IMRT QA
When and What is Enough?

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Observations, assertions, caveats

- We do not know what all the problems are
- Doing measurements for every patient
  - Time-consuming
  - Inefficient
  - Ineffective
- Billing considerations should not drive QA practices

Observations, assertions, caveats

- Dosimetric QA is necessary but not sufficient
  - Always need to evaluate plan quality to make sure inverse plan is not a "perverse" plan
- This discussion is about ongoing QA and not commissioning

We do not know the failure modes

- Planning can be inaccurate
  - dose calculation
  - linac/MLC modeling
  - leaf sequencing
- Delivery can be inaccurate
  - information transfer
  - linac/MLC performance

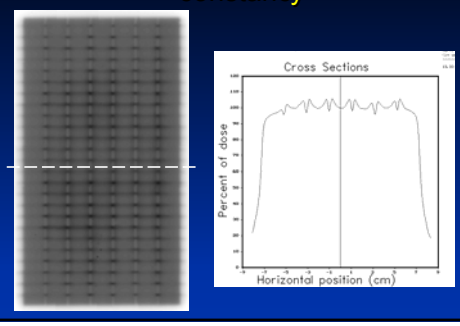
Our current practice needs improvement

- Per-patient measurements of doses transferred to a phantom
  - Don't sample entire volume
  - Can't find planning blunders
  - Can't isolate the source of errors

QA system should include Measurements

- Standardized tests of delivery system performance
  - daily, weekly, monthly
  - testing for problems in MLC/MU delivery control
  - e.g. frequent films of abutting strips taken at multiple gantry angles

Check standard patterns for constancy



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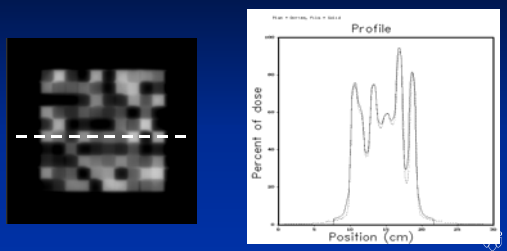

QA system should include Calculations for each patient

- Based on:
  - leaf sequence used for treatment extracted from delivery system
  - measurements of SSD and depth NOT taken from planning system
- Checking
  - dose to target
  - dose to critical structures

Summary

- Detailed phantom measurements should be part of commissioning
- On-going QA should have
  - machine measurements designed to test equipment performance
  - per-patient calculations designed to find planning and information-transfer errors

Logic should point the way