

# *CyberKnife patient specific quality assurance using 2D Mapcheck diode array*



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# *Patient Specific QA on CK*

## **Most CK treatment centers use pinpoint ion chamber measurements for patient specific QA on CK**

### **Gafchromic EBT film**

Gallo JL. J Appl Clin Med Phys. 2015;16(1):5120;

Bellec J. et al., Physica Medica 2017;39, 50-58

### **Planar ion chamber array and cylindrical diode array**

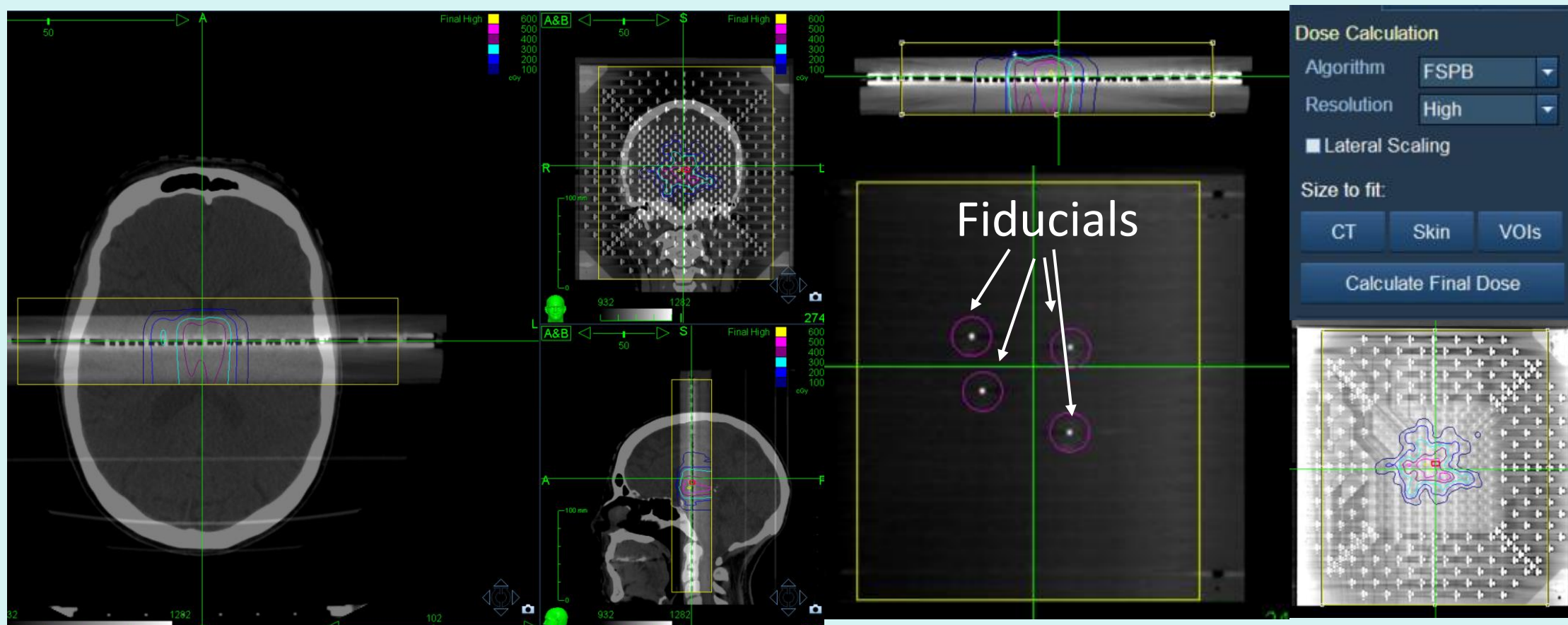
Lin M.H. et al., JACMP, 2015;16(4), 290-305

Yoon J. et al Prog Med Phys 2018; 29 (2), 59-65

### **MapCheck diode array???**

SN 1175: 445 solid state detectors, center array spacing: 7.07 mm, active detector area: 0.8 mm x 0.8 mm, total buildup to detector junction:  $2.0 \pm 0.1 \text{ g/cm}^2$

# Patient specific QA plan setup



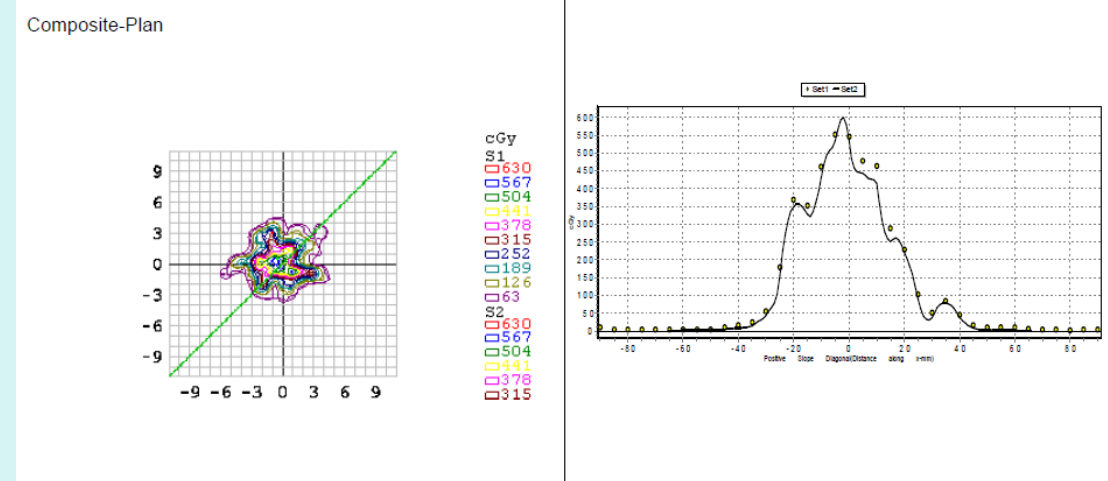
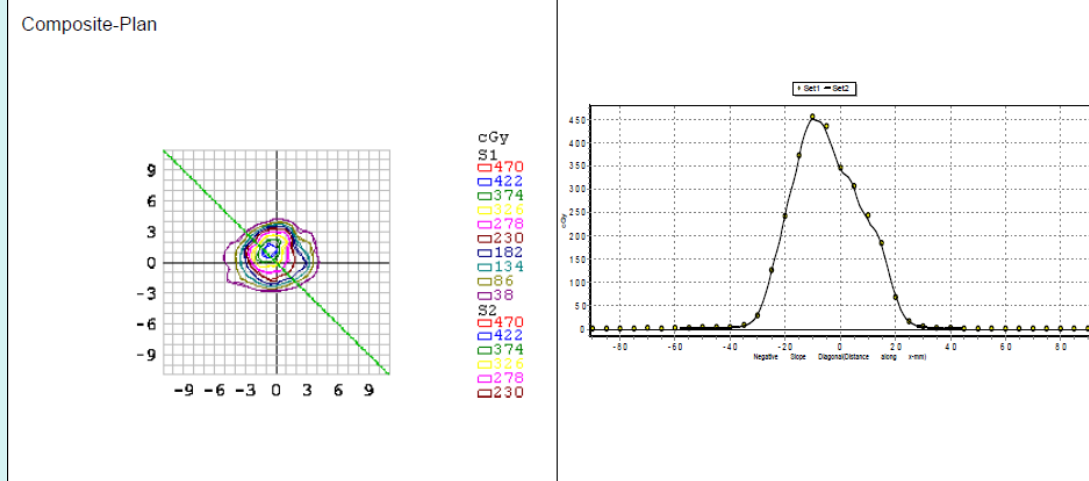
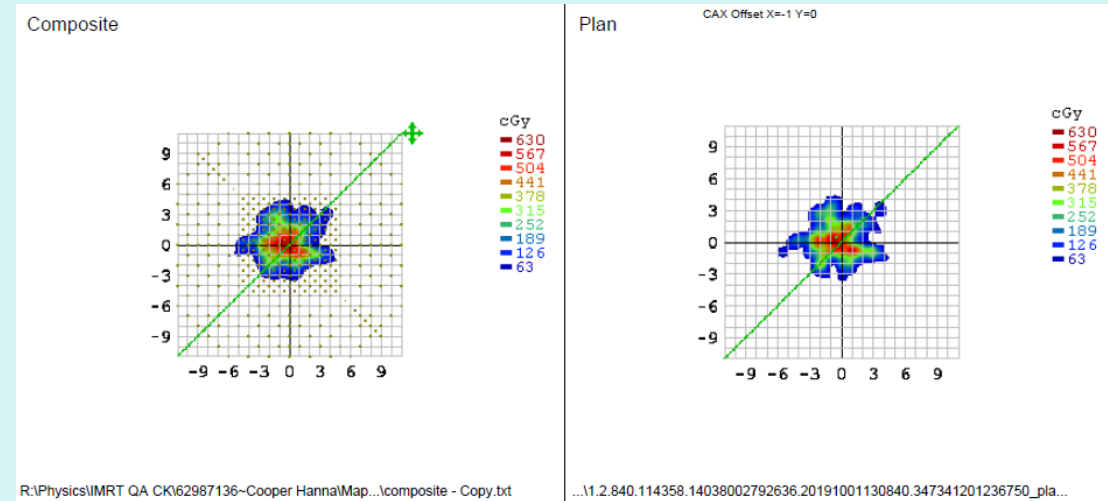
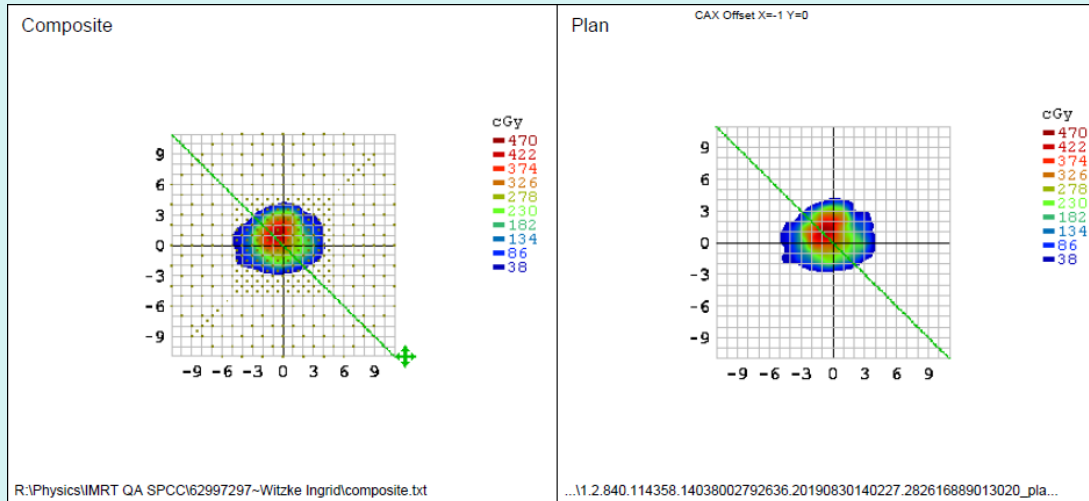
# Patient specific QA

Side	1%/1mm	2%/2mm	3%/3mm	Target Value (cc)
1 lesion	94.3	100	100	15.61
1 lesion	83.3	100	100	5.84
1 lesion	100	100	100	40.77
2 lesions	90	100	100	24.22
4 lesions	98.6	99.3	100	56.66
5 lesions	74.2	97	100	3.71
6 lesions	98.5	100	100	33.1
6 lesions	84.3	100	100	10.65
12 lesions	95.5	98.3	100	10.87
15 lesions	56.3	91	100	3.53

Side	1%/1mm	2%/2mm	3%/3mm	Target Value (cc)
Average	84.8	99.6	100	
Stdev	10.5	0.8	0	

Side	1%/1mm	2%/2mm	3%/3mm	Target Value (cc)
Lung	98.1	100	100	27.05
Lung	86.7	100	100	337
Lung	94.4	100	100	379
Chest	91.2	100	100	19.45
Chest	87.8	100	100	129
Chest	87.6	100	100	334
Liver	95.1	100	100	148.9
T spine	95.1	99	100	45
T spine	84.8	100	100	15.3
T spine	95.2	100	100	98.6
T spine	85.3	100	100	297
L spine	91.8	100	100	23.19
L spine	93.3	100	100	13.7
Sacrum	71.5	98.4	100	263.7
Sacrum	81.3	100	100	8.1
Sacrum	92.3	100	100	20.53
Sacrum	94.1	100	100	46

# Comparison between measured and calculated planar doses



**T spine, 2%/2mm, 10%,  
Passing rate 100%**

**15 lesions, 2%/2mm, 10%,  
Passing rate 91%**

# Conclusions

- **MapCheck - patient specific QA device for CK plans**
- **2%/2mm gamma passing rate (10% threshold) criteria, passing rate > 95%**
- **Be aware about multimet QAs of CK plans**
- **Sub mm resolution detector is ideal for IMRT QA plans, but still unavailable**

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**QUESTIONS???**