AAPM – AMPR - SEFM

Joint Course on Challenges and Advantages of Small Field Radiation Treatment Techniques

Acknowledgments

AAPM - for travel support for AMPR and SEFM speakers

AAPM Headquarters Staff - for technical help

Order of presentations

1. AAPM
   Jan Seuntjens – "Small field radiation therapy: physics and recent recommendations from IAEA and ICRU"
2. SEFM
   Josep Puxeu Vaqué – "Determination of small field output factors: advantages and limitations of Monte Carlo simulation"
3. AMPR
   Yuri Kirpichev– "Experience of IMRT and other conformal techniques in Russia"
4. AAPM
   Eric Ford – "Application of small-field treatment: the promises and pitfalls of SBRT"

Linac based small radiation fields techniques

- IMRT – conceived in early 1980s (*Brahme et al 1982*)
- Linac based SRS and SRT (FSRS)– early 1980s (*Larsson et al. 1974*)
- SBRT – early 1990s (*LAX et al. 1994*)
- Advantages
  - Highly conformal dose delivery
  - reduction of side effects
  - dose escalation ⟶ improved tumour control
  - hypo-fractionation
    - ✓Higher doses per fraction
    - ✓Shorter overall treatment times

Specialized delivery equipment





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Small field radiotherapy accidents due to human errors

- Incorrect calibration and beam data measurements for microMLCs entered in TPS

  - 2004-2005, US, 77 patients received 150% overdose
  - 2006-2007, France, 145 patients maximum overdose as high as 200%
  - 2004-2009, US , 74 patients received overdoses of as much as 50%

"*because a medical physicist did not realize that the smaller radiation beam used in radiosurgery had to be calibrated differently than the larger beam used for more traditional radiation therapy.*" - NY Times

Small field dosimetry

- Specialized dosimetry protocols needed
  - IAEA/AAPM small and composite field dosimetry working group
  - ICRU Small Radiation Field Committee
- Continuous education of medical physicists

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