Radiation for the Treatment of Cancer: the Most Common Cancer among Women

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Breast Cancer Burden

- The most common cancer in women both in the developed and less developed world.
- It is estimated that more than 1.7 million new cases of breast cancer occurred among women worldwide in 2012.

International Agency for Research on Cancer (IARC) and World Health Organization (WHO). GLOBOCAN 2012:
• Second leading cause of cancer-related death among women.

• About 40,290 women in the U.S. are expected to die in 2015 from breast cancer

• Death rates have been decreasing since 1989

• These decreases are thought to be the result of treatment advances, earlier detection through screening, and increased awareness
Treatment of breast cancer

• Surgery
• Radiation therapy
• Systemic treatment
  – Endocrine therapy
  – Chemotherapy
  – Targeted therapy
  – Immunotherapy
    – Therapeutic Vaccines
    – Checkpoint Inhibitors
    – Adoptive T Cell Therapy
    – Antibodies
Radiation therapy is an essential component of breast cancer treatment
- Early stage, locally advanced, metastatic setting
Postoperative RT increases OS

EBCTCG; Lancet 2014 Jun.21:318

EBCTCG; Lancet. 2011 Nov.12:378
Radiation dose to heart related with major coronary events

3-D RT is based on medical imaging techniques, three-dimensional dosimetry software, accessories, and verification procedures and multi-energy linear accelerator with treatment verification procedures

- Limit irradiation of healthy tissues
- Selection of best combination of beams
- Report the doses to TV and OAR
Set-up verification using portal imaging
Techniques 3D+

- IMRT: Intentional variation of dose distribution, inverse planning
- Volumetric IMRT: Continuous rotation of the gantry
- iIMRT/vol IMRT: only needed (increased low dose bath outside TV contralateral breast and lungs)
Partial Breast Radiotherapy
Radiation Therapy in Metastatic Breast Cancer

- Effective tool in the palliation of brain, bone and soft tissue metastases

- SBRT: Specially designed coordinate-system is used for the exact localization of the tumors in the body in order to treat it with limited but highly precise treatment fields.

- Cyberknife: Robotic radiosurgery for brain and body

- Gamma Knife: Noninvasive cerebral surgery for brain metastases using Co60