Radiation Oncology Update: Tom Baker Cancer Centre

2023 Provincial Cutaneous Meeting

Dr. Jordan Stosky

February 10, 2023

Disclosures

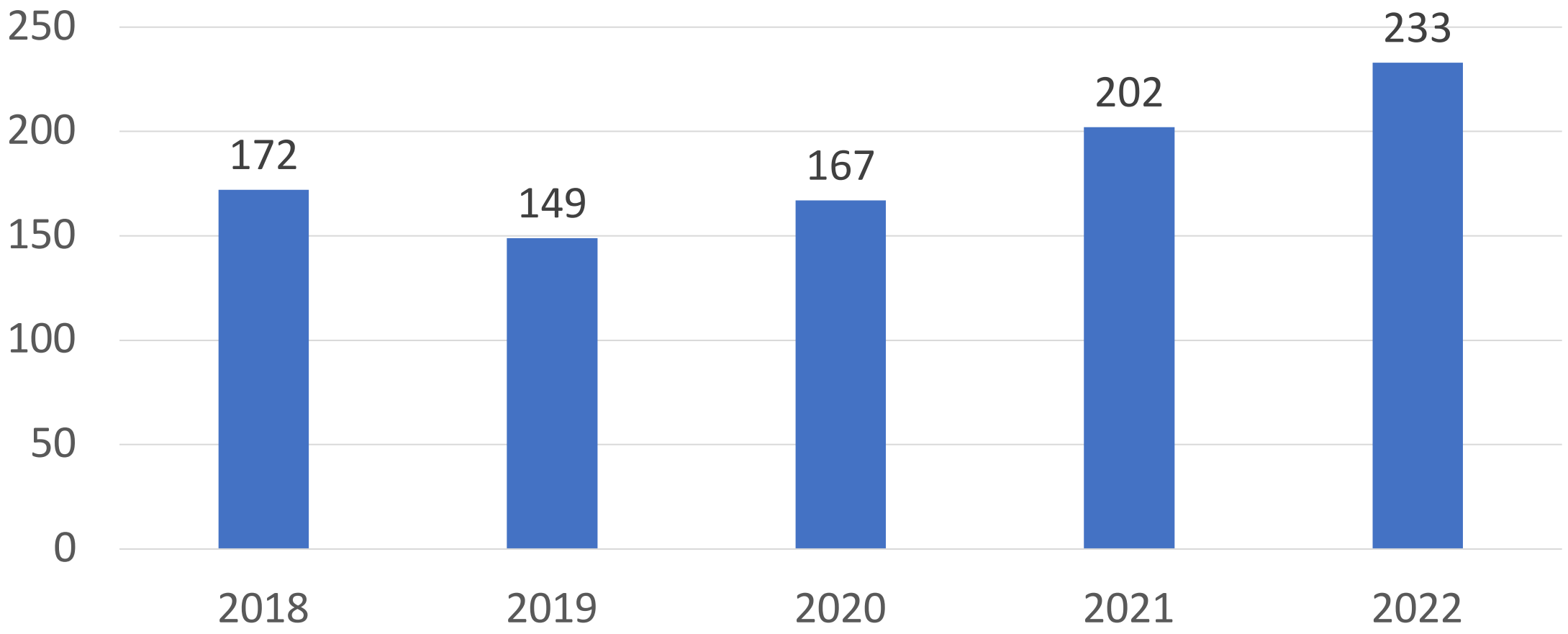
- None

Objectives

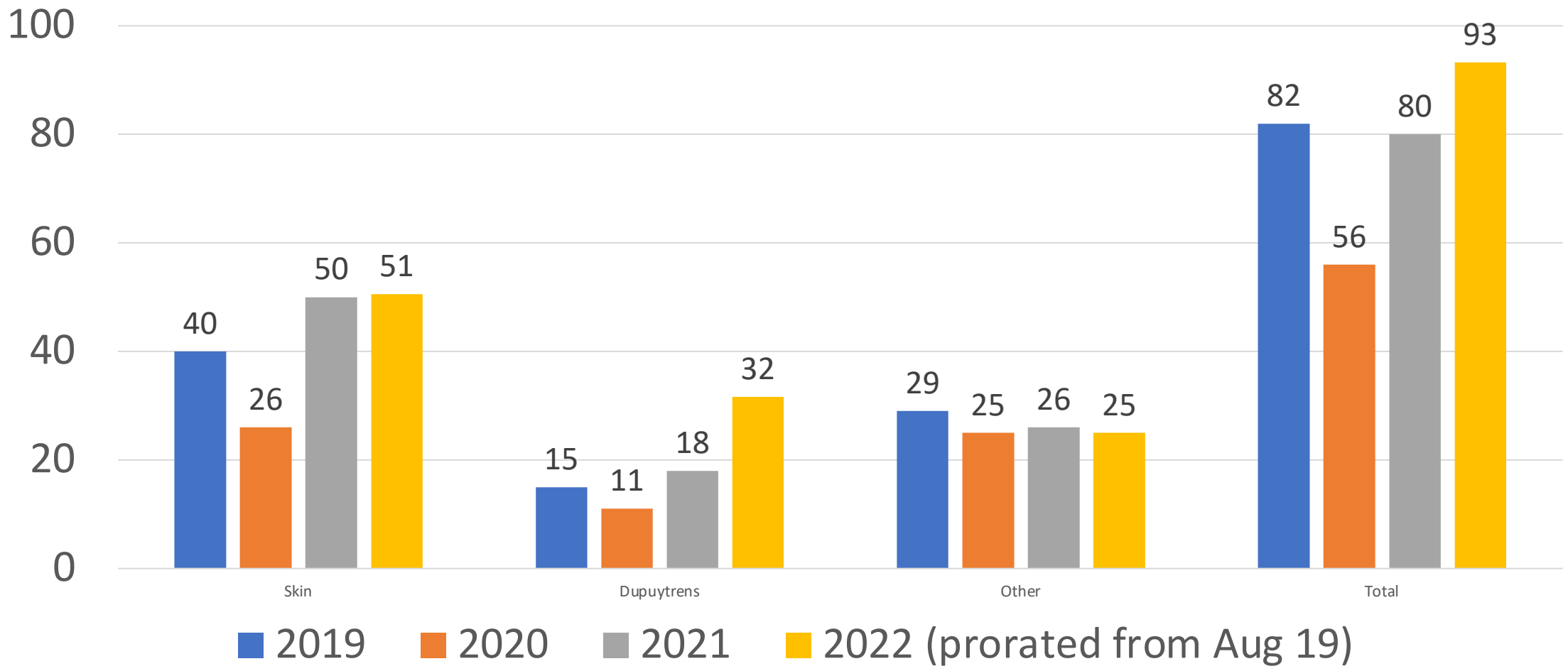
- Discuss increasing Cutaneous Rad Onc Utilization at TBCC
- Review recent advances in melanoma brain metastases
- Review recent Merkel Cell Data and RT practices – Australia
- New Calgary Cancer Centre Update – Orthovoltage Unit

Cutaneous Radiation Oncology Consults - TBCC

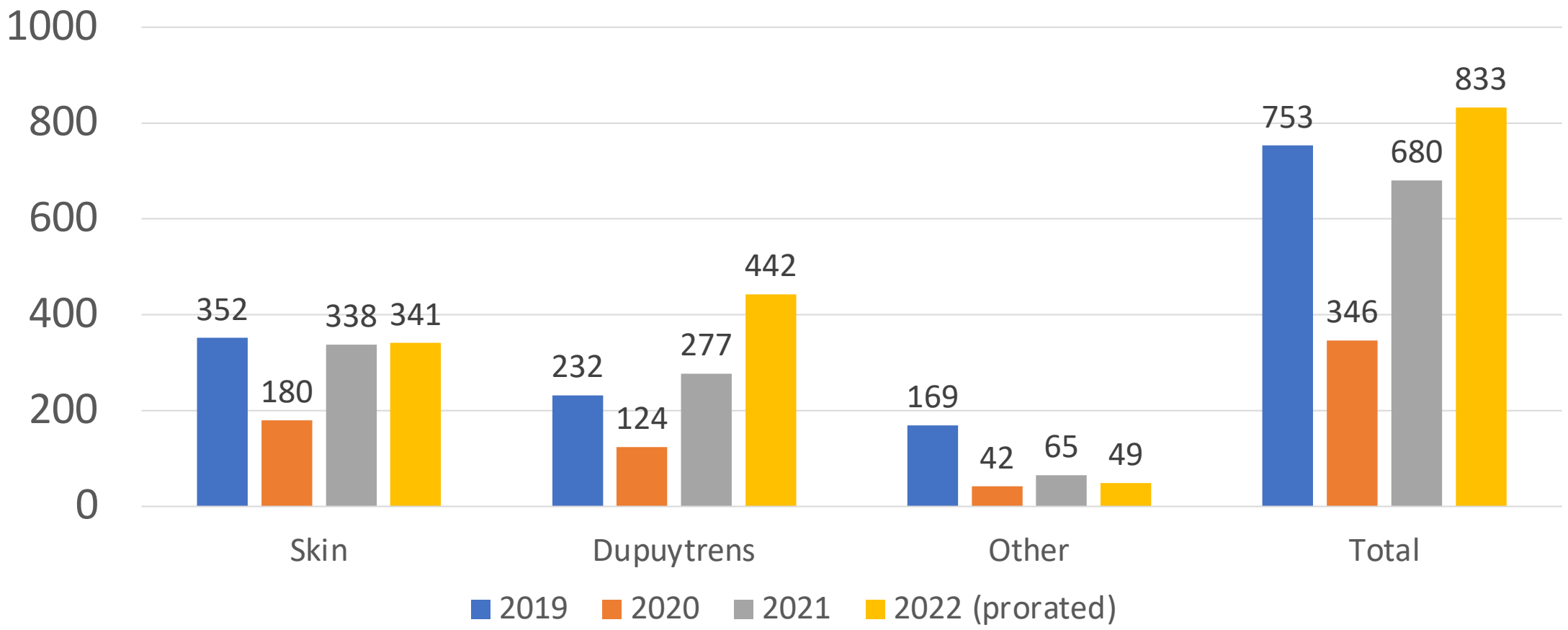
2018-2022 New Patient Consultations



Patients Treated on Orthovoltage Unit



Treatments Delivered on Orthovoltage Unit



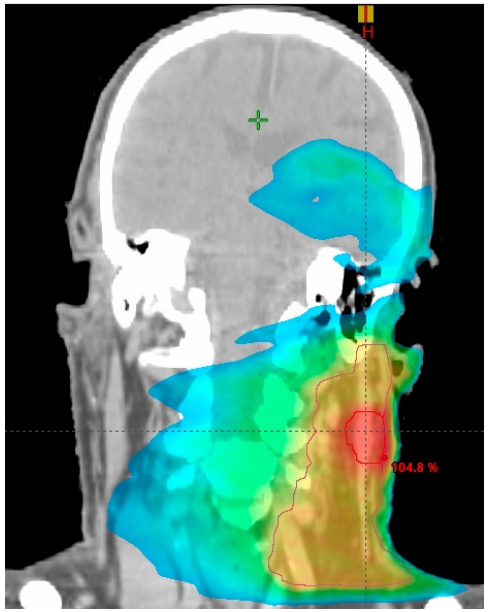
Orthovoltage Example

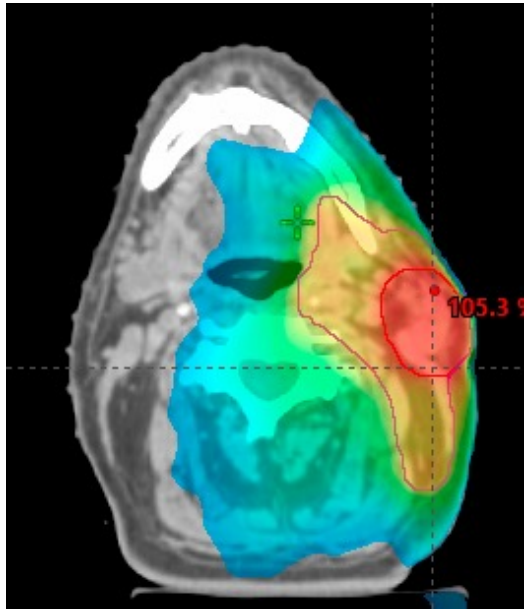
Frail 90s F with locally advanced BCC

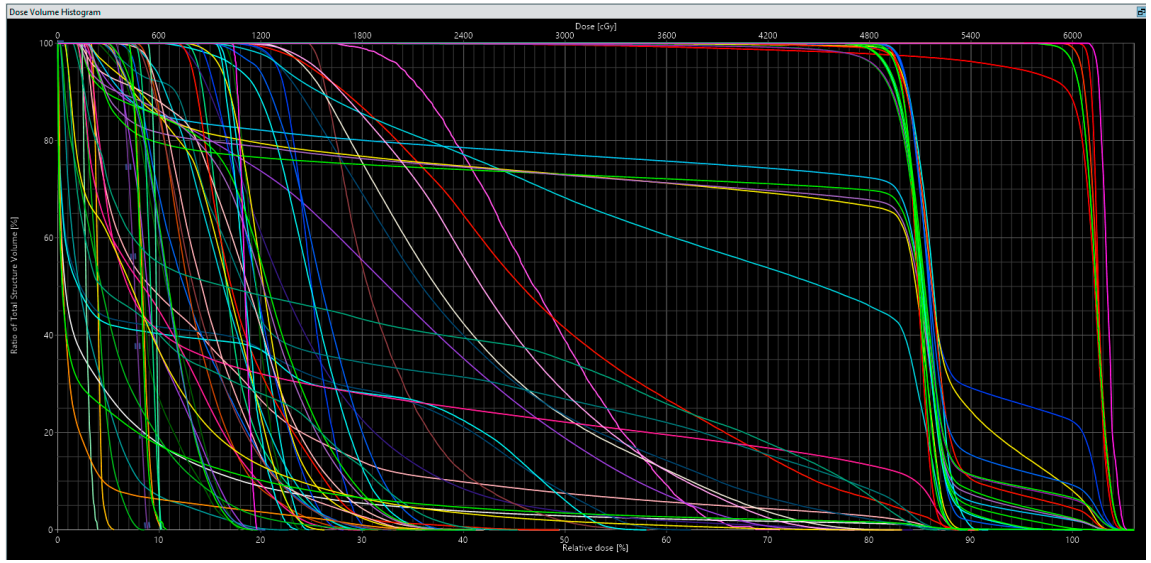
6 Weeks After Treatment

Complex Radiotherapy

- Would use linear accelerator, aquaplast immobilization, daily on-board imaging
- Suitable for complex, deeper, invasive lesions, node positive disease

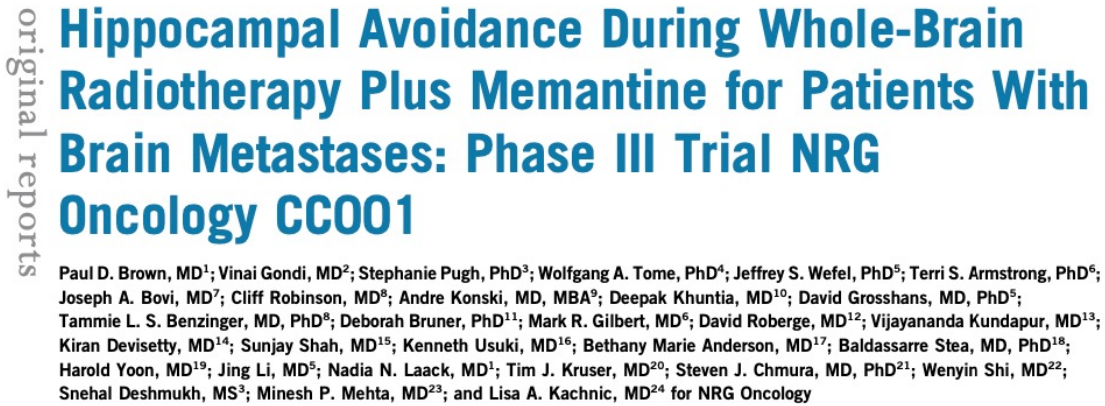


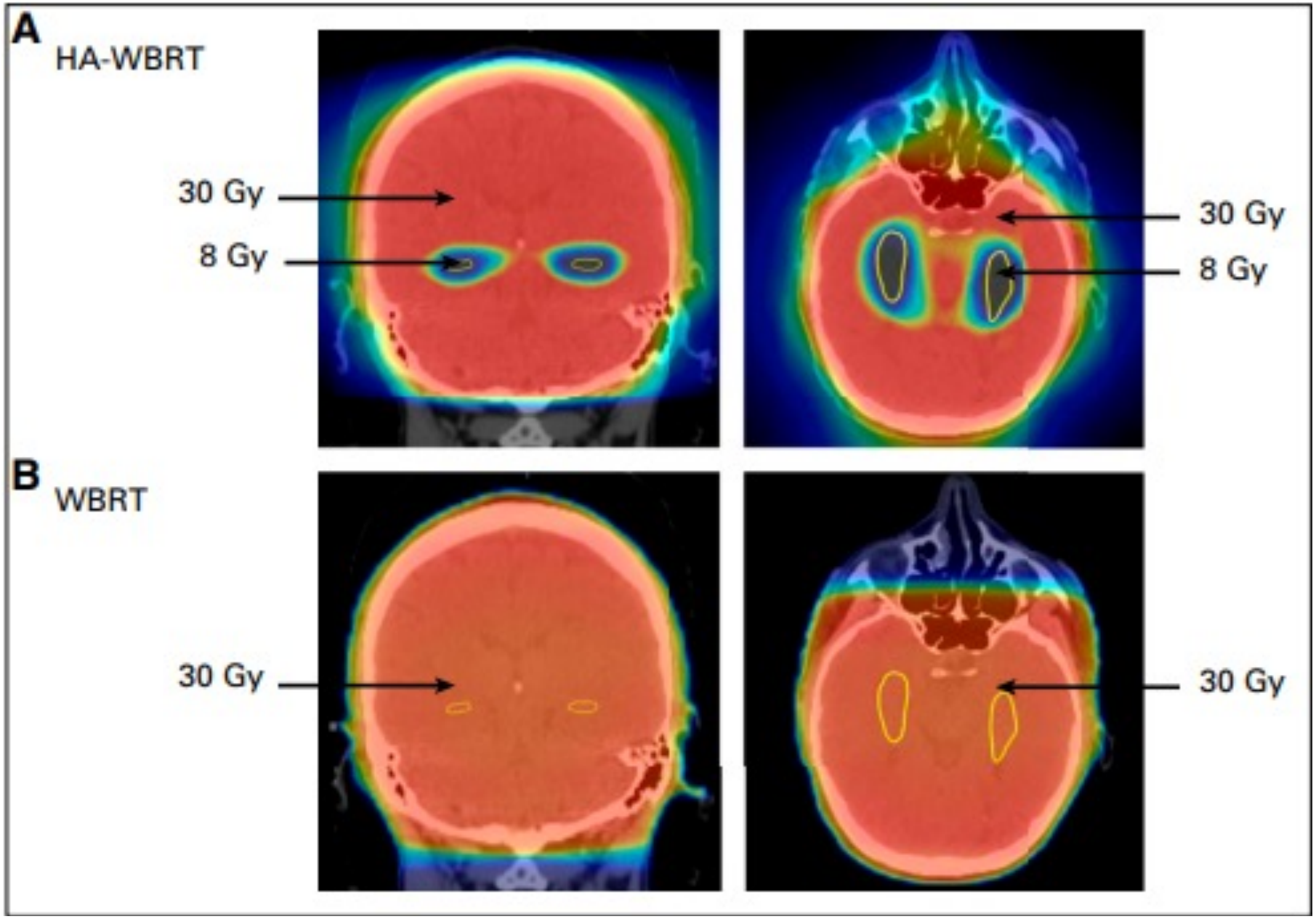




Advances in Brain Metastases - Melanoma

- SRS or FSRT still preferred if solitary or ‘several’ brain metastasis
  - Consider whole brain radiotherapy if >=5-10 lesions
- If not suitable for SRS, then whole brain radiotherapy is possibly indicated
- In recent years, more data supporting practice of more sophisticated treatments, namely: Hippocampal Avoidance – Whole Brain Radiotherapy




A
HA-WBRT
30 Gy
8 Gy
30 Gy
8 Gy
B
WBRT
30 Gy
30 Gy

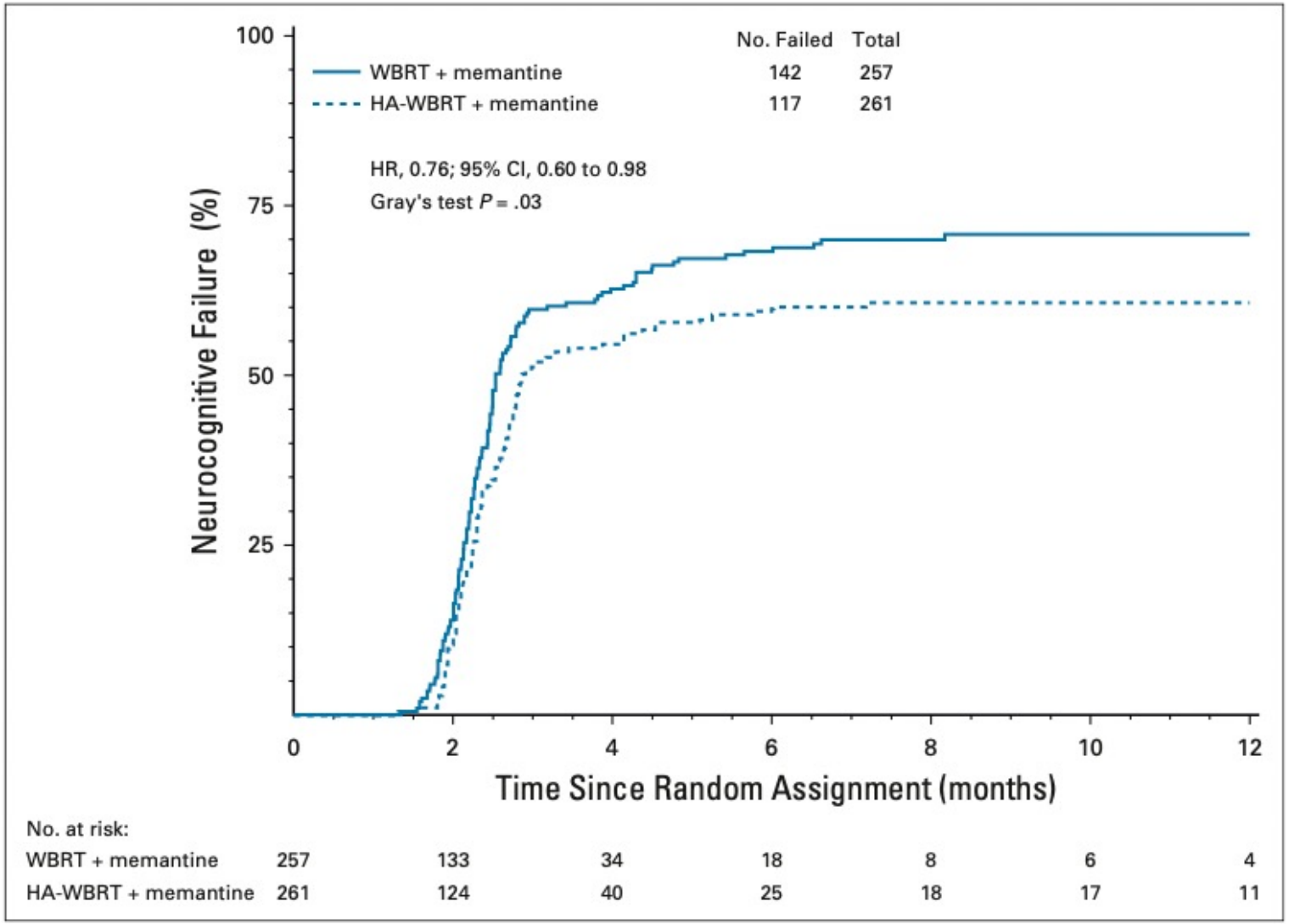


FIG 3. Kaplan-Meier graph showing time to cognitive failure. HA, hippocampal avoidance; WBRT, whole-brain radiotherapy.

CNS Treatments – Melanoma Brain Mets

- Dr Faruqi also in CNS group, offers SRS, HA-WBRT, WBRT
- Dr Stosky offers HA-WBRT, WBRT, refers to CNS for SRS

Wang et al. BMC Cancer (2023) 23:30
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BMC Cancer

RESEARCH Open Access

Merkel cell carcinoma: a forty-year experience at the Peter MacCallum Cancer Centre

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MCC – Peter MacCallum

- Reviewed 533 patient records from 1980 – 2018
- Median FU 5.3 years
- Prior skin cancers in 77%
- 14% immunosuppressed

Patient Characteristics

Table 1 Clinicopathological characteristics

Characteristic, *N* = 533	n (%), range
Age at diagnosis, yrs	(yrs)
Mean (sd)	76.1 (11.9)
Median [range]	78 [19–98]
Interquartile range	69–85
Sex	
Male	315 (59)
Female	218 (41)
Immunosuppressed	
Yes	77 (14)
No	456 (86)
Other Skin Malignancy	
Yes	272 (77)
No	81 (23)
Missing	180
Sun damaged skin	
Yes	112 (93)
No	9 (7)
Missing	412
Viral Status	
Positive	38 (39)
Negative	60 (61)
Missing	435
Location of Primary	
Head & Neck	267 (50)
Upper Limbs	77 (14)
Lower Limbs	95 (18)
Trunk	24 (5)
Unknown	70 (13)
Unknown primary site	
Yes	69 (13)
No	464 (87)
Median Tumour diameter, mm, (IQR)	15 (9–23)
Stage (AJCC 8th edition)	
I	225 (43)
II	72 (14)
III (A or B)	215 (21)
IV	12 (2)
Missing	9
Margins	
Negative	288 (67)
Positive	145 (33)
Missing	100
Staging modality	
Chest X-ray	47 (10)
CT	286 (60)
PET	300 (58)
Treatment received	
Surgical excision alone	34 (6)
Surgery + RT	393 (74)
RT/CRT	79 (15)
Other	27 (5)

Staging

- 78% PET staging
- Only 66/533 received SLNB
  - Only performed on T1N0
  - Uncertainties of SLNB post-reconstruction (many done at external centres)
  - Not performed if clear PET

Surgery

- 85% received excision
- Median pathological margin was 2.0mm [0.0-40.0 mm]
- Positive margins in 33% of patients
- 154 patients undersent nodal surgery (separate from SLNB)
  - 56/154 dissections
  - 28/154 node excisions
- 34/533 (6%) of all patients treated with surgery alone
  - 76% stage I or stage II

Radiotherapy

- 66/533 (12%) treated with definitive or chemoradiotherapy (carboplatin + etoposide)
- 383/454 patients (84%) received post-op RT to primary +- nodal regions
- **All T2N0 received elective nodal radiation therapy**
- Median post op (microscopic) dose 50 Gy / 25 fr
  - Unchanged since 1990s
- Median definitive dose 54 Gy / 27 f (with chemo)
  - Increased from 50 Gy in 2009
  - Increased again to 60 Gy in 2015

Immunotherapy and recurrence

- 26/533 (5%) of patients received immunotherapy for recurrence

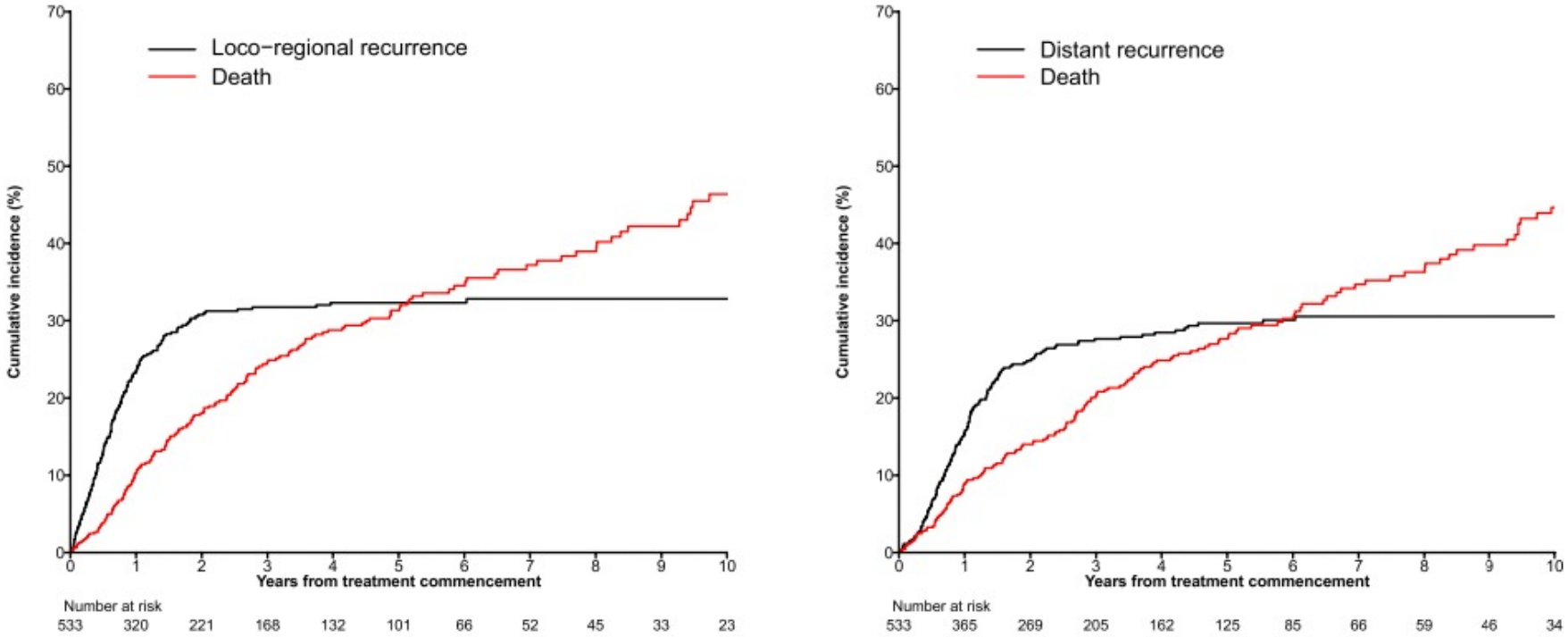
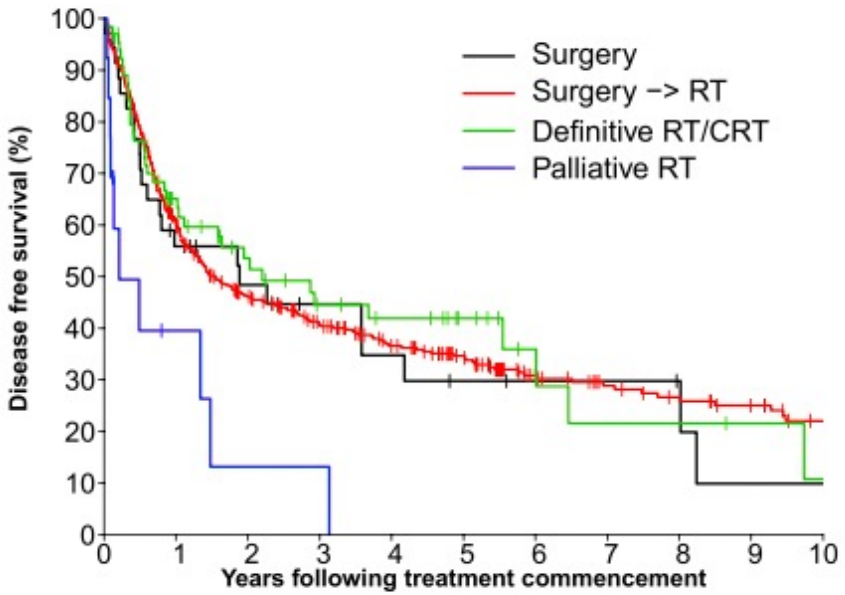


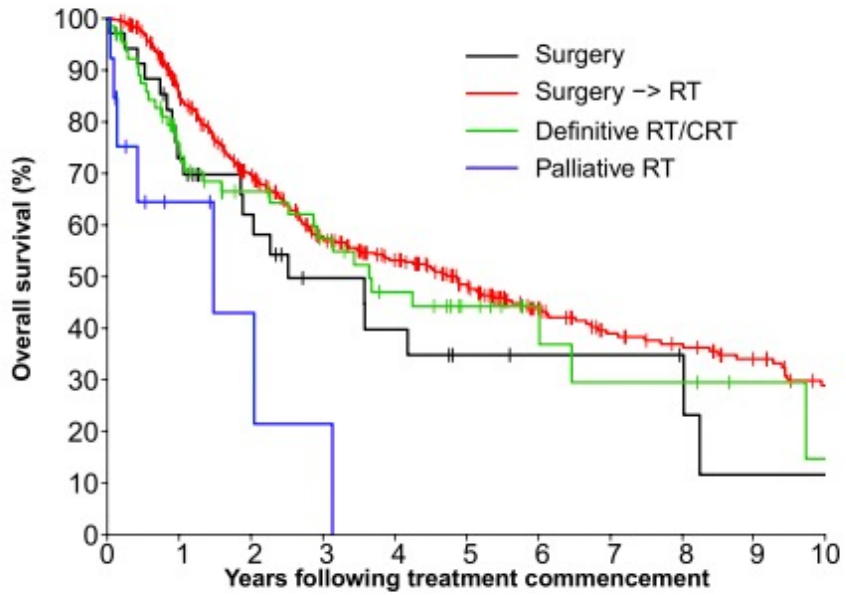
Fig. 1 Cumulative Incidence of Loco-regional Recurrence, Distant Recurrence and Death

Outcomes by Modality



Number at risk

Surgery	35	18	13	9	7	5	4	4	3	1	1
Surgery -> RT	419	232	162	129	102	81	51	40	34	28	20
Definitive RT/CRT	66	36	25	18	15	10	5	3	3	2	1
Palliative RT	13	3	1	1	0	0	0	0	0	0	0

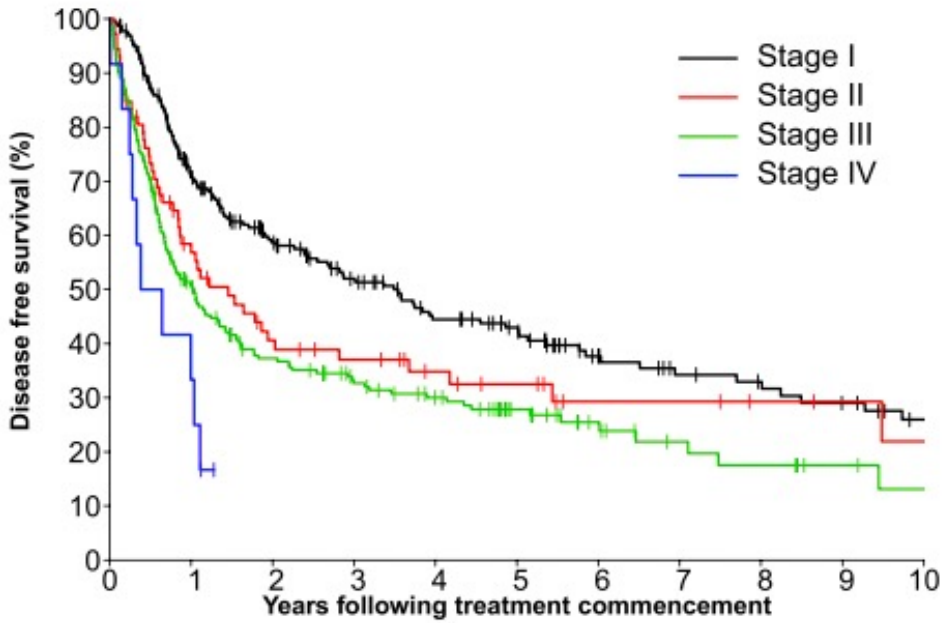


Number at risk

Surgery	35	23	16	10	8	5	4	4	3	1	1
Surgery -> RT	419	329	245	182	148	115	78	60	53	43	32
Definitive RT/CRT	66	42	31	23	17	11	6	4	4	2	1
Palliative RT	13	4	2	1	0	0	0	0	0	0	0

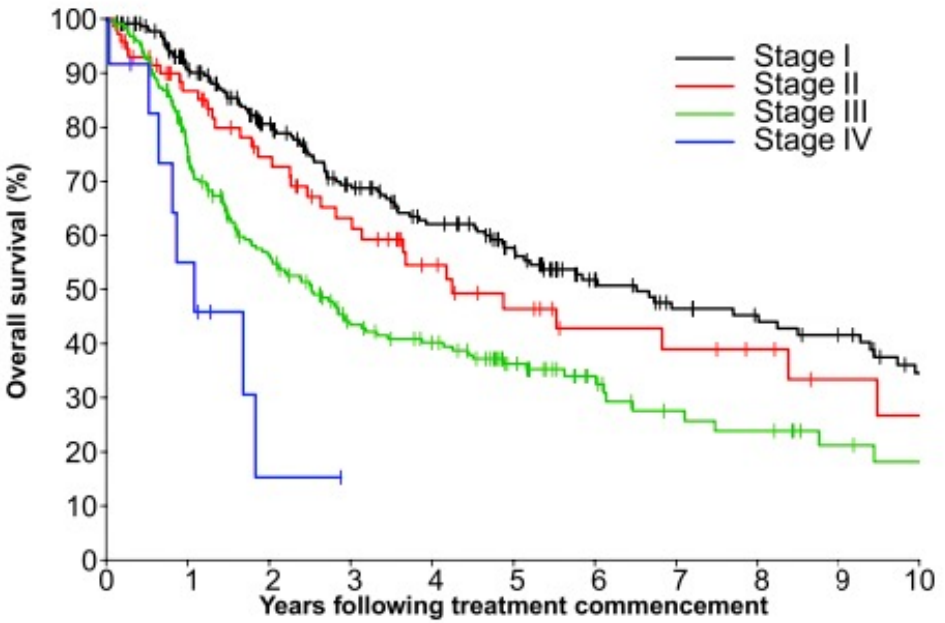
Fig. 2 Disease Free Survival and Overall Survival by initial treatment modality

Outcomes by Stage



Number at risk

Stage I	225	143	104	82	64	54	35	28	25	21	15
Stage II	72	36	24	20	15	12	7	7	5	4	3
Stage III	215	100	68	52	42	27	16	10	8	5	3
Stage IV	12	4	0	0	0	0	0	0	0	0	0



Number at risk

Stage I	225	182	144	112	91	74	51	41	37	32	23
Stage II	72	53	41	32	22	16	11	10	8	5	4
Stage III	215	150	102	68	56	37	23	15	13	8	6
Stage IV	12	6	1	0	0	0	0	0	0	0	0

Fig. 3 Disease Free Survival and Overall Survival by stage

Considerations

- More definitive RT/ChemoRT than what we would typically use locally
- Less pursuit of wide margins on local excision if planning for adjuvant RT
- More elective nodal irradiation in T2N0
- Non randomized

MCC Hypofractionation

- MCC is a rapidly growing tumor, but most described and standard of care radiation doses are conventional fractionation
- MCC also most commonly found in elderly patients, those most unlikely to be fit for protracted courses of treatment
- We use hypofrationation commonly in other skin and non skin cancers
- Very little data on hypofractionation in this tumor site

MCC Hypofractionation

- Brigham & Women's Hopsital observational data from 2005-2021 for patients with non-metastastic MCC treated with curative intent
- Patients unfit for conventional fractionation treated with hypofractionated radiotherapy

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Original Article

Characterization of clinical outcomes after shorter course hypofractionated and standard-course radiotherapy for stage I-III curatively-treated Merkel cell carcinoma

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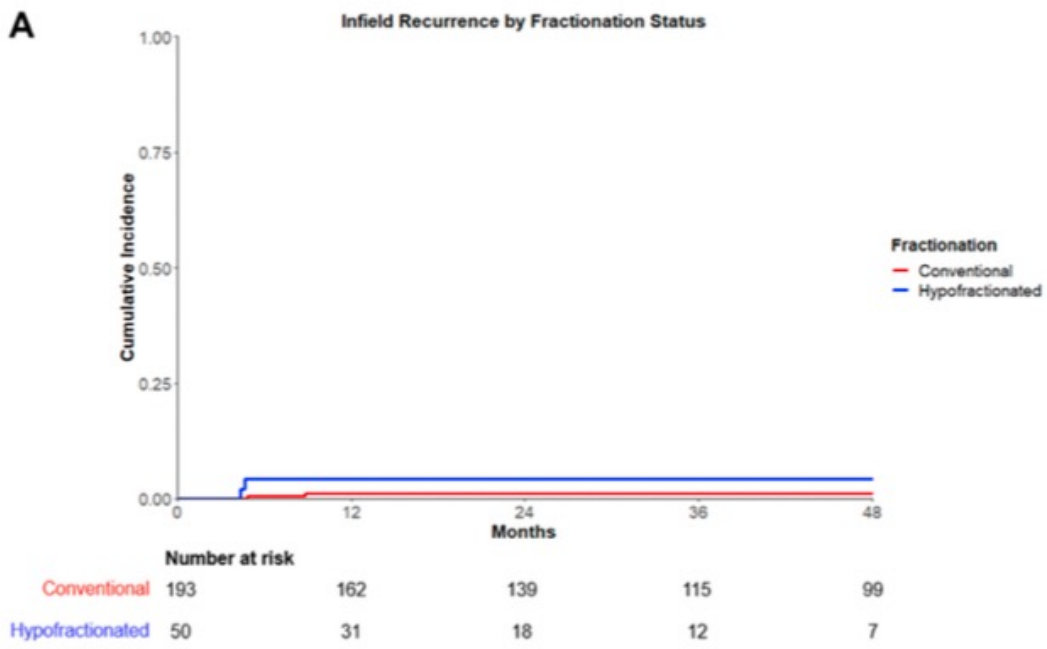
Table 2
Treatment characteristics for curative-intent postoperative or definitive radiation therapy for Merkel cell carcinoma.

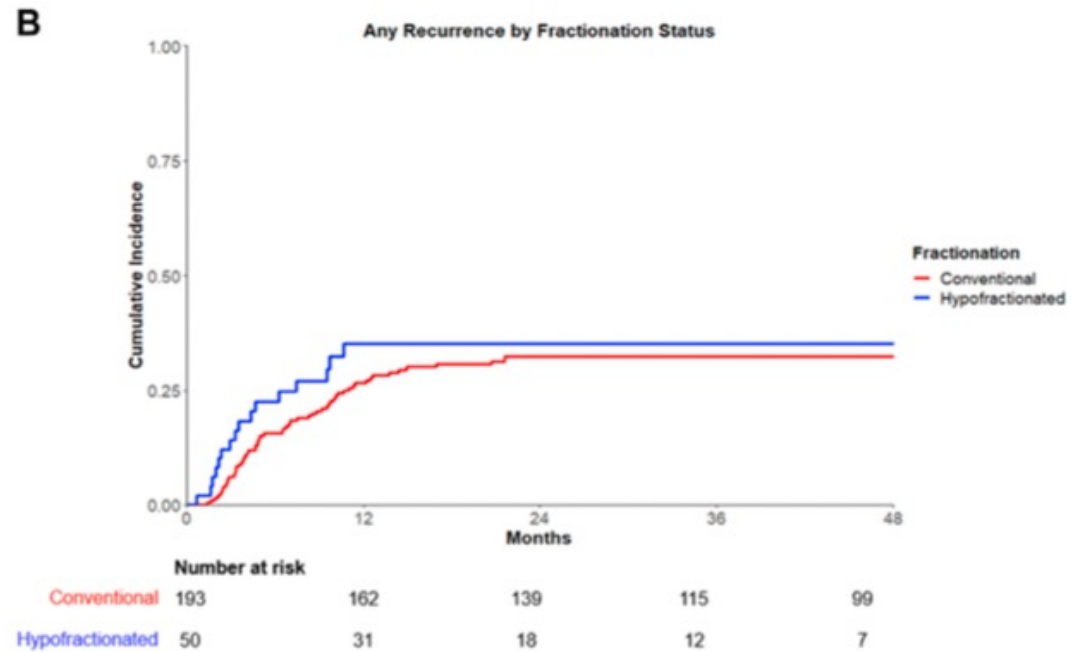
	Entire Cohort *n* (%)	Standard Fractionation *n* (%)	Short course/Hypofractionation *n* (%)	*p*-value
Definitive surgery before radiation				
No	84 (34.6%)	62 (32.1%)	22 (44.0%)	0.134
Yes	159 (65.4%)	131 (67.9%)	28 (56.0%)	
Nodal sampling before radiation[^]				
No	68 (28.0%)	48 (24.9%)	20 (40.0%)	0.051
Yes	175 (72.0%)	145 (75.1%)	30 (60.0%)	
Definitive radiation				
No	155 (63.8%)	129 (66.8%)	26 (52.0%)	0.069
Yes	88 (36.2%)	64 (33.2%)	24 (48.0%)	
Positive margins before radiation				
No	139 (64.7%)	120 (70.6%)	19 (42.2%)	0.001*
Yes	76 (35.3%)	50 (29.4%)	26 (57.8%)	
Days from diagnosis to radiation[†]				
≤62 days	127 (52.3%)	97 (50.3%)	30 (60.0%)	0.267
>62 days	116 (47.7%)	96 (49.7%)	20 (40.0%)	
Equivalent dose in 2 Gy fractions (EQD2)				
≥50 Gy	204 (83.5%)	183 (94.8%)	21 (42.0%)	<0.001*
<50 Gy	39 (16.5%)	10 (5.2%)	29 (58.0%)	
Radiation modality for primary site treatment				
Electrons	99 (47.6%)	78 (47.3%)	21 (48.8%)	<0.001*
Photons	100 (48.1%)	86 (52.1%)	14 (32.6%)	
Brachytherapy	9 (4.3%)	1 (0.6%)	8 (18.6%)	
Radiation modality for nodal treatment				
Electrons	2 (1.2%)	1 (0.7%)	1 (4.8%)	0.239
Photons	163 (98.8%)	143 (99.3%)	20 (95.2%)	
Systemic therapy before radiation				
No	231 (95.1%)	182 (94.3%)	49 (98.0%)	0.468
Yes	12 (4.9%)	11 (5.7%)	1 (2.0%)	
Concurrent systemic therapy with radiation				
No	207 (85.2%)	159 (82.4%)	48 (96.0%)	0.014*
Yes	36 (14.8%)	34 (17.6%)	2 (4.0%)	
Systemic therapy after radiation				
No	216 (88.9%)	168 (87.0%)	48 (96.0%)	0.081
Yes	27 (11.1%)	25 (13.0%)	2 (4.0%)	
Progression before radiation				
No	226 (93.0%)	182 (94.3%)	44 (88.0%)	0.127
Yes	17 (7.0%)	11 (5.7%)	6 (12.0%)	

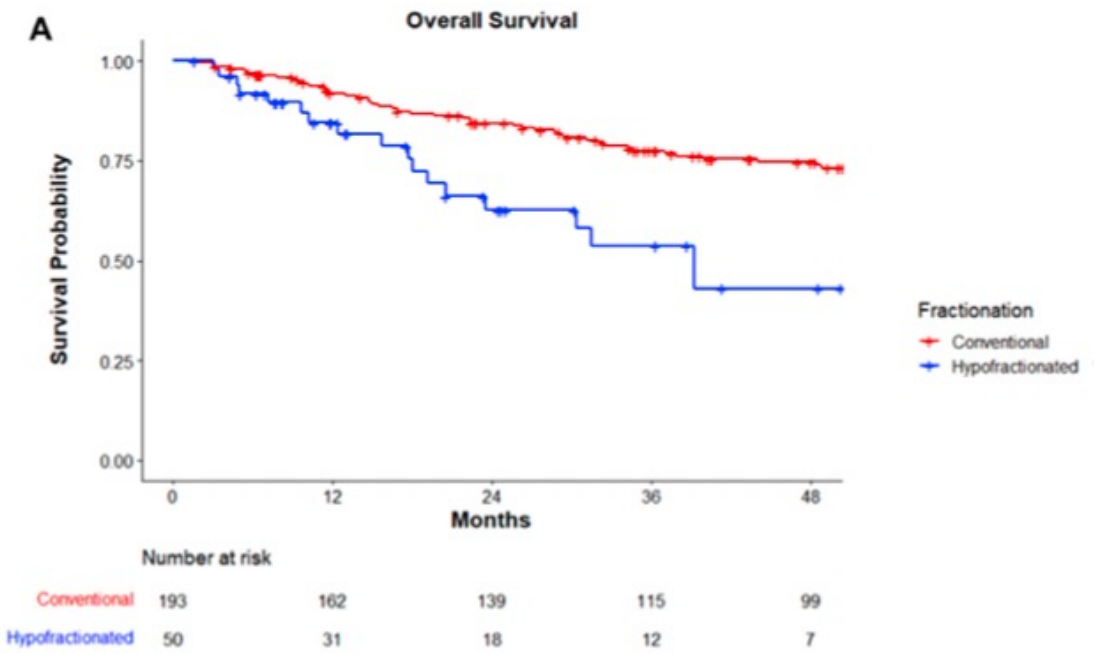
* $p < 0.05$.
[^] Includes sentinel lymph node biopsy and lymph node dissection.
[†] Dichotomized at the median.

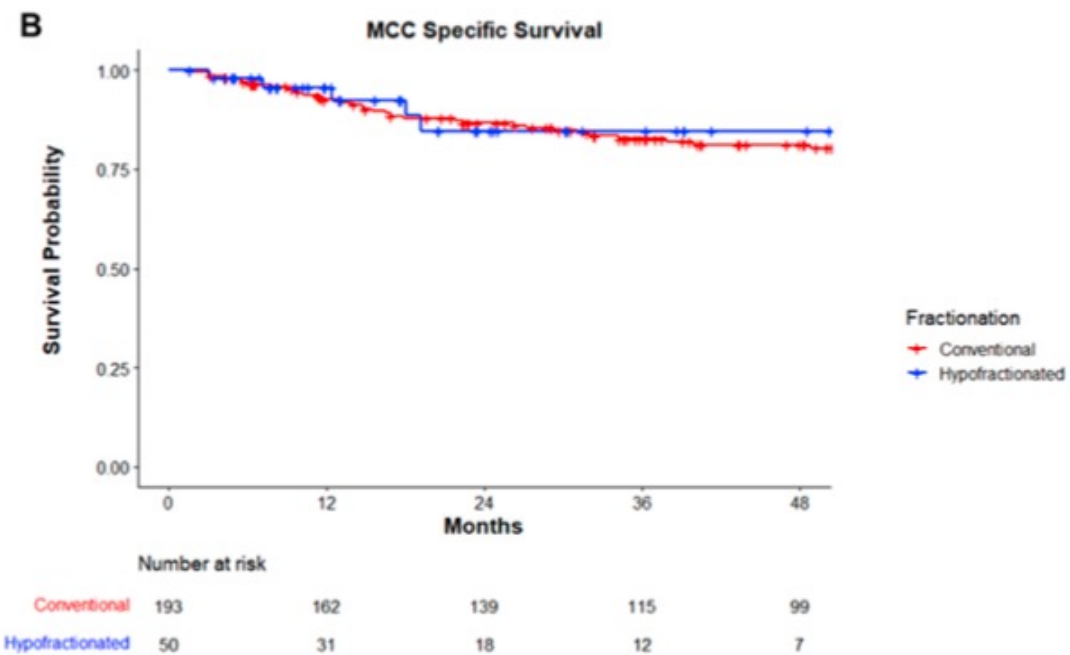
In-field Recurrence

Any Recurrence






A
Overall Survival
Survival Probability
1.00
0.75
0.50
0.25
0.00
0
12
24
36
48
Months
Fractionation
Conventional
Hypofractionated
Number at risk
Conventional 193 162 139 115 99
Hypofractionated 50 31 18 12 7


B
MCC Specific Survival
Survival Probability
1.00
0.75
0.50
0.25
0.00
0
12
24
36
48
Months
Fractionation
Conventional
Hypofractionated
Number at risk
Conventional 193 162 139 115 99
Hypofractionated 50 31 18 12 7

Considerations

- Reasonable in-field control with hypofractionation
- Non-randomized, unbalanced groups don’t allow for even comparisons
- Worse OS in hypofractionation group probably represents patients selection of worse patient and tumor factors for hypofractionation

CCC Pictures

- Reception CT SIM

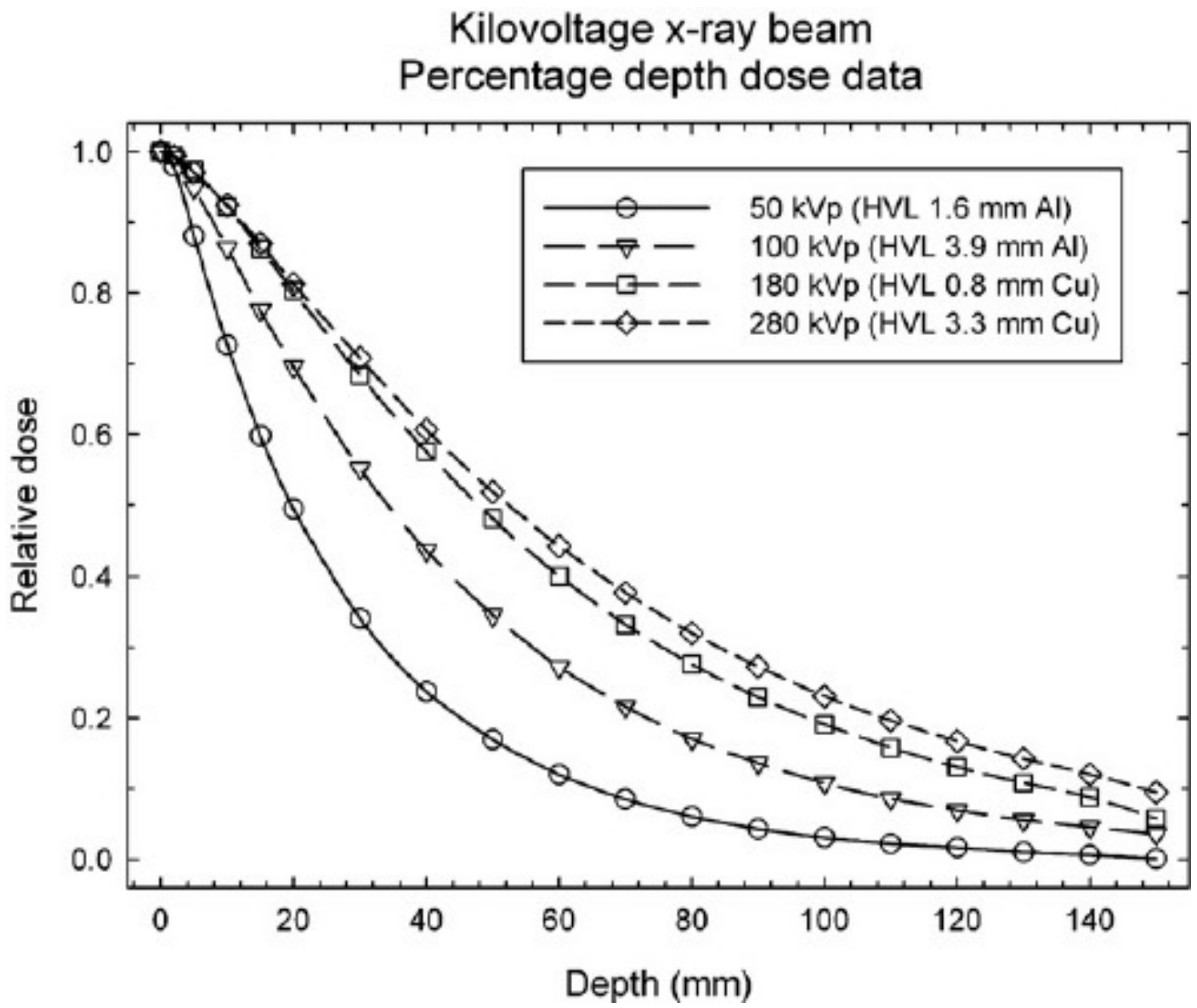
Orthovoltage Vault


CAUTION

New Orthovoltage Unit

Orthovoltage

- Currently, have commissioned 100kV, 150kV, 200kV
- New CCC will also add 300kV to xstrahl commissioning
  - Adds a bit more dose to depth for thicker lesions
  - Practical for palliation not suitable for linac



Questions and Discussion

Thank you

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