

Portaldosimetrie mit 'Portal Vision'

Varian's QA solution



Die Vision

- **Goal**

- **Verify the dose distribution**

- Each IMRT field, without patient in beam
 - PortalVision LC250 and aS500

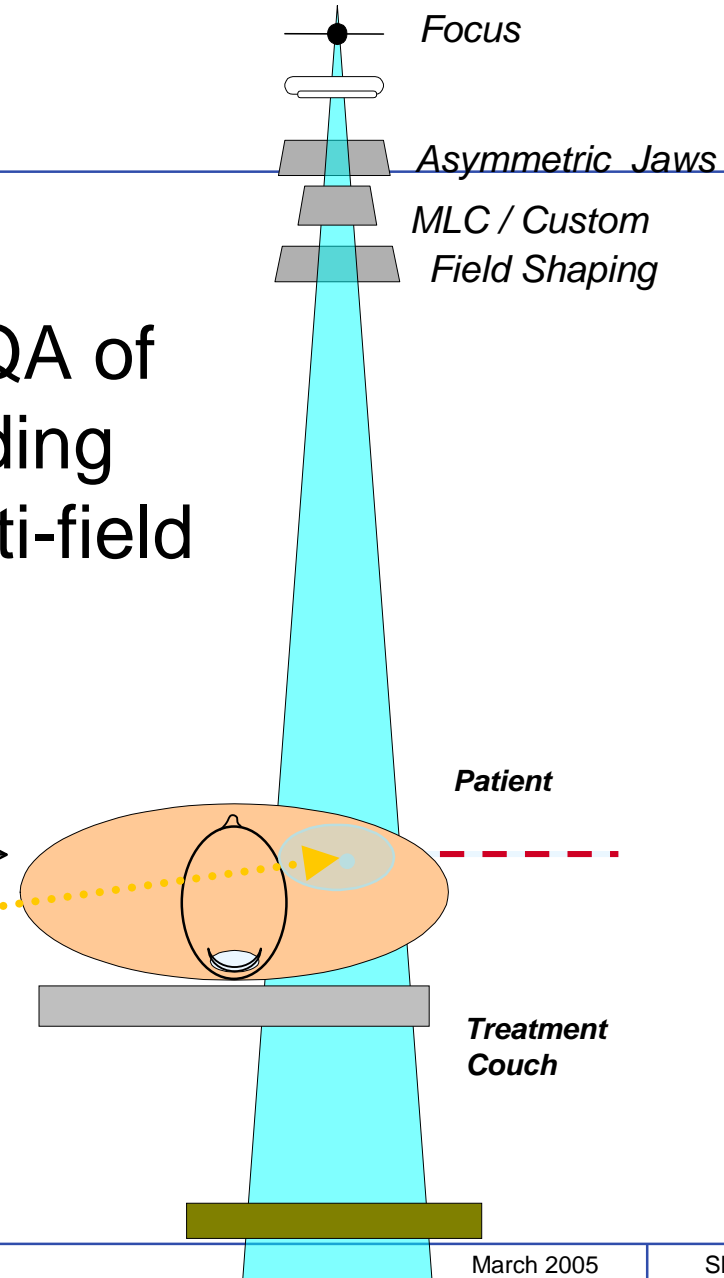
- **Increase efficiency for the Physicist**

- Commission IMRT sooner
 - Ongoing pre-treatment QA
 - Reduce time to evaluate a plan
 - Less time/plan = Verify more plans

Die Zukunft...

- Quantitative dosimetric QA of Patient Treatment, including 3D reconstruction of multi-field IMRT

Central Dose
Absolute dose=
100 cGy delivered?



Traditional Dosimetry Tools

- Measurement tools



- Ion chamber
- Diodes
- Film
- Analysis software

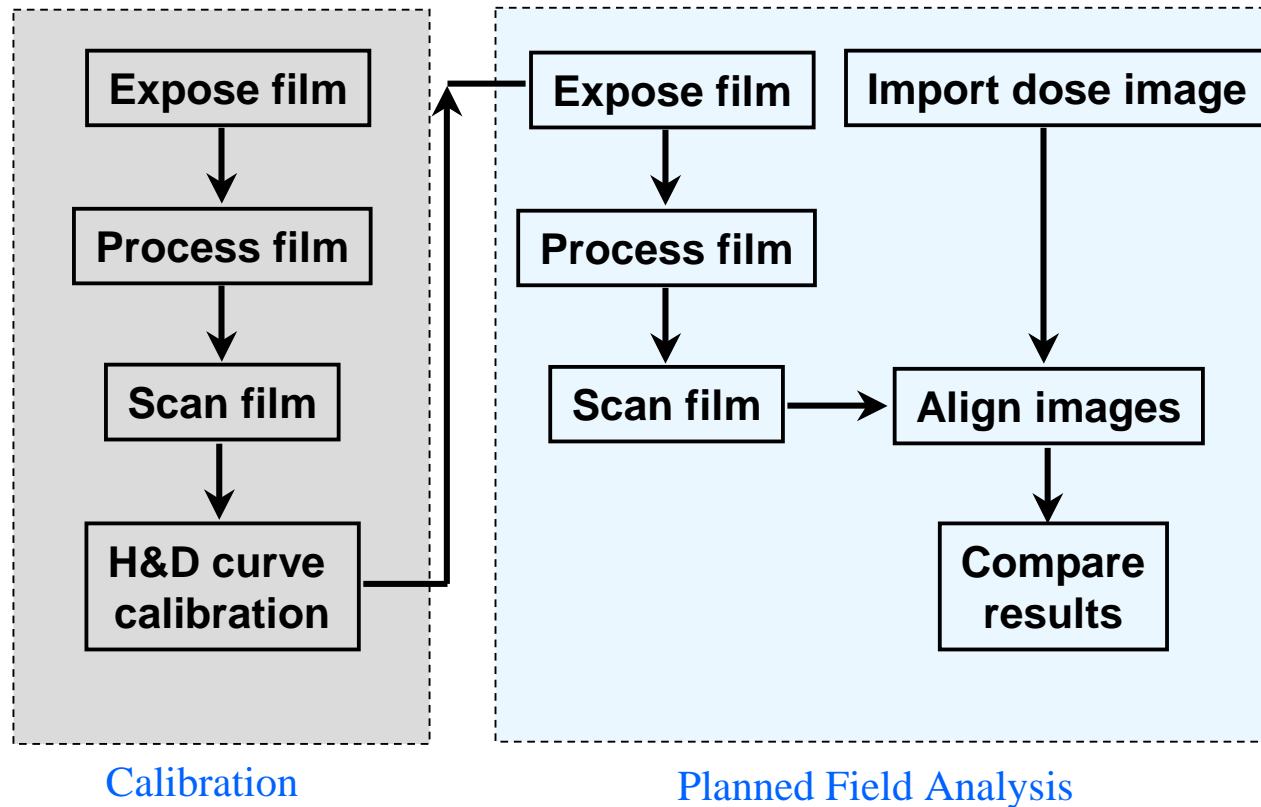


- Challenges

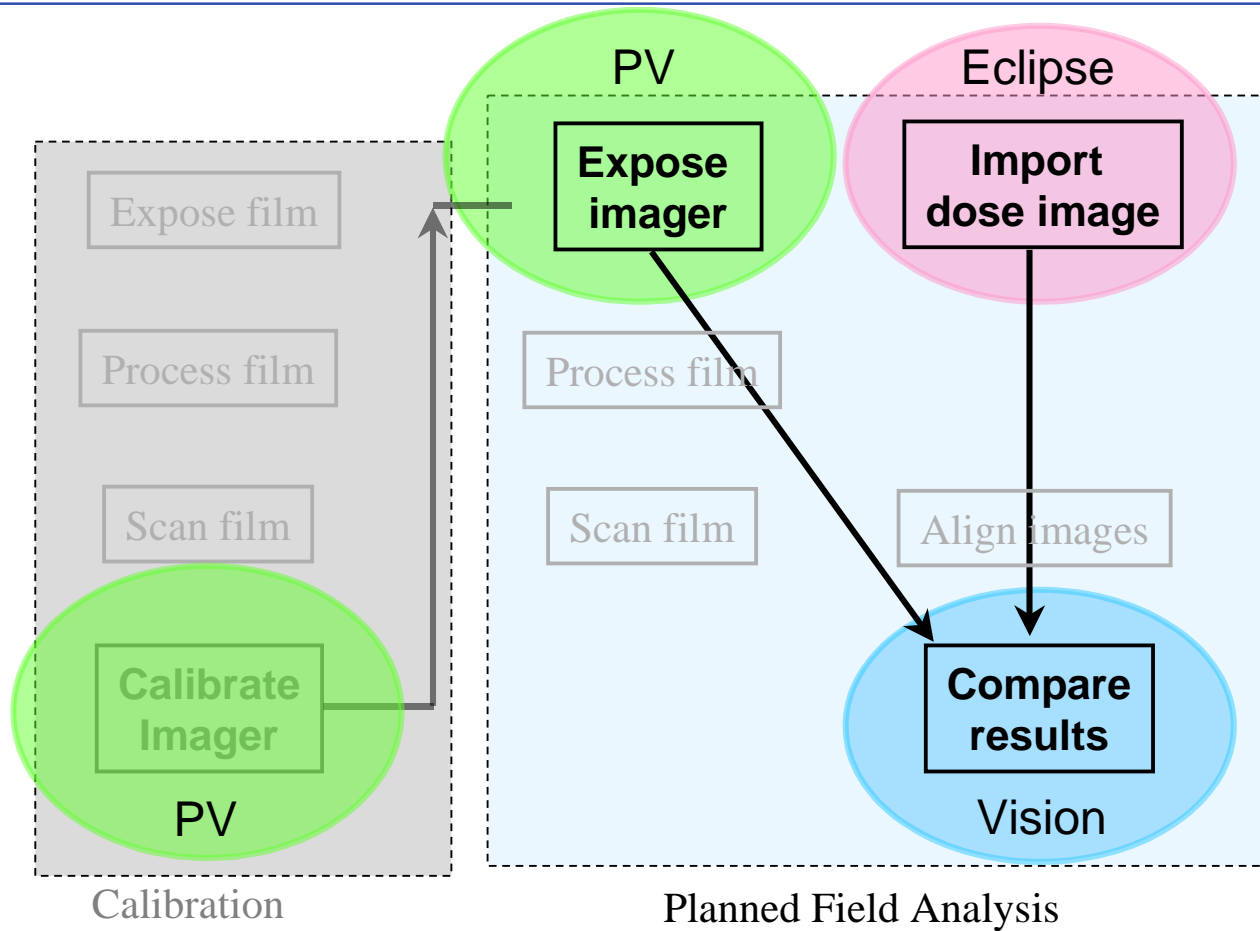
- Non-linear sensitometry of film
- Image registration; accuracy variations
- User errors
- Labor intensive, time consuming (2-4 hr. / plan)



Traditional Film Dosimetry



Portal Dosimetry



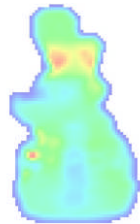
Portal Dosimetry

- Dosimetry is a Process
- 'Portal Dosimetry' is a system capability (TPS, PV, VarisVision)
- 'Dosimetry Workspace' access in PV (standalone) and Vision Review
- Portal Dosimetry is a set of capabilities which provides
 - Accumulation of relative dose at the PV imager position
 - Dose evaluation, acquired dose vs. TPS-predicted dose
 - For the application of Pre-treatment QA
 - Beam through air only (thru phantom = future capability)
 - No patient in beam

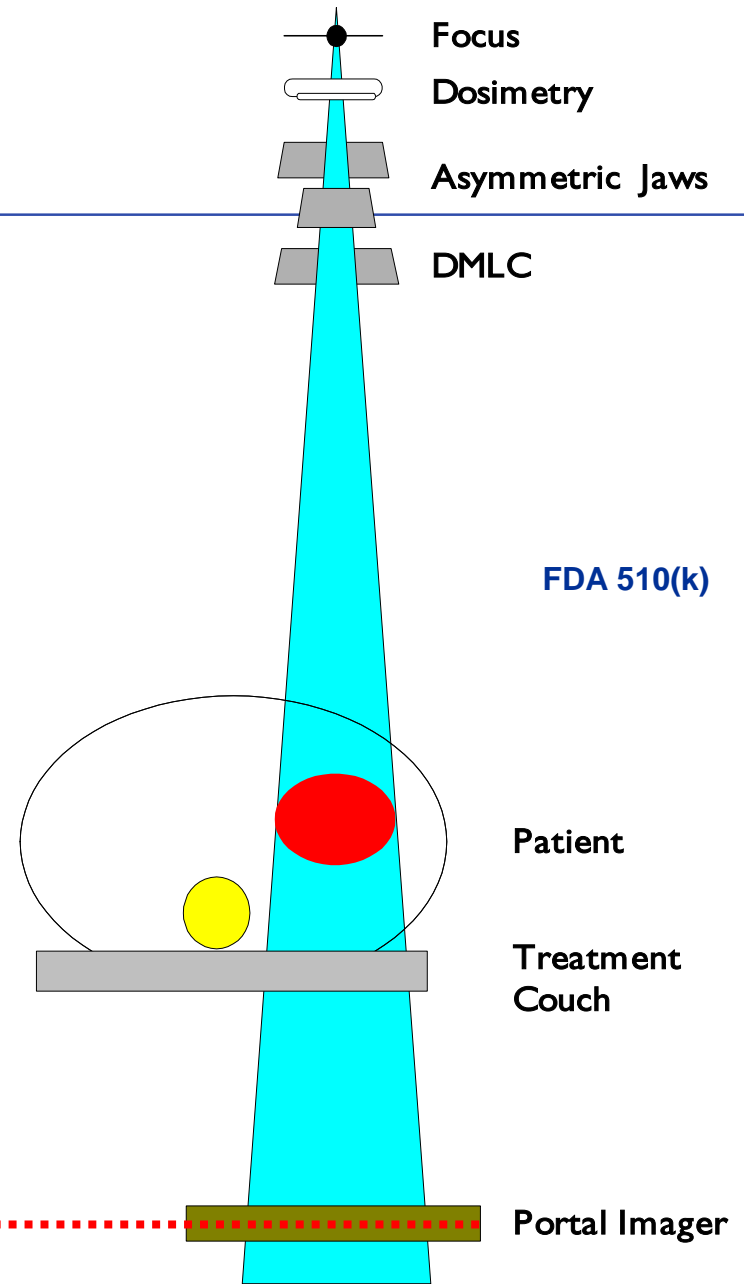
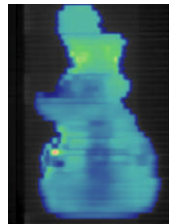
Portal Dosimetry

- Application
 - Pre-Treatment Verification without Phantom
- Qualitative Comparison

Predicted Portal Dose

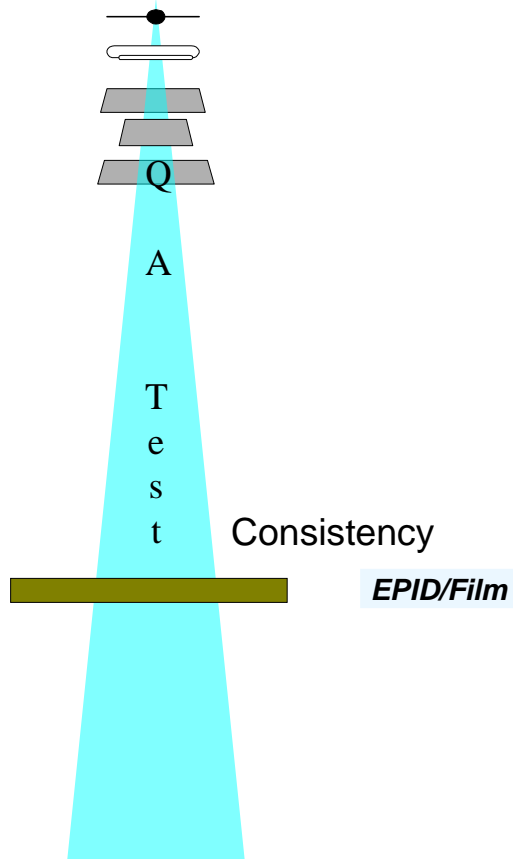


Acquired Portal Dose

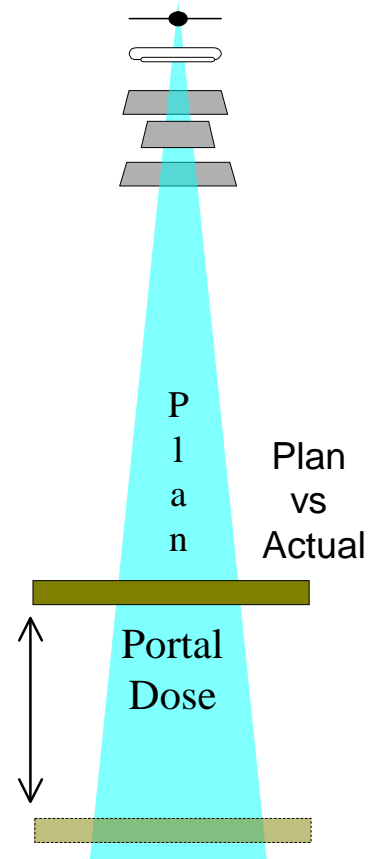


Portal Dosimetry Applications

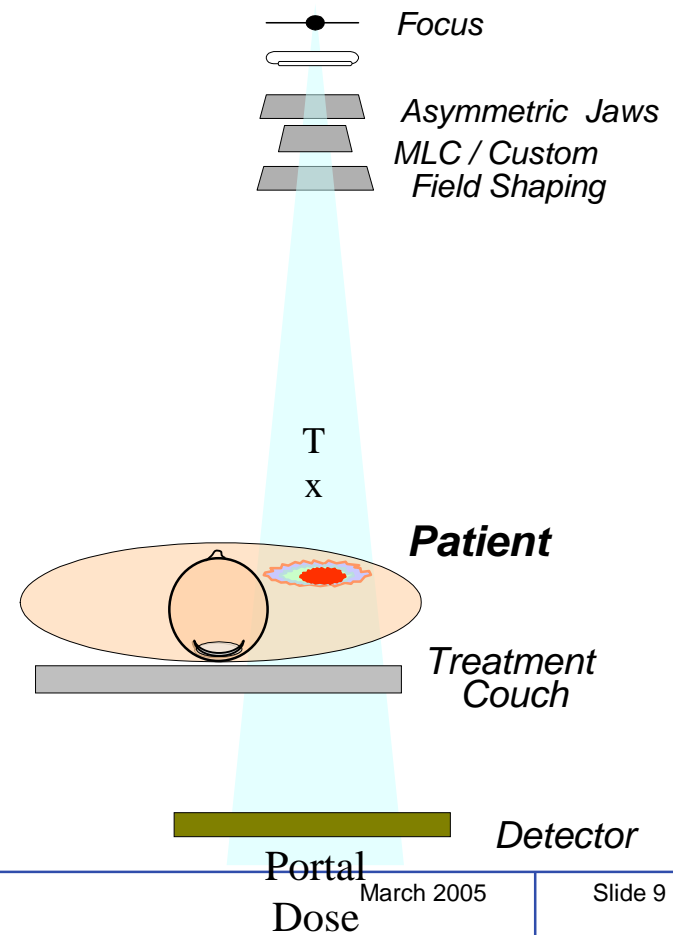
Machine QA



pre-Treatment QA

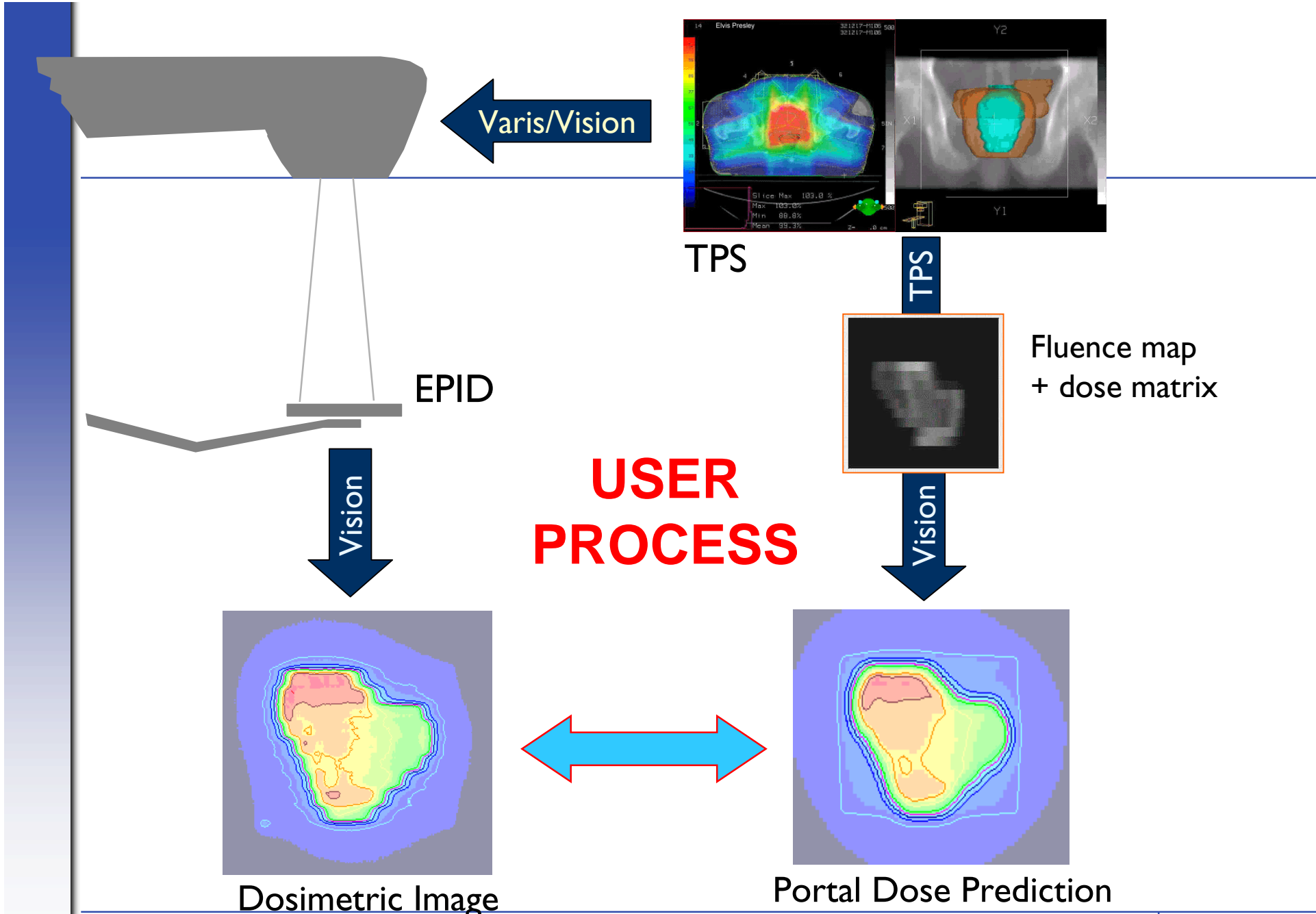


The Future? in vivo QA

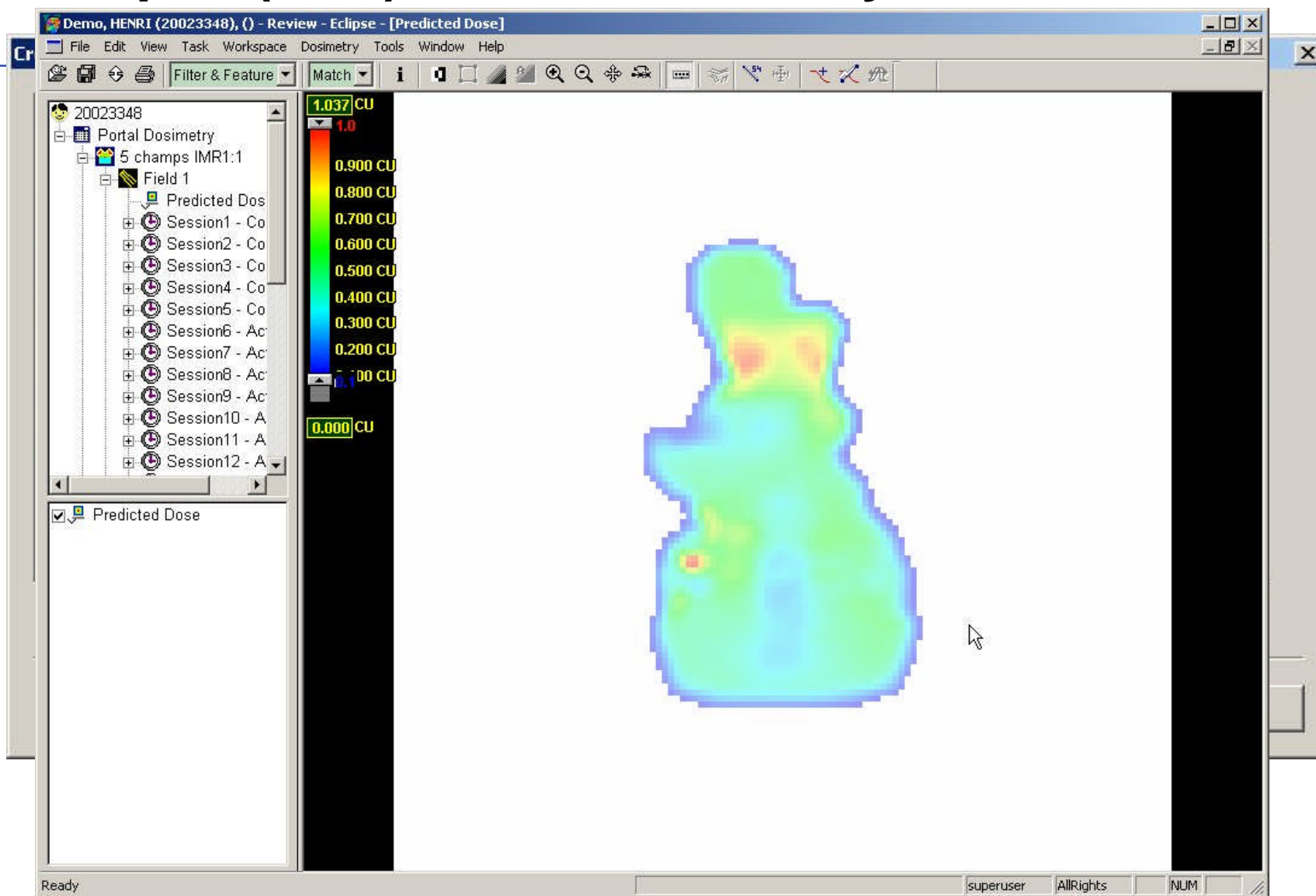


Treatment Methods Supported

<u>Treatment Type</u>	Overall	<u>Dose Prediction</u>	<u>Dose Acquisition</u>
IMRT sliding windows	Yes	Yes	Yes
Step-and-shoot	Yes	Yes	Yes
Static field for machine QA	Yes	Yes	Yes
Dynamic wedge	No	No	Yes



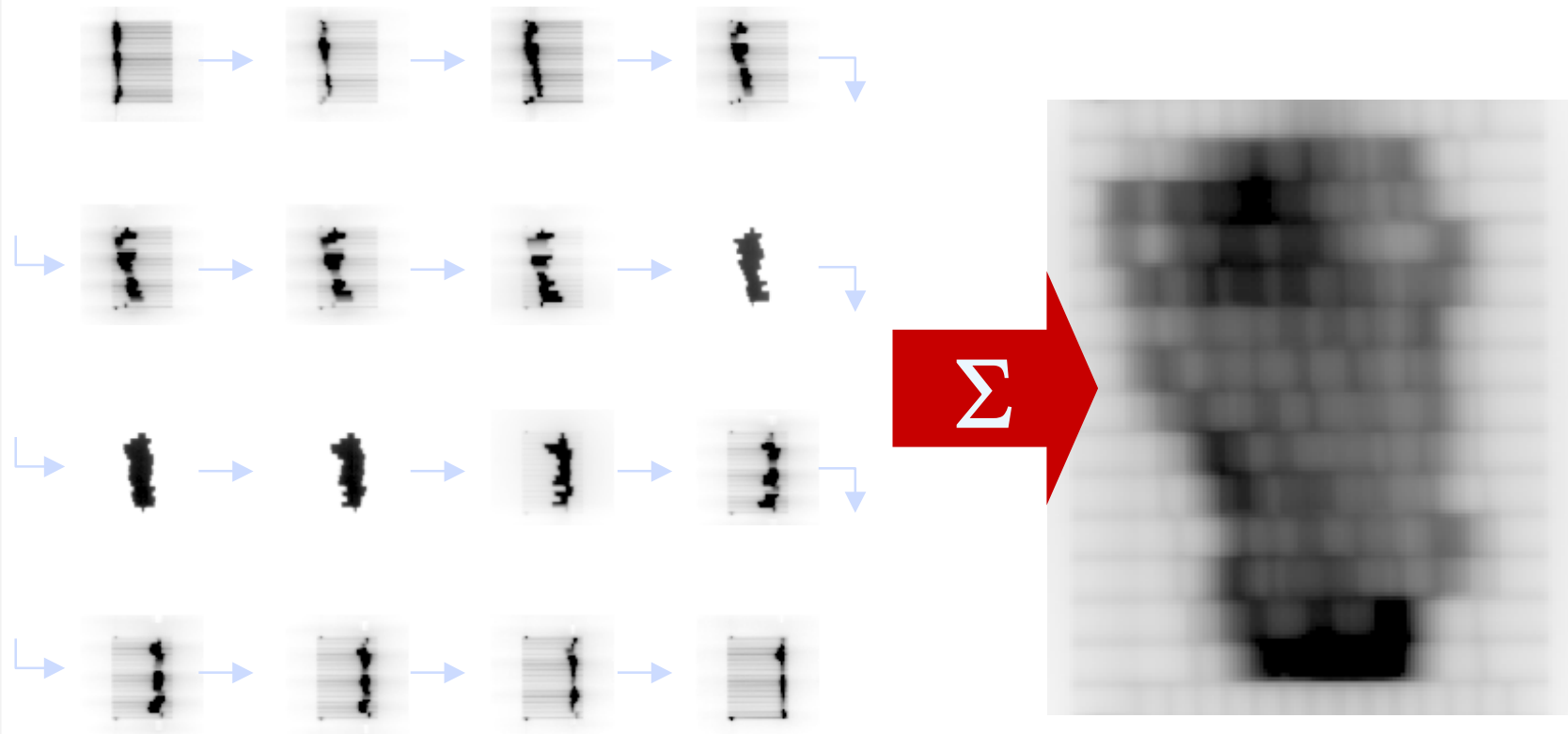
Eclipse (TPS) role in Dosimetry



Portal Vision (EPID) role in Dosimetry

- Calibration (Treat or Standalone PV)
 - Calibration of detector at each energy, dose rate, and 2 distances
 - Dose normalization for LC250
- Acquisition (Treat or Standalone PV)
 - Integrated Image acquisition mode and sequence template
 - Automated Density Image to Dose Image conversion
 - Off-line integration of split fields (multiple image)

Portal Vision (EPID) Acquisition



FDA 510(k) - Images courtesy of KFJ Hospital, Vienna Austria

Portal Vision (EPID) Acquisition

Reference Image

Integrated Dose

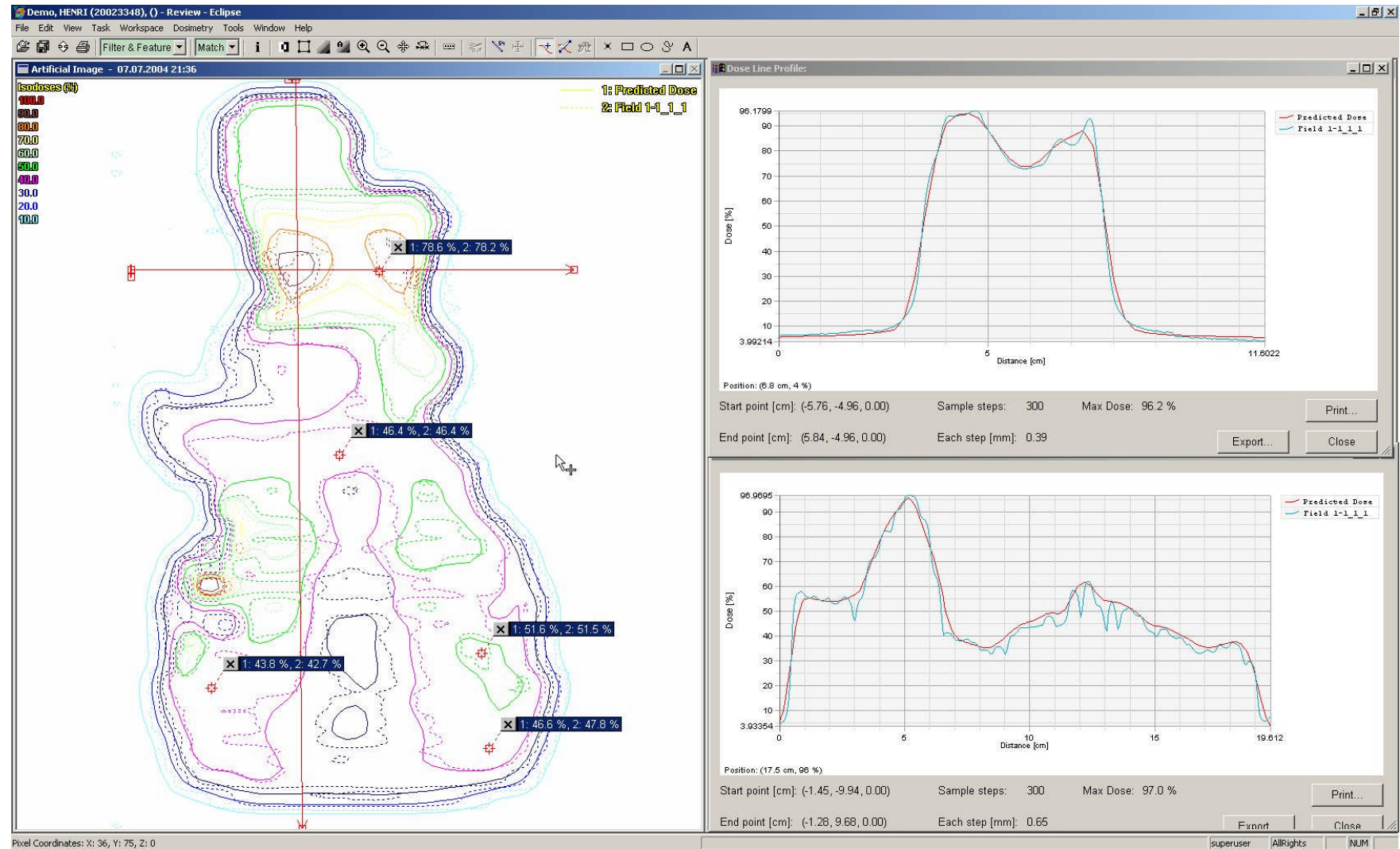
The screenshot displays the Varian Medical Systems Treatment v.6.5 interface for patient HENRI. The left sidebar shows a treatment plan with 5 fields (Field 1-5) and 5 IMRT fields. The main area is split into two windows: 'Integrated Image' (Reference Image) and 'Integrated Dose'. The Reference Image window shows a predicted dose map for Field 1-6_1_2, dated 25.01.2004 01:14. The Integrated Dose window shows the actual dose map for Field 1-6_1_2, dated 07.07.2004 21:09. The bottom status bar shows 'NO PLAN' and 'MLCWS IL'.

VarisVision (R&V) role in Dosimetry

- Dosimetry workspace in Review (Vision or Standalone PV)
 - Dose Image Display
 - Dose Images Alignment
 - Dose Measurement & Evaluation
 - Point dose
 - Line Profile
 - Dose difference
 - Gamma evaluation
 - Off-line integration of split fields (multiple image)

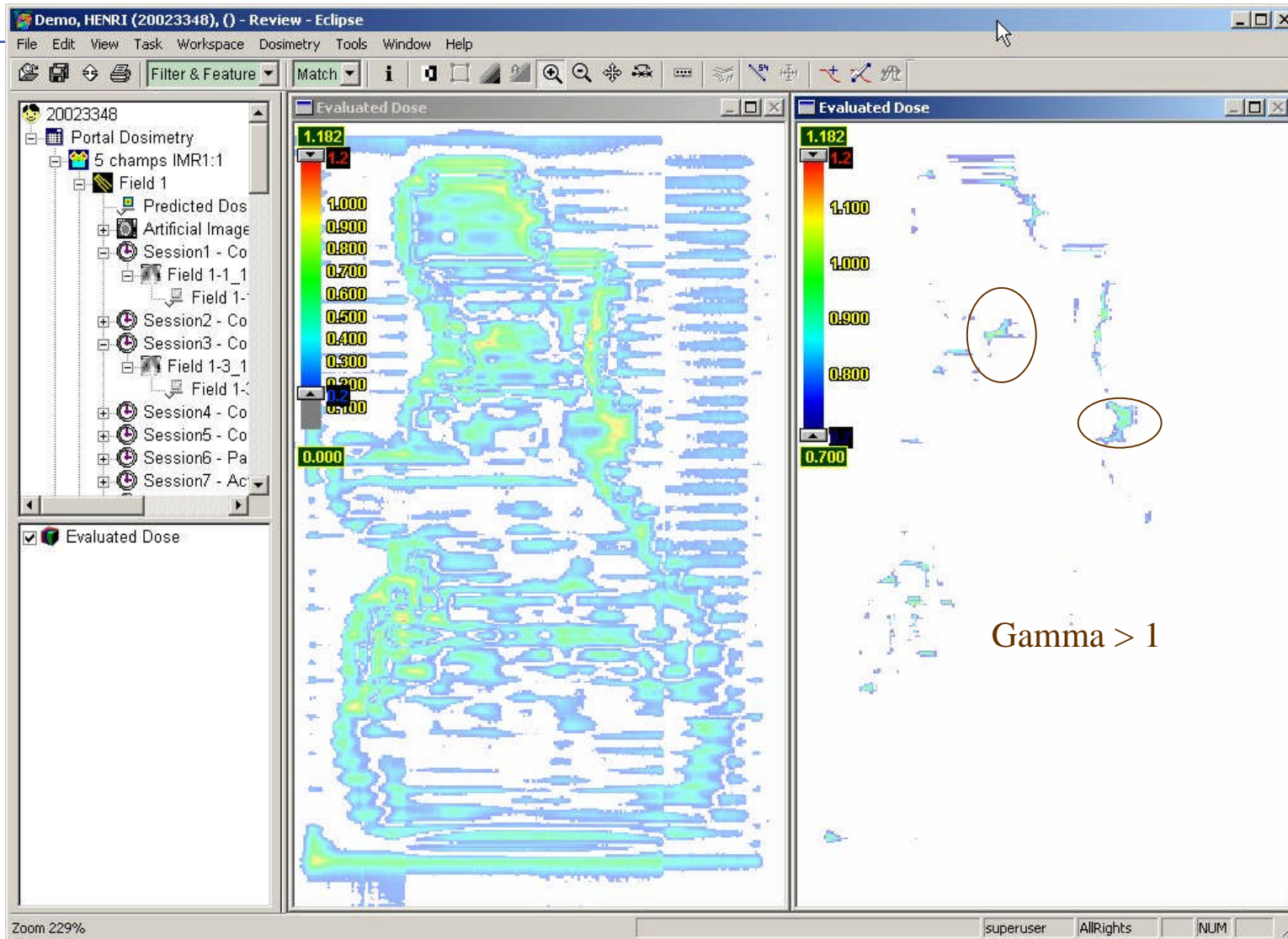
Dosimetry Review: Dose Evaluation

Traditional Dose Evaluation Tools: Line Profile + Point Dose



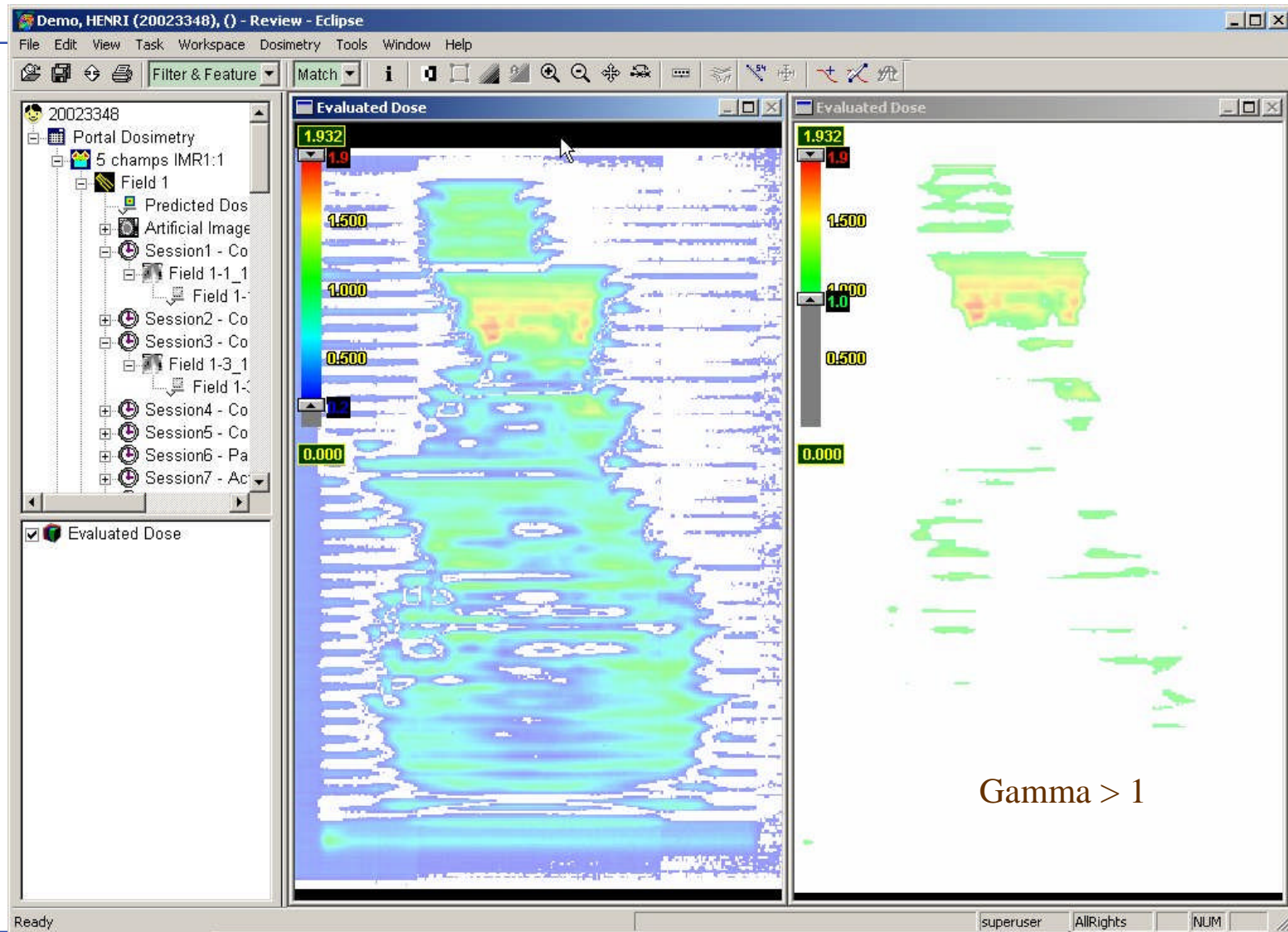
Dosimetry Review: Dose Evaluation

Gamma Evaluation showing good correlation



Dosimetry Review: Dose Evaluation

Gamma Evaluation showing mismatch



Dosimetry Summary

- IMRT adoption easier and faster
 - Facilitates IMRT QA
 - Confirms that Clinac delivers the planned dose
 - Pre-treatment QA in a fraction of the time vs. traditional methods
- Advantages
 - Improved staff efficiency
 - Costs ↓ , billings ↑
 - Facilitates good patient care

Conclusion

- Acceptance testing, commissioning and QA of IMRT involves new concepts specific to IMRT.
- Standards and guidelines are not yet established.
- Your clinical judgment is important to patient safety.
- In general, you should expect IMRT planning and delivery systems to perform as well as 3DCRT planning and delivery systems.

Vielen Dank für Ihre Aufmerksamkeit

