Radiotherapy in Cancer Management

May Abdel-Wahab , MD, PhD

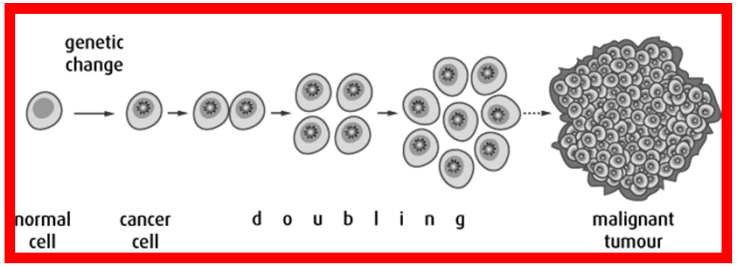
Director Division of Human Health

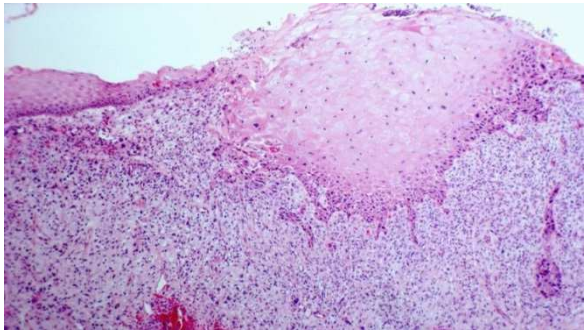
Department of Nuclear Sciences and Applications

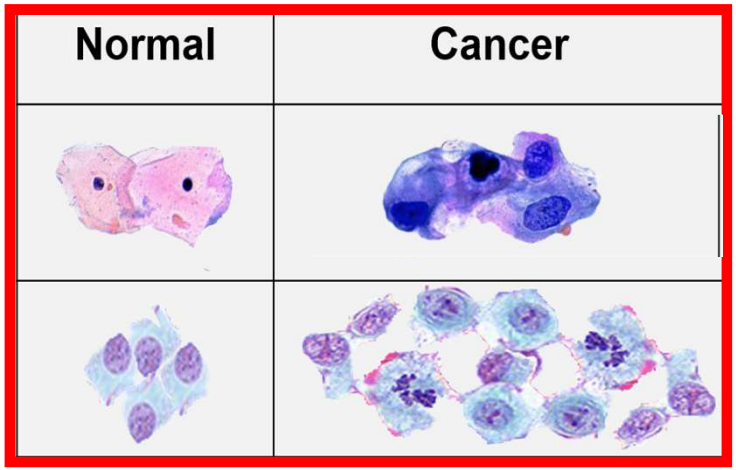
WiN conference Wed, 26 August; 11:00-12:30; Session: Use of Radiation in Medicine

What is Cancer

- Diagnosis:
  - Biopsy
  - Laboratory
  - Radiologic
- Staging:
  - Depends on the type of cancer





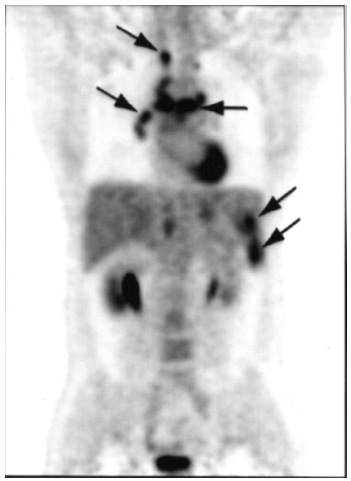


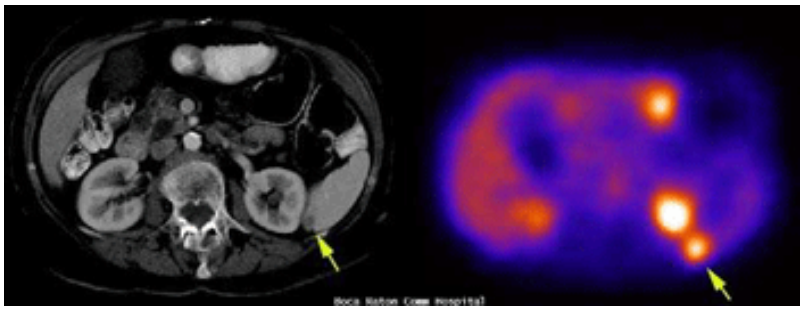
http://sphweb.bumc.bu.edu

Functional Imaging

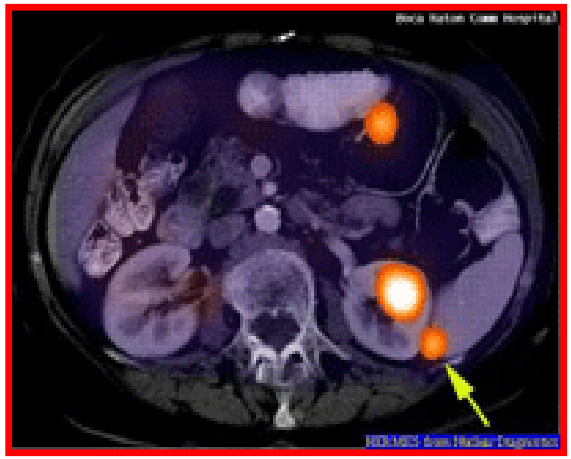
CT Image

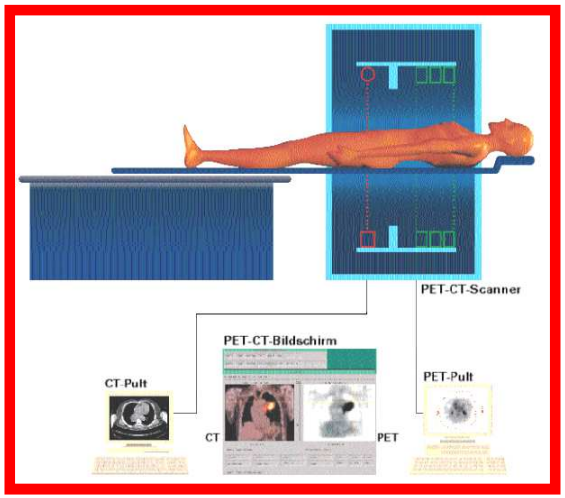
PET Image



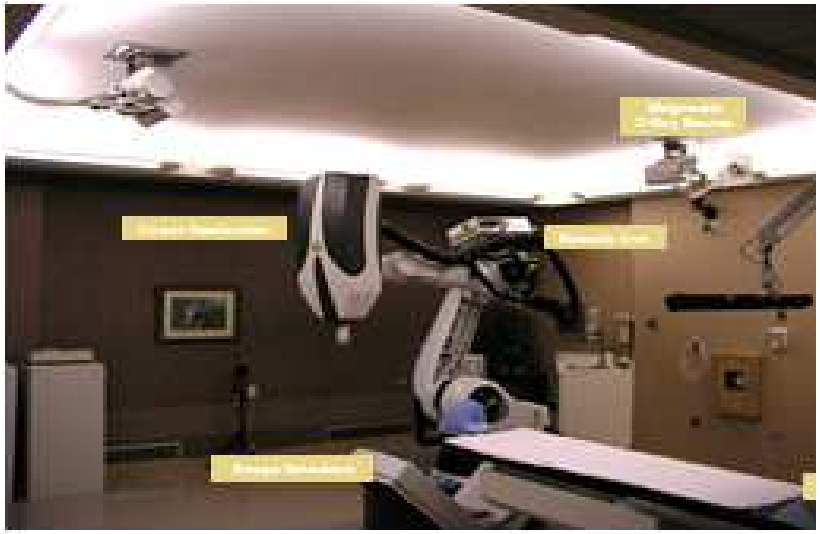


Combined CT and PET offers the most benefit in interpretation

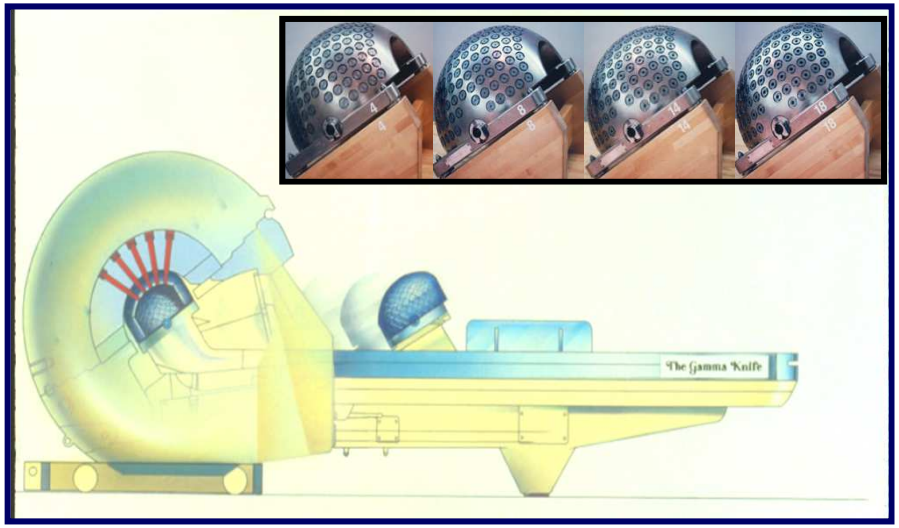




Radiation Therapy Techniques



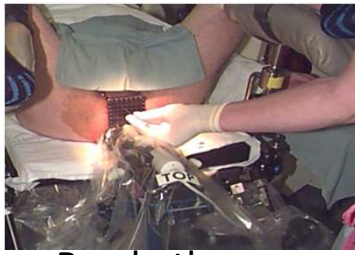
Robotic Body Radiosurgery



Gamma-knife Radiosurgery

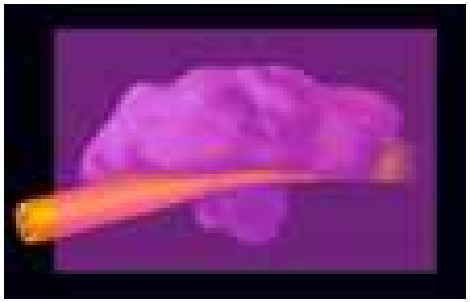
External Beam 3-D/IMRT

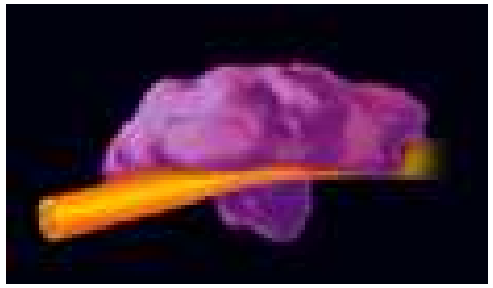
- Radiotherapy has been used for curative or palliative treatment of cancer., alone or combined with chemotherapy or surgery.

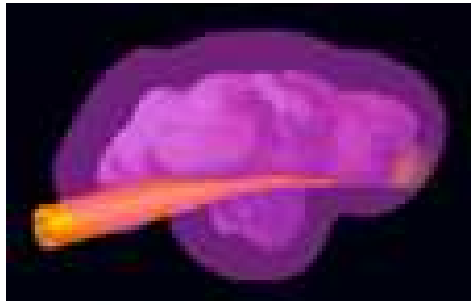


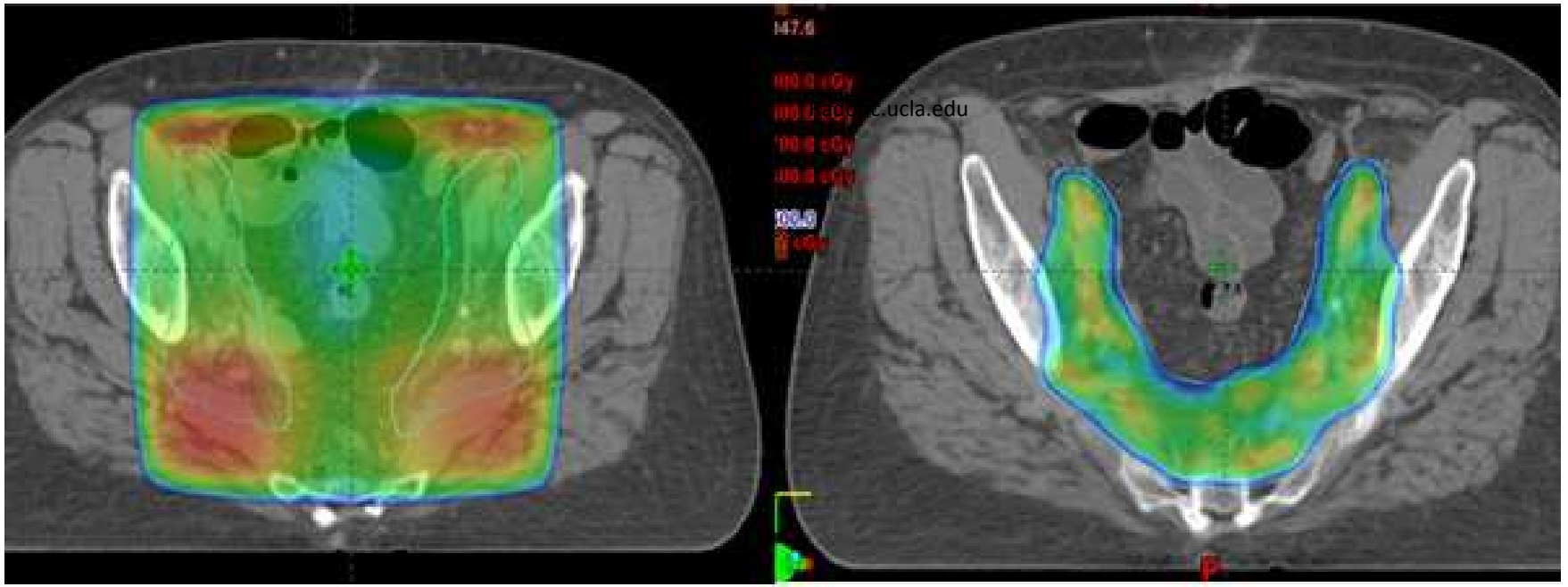
Brachytherapy

Comparison of Techniques



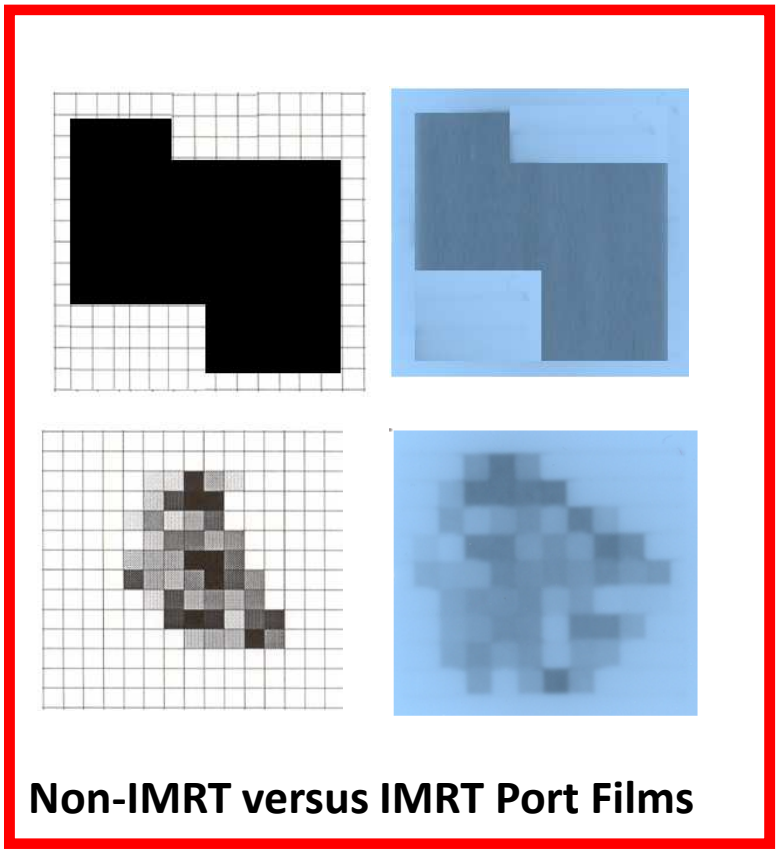




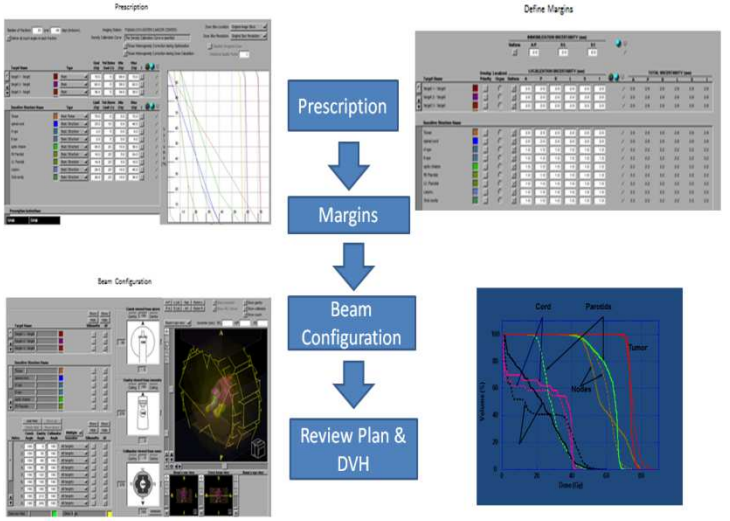


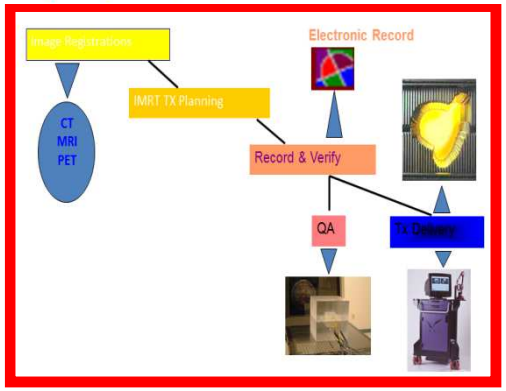
Courtesy Sua Yu, MD

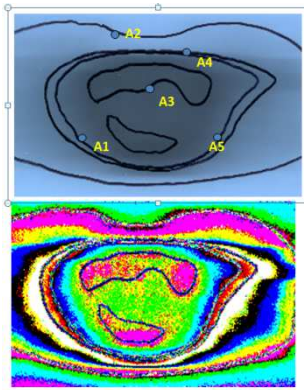
Intensity Modulated Radiation Therapy



Non-IMRT versus IMRT Port Films







CT-Simulation Structure Definition → Plan Optimization → QA and Delivery

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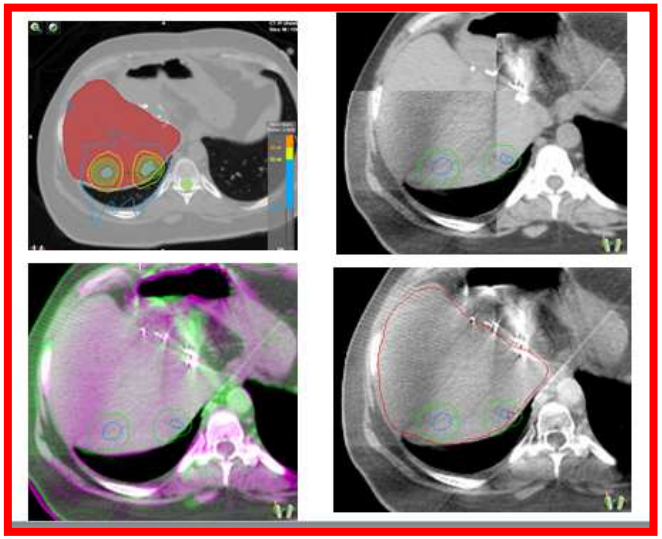
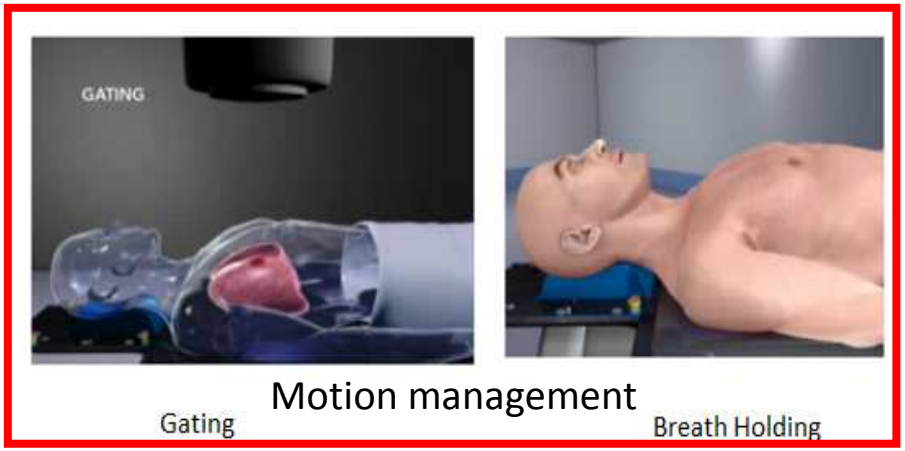
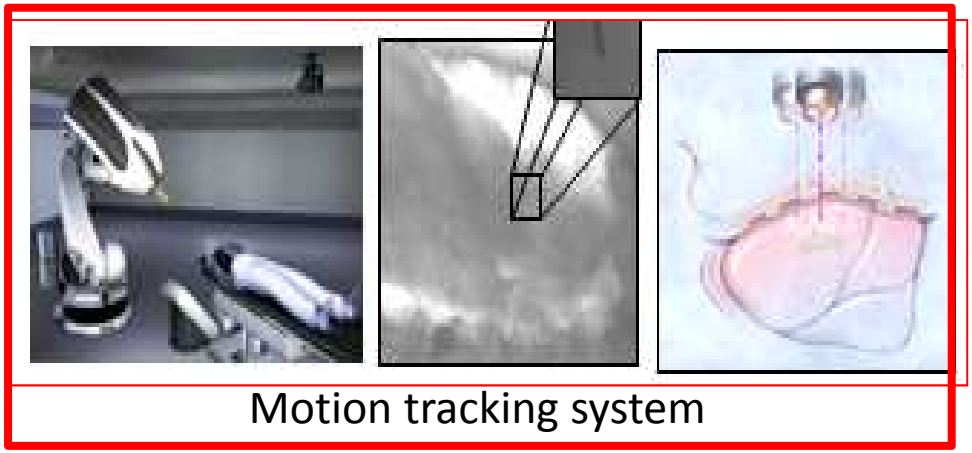
Targeting & Motion Management



Onboard imaging (OBI)





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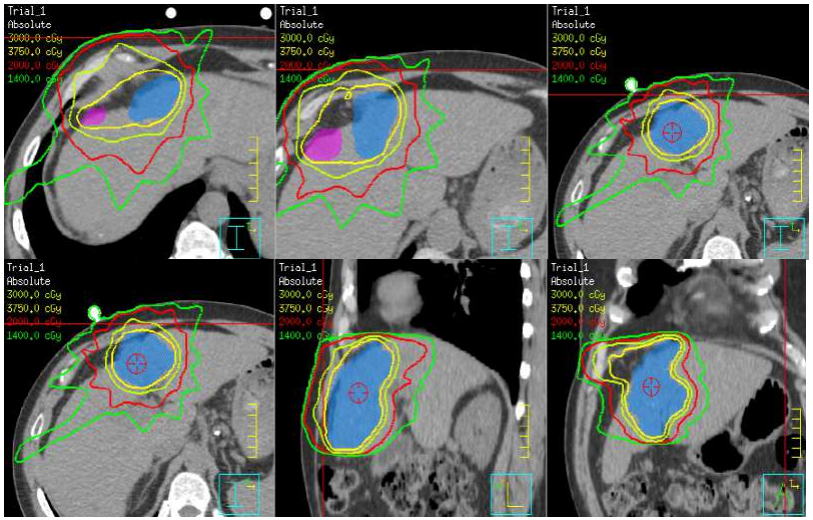
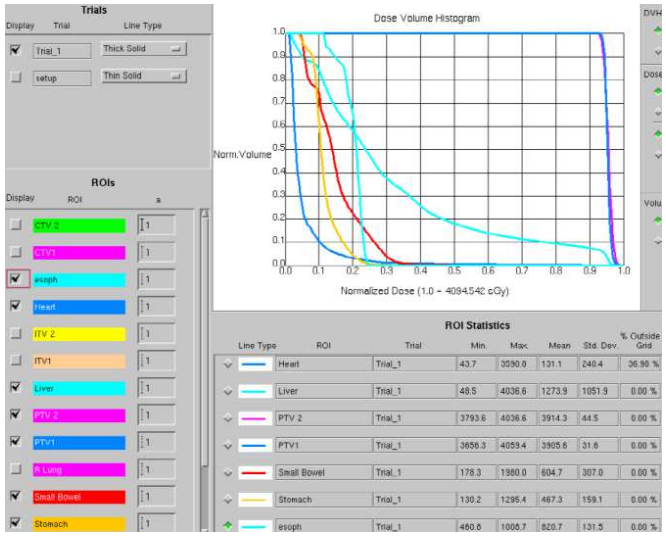
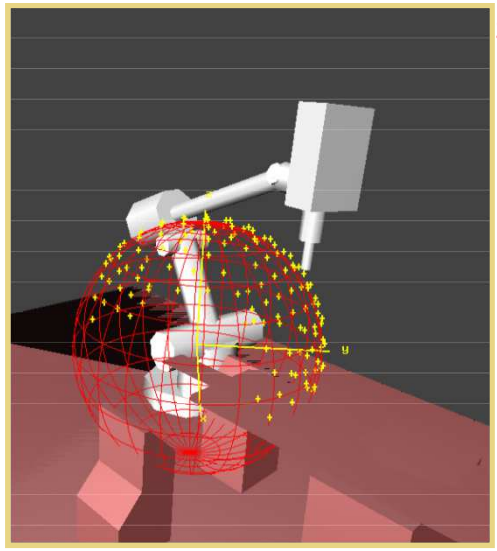
Stereotactic Body Radiation Therapy/Radiosurgery







SBRT to 37.5 Gy in 3 fx

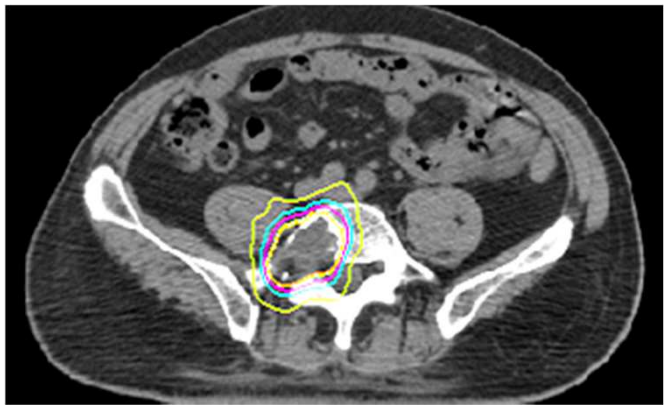


Image-guided Robotic radiosurgery

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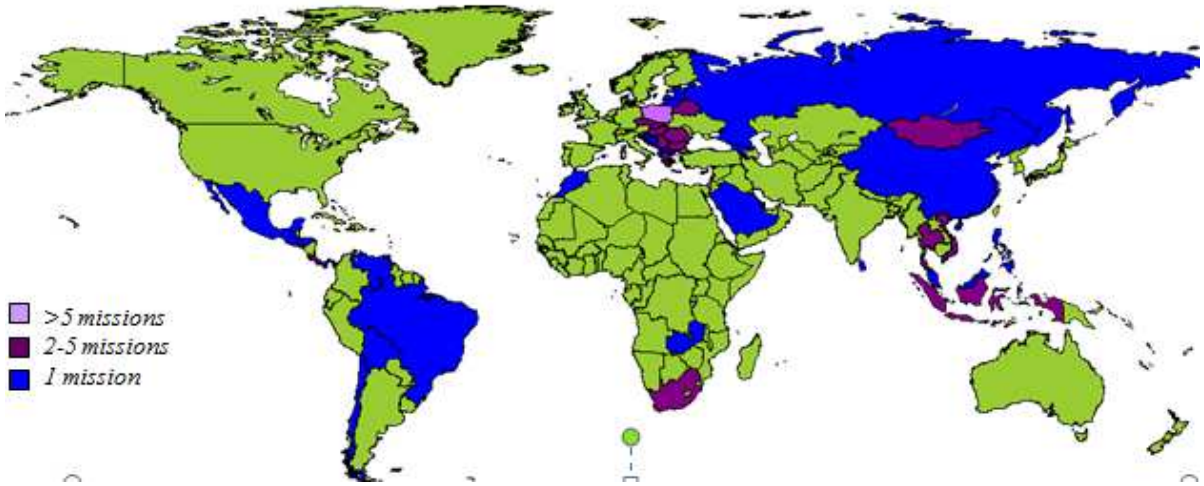
THE IAEA HUMAN HEALTH PROGRAMME

- Applied Radiobiology & Radiotherapy **Eduardo Rosenblatt, SH**
- Nuclear Medicine & Diagnostic Imaging Section **Diana Paez, SH**
- Dosimetry & Medical Radiation Physics **Ahmed Meghzifene SH**
- Nutrition & Health related Environmental Studies **Cornelia Loechl SH**

Technical Cooperation (TC) Department	**Manages projects in radiotherapy in LMIC countries; assistance in National Cancer Control Programmes through Programme of Action for Cancer Therapy**
Nuclear Safety (NS) Department	**Establishes normative and codes of practice in radiation safety and promotes regulatory infrastructure in all countries**

IAEA support in Radiotherapy, Medical Physics, & Nuclear Medicine

- **Setting up** new centres/Upgrade/QA
- National **education** programmes
- **Fellowships** for education and training
- **Experts** (equip. commissioning, on-site training, etc.)
- **Procurement** of equipment
- Regional **training** courses
- **Dosimetry** services
- Comprehensive audits



2015 QUATRO activities: 87 QUATRO missions to date: Africa – 7; Asia – 11 + 2 re-audits; Europe – 33 + 4 re-audits; Latin America – 12; Middle East - 10 + 8 re-audits

✓Radiation oncologist
✓Medical physicist
✓RTT
✓Safety specialist (local)

QUANUM, QUATRO, QUAADRIL missions

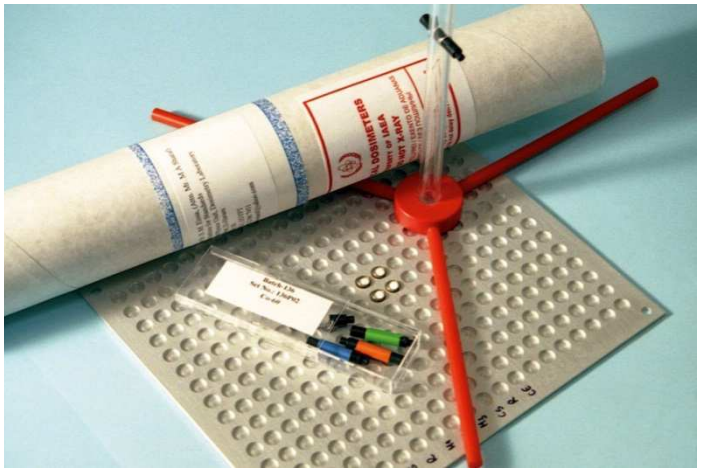
QA Calibration & Audit services

Calibration service for national dosimetry standards

IAEA-WHO SSDL Network

- 80 SSDL laboratories in 67 countries
- 6 SSDL organizations
- Five collaborating international organizations

Support to end-users in dosimetry: Verification of clinical beam calibration



IAEA/WHO TLD postal service for external beam radiotherapy

- About 500 beams per year
- Includes Co-60 and High Energy X-ray beams
- Discrepancies are followed up, if necessary by an expert visit

Coordinated Research Projects (CRP)

- Post-mastectomy radiotherapy
- Pre-operative advanced rectal cancer
- Palliative oesophagus cancer
- Glioblastoma multiforme
- Lung cancer
- Painful bone metastasis
- Head and neck cancer (2)
- Cervical cancer (2)

Proffered Papers

CLINICAL 3: IAEA

16:45 - 18:00 | ROOM 118-119

Chair: J. Overgaard (Denmark)

Chair: G. Jones (Canada)

16:45 IAEA-HypoX. A randomized study of nimorazole with accelerated radiotherapy in HNSCC. Report of an incomplete trial
M.A.H. Metwally (Denmark), R. Ali, K. Iqbal, M. Kuddu, T. Shouman, P. Strojan, R. Prasad, C. Grau, J. Overgaard OC-0187

16:55 IAEA randomised study on optimization of treatment of locally advanced NSCLC using radiotherapy and chemotherapy
B. Jeremic (Serbia), E. Fidarova, V. Sharma, M. Faheem, A. Ameira, C. Nasr Ben Amar, A. Frobe, F.N. Lau, S. Brincat, G. Jones OC-0188

17:05 Irradiation of the supraclavicular nodal region in post-mastectomy radiotherapy; an IAEA randomized trial
E. Rosenblatt (Austria), G.W. Jones, M. El-Mongy, H. Mahmood, J. Marinello, A. Elzawawy, S. Shahid, D. Filali-Benaceur, J. Yarney, J. Moscol Ledesma, N.S. Bese, O. Campbell OC-0189

17:15 Short-course radiotherapy for locally advanced rectal cancer: an IAEA randomized trial
E. Rosenblatt, G.W. Jones (Canada), V. Valentini, M.A. Gambacorta, T. Menon, R. Engineer, B. Robertson, A. Frobe, A. Ulloa-Balmaceda, R. Ospino-Pena, E. Nuryadi, M. Nagarajan, R. Lakier OC-0190

17:25 IAEA randomised trial of optimal single dose radiotherapy in the treatment of painful bone metastases
P. Hoskin (United Kingdom), A.M. Rojas, R. Jalali, A.M. Merino, A. Poitevin, S. Oucrif, S. Abdelwahab, L. Kochbati, A. Plieskiene, F. Casas, S. Stojanovic, G. Schneider, E. Fidarova, B. Jeremic OC-0191

17:35 Optimal radiotherapy utilization rate in developing countries: an IAEA study
E. Rosenblatt, M. Barton (Australia), W. Mackillop, E. Fidarova, L. Cordero, J. Yarney, C.C. Lim, A. Abad, V. Cernea, S. Stojanovic-Rundic, P. Strojan, L. Kochbati, A. Quarneti OC-0192

17:45 Current radiotherapy capacity in post-Soviet countries; an IAEA survey
E. Rosenblatt, E. Fidarova (Austria), O. Utehina, S. Tkachev, M. Kislyakova, N. Semikoz, V. Sinaika, V. Kim, N. Karamyan, I. Isayev, K. Akbarov, Lomidze, D.(8), O. Bondareva, P. Tuzlukov, M. Zardodkhonova, J. Alimov, G.W. Jones, M. Barton, W. Mackillop OC-0193

SATURDAY 25 APRIL 2015

IAEA Technical cooperation (TC) programme

Developed and managed **jointly** by the Member States and the IAEA Secretariat.

The IAEA Technical Departments are responsible for the technical integrity of the TC programme.

IAEA TC Department responsible for the management of the TC programme

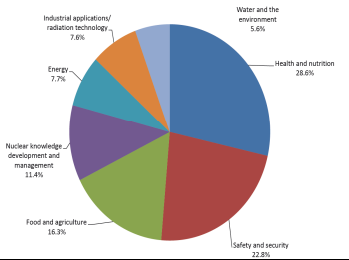
Yearly budget of about €120 million
About €32 million (~26%) are spent on Human Health

IAEA TC Activities

125 countries/territories receive support from the IAEA

Per year

- ✓ ~ 3200 expert missions fielded
- ✓ ~ 1600 fellowships and scientific visits
- ✓ ~ 3200 participants in training courses
- ✓ ~ 190 training courses
- ✓ ~ 2500 Purchase Orders



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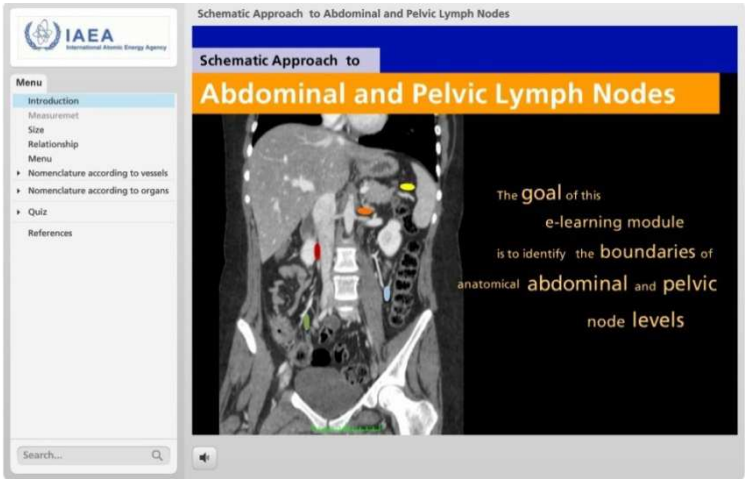
Education & Training -Improving the learning experience

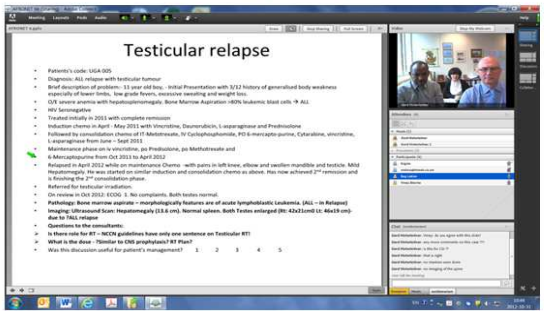
Development of interactive eLearning modules for Health Professionals:

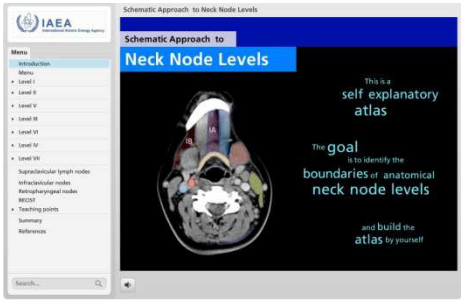
- Introduce new interactive E-learning modules that enhance self-directed learning.
- Improve efficiency in education
- Expand educational opportunities in remote areas.



AFRONET

- Monthly online meetings to discuss oncology patients
- 10 departments in Anglophone Africa





Development of **academic and clinical training guides** for medical physicists

Development of **educational material** (handbooks, teaching slides) for medical physicists

Physical & technical aspects of **dosimetry and QA** to support safe & effective use of radiation in medicine

Guidance and medical physics support to **comprehensive clinical audits**

http://humanhealth.iaea.org

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THANK YOU