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Partners In Solutions

Use of Xoft Cervical Applicators

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Disclosure / Conflict of Interest

I am an employee of Xoft, a subsidiary of iCAD
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Xoft AXXENT® HDR X-ray Source

- 2.3 mm diameter
- 15 mm length
- Standard high vacuum x-ray tube technology
- Operates at 50 kV and 300 uA (15 Watts)
- Avg energy: ~28 kV
- Doserate in water: 14 Gy / min @ 1 cm
Xoft AXXENT® HDR Source Catheter

- X-ray source embedded in tip of a flexible cooling catheter
- Available in 2 lengths
  - 25 cm (standard)
  - 50 cm (cervical)
- Up to 1500 min beam-on time
- Fully disposable
Xoft AXXENT® HDR X-ray Source Dosimetry

- In-water dosimetry data were measured and MC calculated following AAPM TG-43 UI dosimetry protocol
- NIST calibration standard in 2014
Xoft AXXENT® HDR X-ray Source Dosimetry

- Sample dose distribution from Xoft x-ray source
- Green dot denotes location of source anode
  - Can be treated as a point source due to 1 mm effective length*
- Essentially a point source with 2D anisotropy

Xoft AXXENT® HDR X-ray Source Dosimetry

Delivered Dose Distribution On Film

Dose Distribution From TPS

TG43 formalism accurately represent the source characteristics
Xoft AXXENT® HDR X-ray Source Dosimetry

Dose distribution comparison between x-ray and Ir-192 source
Xoft AXXENT® HDR X-ray Source Dosimetry

Comparison of Dose Rates vs Depth in Water for Various Sources
Xoft AXXENT® HDR X-ray Source Dosimetry

Absolute Dose vs. Depth in Water for 50kV Xoft and Ir-192 Sources
Dose of 34 Gy to the Prescription point at 3.5 cm

Radius (cm)

Dose (Gray)

50 kV
Ir 192
Xoft AXXENT® Cervical Applicator
Xoft AXXENT® Cervical Applicator

- Henschke type applicator
- Thin wall Ti design
  - CT compatible
  - MR conditional
- Multiple tandem angles
  - 0°, 15°, 30° and 45°
- Multiple ovoid diameters (unshielded)
  - 2.0 cm, 2.5 cm and 3.0 cm
- Use with 50 cm source
Modified TG-43 Dosimetry For Cervical Applicator

Due to the 50 kV energy

- Filtration effects from the Ti material must be accounted for
- Amount of filtration depends on position of source within the applicator
- Modification of water-based TG-43 source data is required
The source at first dwell position near the tip of the applicator will “see” a fairly uniform wall thickness.

Forward directed dose will attenuate uniformly through the Titanium.

Beam will also harden in a relatively uniform manner.
When source is stepped back

- Some x-rays become oblique to the applicator wall
- Amount of wall material traversed increases for those rays
- Filtration will vary depending on obliqueness of the x-rays
Modified TG-43 Dosimetry For Cervical Applicator

- Current Xoft water-based TG-43 source dataset does not correct for dose heterogeneities caused by the Titanium cervical applicator.
- Must have new TG-43 source dataset to correctly model the Ti-filtration
  - One dataset for each position between 0 mm and 12 mm
  - Positions beyond 12 mm can use the 12 mm dataset
- Xoft provides Ti-filtered source datasets for dwell positions at 0 mm, 3 mm, 6 mm and 12 mm
Xoft Cervical Applicator Treatment Planning
Xoft Cervical Applicator Treatment Planning
Thank You!

Questions? Lchan@icadmed.com