

Radiotherapy in Cancer Management

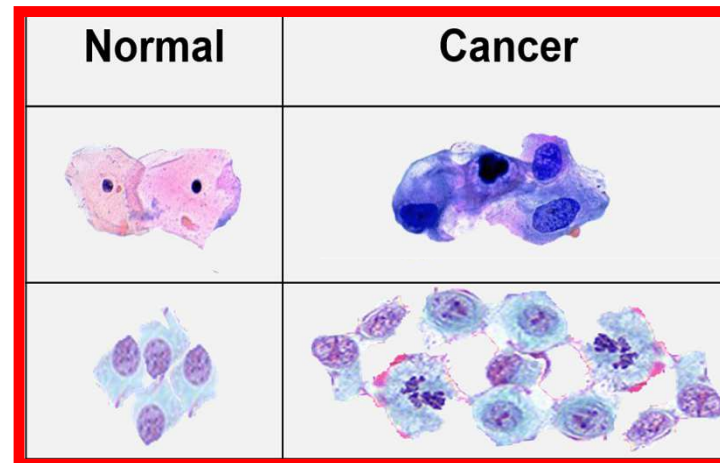
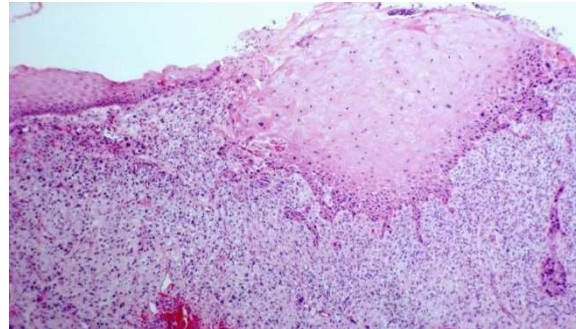
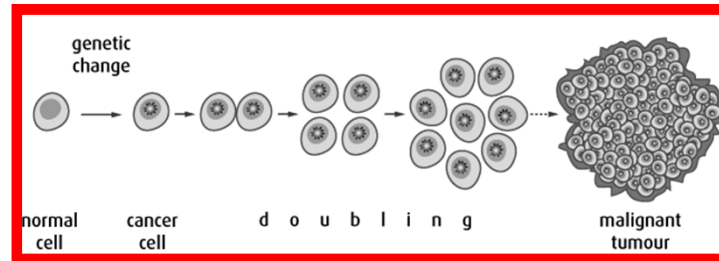


May Abdel-Wahab , MD, PhD
Director Division of Human Health
Department of Nuclear Sciences and Applications

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

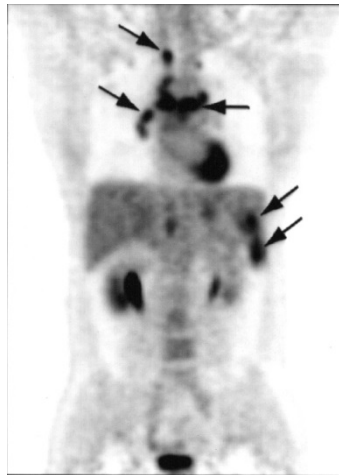


Functional Imaging

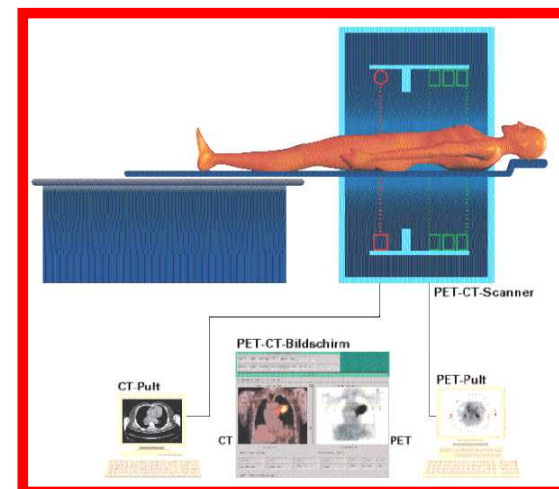
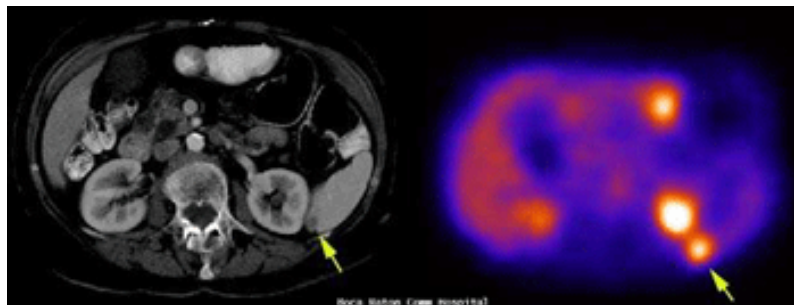
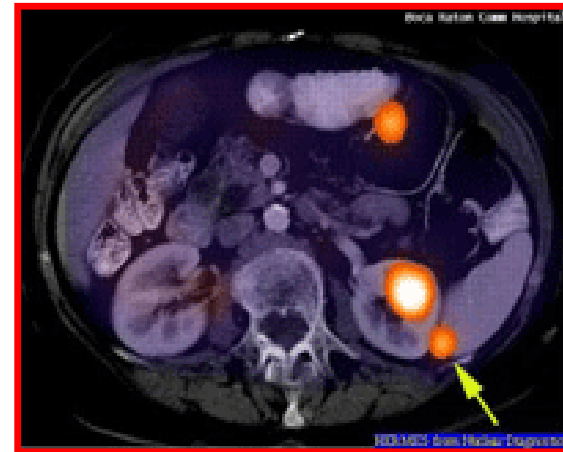
CT Image



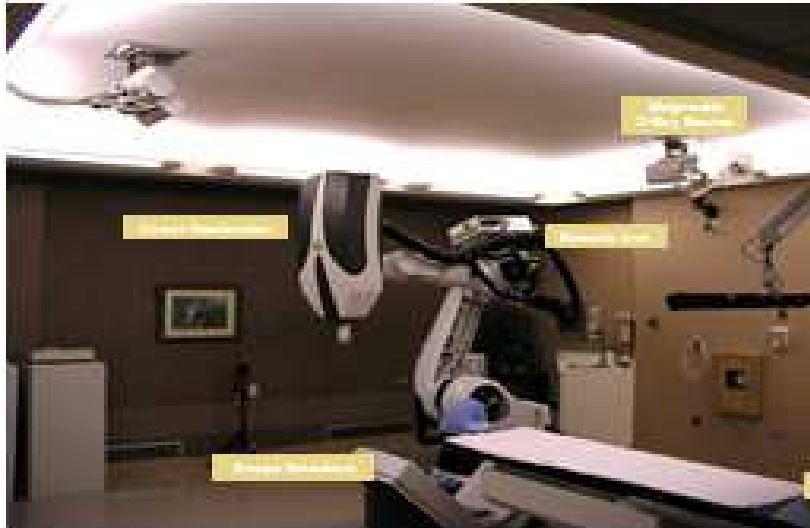
PET Image



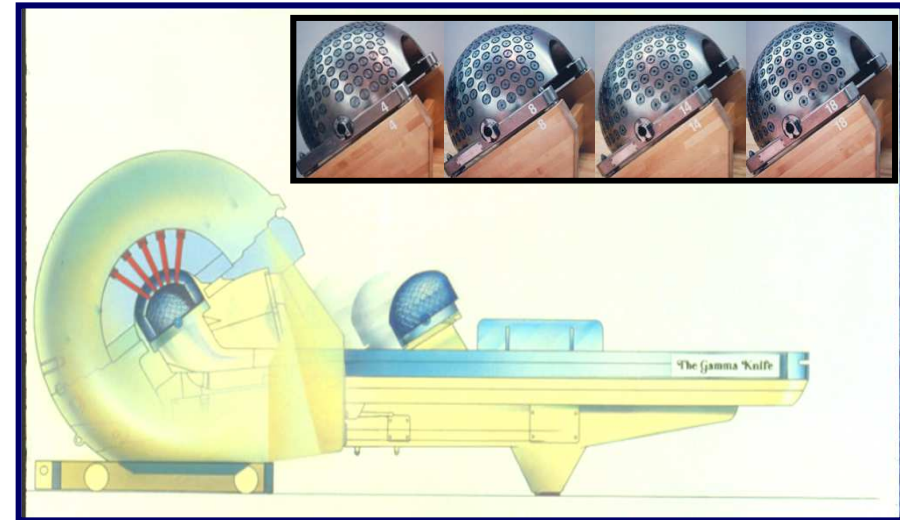
**Combined CT and PET
offers the most benefit in
interpretation**



Radiation Therapy Techniques



Robotic Body Radiosurgery

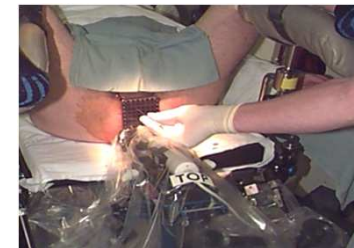


Gamma-knife Radiosurgery

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

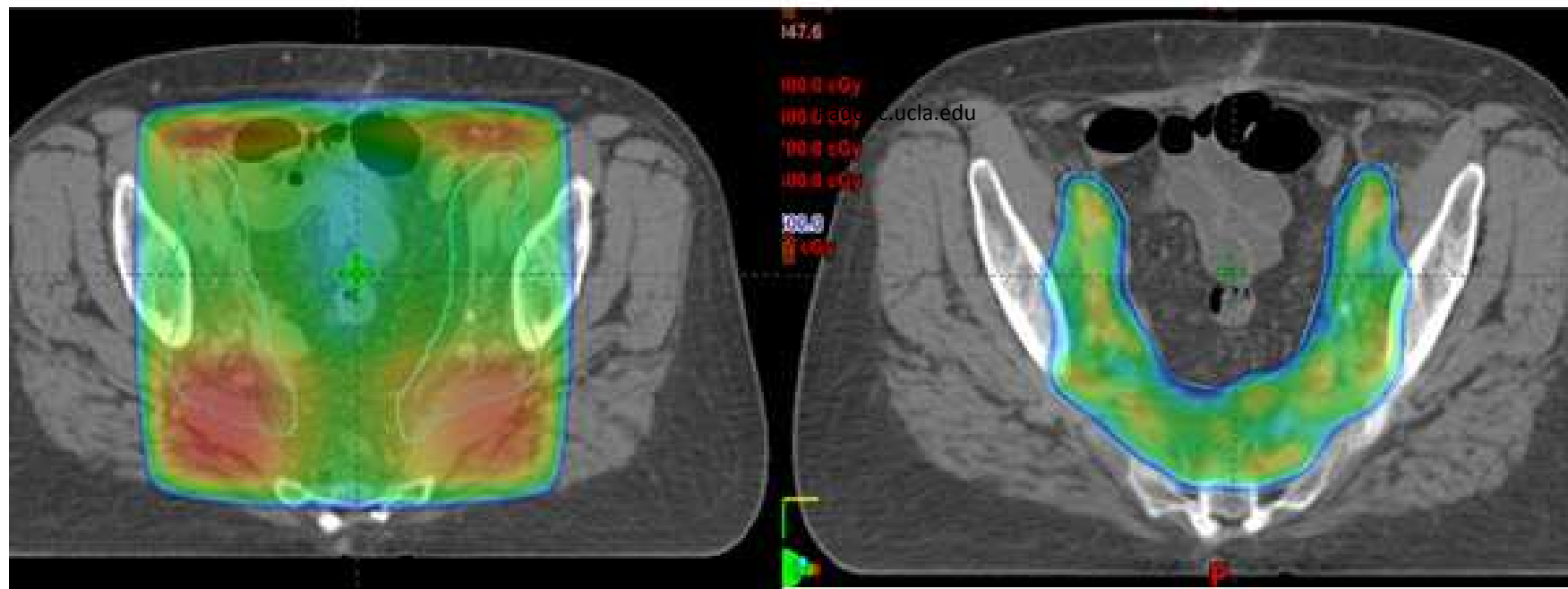
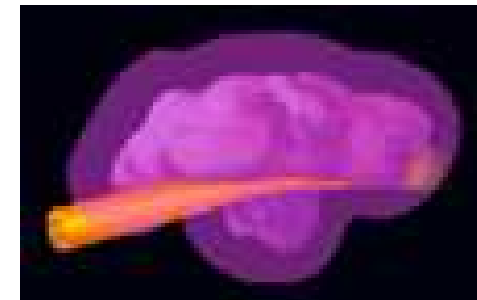


External Beam 3-D/IMRT



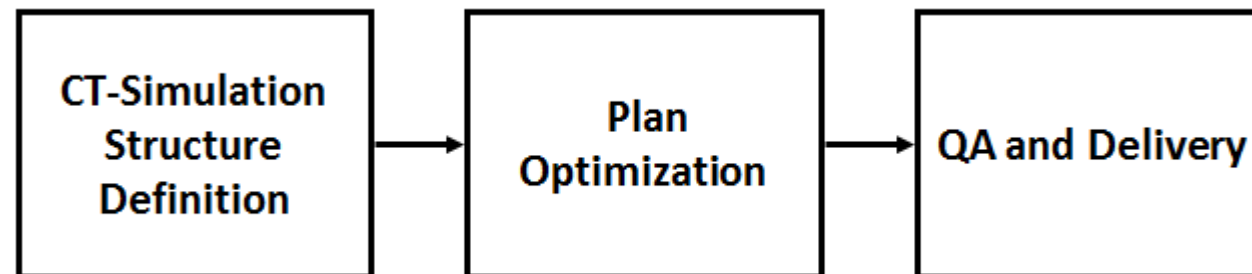
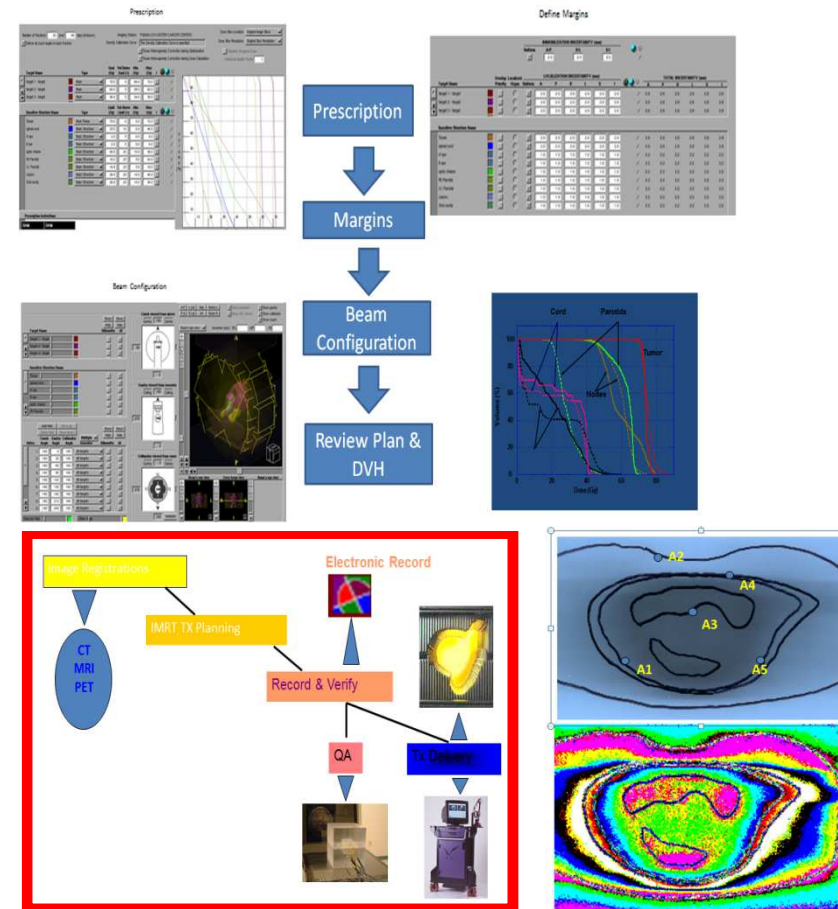
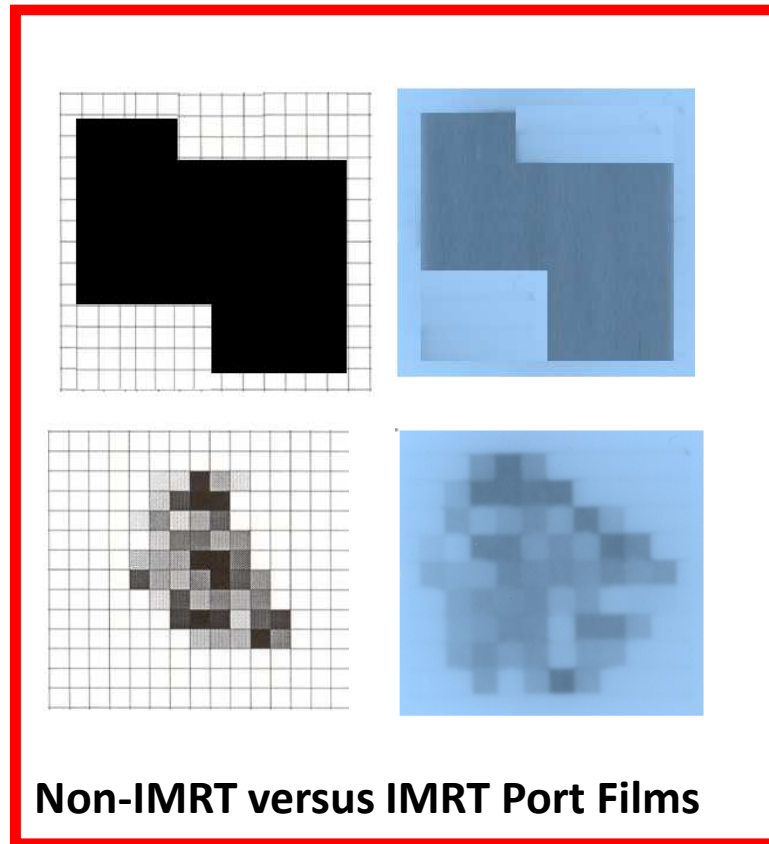
Brachytherapy

Comparison of Techniques

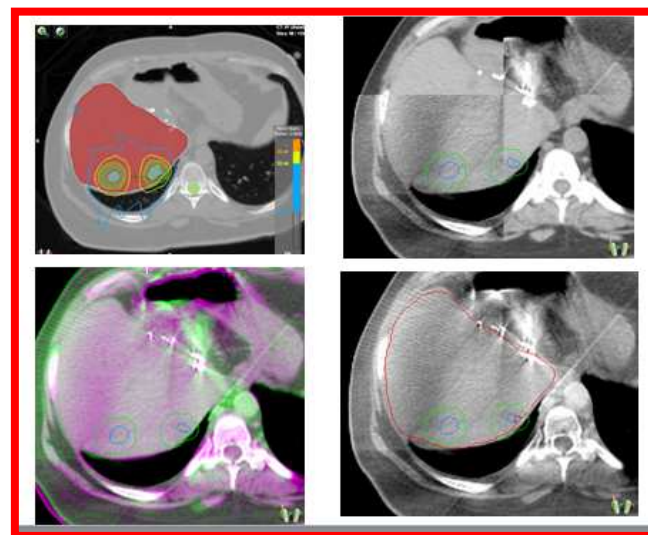


Courtesy Sua Yu, MD

Intensity Modulated Radiation Therapy



Targeting & Motion Management



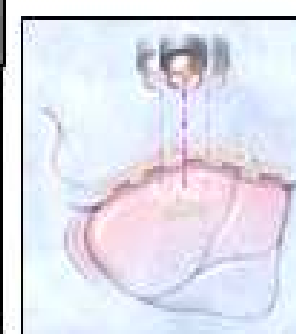
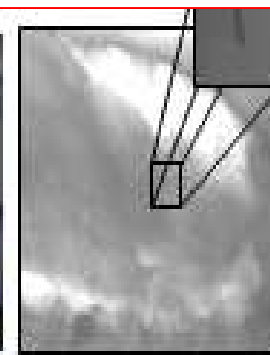
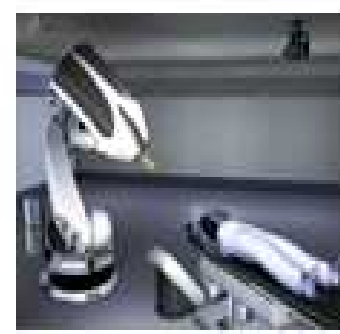
Onboard imaging (OBI)



Motion management

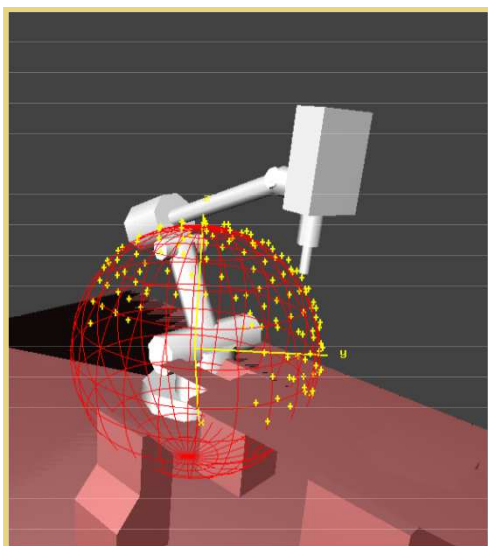
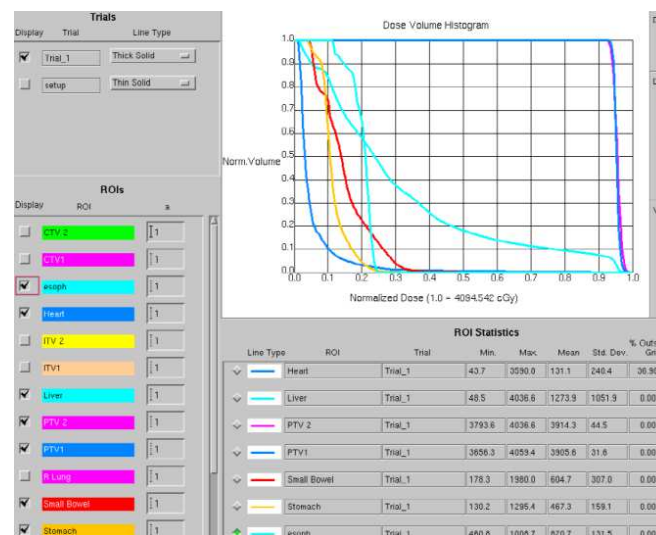
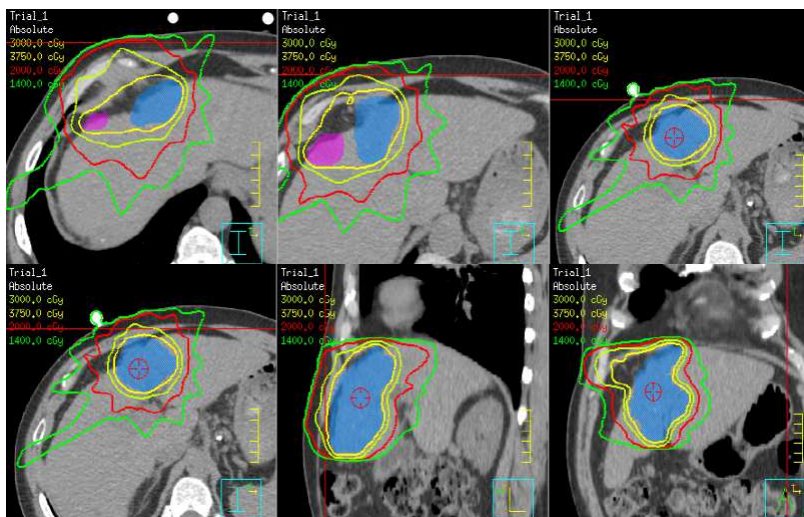
Gating

Breath Holding



Motion tracking system

Stereotactic Body Radiation Therapy/Radiosurgery



SBRT to 37.5 Gy in 3 fx

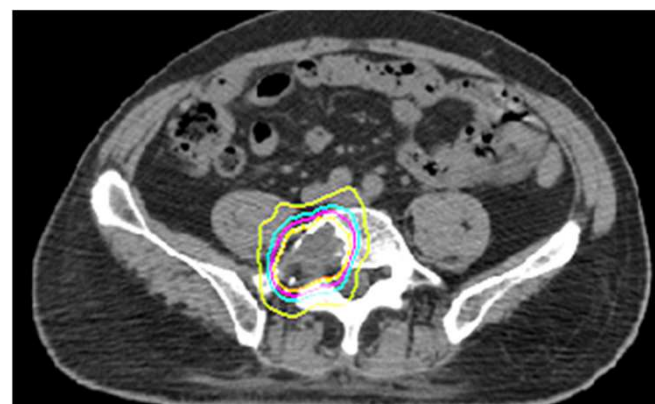


Image-guided Robotic radiosurgery

THE IAEA HUMAN HEALTH PROGRAMME

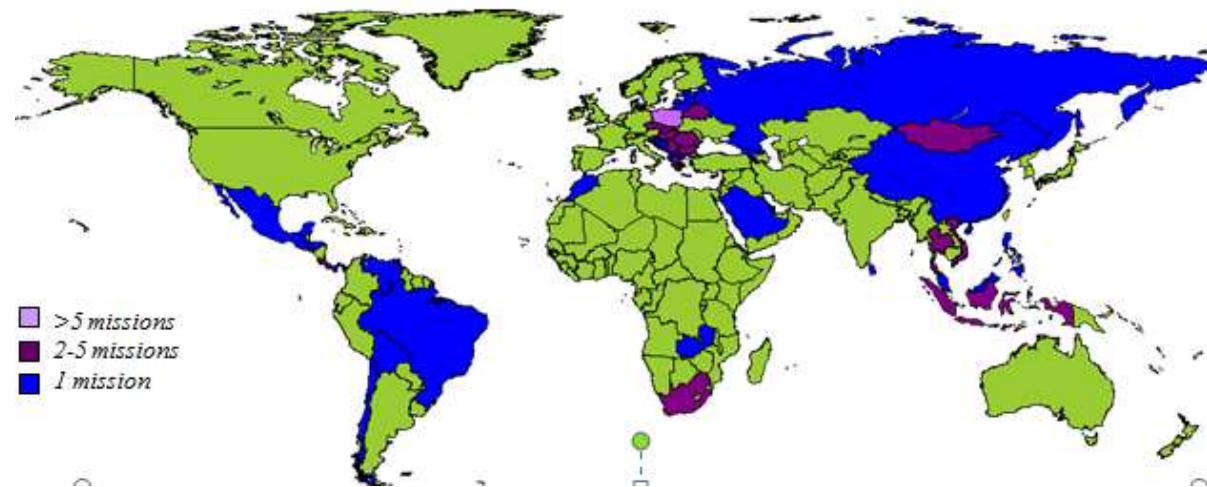
- Applied Radiobiology & Radiotherapy
Eduardo Rosenblatt, SH
- Nuclear Medicine & Diagnostic Imaging Section Diana Paez, SH
- Dosimetry & Medical Radiation Physics Ahmed Meghzifene SH
- Nutrition & Health related Environmental Studies cornelia Loechl SH



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

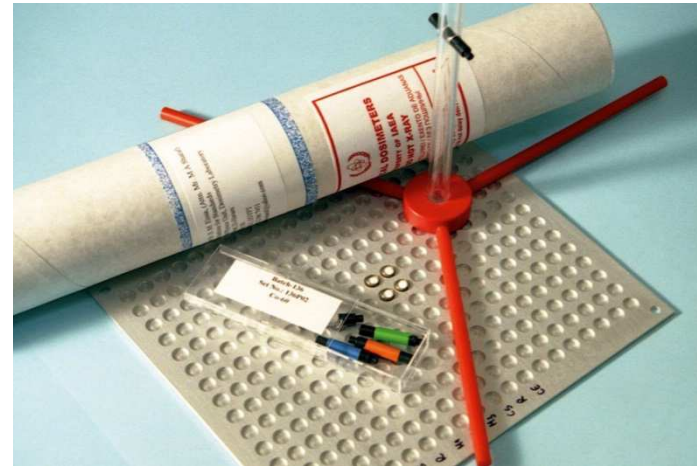
Calibration service for national dosimetry standards



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
<i>M.A.H. Metwally</i> (Denmark), R. Ali, K. Iqbal, M. Kuddu, T. Shouman, P. Strojjan, 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
<i>B. Jeremic</i> (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
<i>E. Rosenblatt</i> (Austria), G.W. Jones, M. El-Mongy, H. Mahmood, J. Marinello, A. Elkawawy, 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
<i>E. Rosenblatt, G.W. Jones</i> (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
<i>P. Hoskin</i> (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
<i>E. Rosenblatt, M. Barton</i> (Australia), W. Mackillop, E. Fidarova, L. Cordero, J. Yarney, C.C. Lim, A. Abad, V. Cernea, S. Stojanovic-Rundic, P. Strojjan, L. Kochbati, A. Quarneti | OC-0192 |
| 17:45 | Current radiotherapy capacity in post-Soviet countries; an IAEA survey
<i>E. Rosenblatt, E. Fidarova</i> (Austria), O. Utekhina, 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

Human Health

Using nuclear techniques to improve health around the world

Sustainable socioeconomic development is not possible if debilitating diseases are not controlled. The IAEA's human health activities carried out through the technical cooperation programme aim to provide developing countries with specialized skills and infrastructure to prevent, detect and cure major illnesses. They also support the planning and evaluation of nutrition programmes, as well as prioritizing the establishment of quality assurance programmes for radiation dosimetry and treatment of cancer.

- Half of the world's population is at risk of contracting ¹.
- Malaria decreases Gross Domestic Product (GDP) by as much as 1.3% in countries with high levels of transmission.
- The physical and economic burdens of tuberculosis (TB) illness, deaths, and loss of wages and productivity costs the global economy some US \$12 billion every year.
- According to WHO and UNAIDS estimates, by the end of 2008 33.4 million people were living with HIV, 2.7 million people became newly infected and 2.0 million died of AIDS, including 280 000 children.
- Treatment and health care costs related to HIV/AIDS consume household incomes, diminish people's ability to support, work and provide for their family, prevent economic gains in developing countries and keep communities in a cycle of poverty.
- Malnutrition contributes to 1 out of 2 deaths (53%) associated with infectious diseases among children under five in developing countries, and costs poor countries up to 3% of their yearly GDP.

Fighting cancer

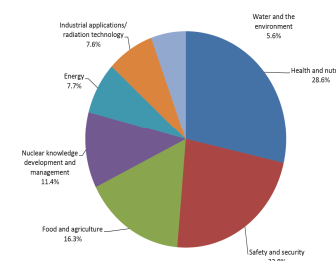
According to the World Health Organization, cancer has become one of the leading causes of death worldwide. Of the estimated 11 million cancer deaths projected for 2030, more than 70% of all cancer deaths will occur in low- and middle-income countries. Fortunately, through prevention, early detection and treatment, a third of these cancer deaths could be avoided.

IAEA TC Activities

125 countries/territories receive support from the IAEA

Per year

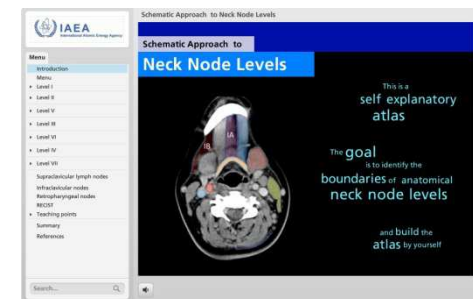
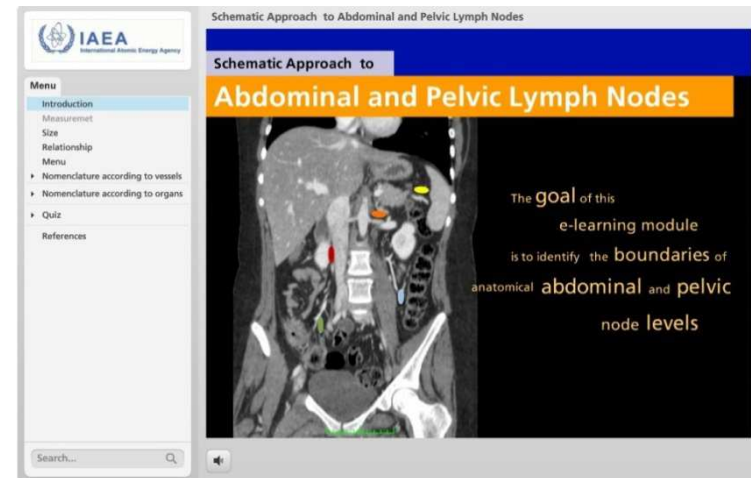
- ✓ ~ 3200 expert missions fielded
- ✓ ~ 1600 fellowships and scientific visits
- ✓ ~ 3200 participants in training courses
- ✓ ~ 190 training courses
- ✓ ~ 2500 Purchase Orders



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.

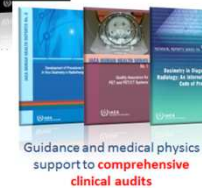


AFRONET

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



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



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



THANK YOU

