

A Medical Physicist In Industry: Experience, Guidance & Lessons Learned

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PROS

11/01/2016

Background & Experience – Before MP



- Education:
 - Marquette University
 - BS, Mechanical Engineering
 - Michigan State
 - Minor in Physics
 - Wayne State University
 - MS, Radiological Physics
 - Masters Essay: ***A Systematic Analysis Of The Error Sources Within The CyberKnife M6 Daily AQA Test***
 - Toronto World Congress Medical Physics 2015
- Experience
 - Nucor Steel – Fortune 500 (2 years)
 - Industrial Programming
 - Rockwell Automation – Fortune 500 (3+ years)
 - Industrial Programming



Background & Experience – MP

- Mercy Health Lacks Cancer Center
 - March 2012 – May 2015 (3+ years)
 - Medical Physics Clinical Research Intern
 - LINAC, HDR, SRS/SBRT
 - ACR Accreditation
 - Research:
 - Ion Chamber Cross Calibration
 - Electron Cutout Output Factors
 - Masters Essay: CyberKnife AQA
 - Physicists
 - Tewfik Bichay, PhD
 - Chen Chen
 - Alan Mayville (WSU Alum)



Background & Experience – MP

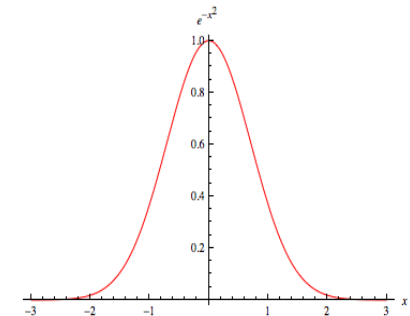
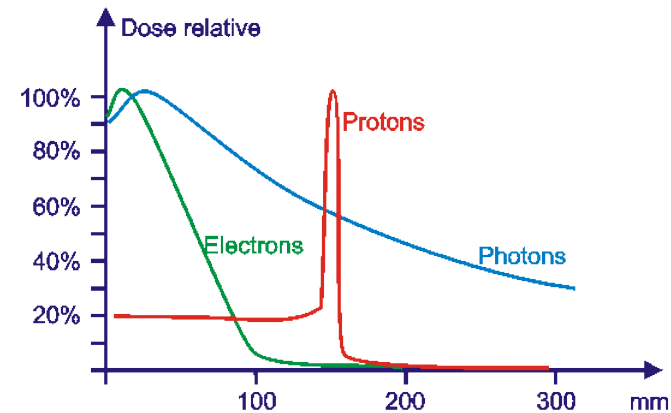
- Philips
 - 2014 Revenue: \$22B Euro
 - Employees: >100,000

- Healthcare Division:
 - Radiation Oncology Systems
 - Pinnacle Treatment Planning Software (TPS)



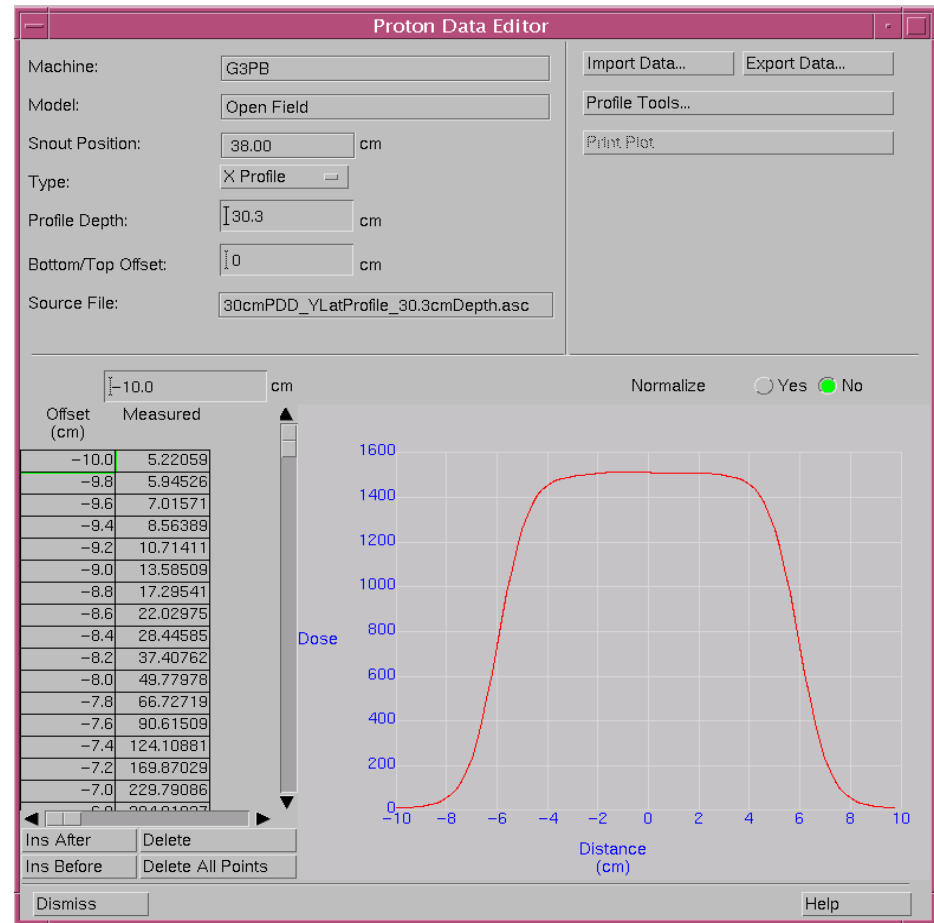
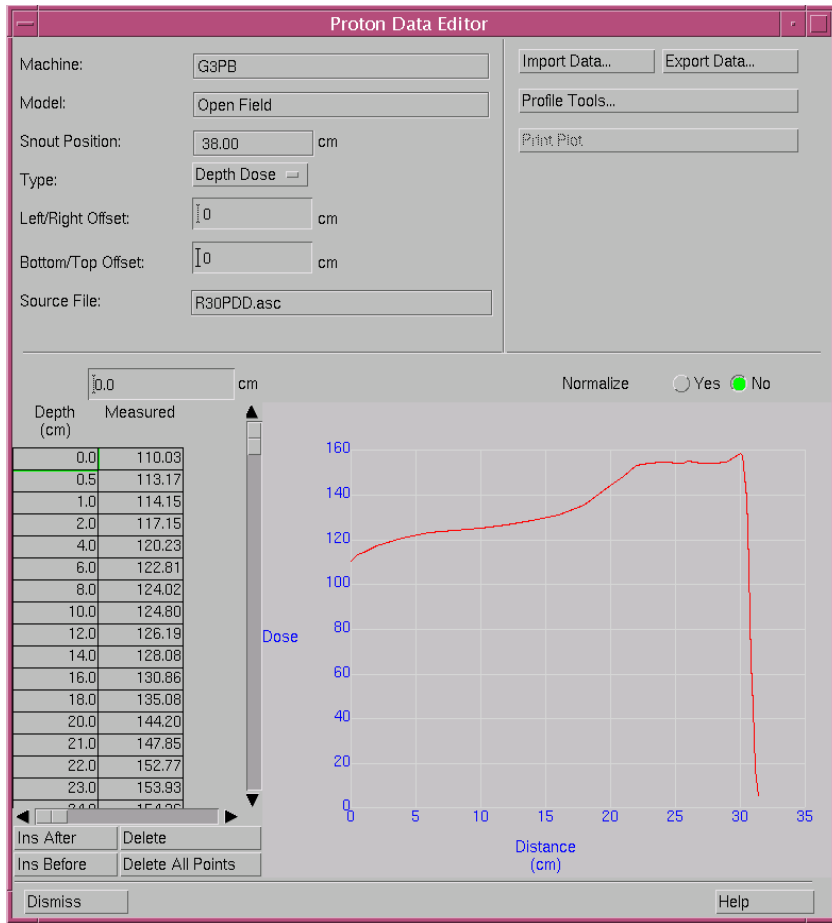
Background & Experience – MP

- Roles
 - Software Quality Physicist 3 (June 2015 – September 2016)
 - Integration Testing
 - Clinical R&D
 - Global Team Leader – Protons (September 2016 – Present)
 - Global Physics Responsibility for All Things Protons
 - Physics & Planning Success with Pinnacle Proton Modalities
 - Double Scattering
 - Uniform Scanning
 - Spot Scanning (IMPT)
 - Also: Multi-modality & DIR
 - E2E Integration: Imaging, TPS, OIS, TDS



$$D(x, y, z, E_0) = MU \times (w_{nuc} \dot{D}_{nuc}(x, y, z, E_0) + w_{DG} \dot{D}_{DG}(x, y, z, E_0) + w_{SG} \dot{D}_{SG}(x, y, z, E_0))$$

Pinnacle Physics



Pinnacle Planning

ROI | ROI Group

Trials

Display	Name	Line Type
<input checked="" type="checkbox"/>	VMAT	Thin Dashed
<input type="checkbox"/>	Trial_3	Medium D...
<input checked="" type="checkbox"/>	MFORB	Medium S...

ROIs

Display	Name	a
<input type="checkbox"/>	8mm	1
<input type="checkbox"/>	avoid 66	1
<input checked="" type="checkbox"/>	Esophagus	1
<input type="checkbox"/>	fs ext	1
<input type="checkbox"/>	fs NT	1
<input type="checkbox"/>	fs p exp 2	1
<input type="checkbox"/>	fs ring 60	1
<input type="checkbox"/>	fs ring 66	1
<input type="checkbox"/>	Heart	1

Dose Volume Histogram

Norm. Volume

Dose (cGy (RBE))

DVH Calculation

Cumulative Differential

Dose Axis Display

Normalized Dose
 Absolute Dose

Auto-Compute Max
 Specify Max Dose

Volume Axis Display

Normalized Volume
 Absolute Volume

Tabular DVH...

DVH Tools

ROI Statistics

	Line Type	ROI	Trial or Record	Min.	Max.	Mean	Std. Dev.	% Outside Grid	% > Max	Generalized EUD
<input type="radio"/>	—	Esophagus	MFORB	--	6932.3	1109.1	1782.1	0.00 %	0.00 %	0
<input type="radio"/>	- - - - -	Esophagus	VMAT	28.1	6742.6	820.9	1267.5	0.00 %	0.00 %	0
<input type="radio"/>	—	iCTV_6000	MFORB	5337.6	7437.4	6611.2	211.8	0.00 %	0.00 %	0
<input type="radio"/>	- - - - -	iCTV_6000	VMAT	3394.3	7143.5	6566.9	201.8	0.00 %	0.00 %	0
<input type="radio"/>	—	iGTV_6600	MFORB	6247.4	7264.1	6804.1	112.4	0.00 %	0.00 %	0
<input checked="" type="radio"/>	- - - - -	iGTV_6600	VMAT	5454.8	7143.5	6805.7	91.7	0.00 %	0.00 %	0

Pinnacle – QA phantom

Plan **Plan_2** Rev **R01.P01.D08** Trial_2

Trial: Trial_2
Pct Max. Max = 167.0 cGy (RBE)

98.0 %
80.0 %
60.0 %
40.0 %
20.0 %

Isodose Lines

Isodose lines are **Percent of Max Dose**

Max dose **167.0** cGy (RBE)

Add Line(s)... All Lines On
Remove Line... All Lines Off
Line Details...

Value	Color	2D Display	3D Display
98 %	red	On	Off
80 %	gr...	On	Off
60 %	blue	On	Off
40 %	yel...	On	Off
20 %	pu...	On	Off

Dose Display & Analysis

2D Colorwash Display On Off
3D Colorwash Display On Off
Max dose point display... On Off
Point of Interest Dose Table...
Dose Volume Histogram...
Beam Weighting

Slice 181: Z = 0.00 cm zzV13

Trial: Trial_2
Pct Max. Max = 167.0 cGy (RBE)

98.0 %
80.0 %
60.0 %
40.0 %
20.0 %

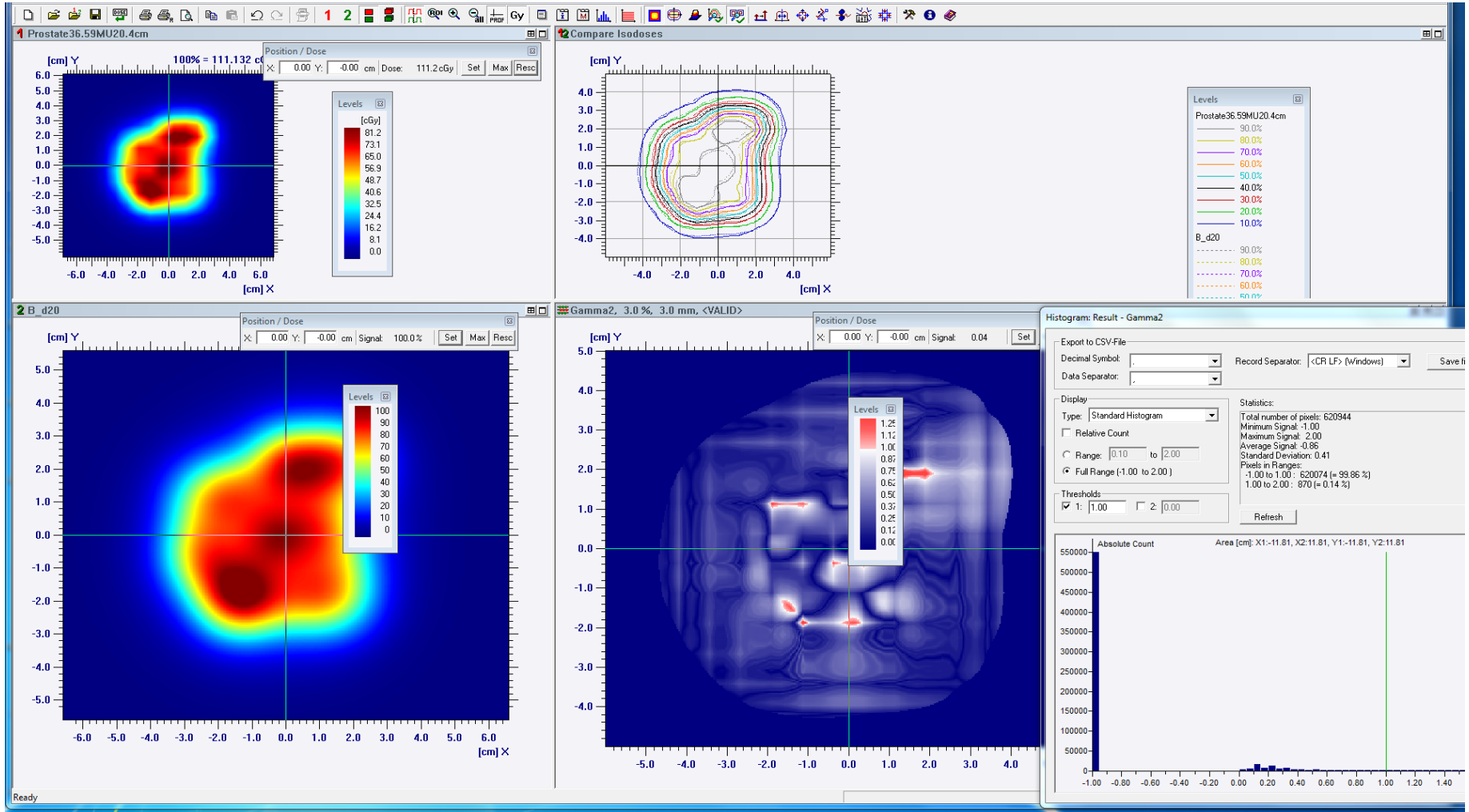
Slice 256: X = -0.05 cm zzV13

Trial: Trial_2
Pct Max. Max = 167.0 cGy (RBE)

98.0 %
80.0 %
60.0 %
40.0 %
20.0 %

Slice 256: Y = -0.05 cm zzV13

Pinnacle Export– Gamma Analysis OmniPro



10 Rules for Success

Rule 10:
Never miss out on a chance to impress and take
leadership

Rule 9:

Know what you don't know, be willing to admit
it

Rule 8: Understand Financials

Rule 7:

Own it, do it right; even if it requires extra time
of your own

Rule 6: Stick with it

Rule 5:

Remember: Not all your colleagues are physicists

Rule 4:

Have fun with it, know when to pick your battles

Rule 3: Stay Sharp with Clinical Practices

Rule 2:
Remember why you got into it: For the Physics &
the patients

Rule 1:
Always Trust your Gut

Thank You!

Questions?

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Kevintjordan.com

