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

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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