PHYSICS & DOSIMETRY BREAKOUT SESSION

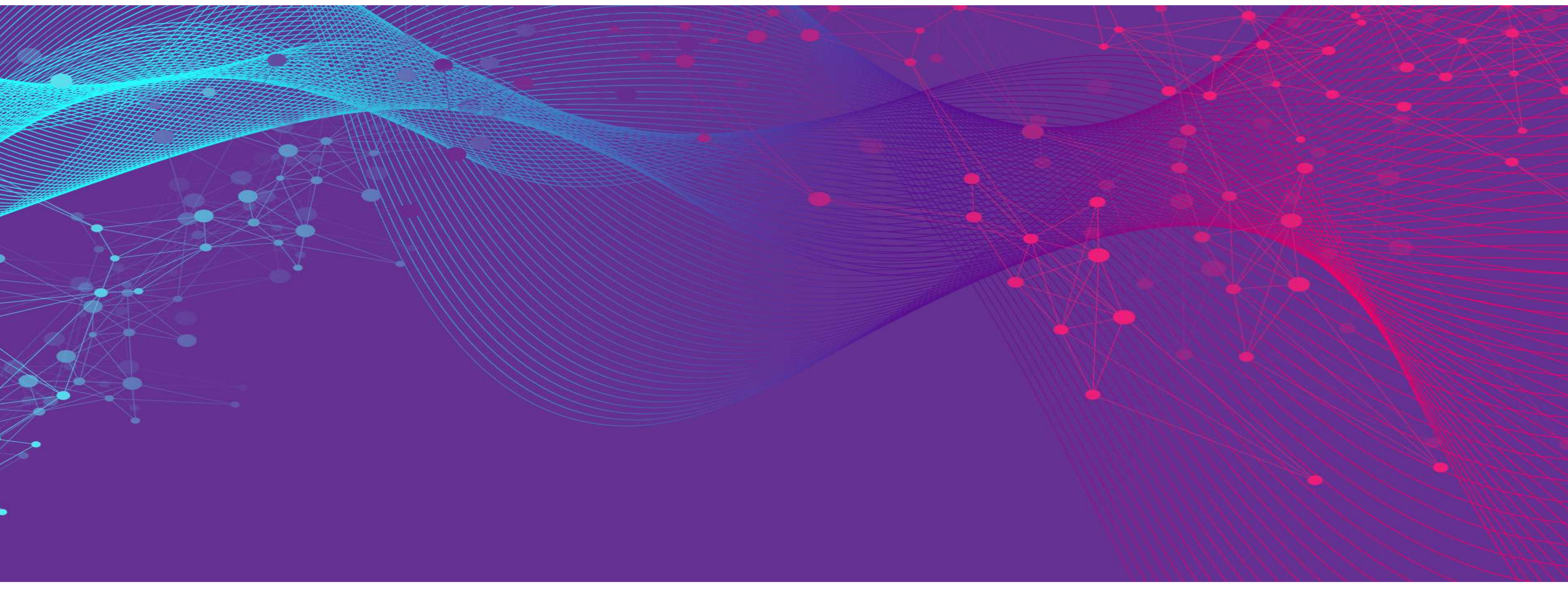
May 15, 2026

AGENDA

- Welcome and CE Credits
- Scheduling Notes
- ASTRO DVH constraints
- Prostate patient MRI submission pilot
- Brain mets physics data collection
- Open discussion
- Feedback survey

CONTINUING EDUCATION CREDITS

- 3.5 MDCB and ASRT/ARRT credits
- 4.58 CAMPEP credits
- To receive CAMPEP credits for this CWM, make sure to fill out speaker evaluation and program evaluation before leaving



SCHEDULE NOTES

SCHEDULE NOTES

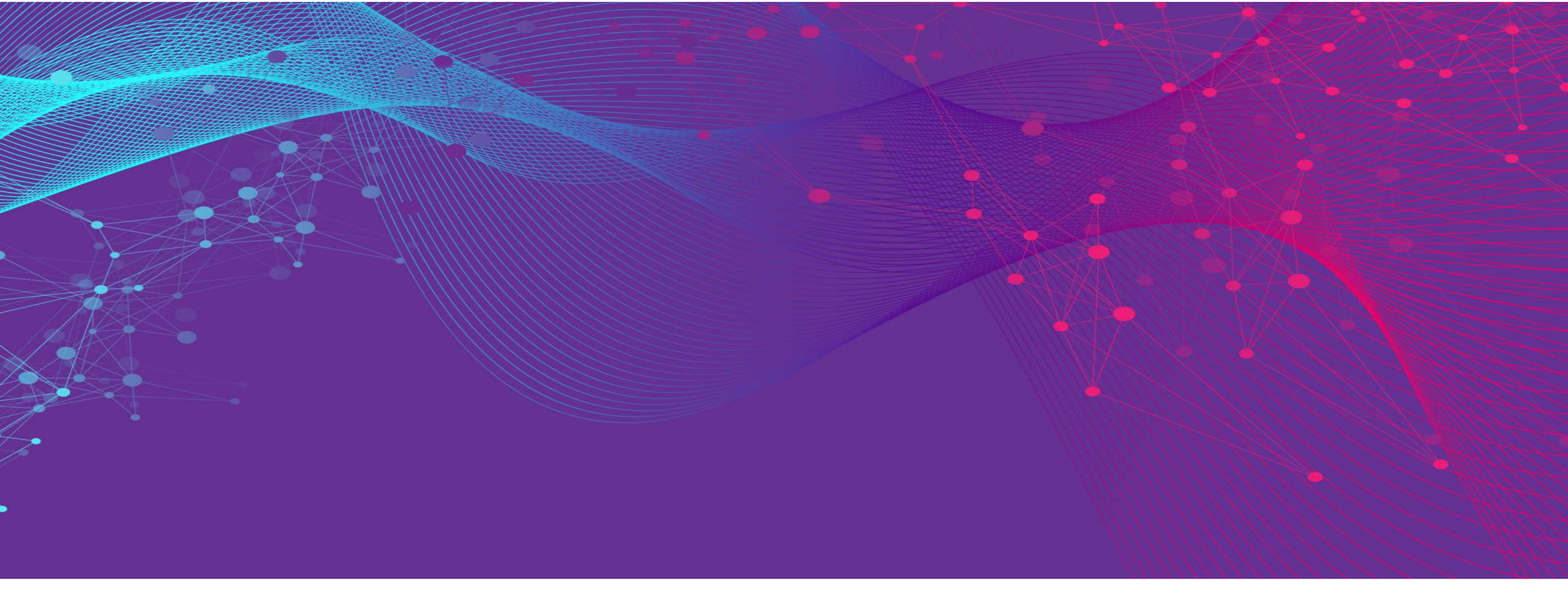
Physics data audits begin in June

- This year's format:
  - Sign up for a time slot
  - Scored audit of two randomly selected cases per project
  - Unscored review of cases with nomenclature and/or data problems
  - 2025 data checker errors must be fixed within 1 month of audit date
  - Coordinating center physicists to join as available for discussion

- If your facility scored ≥99% last year, you are exempt from audit this year!

SCHEDULE NOTES

- DICOM upload tool maintenance is planned for June 15-18
- The next CWM has moved to October 30th
- The coordinating center is developing REDCap database for launch in 2027



ASTRO DVH CONSTRAINTS

FROM THIS MORNING:

Physics leads presented MROQC performance on ASTRO DVH constraints for selected fractionations

Lung	Summary
Conventional fractionation	• Almost all cases meet secondary constraint thresholds • Performance for OARs is strong (except lung V5) • Esophageal near-max dose has gotten lower over time, aligned with MROQC performance goal
Ultrahypofractionated (5 fractions)	• Almost all cases meet secondary constraint thresholds • Performance for OARs is strong (except chest wall)

FROM THIS MORNING:

Physics leads presented MROQC performance on ASTRO DVH constraints for selected fractionations

Breast	Summary
Moderate hypofractionation without nodes	• Large number of patients (>3200) • Performance for OARs is very strong • MROQC heart dose goals have been impactful
Moderate hypofractionation with nodes	• Smaller numbers reflect recent uptake of this regimen (~225 patients) • Performance for OARs is strong • Significant variation in dose constraints for nodal regions

FROM THIS MORNING:

Physics leads presented MROQC performance on ASTRO DVH constraints for selected fractionations

Prostate	Summary
Moderate hypofractionation (28 fractions)	• Almost all cases meet secondary constraint thresholds • Performance for OARs is strong • Further discussion of PTV coverage goals is needed
Moderate hypofractionation (20 fractions)	• Almost all cases meet secondary constraint thresholds • Performance for OARs is strong (except rectum V60) • Consider PTV coverage in absolute dose

FEEDBACK

Initial impressions?

Which (if any) metrics are most meaningful?

How can MROQC promote plan quality?

POTENTIAL INVESTIGATION: PATTERNS OF DEVIATIONS

Example: Lung 5-fraction SBRT

- Compliance with individual constraints is very high
- However, 34% of patient plans had at least 1 deviation

Number of deviations (per patient)	N (% of patients)
0	707 (66.0)
1	300 (28.0)
2	50 (4.7)
3	13 (1.2)
4	1 (0.1)

Structure	Number of deviations
Brachial plexus	3
Bronchus	33
Chest wall	291
Esophagus	17
Great vessels	12
Heart	4
Normal lung	8
Spinal canal	0
PTV	75

POTENTIAL INVESTIGATION: LUNG HYPOFRACTIONATION GOALS

Planning Priority	Target	Dosimetric Parameter	8 Fx Goal [cGy or %]
NA	PTV	Common Prescription Doses [cGy]	6000
2		Minimum Coverage [cGy]	4580
2		D95%[%]	100%

Planning Priority	OAR	Dosimetric Parameter	8 Fx Goal [cGy or %]
1	Spinal Cord*	D0.1cc[cGy]	3230
1	Brachial Plexus*	D0.1cc[cGy]	4000
1	Esophagus*	D0.1cc[cGy]	4130
1	Trachea/Bronchus	D0.1cc[cGy]	4760
1	Heart	D0.1cc[cGy]	4760
3	Lungs - GTV	Mean[cGy] & V33%[%]	ALARA

*** Phase 1 Recommendation***

Table 16 **Lung: ultrahypofractionated 8 fraction regimen (7.5 Gy per fraction to 60 Gy)**

Organ/target	Metric	Primary goal	Secondary goal	Deviation	Notes
BrachialPlex[39,53]	D0.035cc	<38 Gy		≥38 Gy	
Chestwall[39,56]	D0.035cc	≤63 Gy	>63 Gy		
	V45Gy	<30 cc		>30 cc	
Esophagus[53,56]	D0.035cc	<40 Gy	<52.5 Gy	≥52.5 Gy*	
	D5cc	<22 Gy		≥22 Gy	
GreatVes[5]	D0.035cc	<62 Gy		≥62 Gy	
Heart[5,56]	D0.035cc	<46 Gy	<60 Gy	≥60 Gy*	
	D15cc	<34.4 Gy		≥34.4 Gy	
Lungs[56]	V26Gy	<10%		≥10%	Lungs – GTV/iGTV
	Mean	<10 Gy*		≥10 Gy*	
Ribs[5,53]	D0.035cc	≤63 Gy	>63 Gy		
	D5cc	≤50 Gy		>50 Gy	
SpinalCanal[39,53,54]	D0.035cc	<32 Gy		≥32 Gy	
Trachea/	D0.035cc	<46.3 Gy	<56 Gy	≥56 Gy	
Bronchus_Main[5,56]	D5cc	<50 Gy		≥50 Gy	
PTV	D95%	100%*	≥99%*	<99%*	
	D99%	≥90%*	≥85%*	<85%*	

Abbreviations: D = dose; GTV = gross tumor volume; iGTV = internal gross target volume; PTV = planning target volume; V = volume.
*Panel consensus.

Green: same or within 1 Gy
Yellow: ASTRO constraints are stricter than MROQC

POTENTIAL INVESTIGATION: BREAST NODAL VOLUMES

Low compliance rates for Sclav and IMN metrics shown for moderately hypofractionated patients

MROQC required contours:

- LN_Ax_L1, LN_Ax_L2, LN_Ax_L3
- LN_IMN
- LN_Sclav

Considerations:

- Methods of reporting of prescribed dose varies across facilities
- Working group review of nodal region contours found range of quality across facilities and physicians
- There are significantly more treatment with nodes for the conventional fractionation regimen, which has not been analyzed yet

POTENTIAL INVESTIGATION: PTV COVERAGE

Example: prostate 5-fraction SBRT

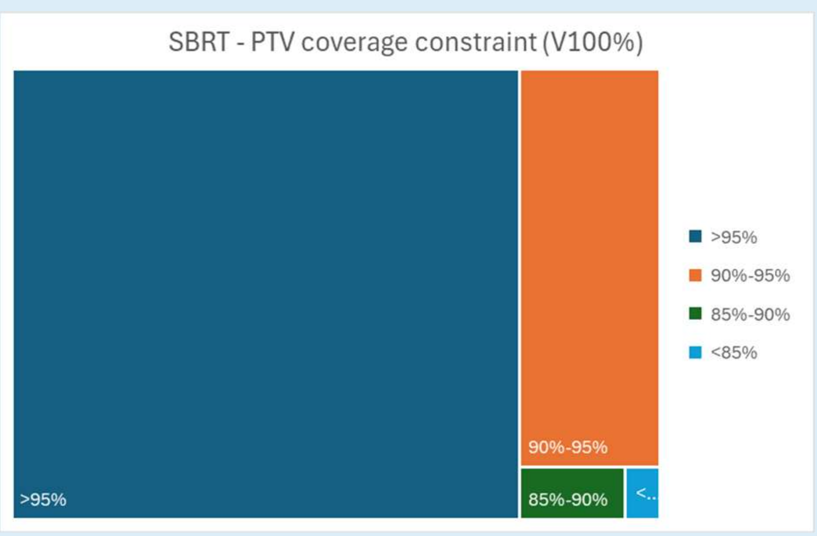
Table 23 **Prostate: ultrahypofractionated 5 fraction regimens (7.25-8 Gy per fraction to 36.25-40 Gy)**

Organ/target	Metric	Primary goal	Secondary goal	Deviation	Notes
Bladder[64,68]	V37Gy	<5 cc	<20 cc	≥20 cc	
	V18.1Gy	<40%		≥40%	
Bowel_Large[68]	D0.03cc	≤30 Gy		>30 Gy*	
Bowel_Small[64,68,74]	V30Gy	≤0.03 cc	≤1 cc	>1 cc*	
	V18.1Gy	<5 cc		≥5 cc	
Femur_Head[64]	V14.5Gy	<5%		≥5%	
Rectum[64,68,76]	V36Gy	<1 cc	<3 cc	≥3 cc	
	V29Gy	<20%		≥20%	
	V18.1Gy	<50%		≥50%	
Urethra[64]	V42Gy	<50%		≥50%	
PTV[4,74,75]	V100%	≥95%*		<95%*	
	D0.03cc	≤120%*		>120%*	Robotic/ablative
	D0.03cc	≤107%		>107%	Linac based

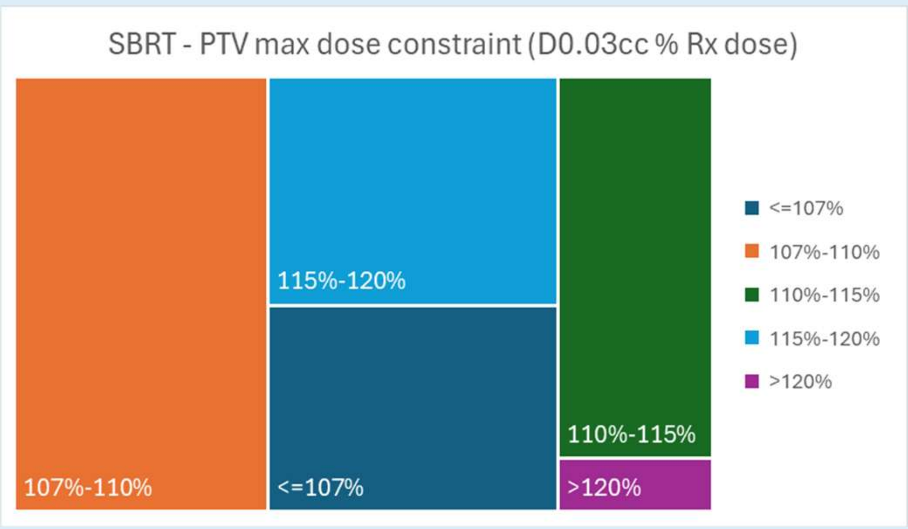
Abbreviations: D = dose; Linac = linear accelerator; PTV = planning target volume; V = volume.
*Panel consensus.

Contour	Metric	Primary %	Secondary %	Deviation %	N
Bladder	V37Gy	51.7%	99.6%	0.4%	482
	V18.1Gy	96.5%	-	3.5%	482
Rectum	V36Gy	68.1%	96.5%	3.5%	482
	V29Gy	99.8%	-	0.2%	482
	V18.1Gy	100.0%	-	0.0%	482
PTV	V100%	78.4%	-	21.6%	477
	D0.03cc	19.7%	-	80.3%	477

PROSTATE SBRT PTV METRICS



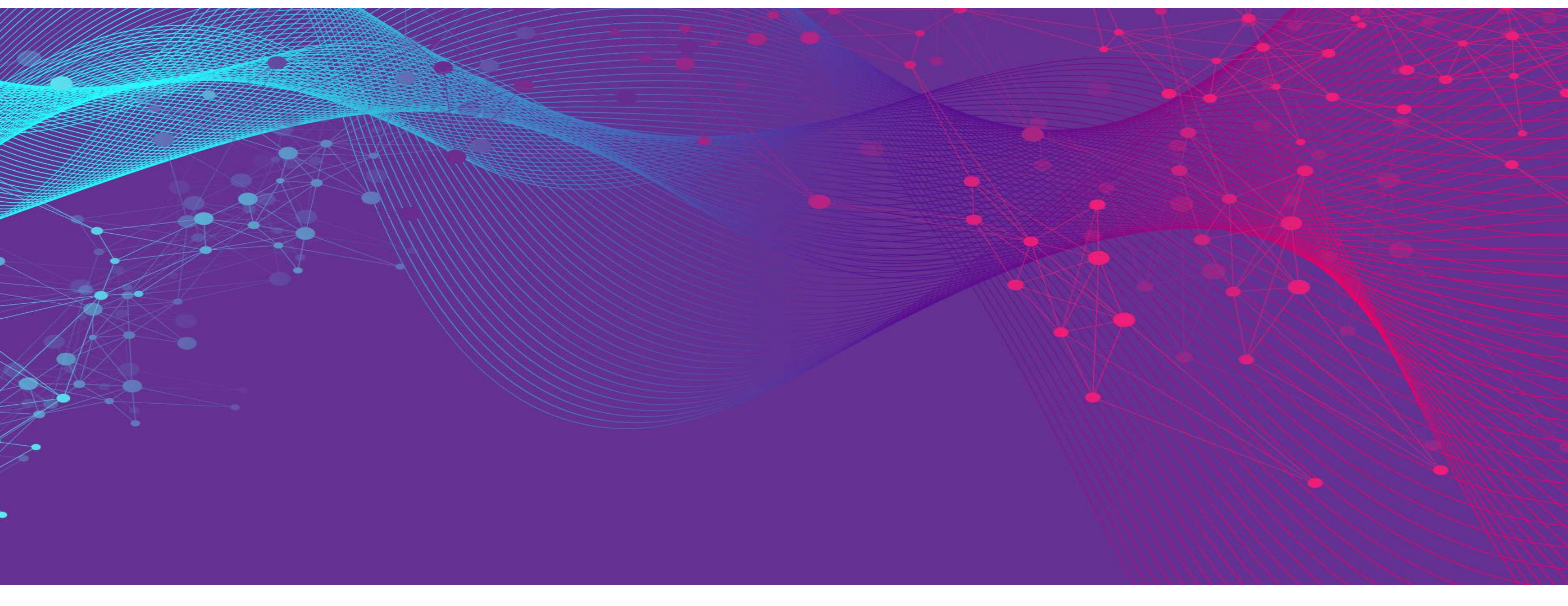
Within deviation rate of 21.6%, PTV coverage typically exceeds 90%



Within deviation rate of 80.3%, PTV near-max varies significantly (107%-120%)

POTENTIAL INVESTIGATION: OTHER REGIMENS

Other regimens in the guidelines		
Lung	**Breast**	**Prostate**
Ultrahypofractionated (1, 3, or 4 fractions)	Conventional fractionation with nodes	Conventional fractionation (intact or post-op)
Moderate hypofractionation (8, 10, or 15 fractions)	Ultrahypofractionated 5-fraction (whole or partial breast)	Moderate hypofractionation (highest number of patients)



PROSTATE PATIENT MRI SUBMISSION PILOT

PROSTATE MRI PILOT

The Prostate WG has been following MRI utilization

Adherence to the quality measure has been good.

A recent MRI is necessary for microboost definition.

Potential next steps in this pathway are to collect and use MRI data.

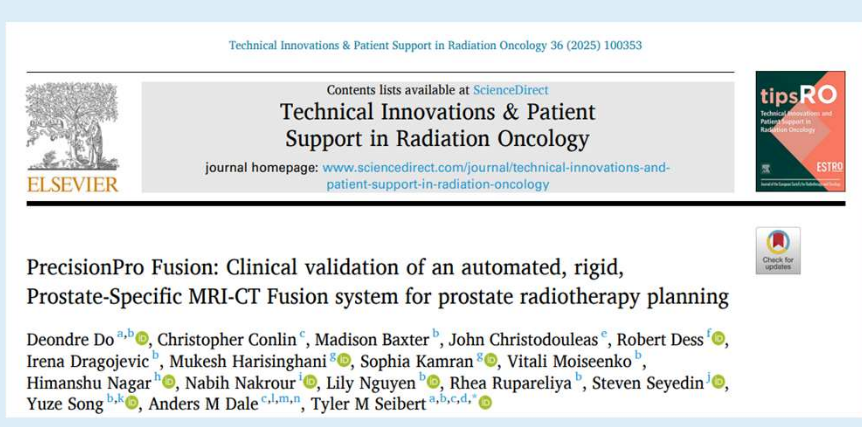
Form P3 reports that 955 patients in the past year had an MRI.

The physics survey for 778 (81%) of those patients reports that the MRI was registered to the CT and used for contouring (all facilities represented).

PROSTATE MRI PILOT

We propose a pilot project to collect the MRI DICOM data for a subset of patients/facilities

Dr. Tyler Seibert and his group at the University of California-San Diego have developed and validated CT-MR fusion and autocontouring tools


Technical Innovations & Patient Support in Radiation Oncology 36 (2025) 100353

Contents lists available at ScienceDirect

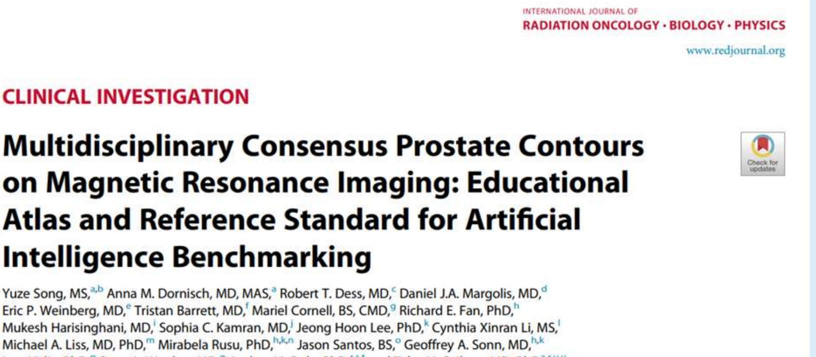
Technical Innovations & Patient Support in Radiation Oncology

journal homepage: www.sciencedirect.com/journal/technical-innovations-and-patient-support-in-radiation-oncology

ELSEVIER

PrecisionPro Fusion: Clinical validation of an automated, rigid, Prostate-Specific MRI-CT Fusion system for prostate radiotherapy planning

Deondre Do [a,b], Christopher Conlin [c], Madison Baxter [b], John Christodouleas [e], Robert Dess [f], Irena Dragojevic [b], Mukesh Harisinghani [g], Sophia Kamran [g], Vitali Moiseenko [b], Himanshu Nagar [h], Nabih Nakrour [i], Lily Nguyen [b], Rhea Rupareliya [b], Steven Seyedin [j], Yuze Song [b,k], Anders M Dale [c,l,m,n], Tyler M Seibert [a,b,c,d,*]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CLINICAL INVESTIGATION

Multidisciplinary Consensus Prostate Contours on Magnetic Resonance Imaging: Educational Atlas and Reference Standard for Artificial Intelligence Benchmarking

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PROSTATE MRI PILOT

Do you think this would be a useful study to assess the quality of physician contours vs. AI contours

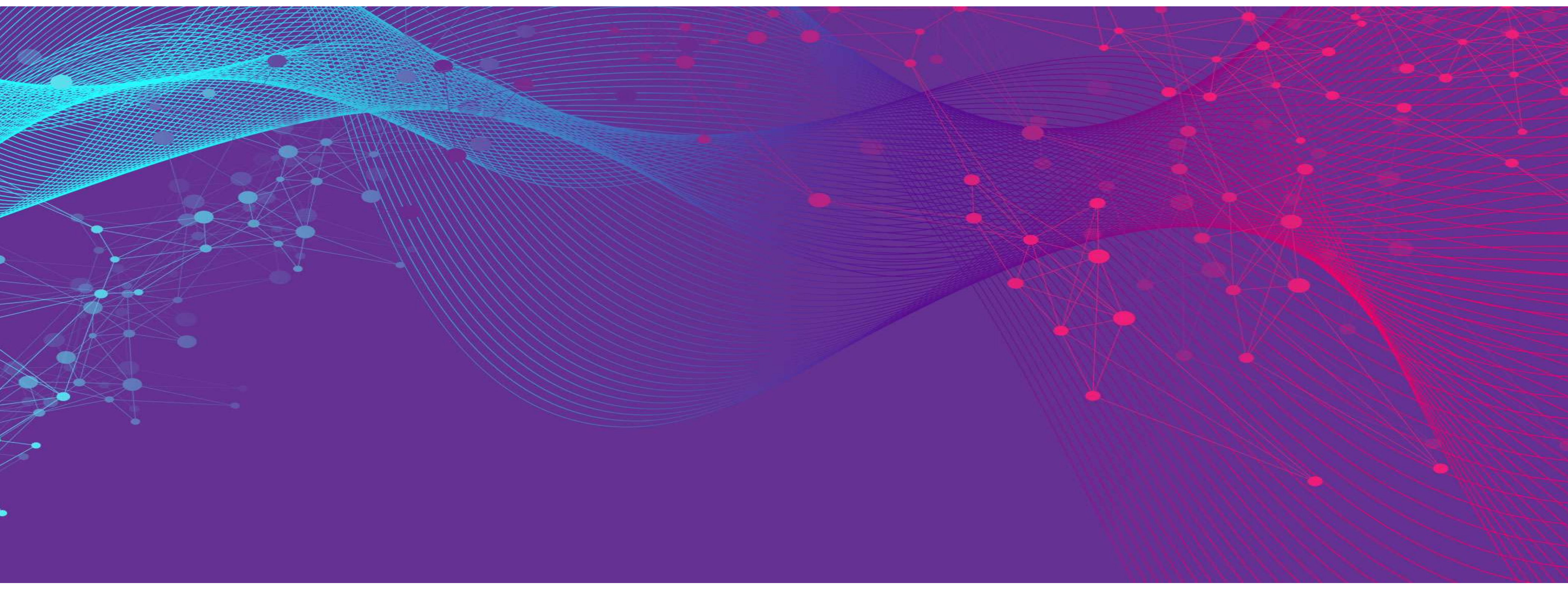
Do you think this would help you with contouring a microboost volume?

What results from the pilot would be most helpful for assessing efficacy?

What concerns do you have with this potential tool?

- Consider: these tools contour prostate only, not SV

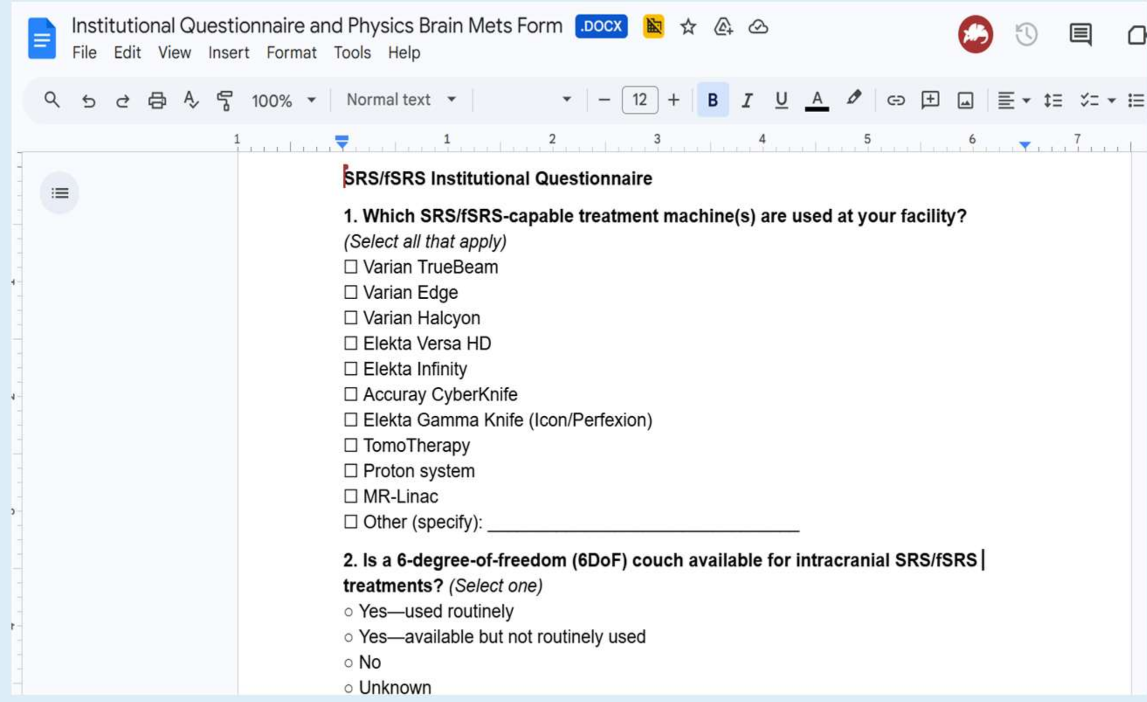
Do you have any concerns about the extra effort required from your team?



BRAIN METS PHYSICS DATA COLLECTION

BRAIN METS – DRAFT FORMS

- Brain-MRTD form (per patient)
- Institutional form (per facility)
- Draft forms were shared with consortium members
- Drafts are available at each table for review and feedback



Institutional Questionnaire and Physics Brain Mets Form .DOCX

File Edit View Insert Format Tools Help

SRS/fSRS Institutional Questionnaire

1. Which SRS/fSRS-capable treatment machine(s) are used at your facility?
(Select all that apply)

☐ Varian TrueBeam
☐ Varian Edge
☐ Varian Halcyon
☐ Elekta Versa HD
☐ Elekta Infinity
☐ Accuray CyberKnife
☐ Elekta Gamma Knife (Icon/Perfexion)
☐ TomoTherapy
☐ Proton system
☐ MR-Linac
☐ Other (specify): ______________________________

2. Is a 6-degree-of-freedom (6DoF) couch available for intracranial SRS/fSRS treatments? *(Select one)*

○ Yes—used routinely
○ Yes—available but not routinely used
○ No
○ Unknown

BRAIN METS – AUTOMATION IDEAS

Goal is to minimize manual data entry

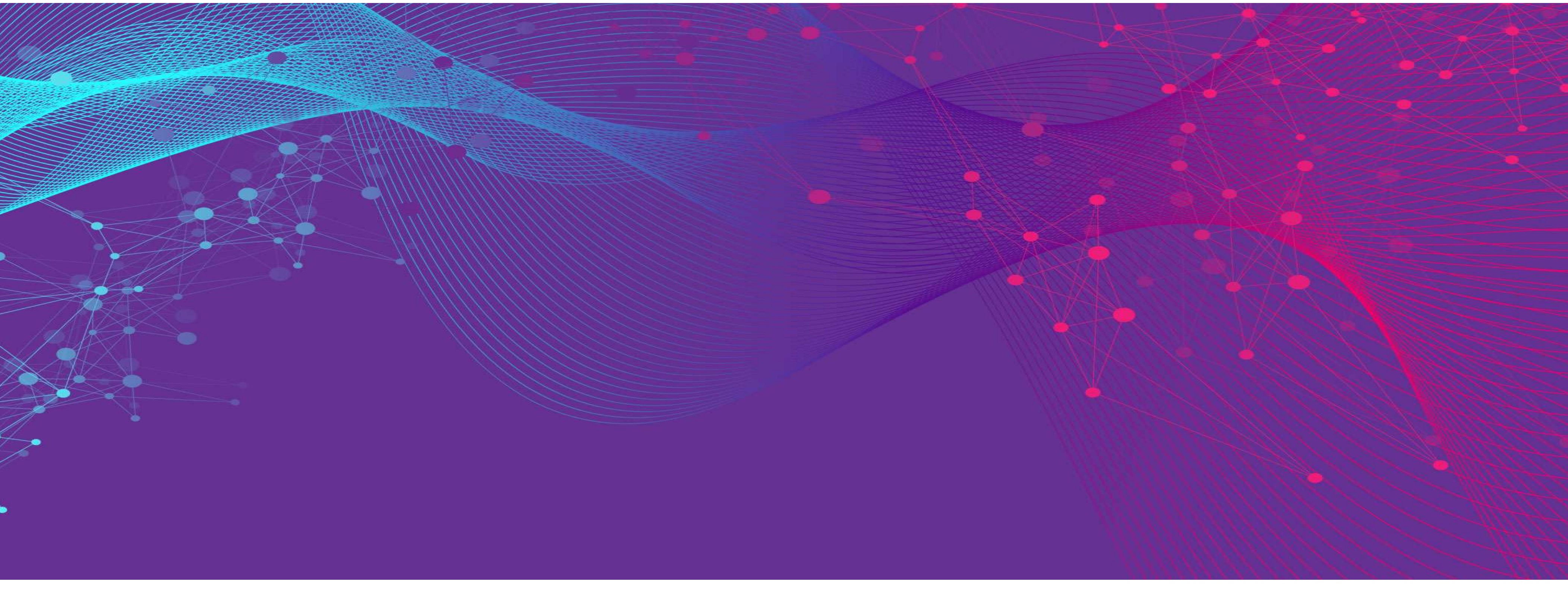
Extract information from DICOM where possible, but need to ensure clarity

Possible new data collection instrument: DICOM Details form

BRAIN METS – AUTOMATION IDEAS

- DICOM Details form workflow:
  - Upload DICOM data as usual
  - Next day or later, return to patient record to submit patient-specific mapping and dose details based on that DICOM set.
    - Review summary
    - Identify relevant targets of interest
    - Specify dose or other details for each target
  - Avoids manual entry of many PTVs but requires a second session to complete data entry.

Other automation ideas?



OPEN DISCUSSION

ANY QUESTIONS?

Thanks for joining us!

BREAKOUT FEEDBACK REQUEST

Please submit the 3-question breakout survey:

If you would like CAMPEP credit for this CWM, make sure to fill out speaker evaluation and program evaluation before leaving!