, doctors often need to see inside the body.
- 3 approaches:

  - Exploratory surgery
  - Endoscopy/Laparoscopy
  - Imaging
1. Medical imaging

- Surgery is highly invasive.
- Endoscopy is minimally invasive.
- Imaging is non-invasive.
- Imaging reduces risks of complications and reduces recovery time.
1. Medical imaging

- Imaging technology operates using advanced physics principles.
1. Radiotherapy

- Radiotherapy is for treating cancer.
- Cancer is one of the leading causes of death.
- Worldwide, 8.2 million deaths in 2012 and 14 million new cases (WHO).
- > 60% of new cases and 70% of deaths occur in Africa, Asia and Central and South America.
2. Radiotherapy

- A variety of methods are available for treating cancerous growths.
  - Surgery
  - Chemotherapy
  - Radiation therapy

- Radiation therapy, with x-rays and gamma rays, for treating localized tumors that are difficult to access surgically.
- X-rays kill cancer cells while minimized damage to healthy ones.
- Requires careful control of radiation dose and location.
2. Radiotherapy

- Modern radiotherapy mostly performed by linear accelerators (linac, 直線加速器).
2. Radiotherapy

- Careful planning is required in radiotherapy, often aided by computer simulations and phantoms.