

弧形动态调强（Vmat）的前期 QA工作及临床应用报告

哈尔滨医科大学附属肿瘤医院
放射物理科





- 设备:

Elekta synergy linac

Monaco plan :MC and Pencilbeam

Pinnacal 8.9 plan: SmartAC

IBA MatrixX with Gantry Sensor

IBA MultiCube Phantom

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例:

NPC.
Prostate

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- 计划用时:

NPC 含上颈下颈部:

Monaco 30-40分钟

SmartAC 60分钟

Prostate:

Monaco 30分钟

SmartAC 40分钟



Vmat计划执行 用时:

NPC : 3分钟-7.5分钟

Prostate: 1.5分钟-7.5分钟

执行时间长短与计划系统本身有关



- 验证方法:

使用具备角度传感器的**MatrixX**测量，
采用绝对量分析与相对量分析，用 γ 方法评价。

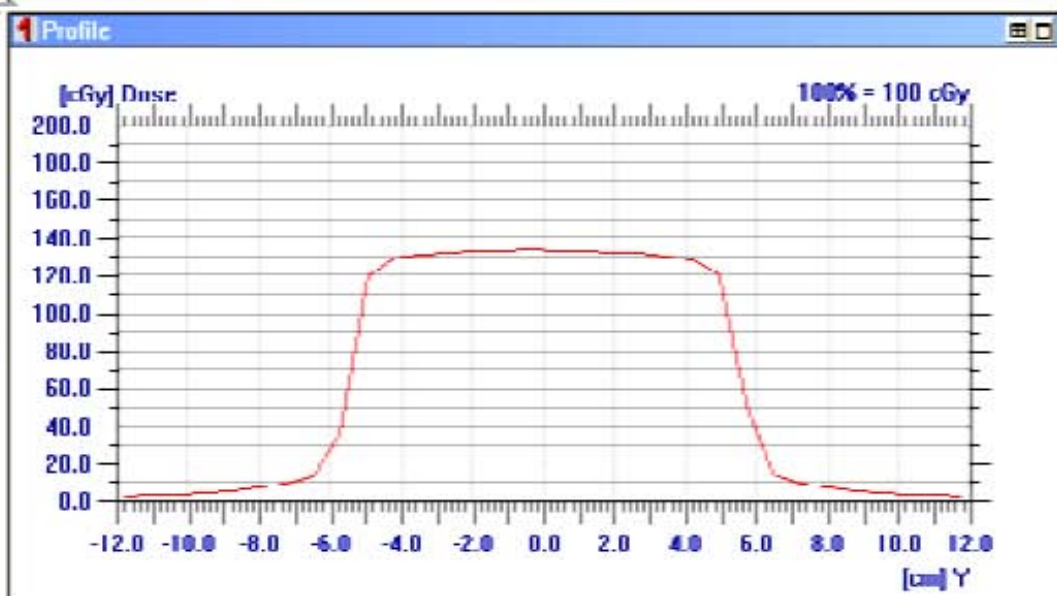
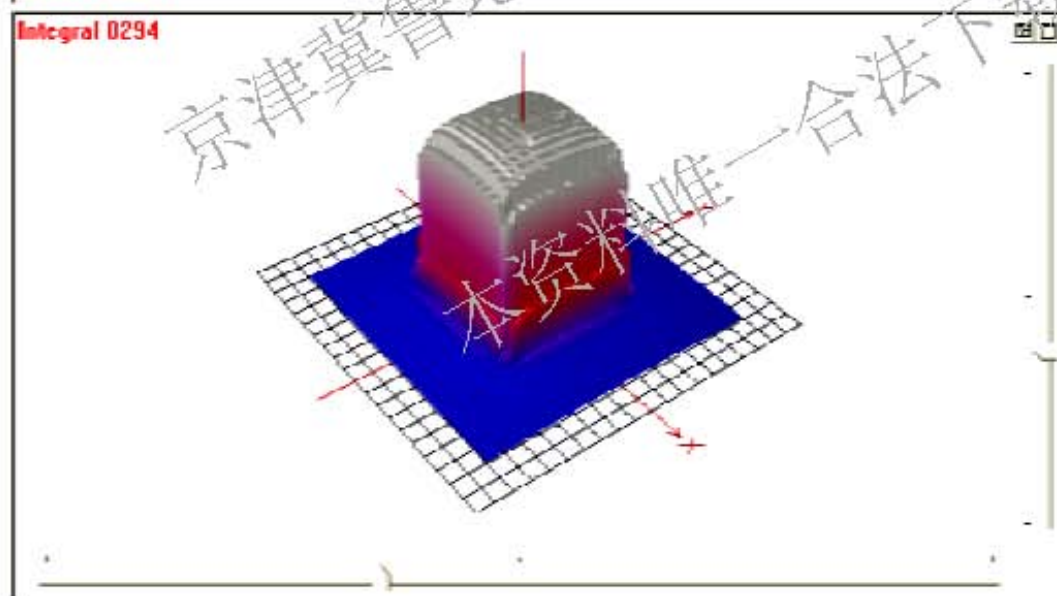
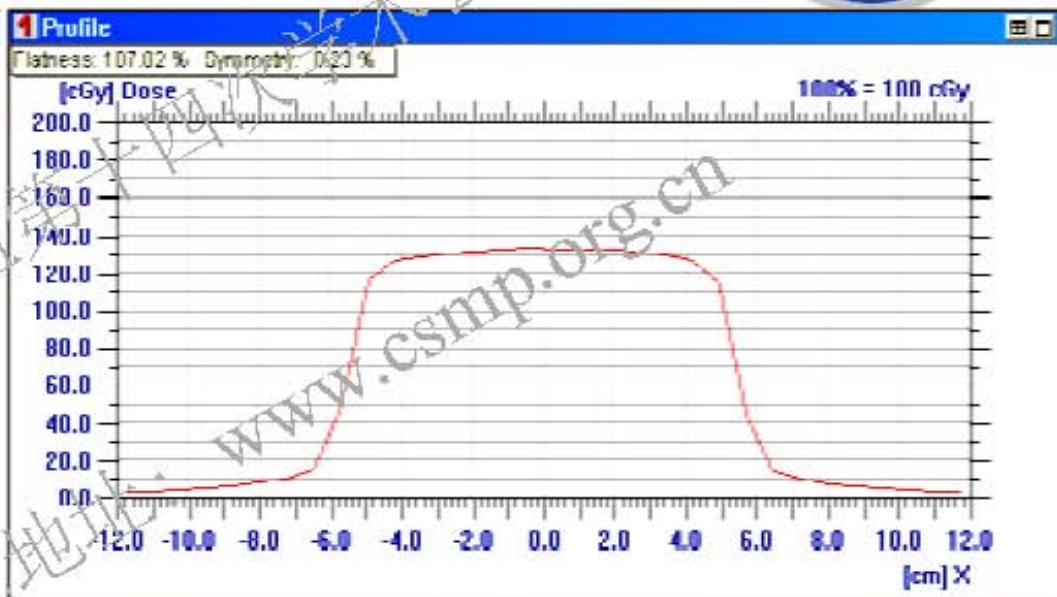
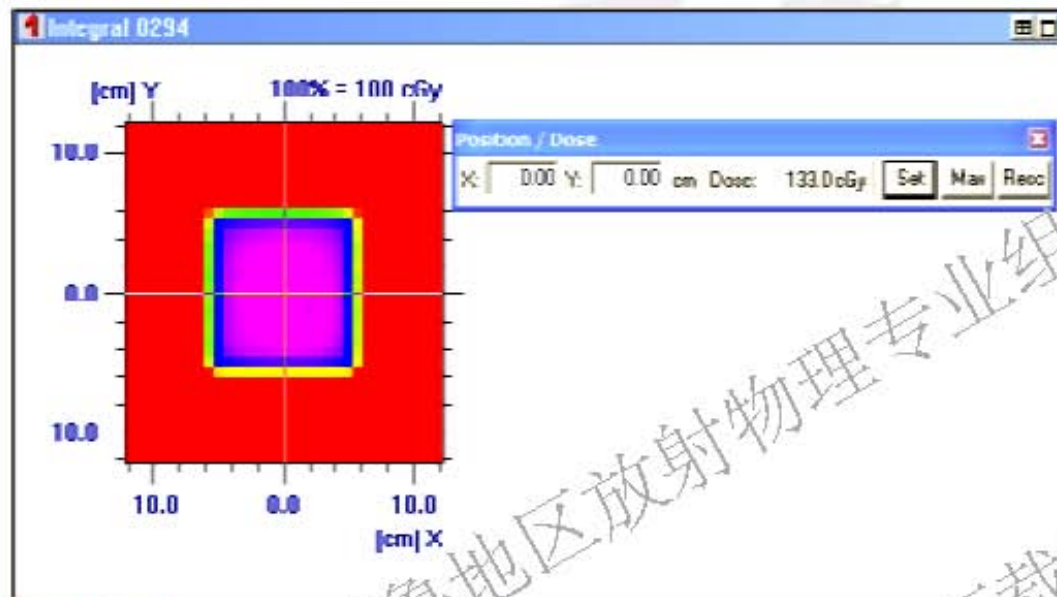
使用**tomo-phantom** or **IBA imrt-phantom**



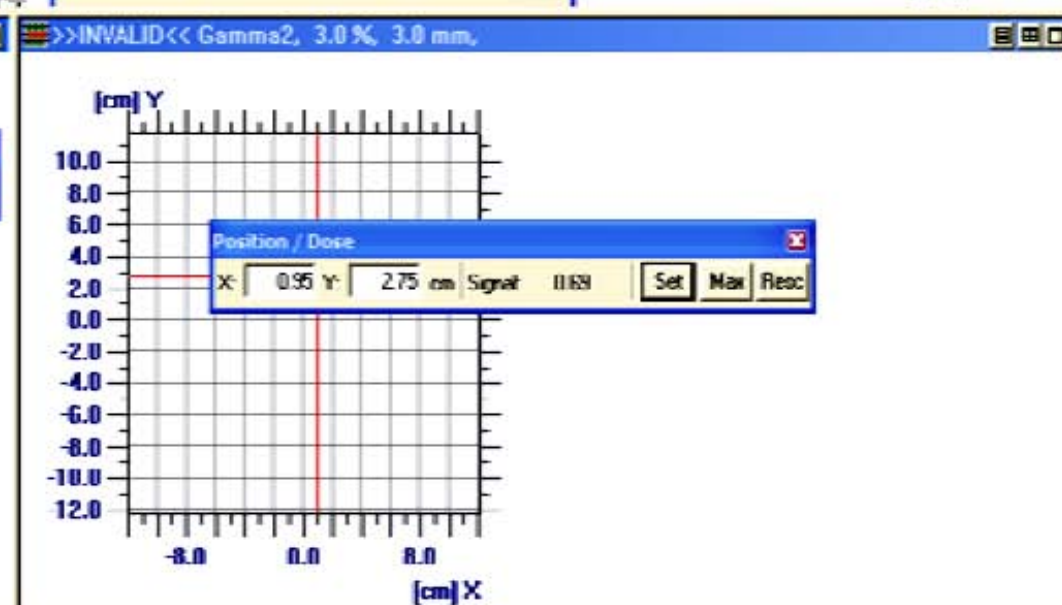
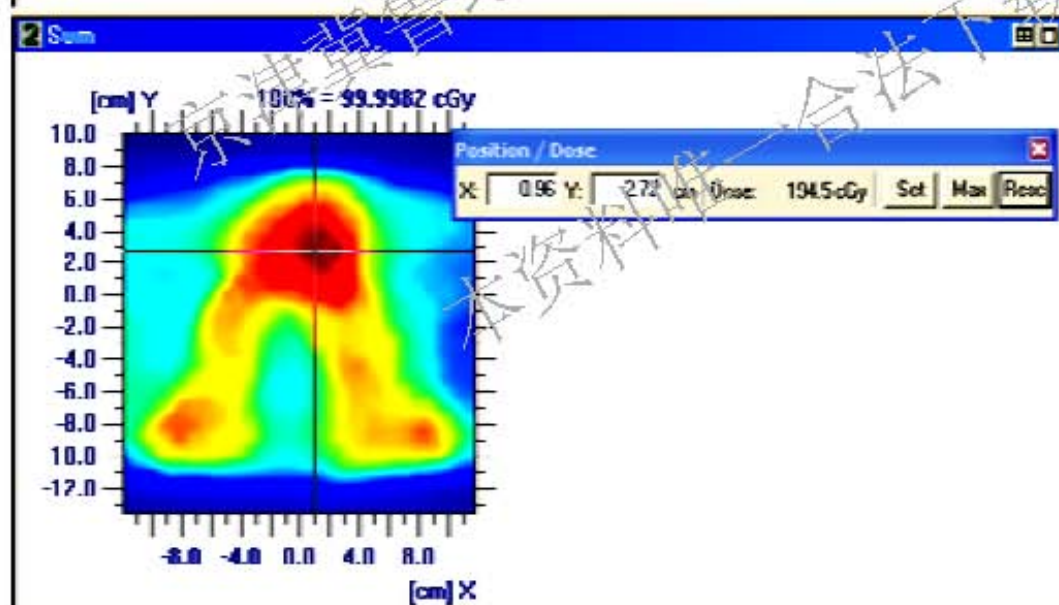
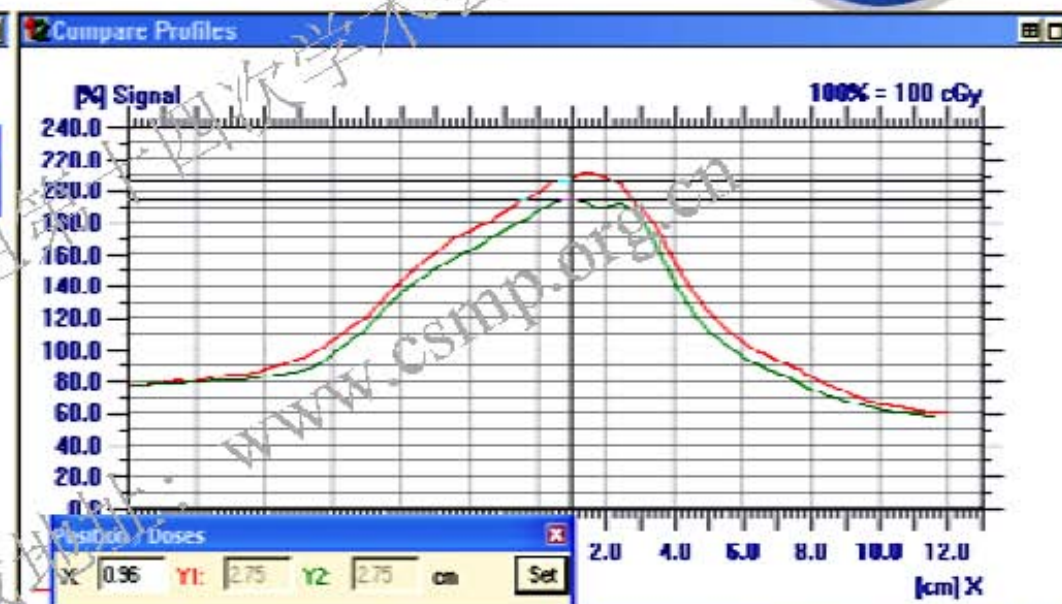
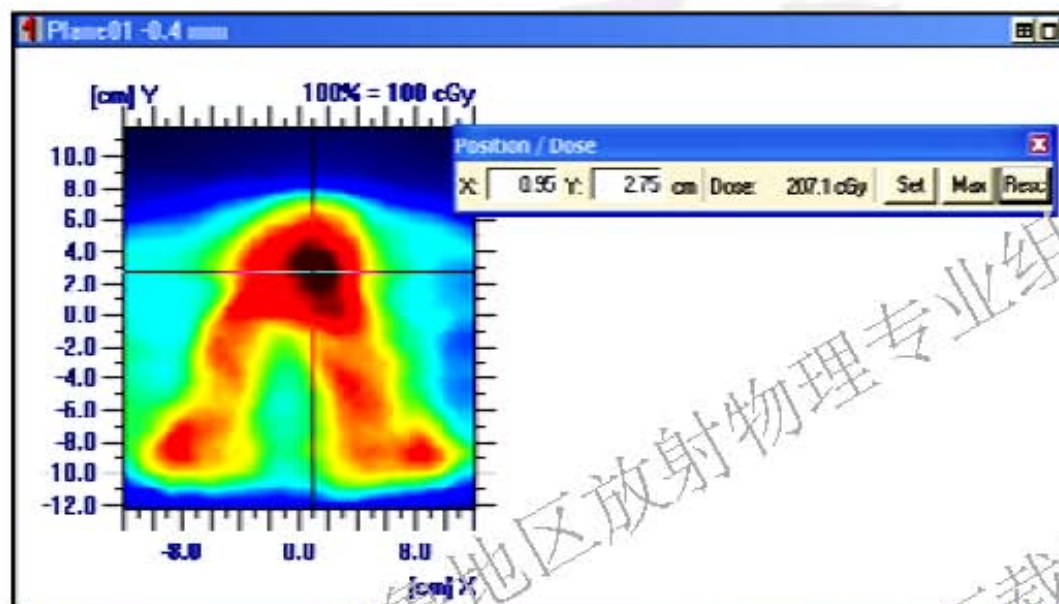
- **A: 采用SSD100, 10X10射野, 200MU, 机架0度刻度MatriXX.**

B: 采用28X28射野, SSD100,200MU,机架0度刻度MatriXX矩阵电离室.

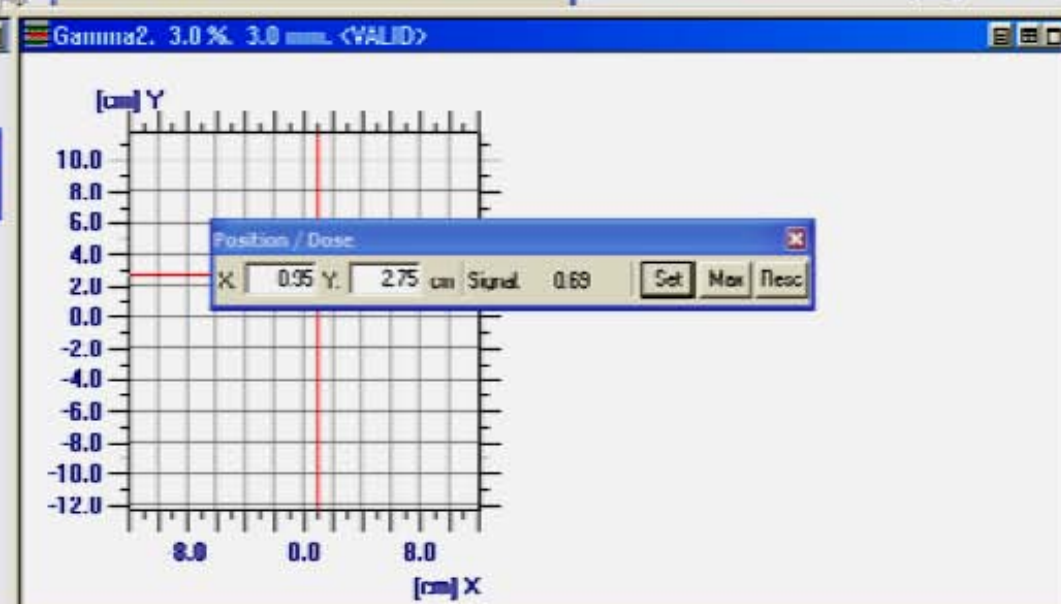
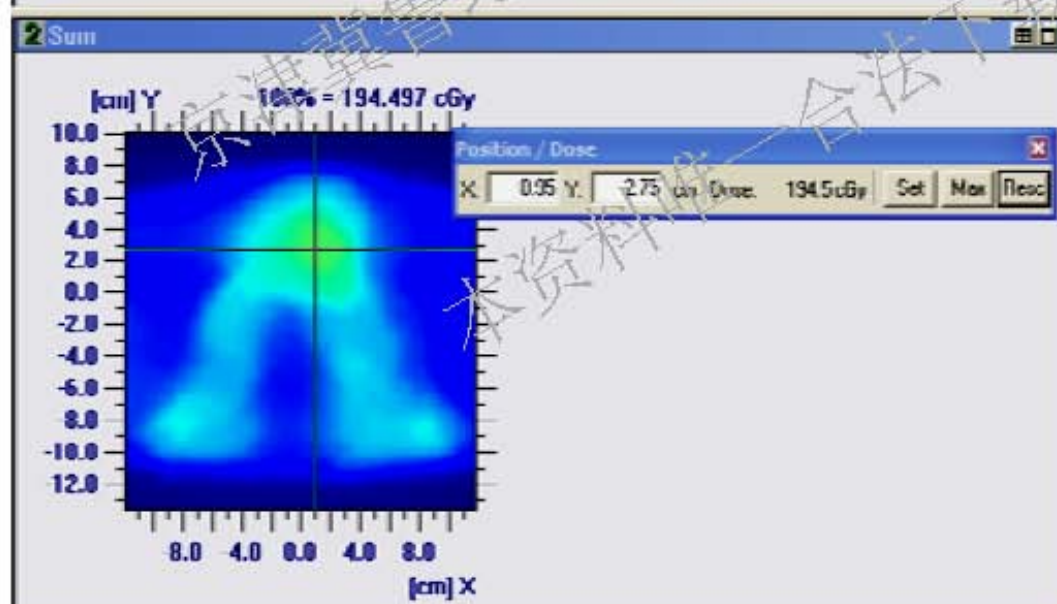
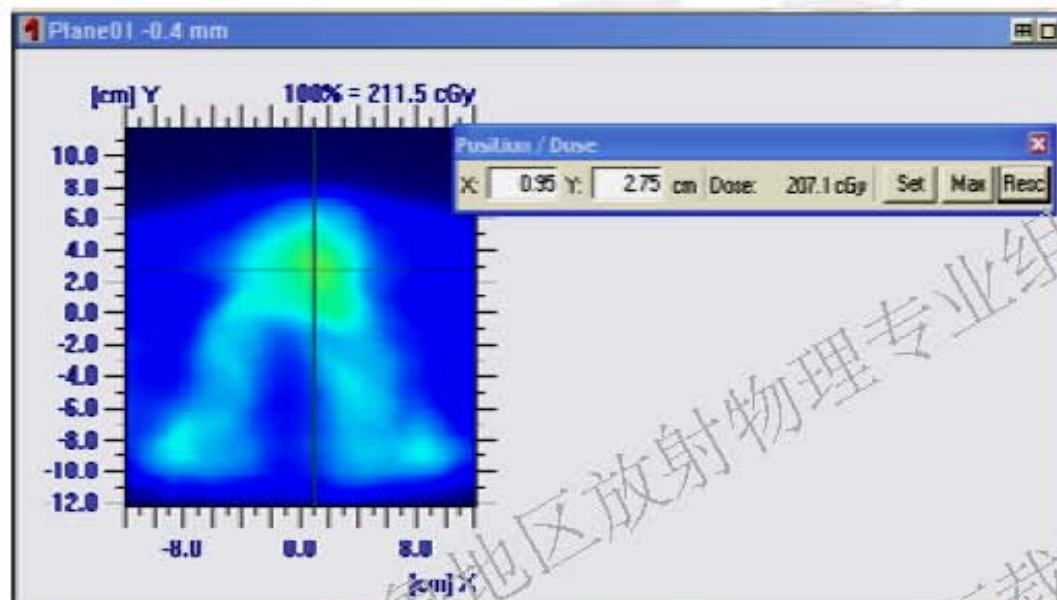
- A: 采用SSD100, 10X10射野, 200MU, 机架0度刻度MatrixX.



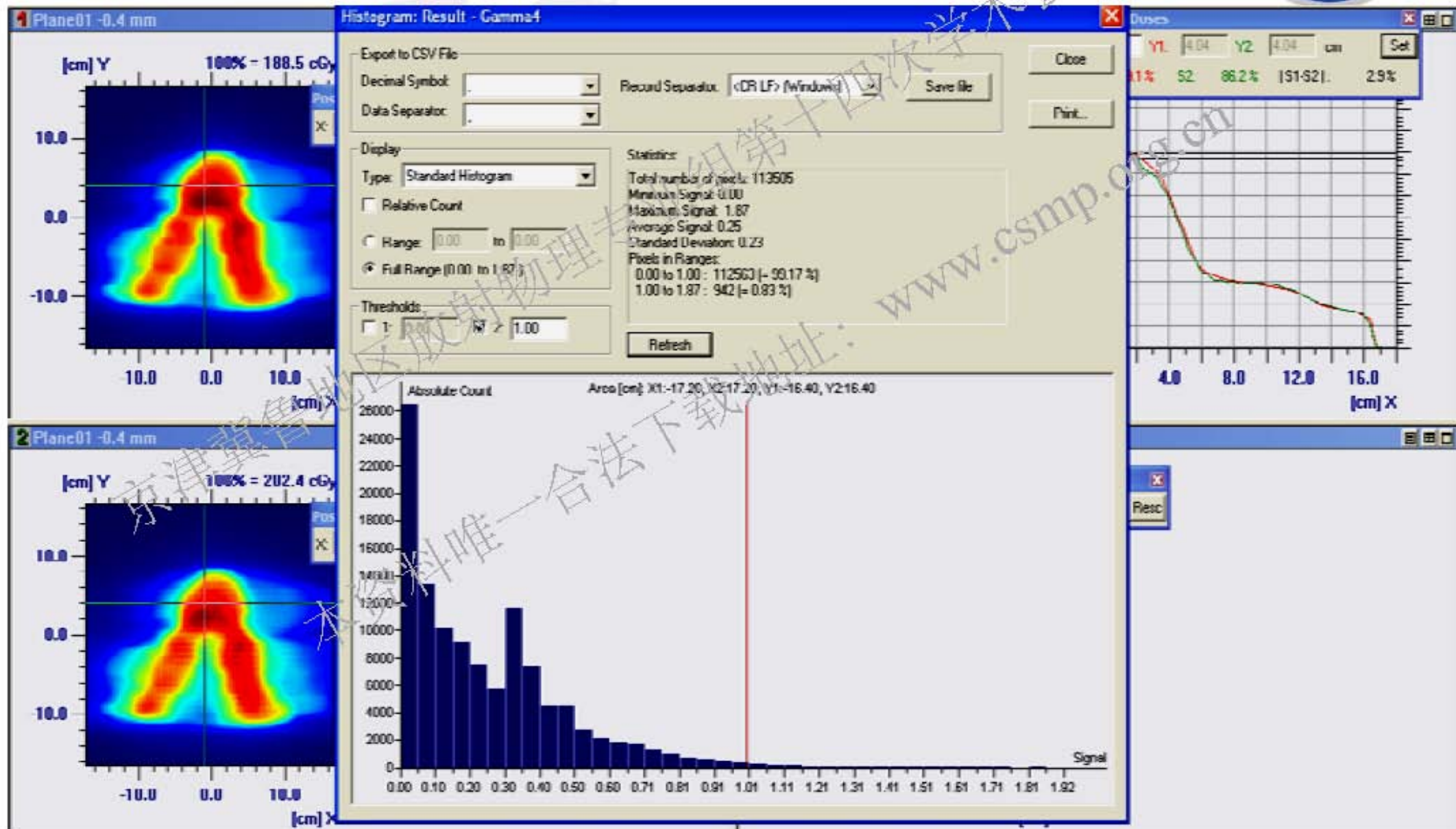
- NPC: 绝对量比较//Plan207.5 vs. Measure194.5;
 $\nabla=12.5$; 6.3%



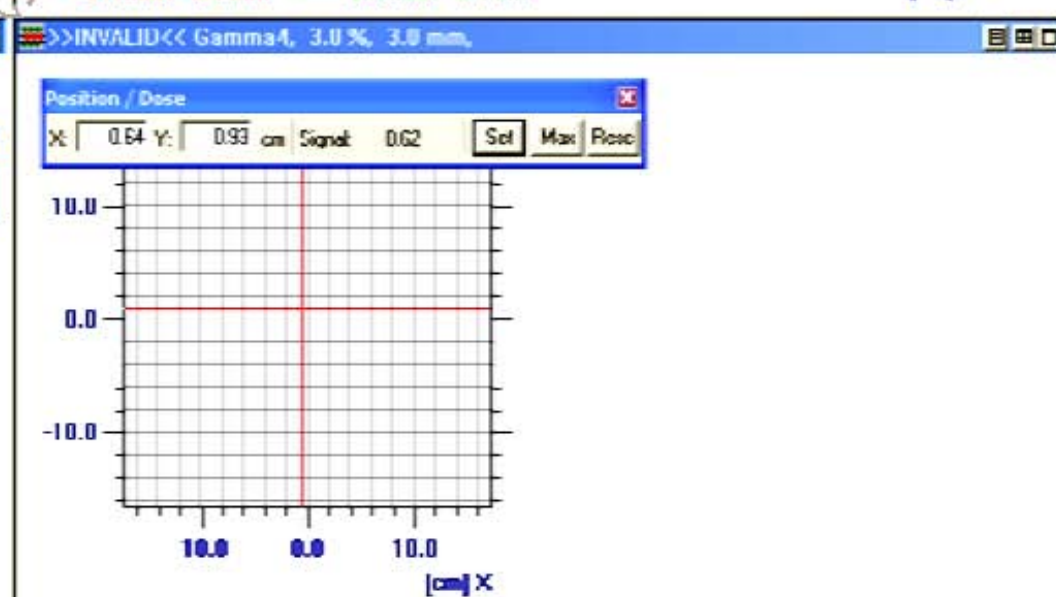
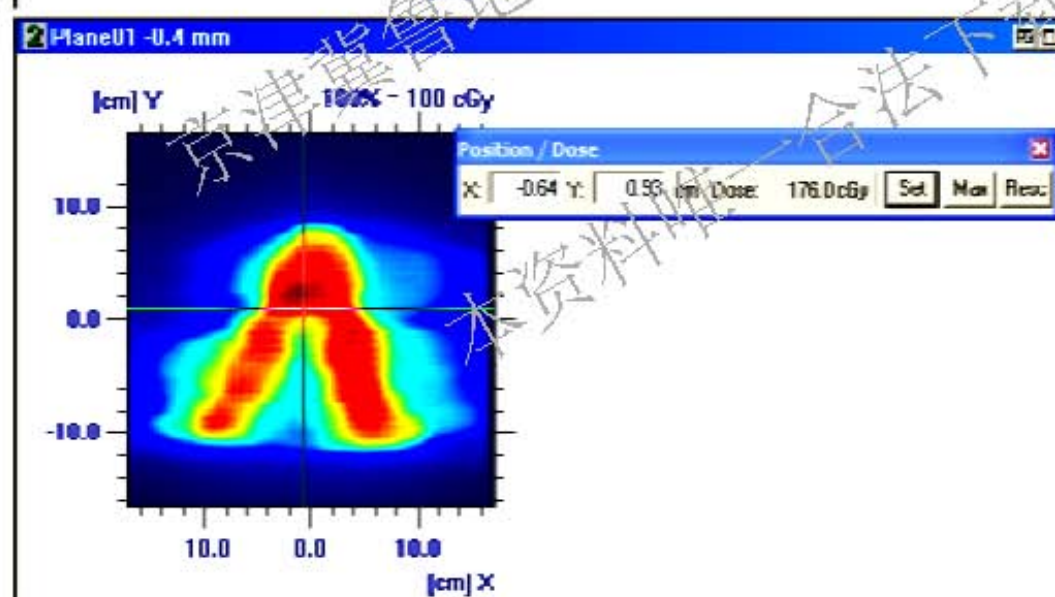
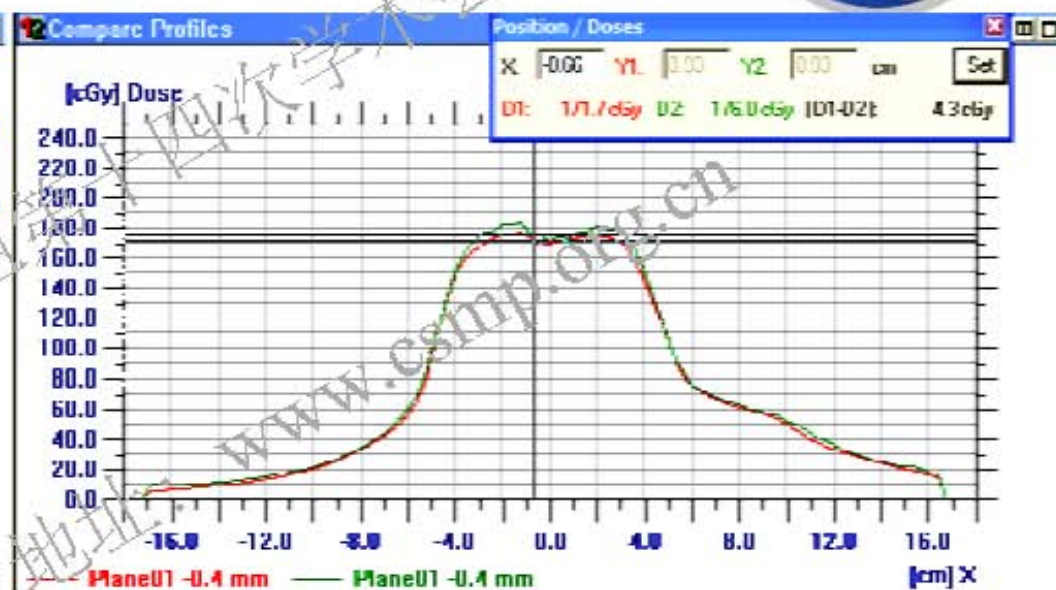
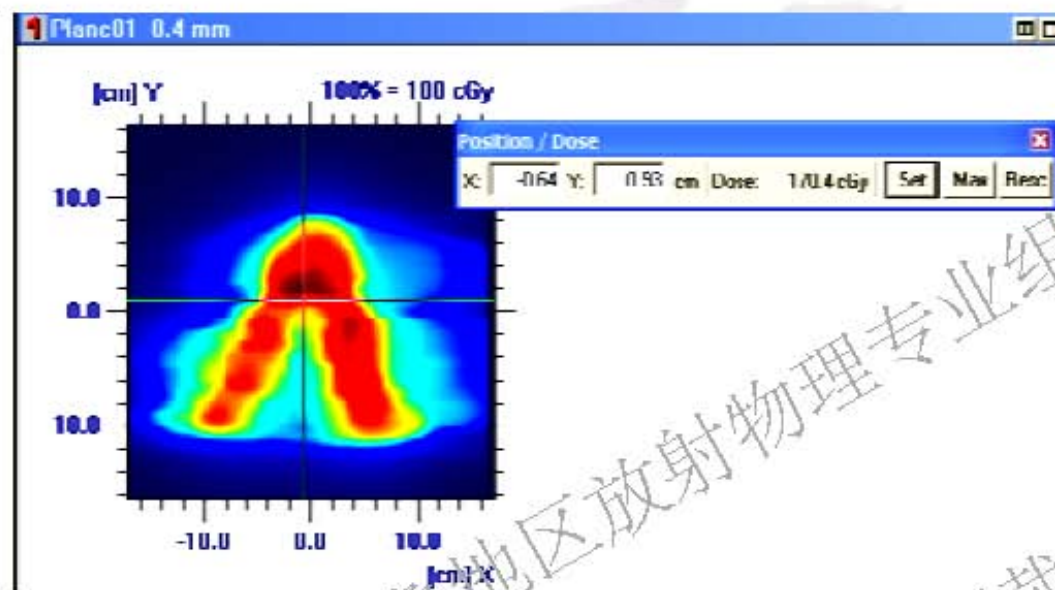
• NPC: 相对量比较



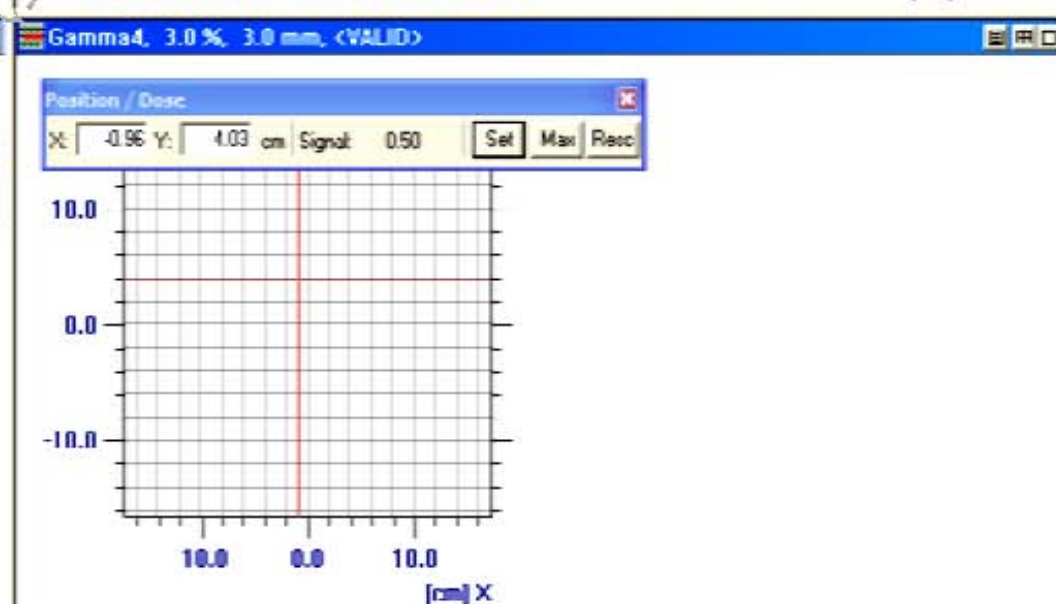
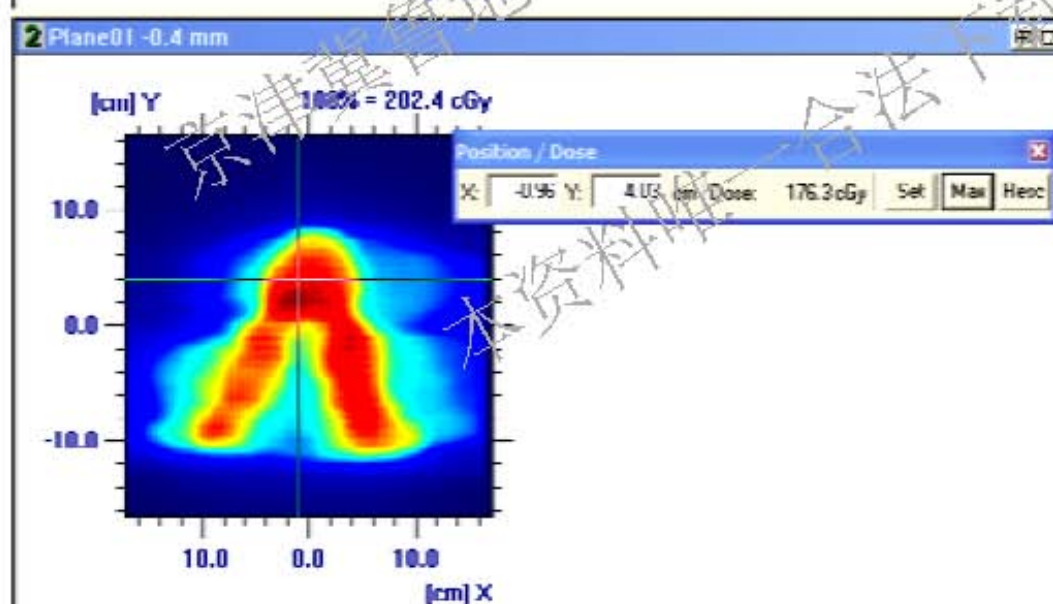
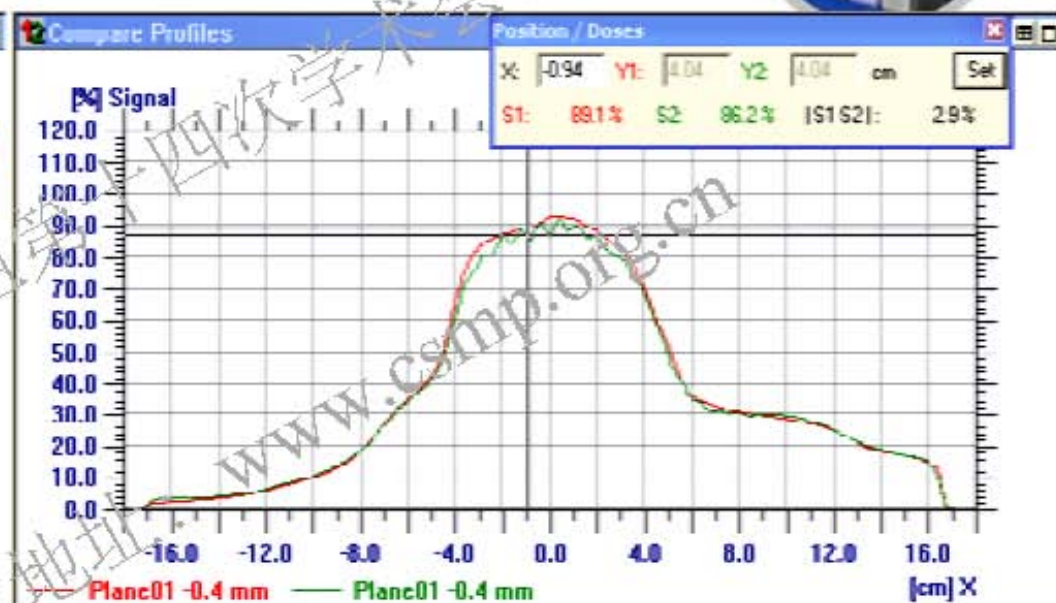
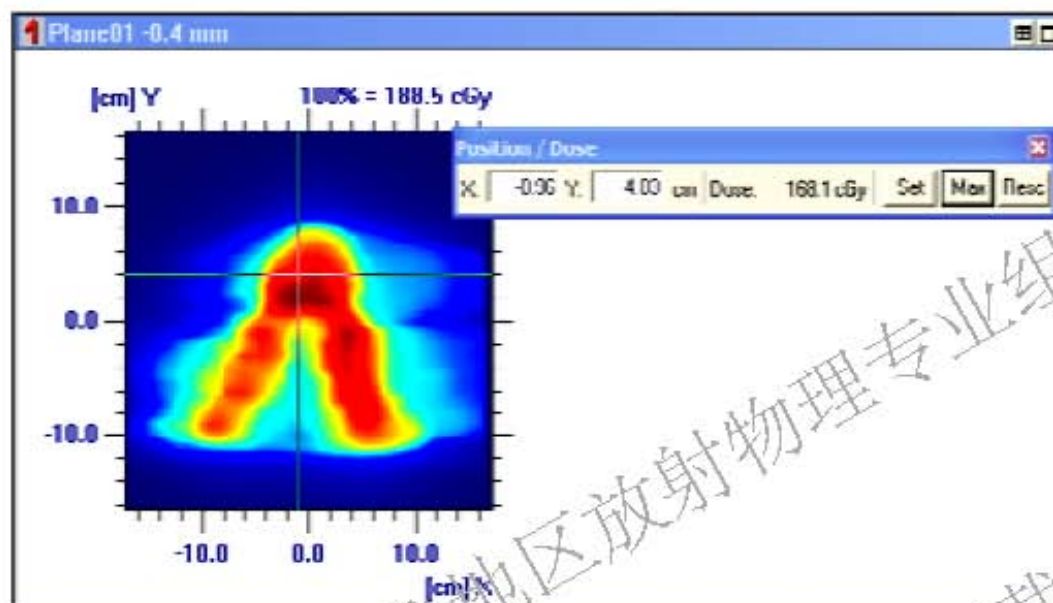
• NPC: 相对量比较γ的评价



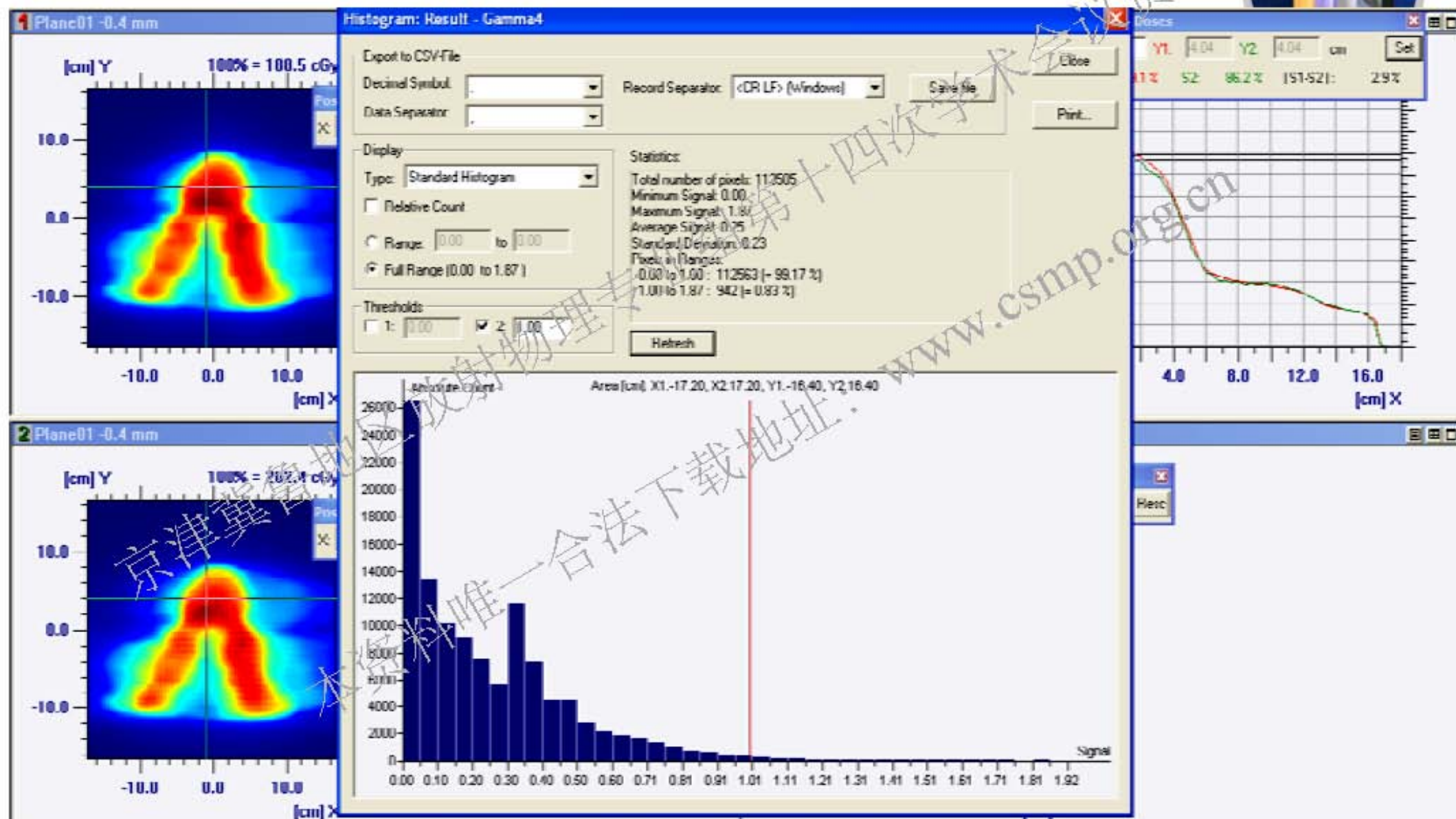
• NPC: MC算法与PB算法绝对量比较//PB170.4 vs. MC176 $\nabla=4.3$



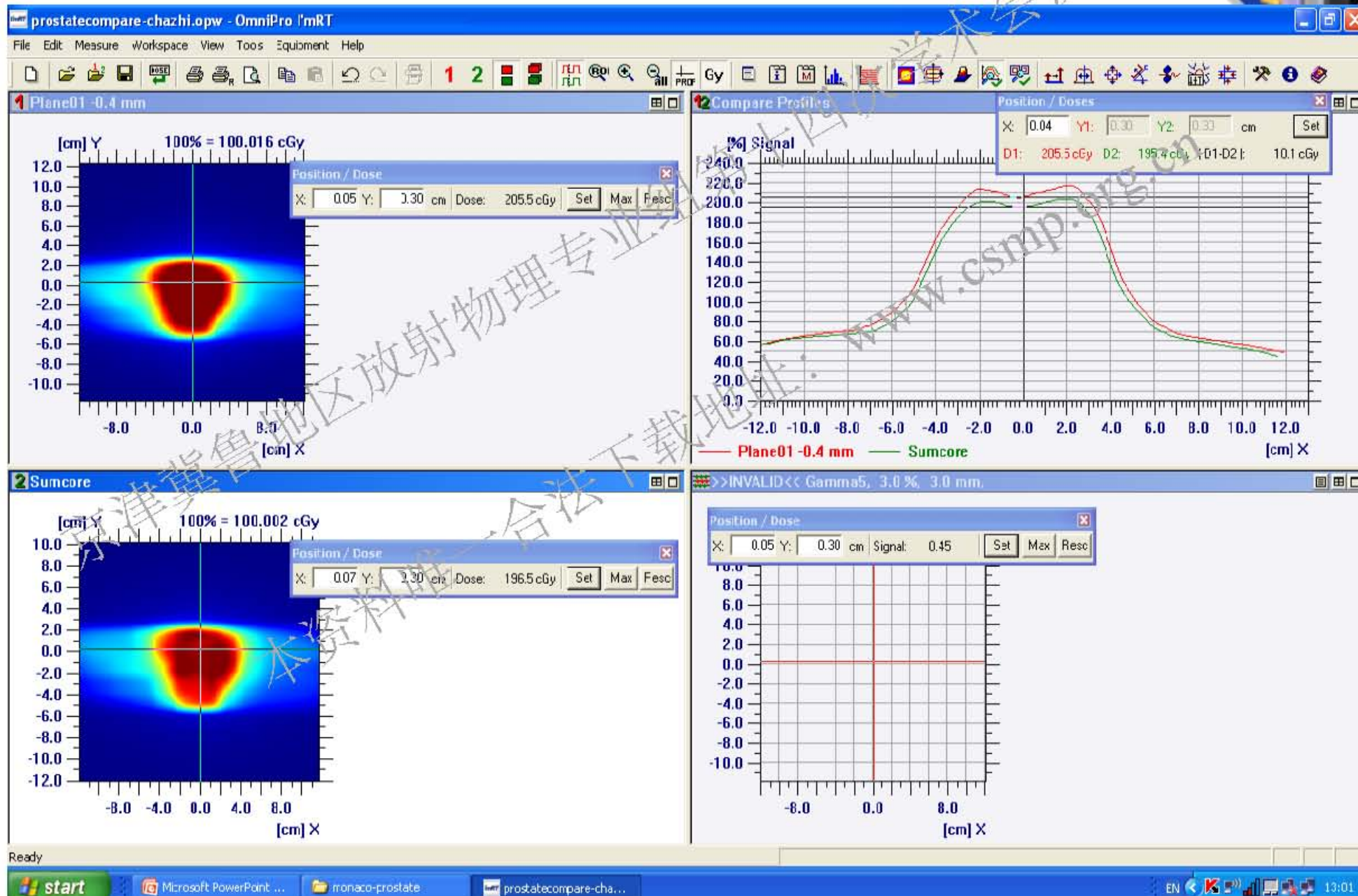
• NPC: MC算法与PB算法相对量比较



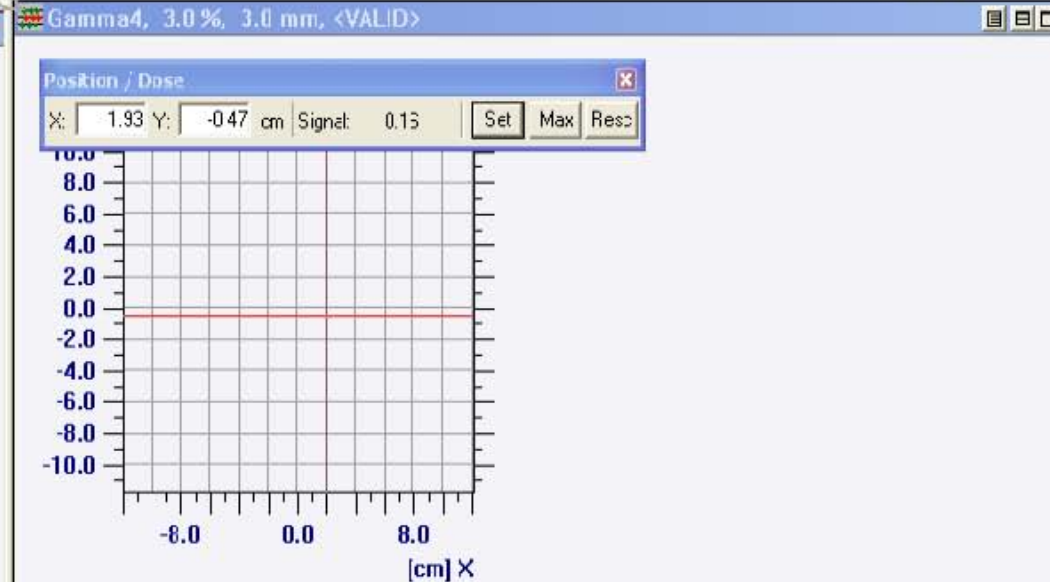
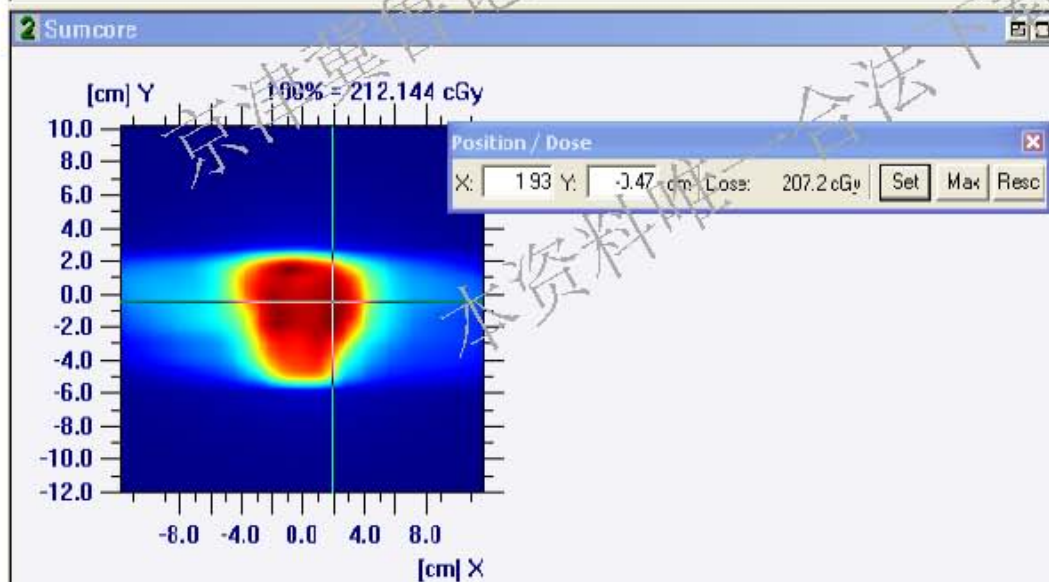
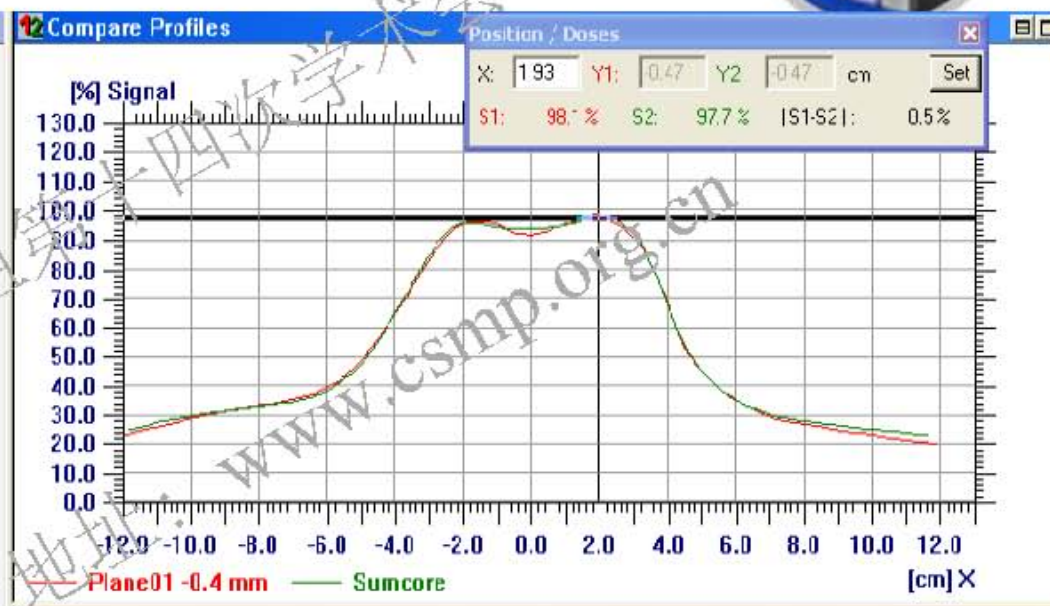
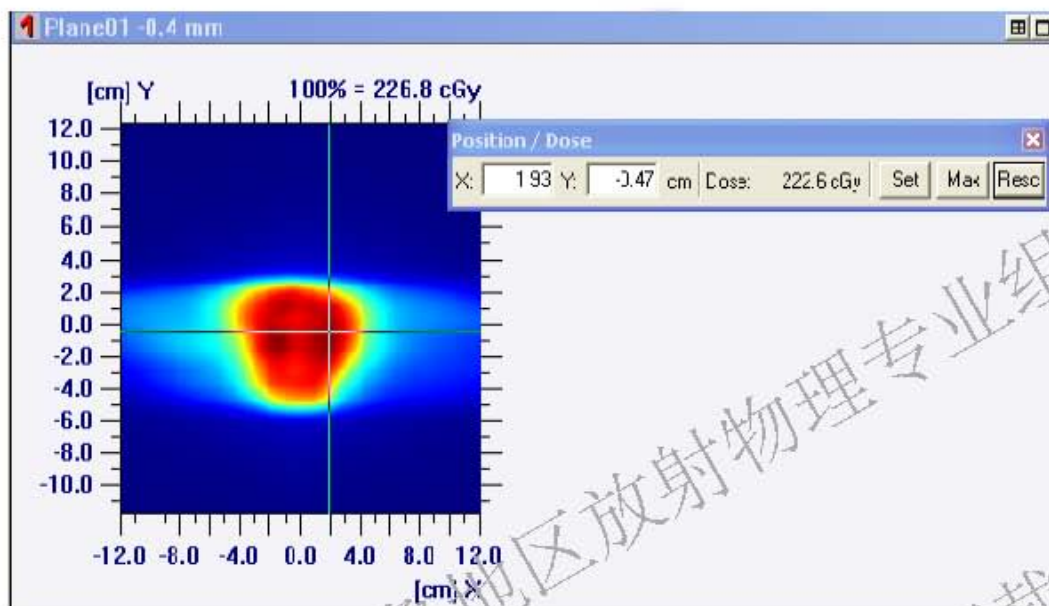
• NPC: MC算法与PB算法相对量比较γ分析



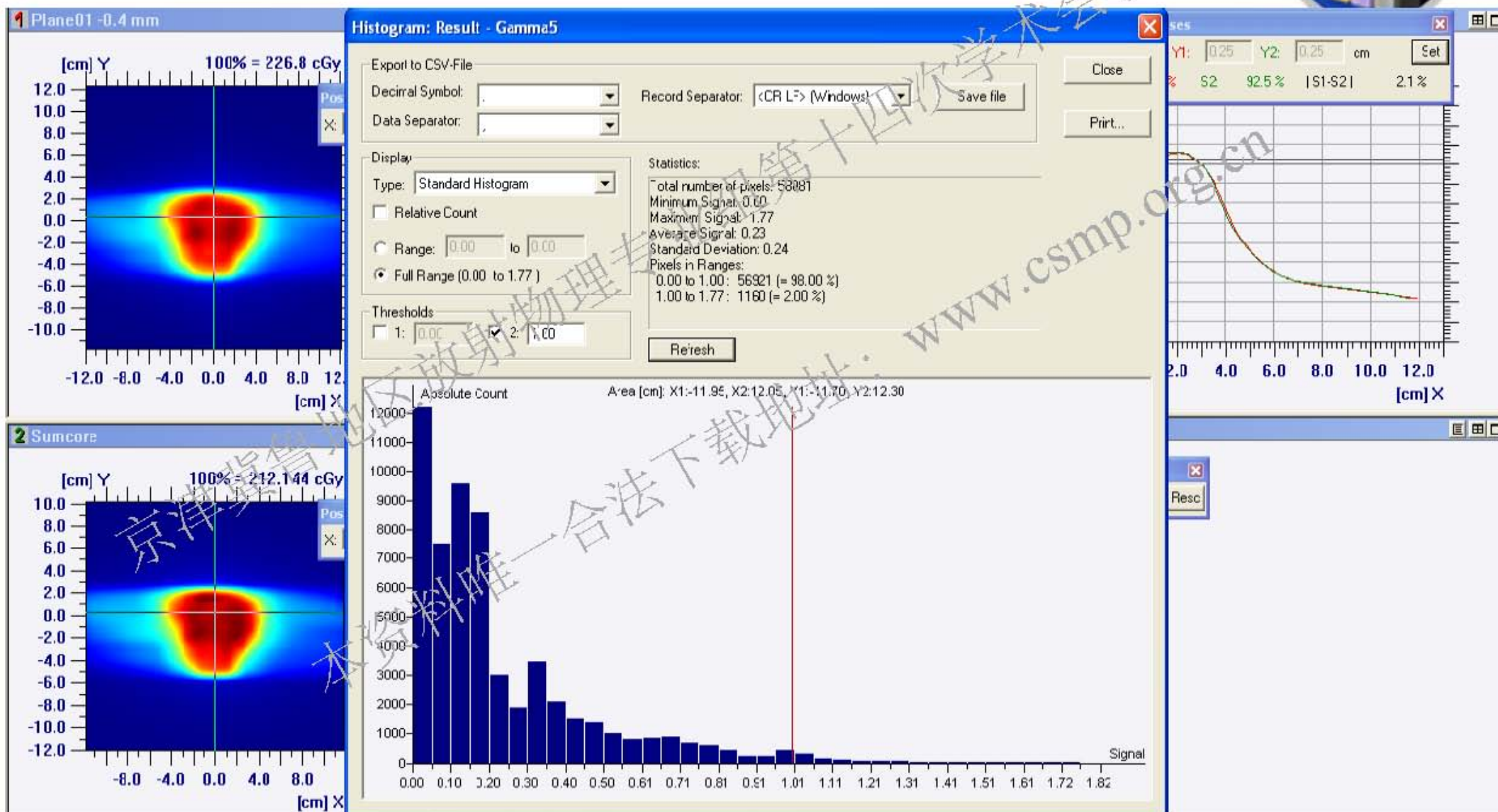
- Prostate: 绝对量比较//Plan205.85vs. Measure196.1;
 $\Delta=10.1$; 4.9%



• Prostate: 相对量比较



• Prostate: 相对量比较 //2mm, 2 γ分析





结果分析:

(1) 我们以**step and shot**方式的**IMRT**为参照, 不论从相对简单的前列腺癌还是到相对复杂的鼻咽癌看, 靶区的剂量学结果基本上相同, 周边正常组织的剂量有所改善, 但这种改善与计划完成人的经验有关。



结果分析:

(2) 计划的子野及序列优化结果完全依赖于治疗计划软件自身,而人不可干预.其结果就是表现在加速器执行的计划的流畅性和效率性.如果计划优化软件本身不佳,则加速器执行的计划的流畅性和效率性并不比我们的静态调强(IMRT)优越多少.



- 结果分析:
- (3). 相同的病例，不同的计划系统，计划优化的需要的时间，既优化计算的速度差异很大，至少在目前表现如此。

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结果分析:

(4) 数据结果:相对剂量分布符合非常好,不论是**MC**还是**PB**,说明容积调强治疗的执行结果在剂量分布上和预期是一致的.



结果分析:

(5) 数据结果:决对剂量分布符合好,不论是
MC还是**PB**,不论卷积、叠代卷积,说明容积
调强 治疗的执行结果用现有的设备测量和
预期出现偏差.

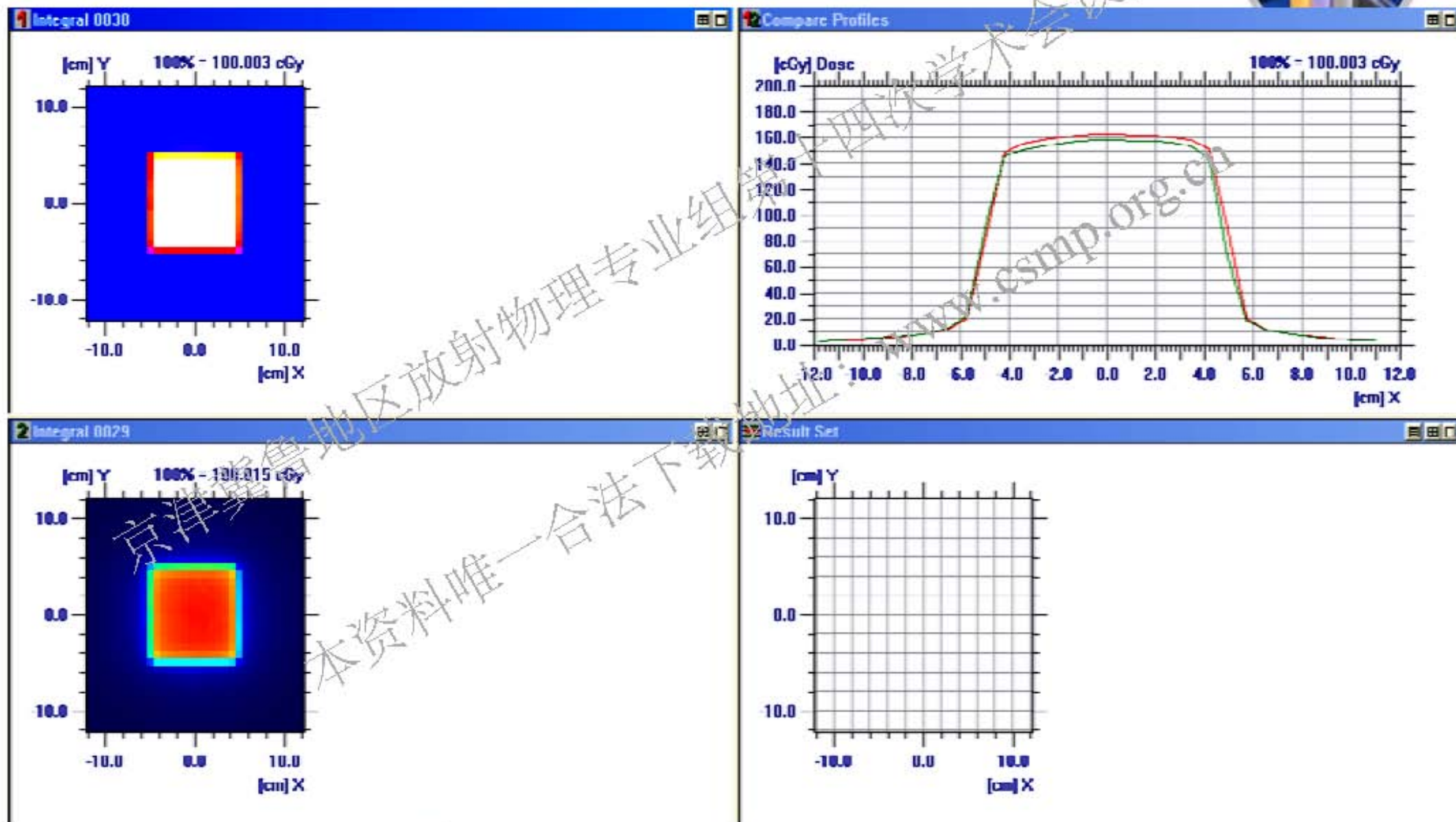
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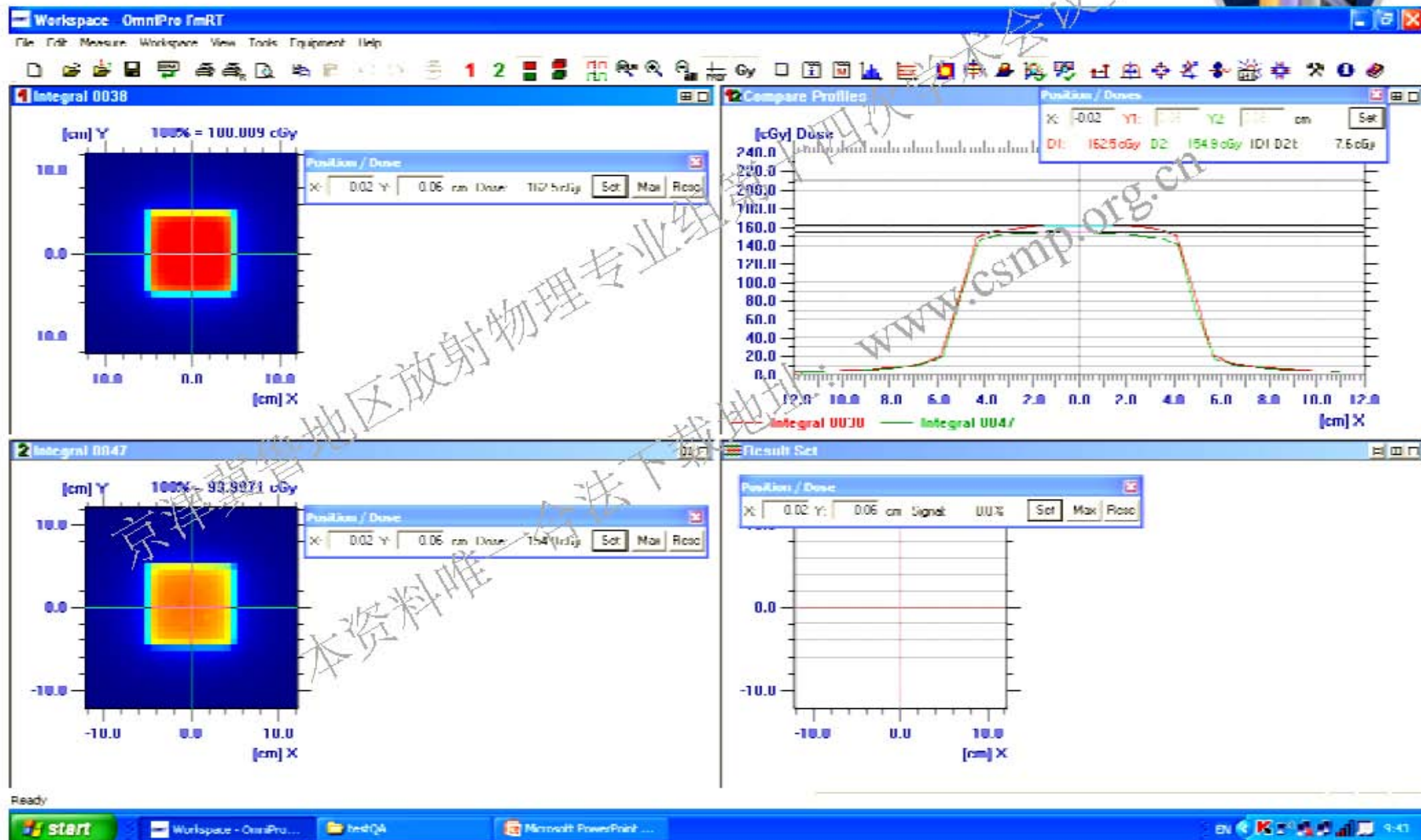
- 结果分析:

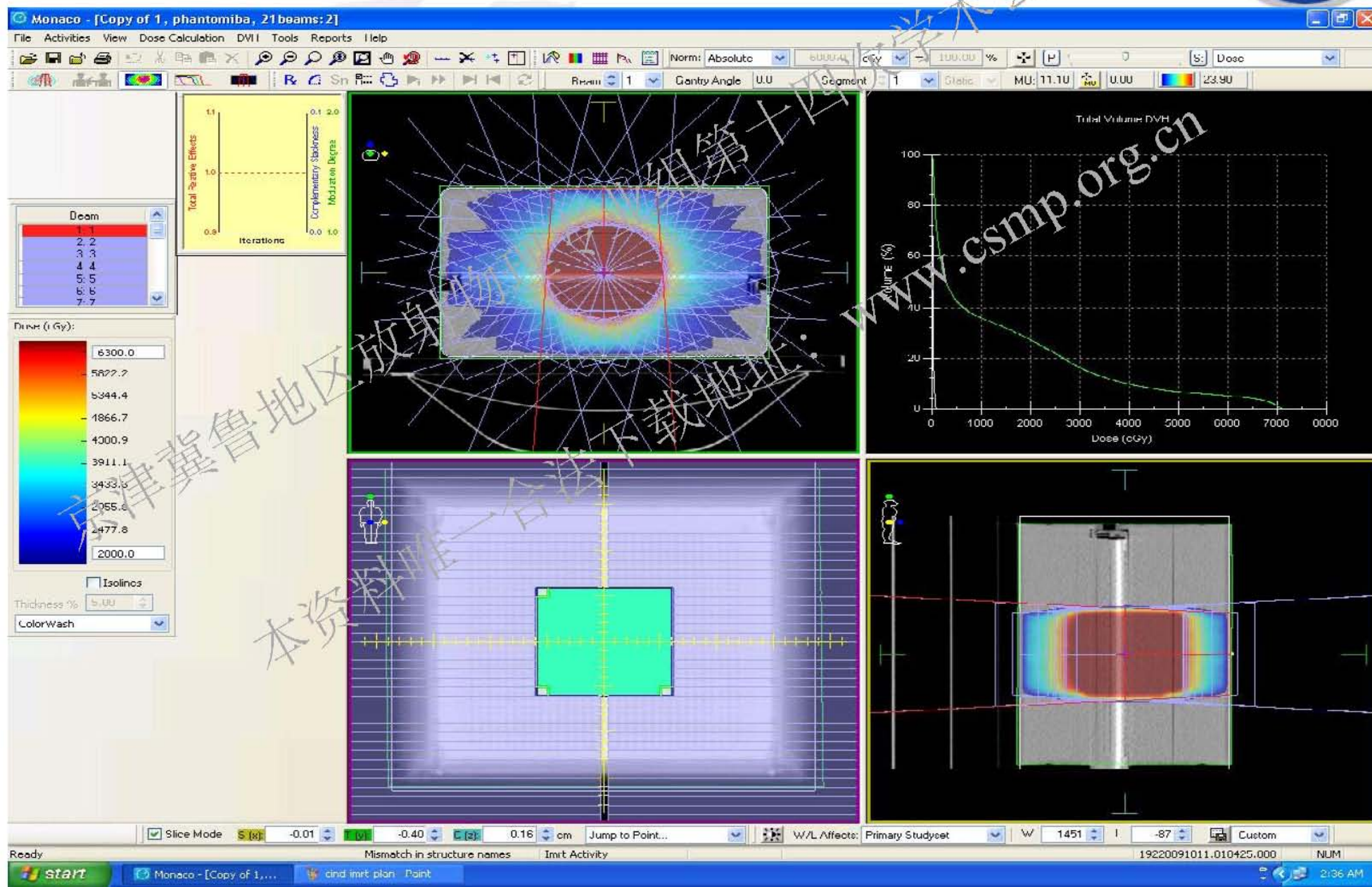
绝对剂量差异可能来源:**MatrixX**电离室的角度
照射修正因子,治疗床衰减,计划本身计算缺陷,
加速器自身物理参数及控制参数到位精度偏差。

- 结果分析:
- 床垂直厚度影响: 162.5 vs. 157.8; $\nabla=4.7$; 2.9%

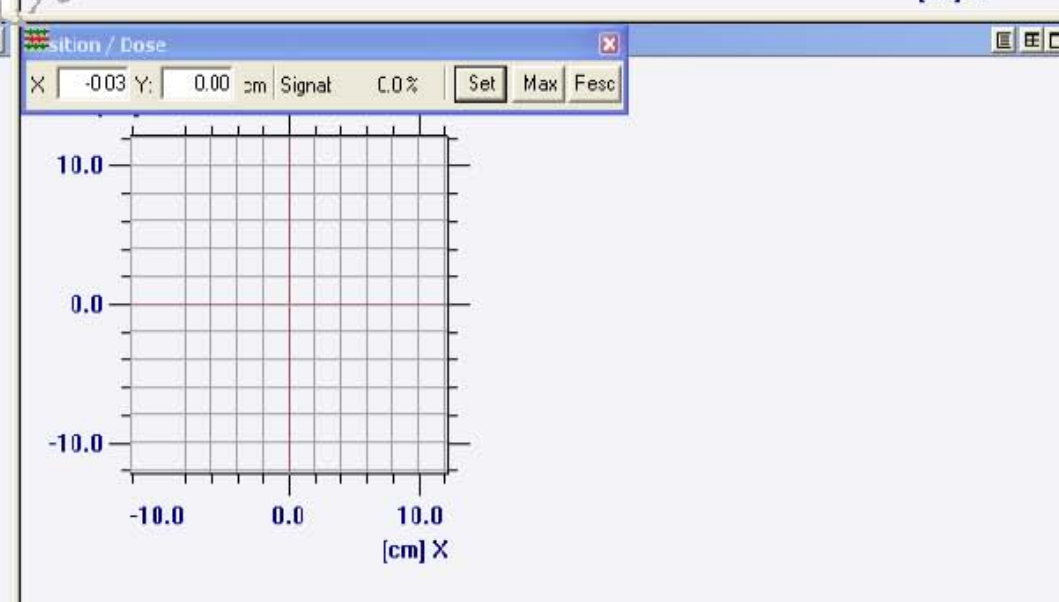
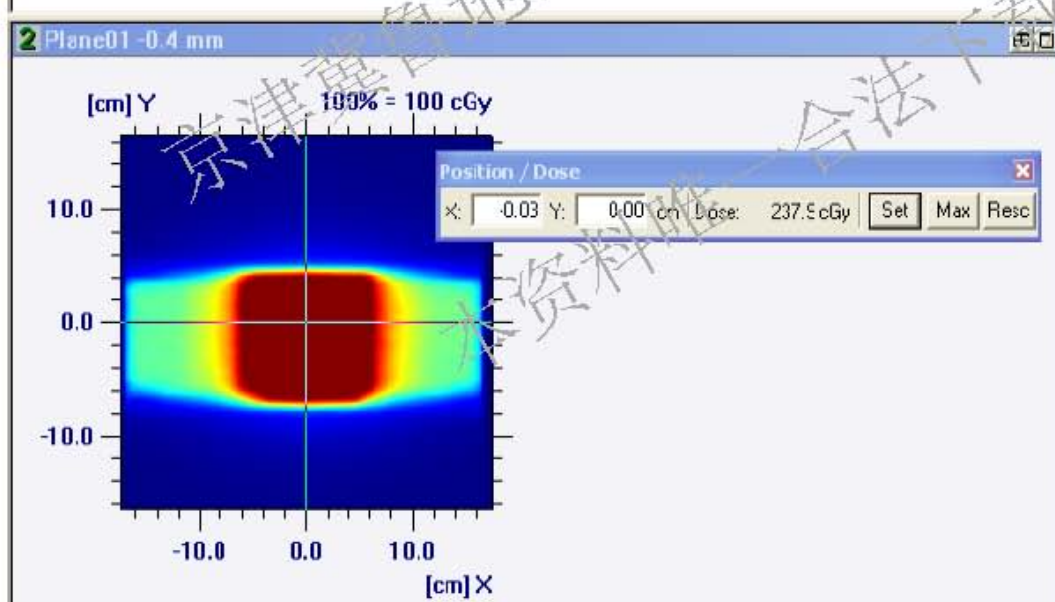
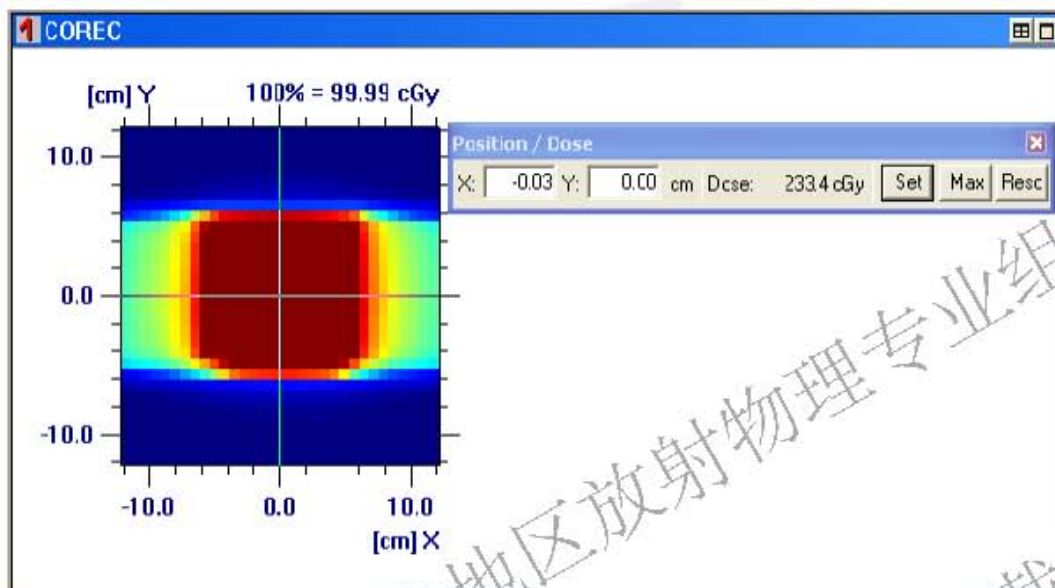


- 结果分析:
- **MatruXX**电离室方向照射因素影响: 162.5 vs. 154.9; $\nabla = 8.3$; 5.1%





结果分析:24个野等角10x10照射:233 vs. 237.9; $\nabla = 4.4$;1.8%



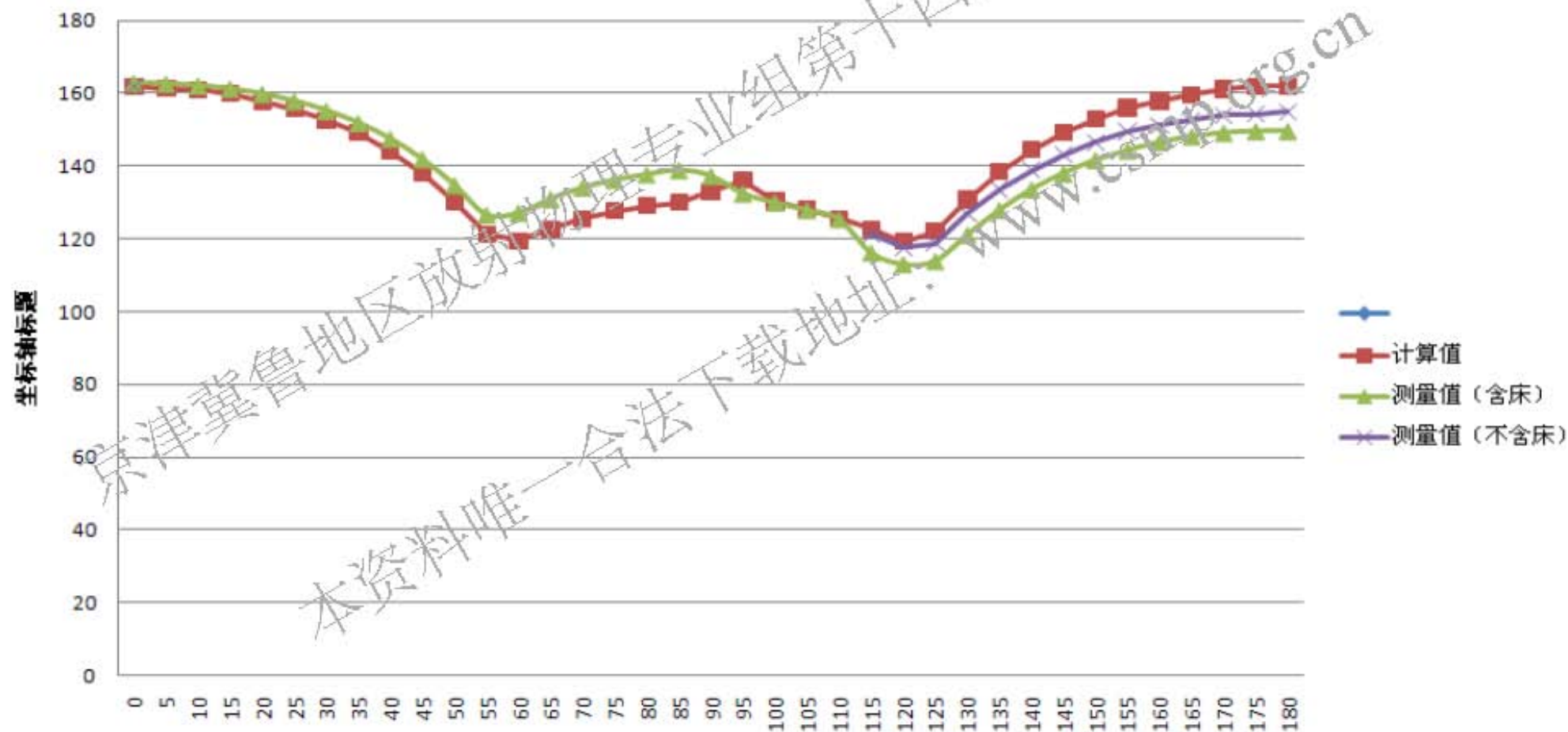


Matrixx电离室角度修正因子



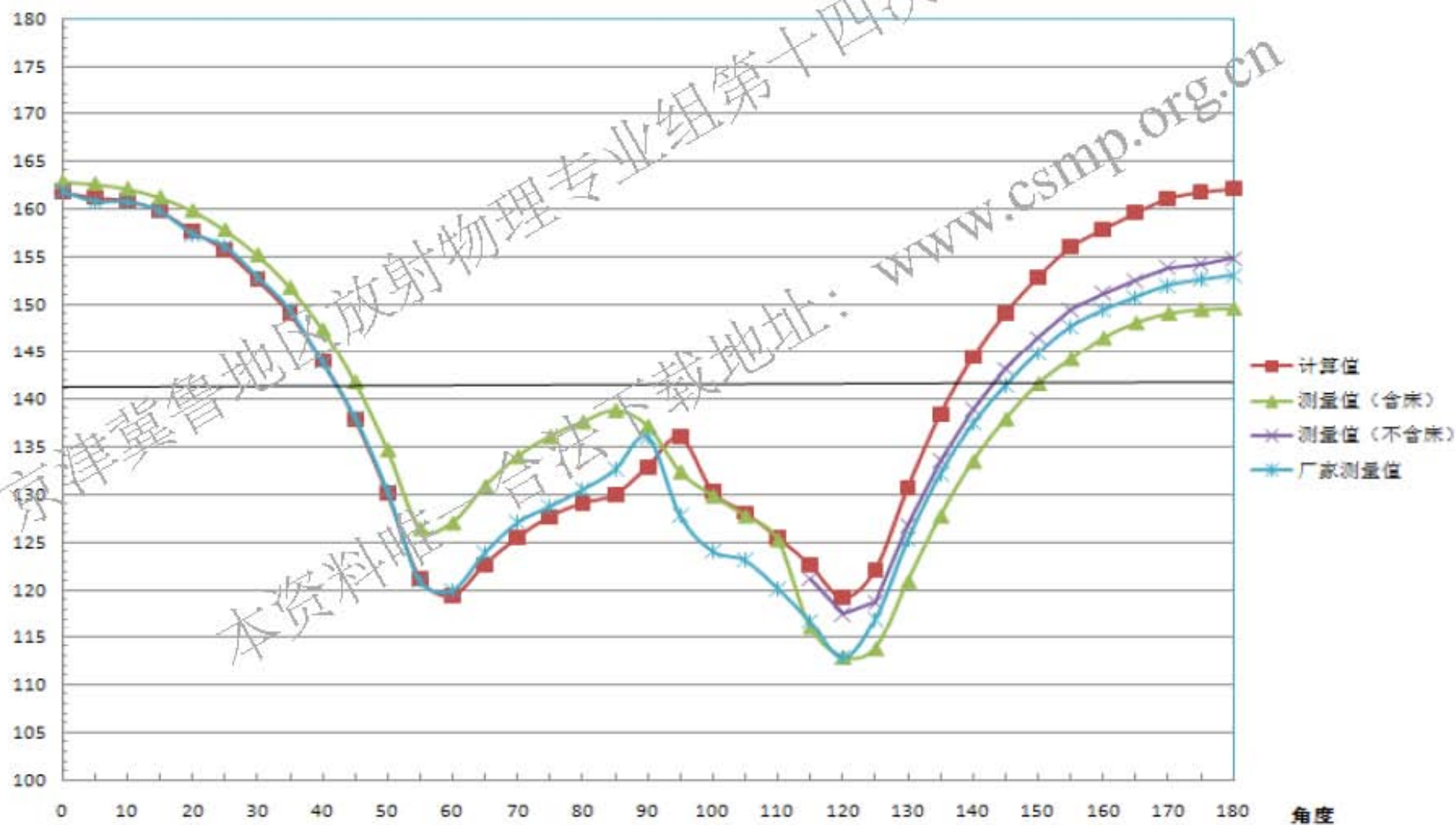


Matrixx电离室角度修正因子





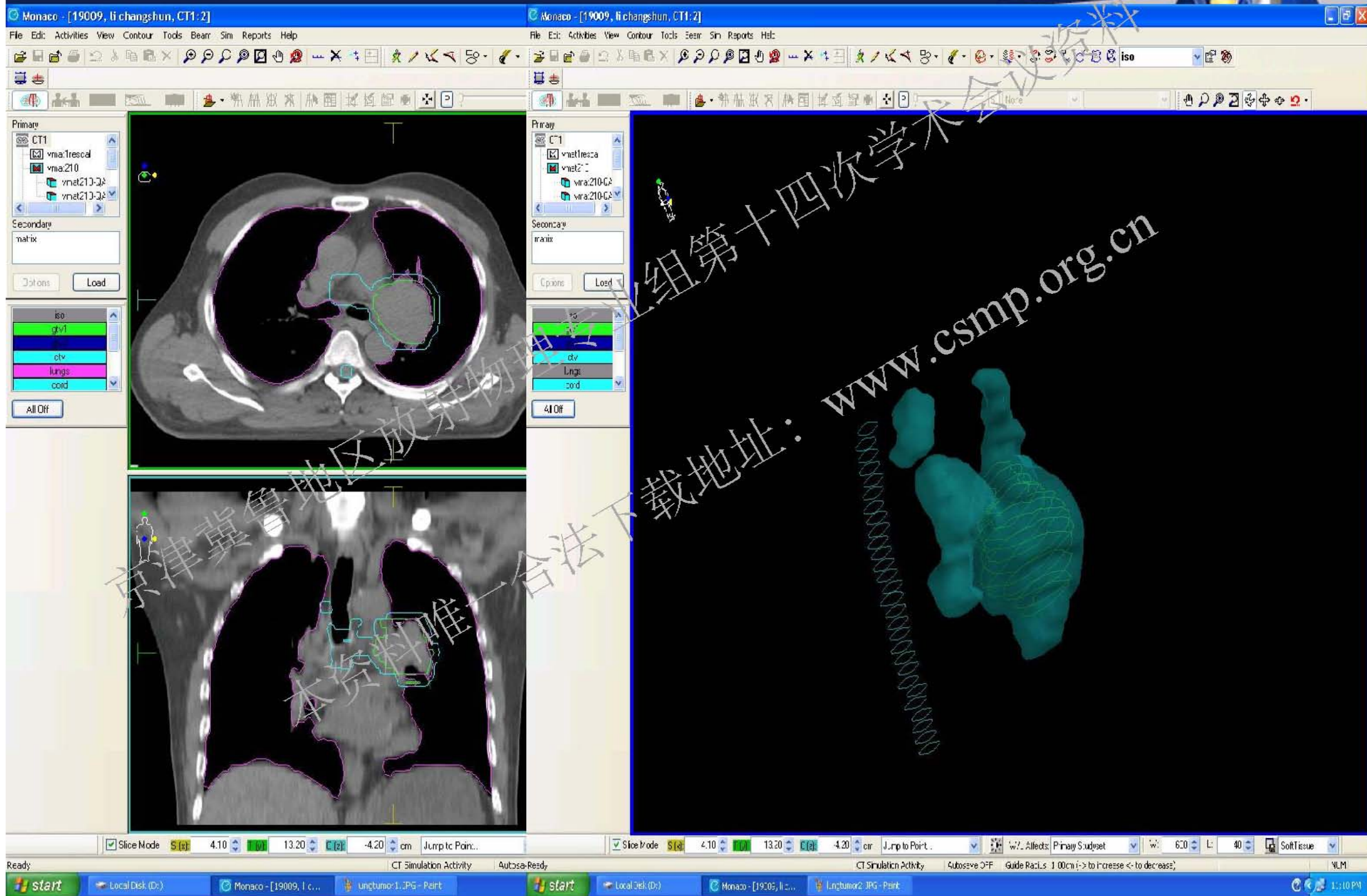
Matrixx电离室角度修正因子



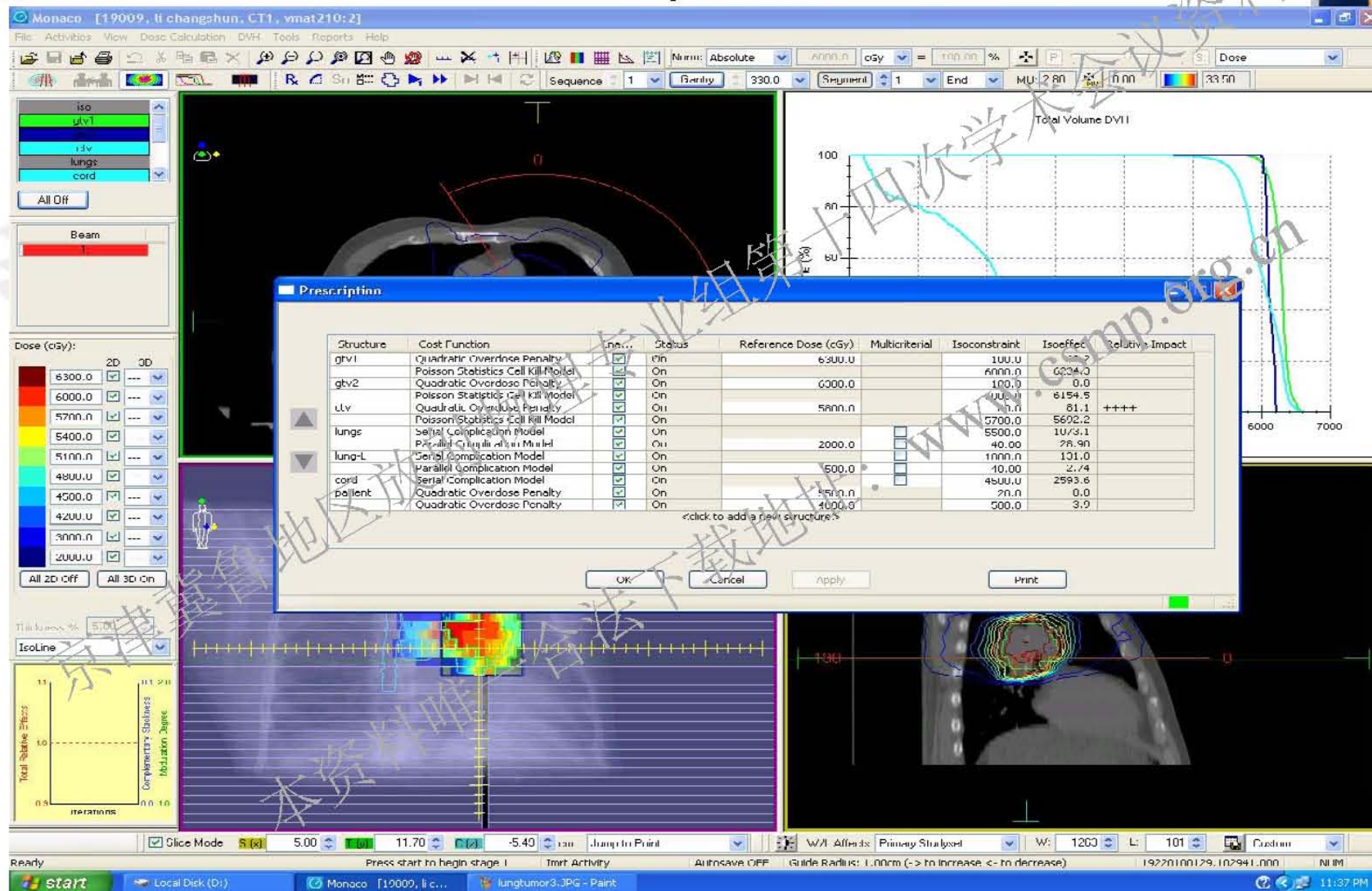
VMAT临床治疗报告

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白彦灵

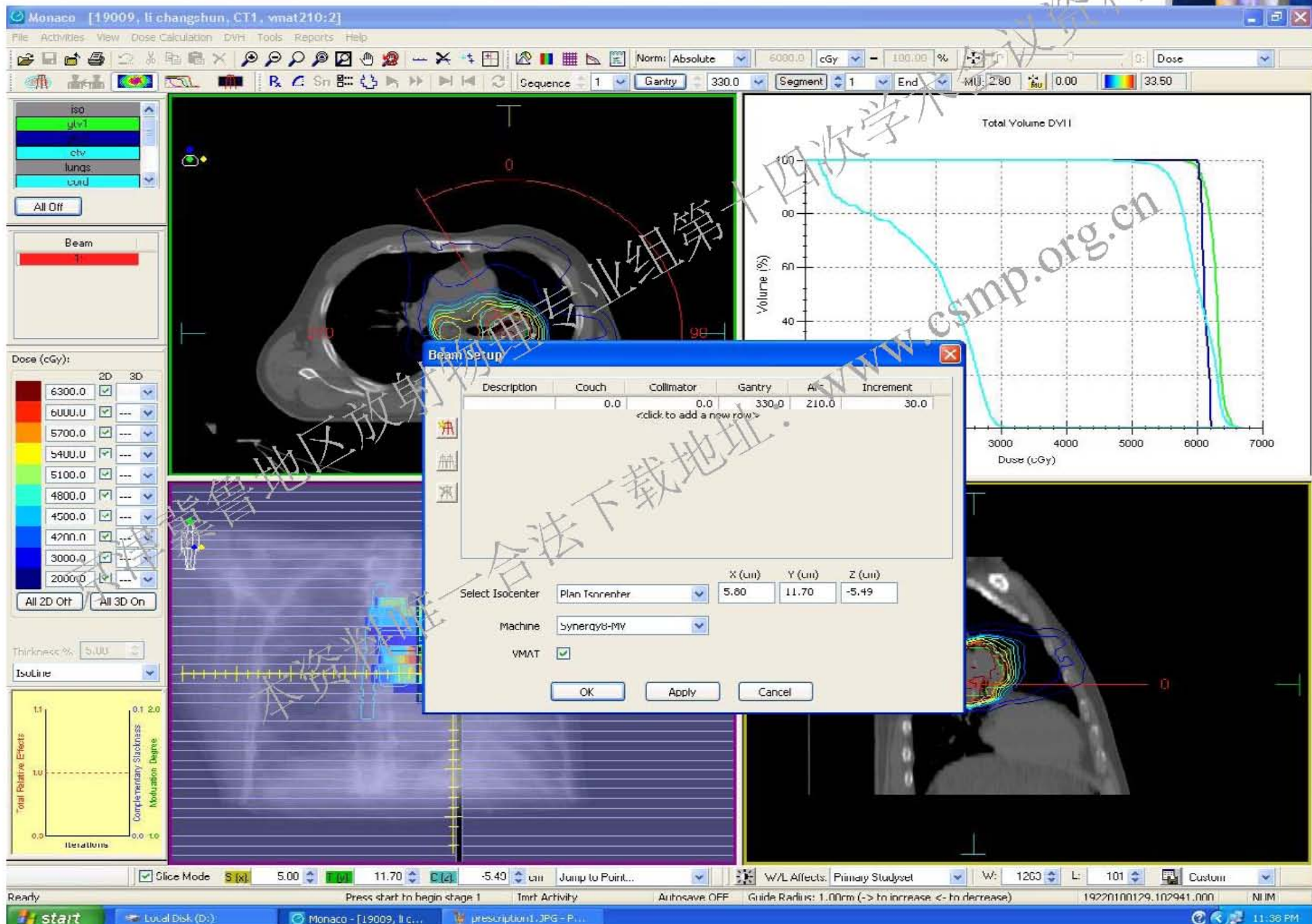




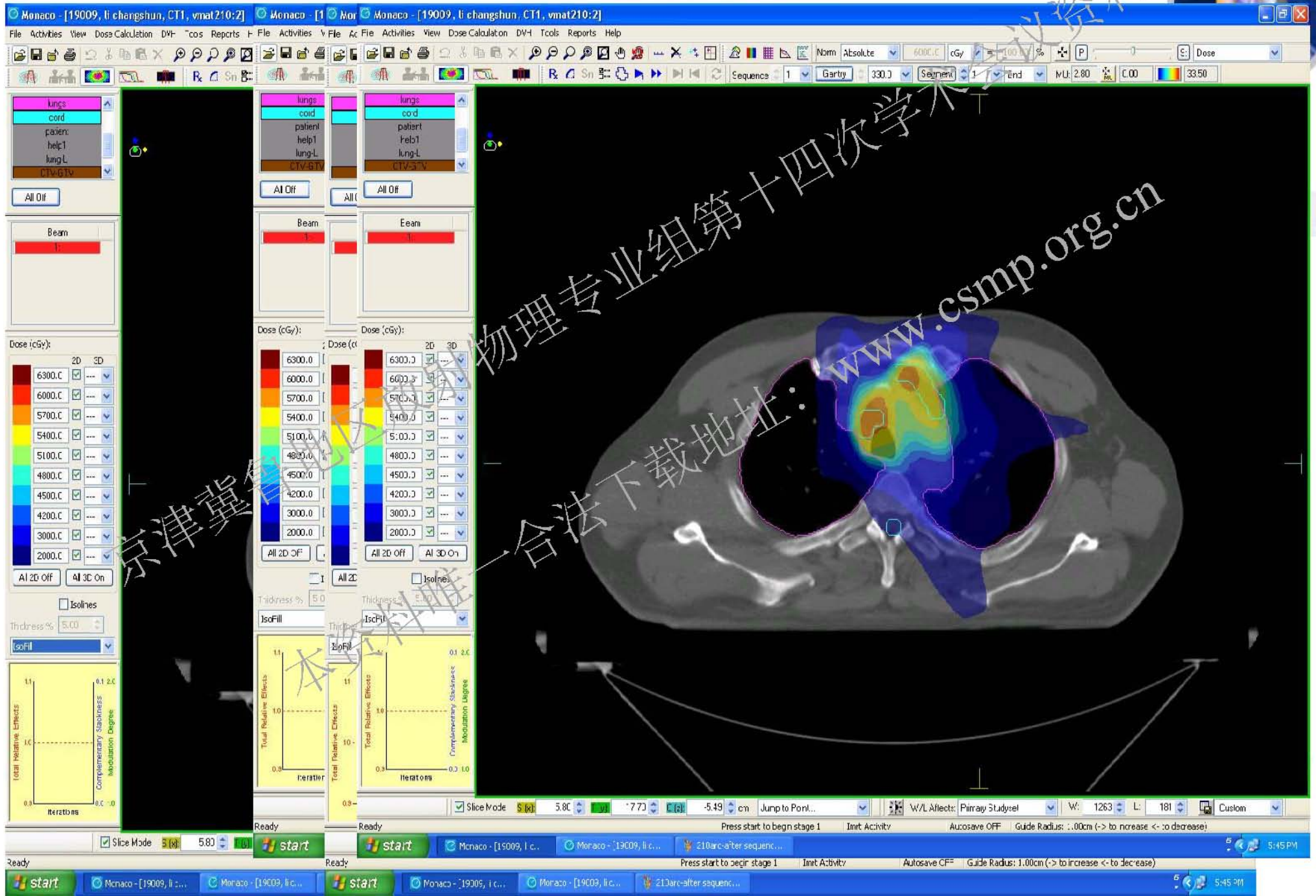
1arc-210 VMAT plan



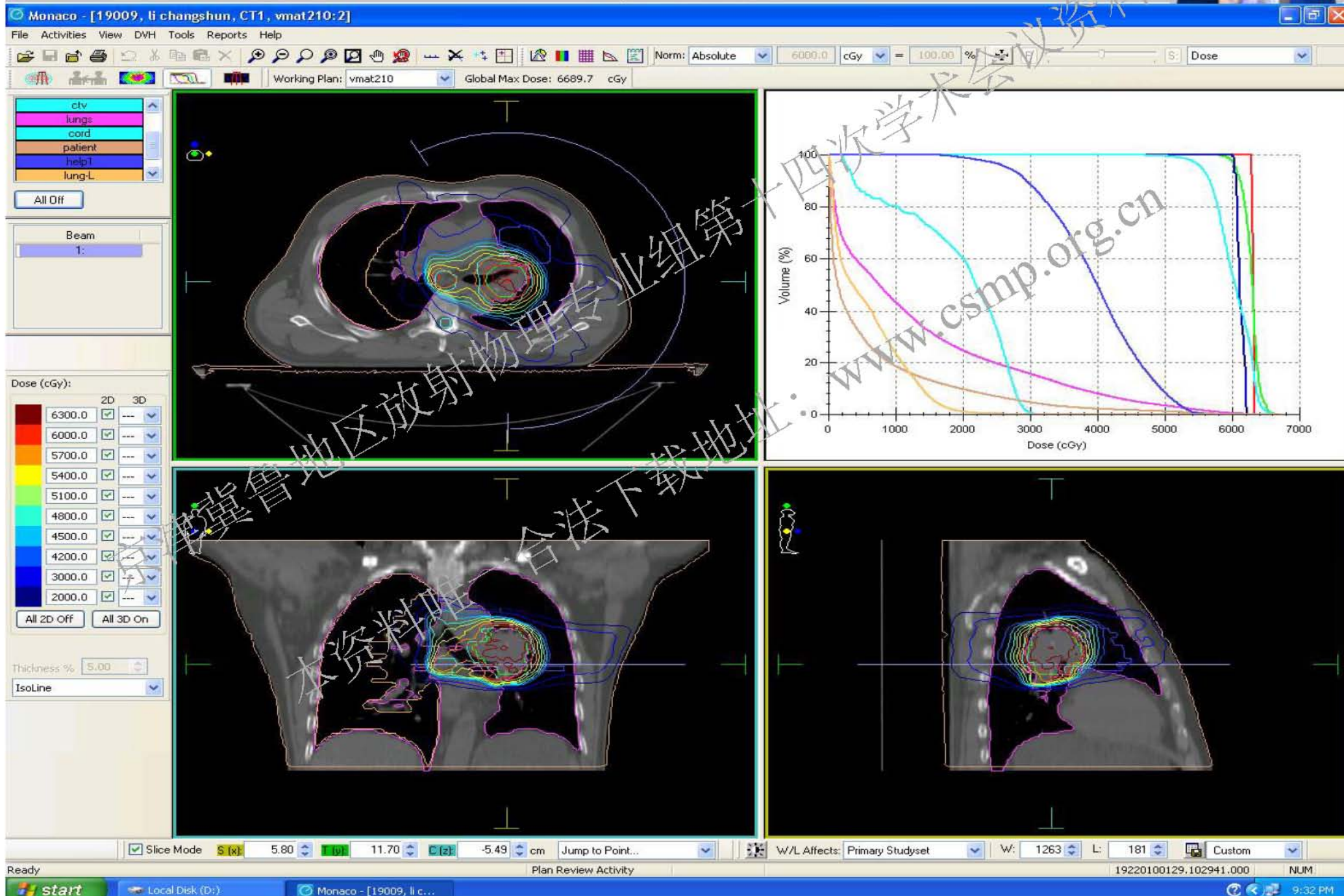
1arc-210 VMAT plan



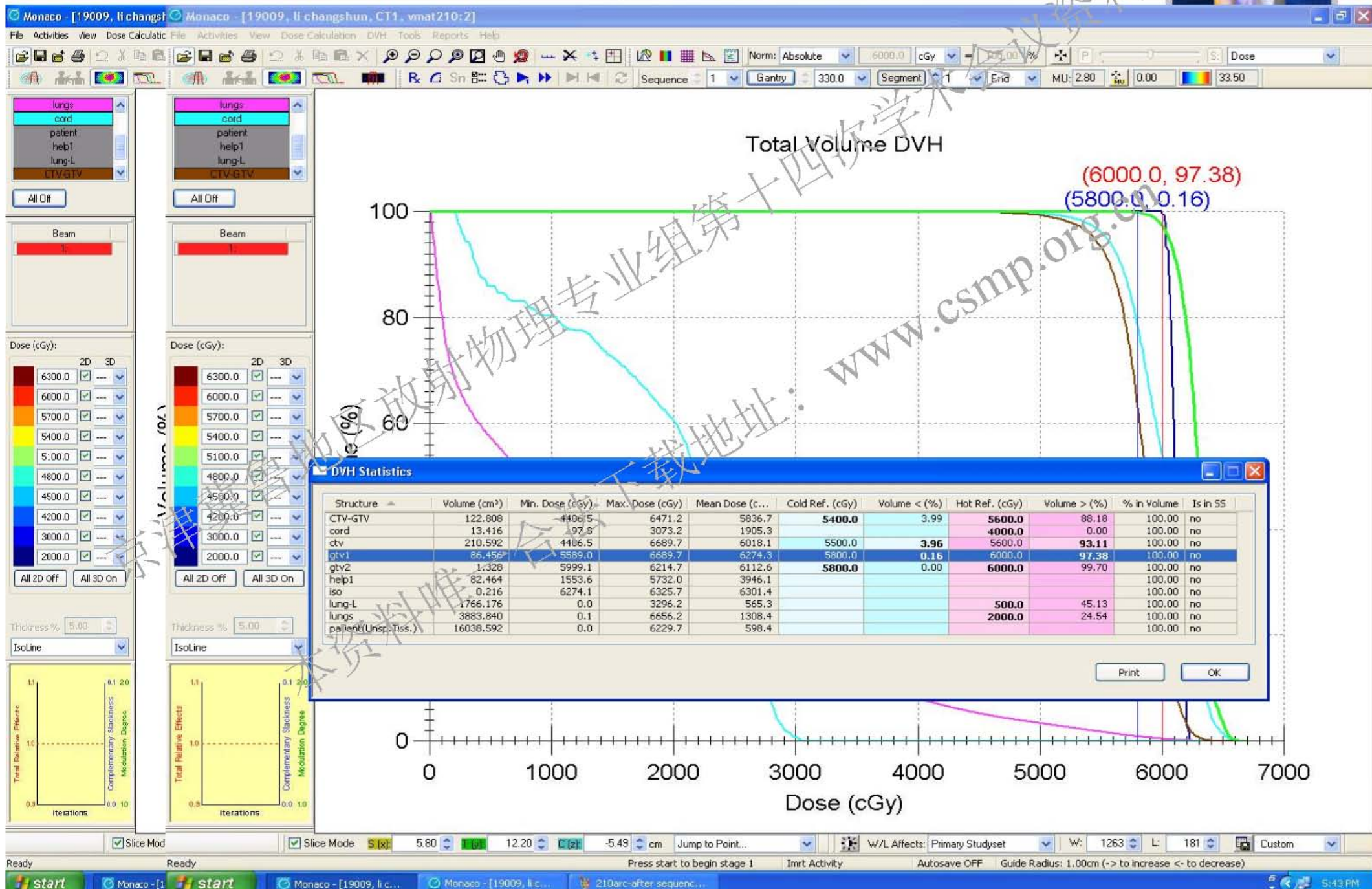
1arc-210 VMAT plan



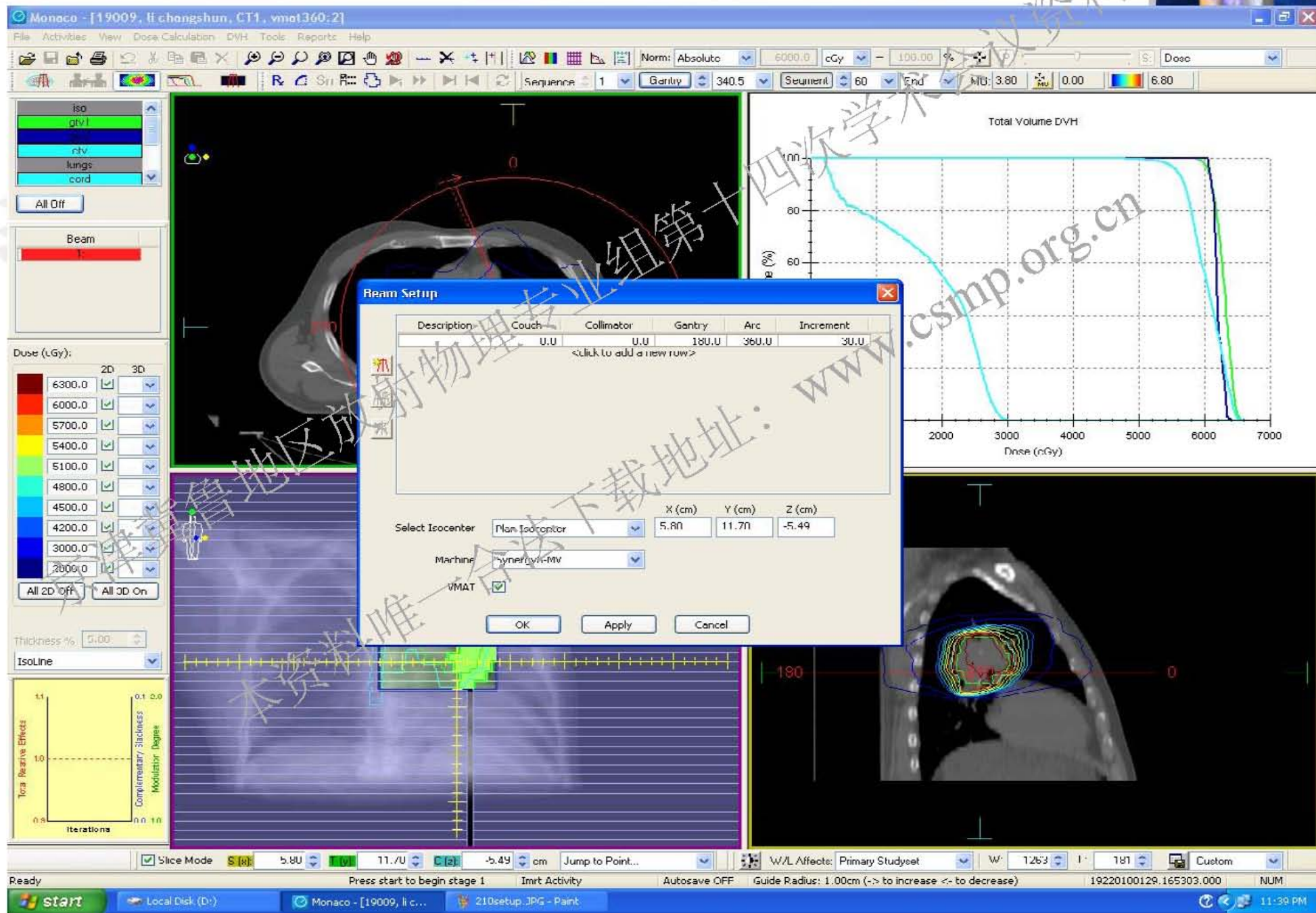
1arc-210 VMAT plan



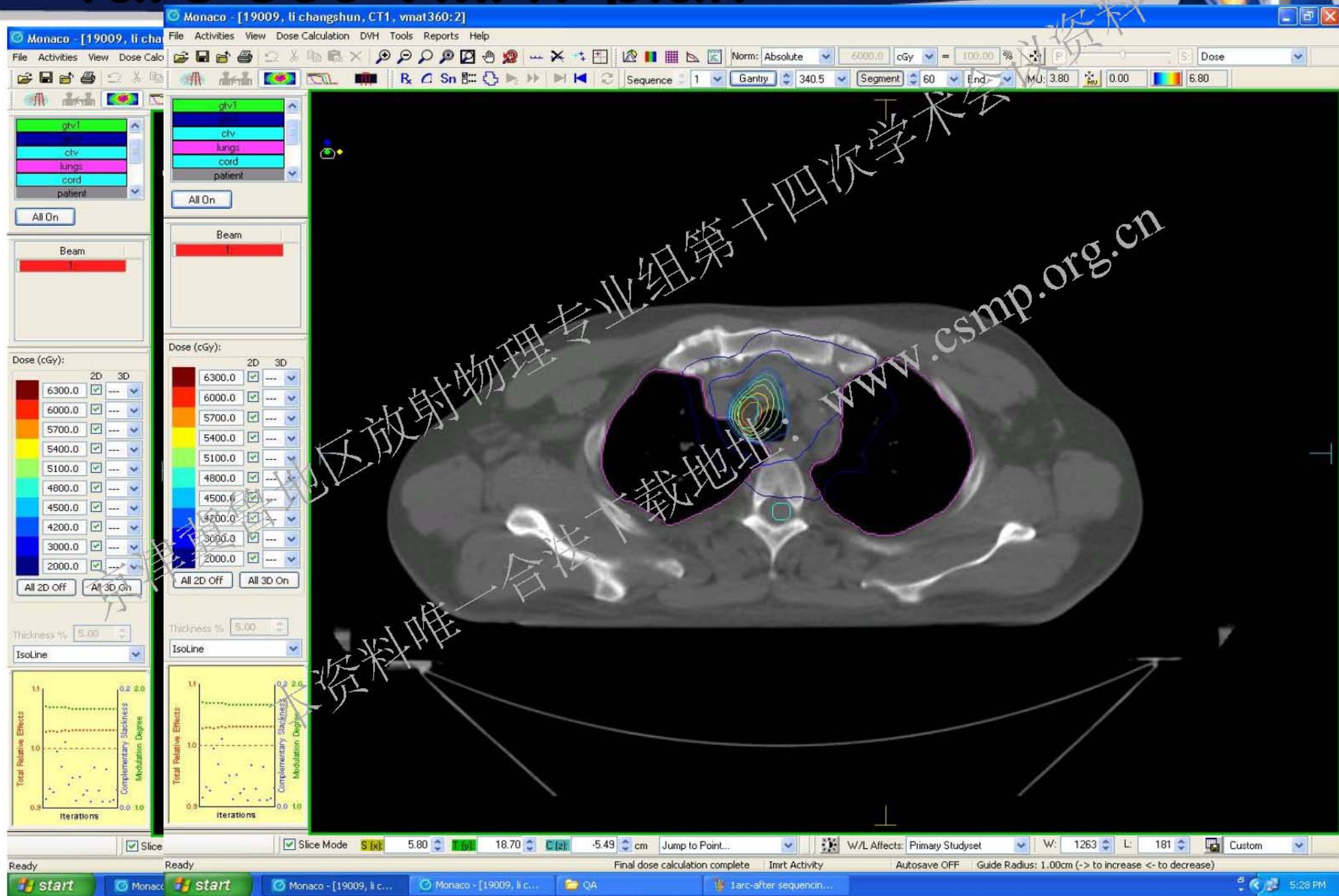
1arc-210 VMAT plan



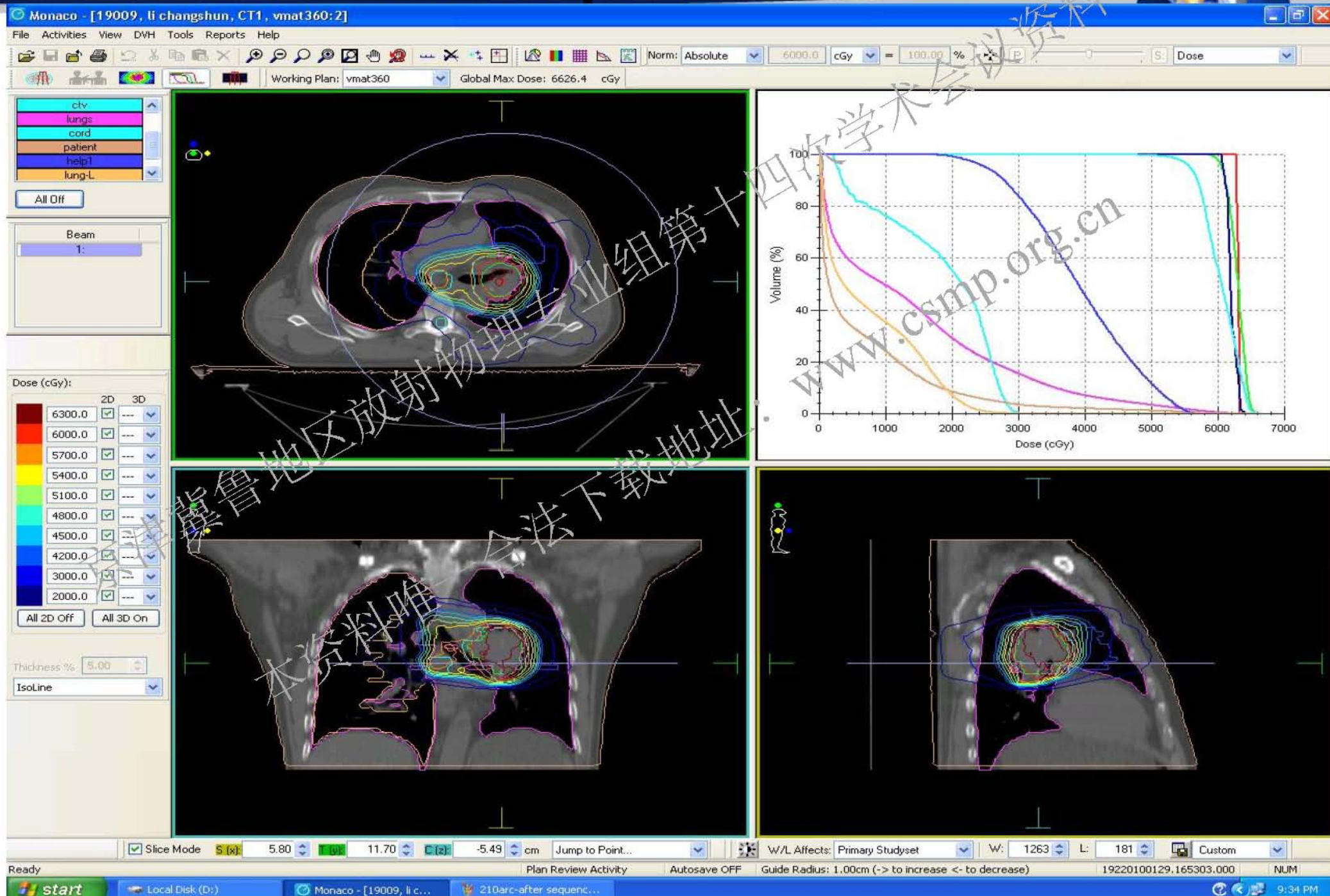
1arc-360 VMAT plan



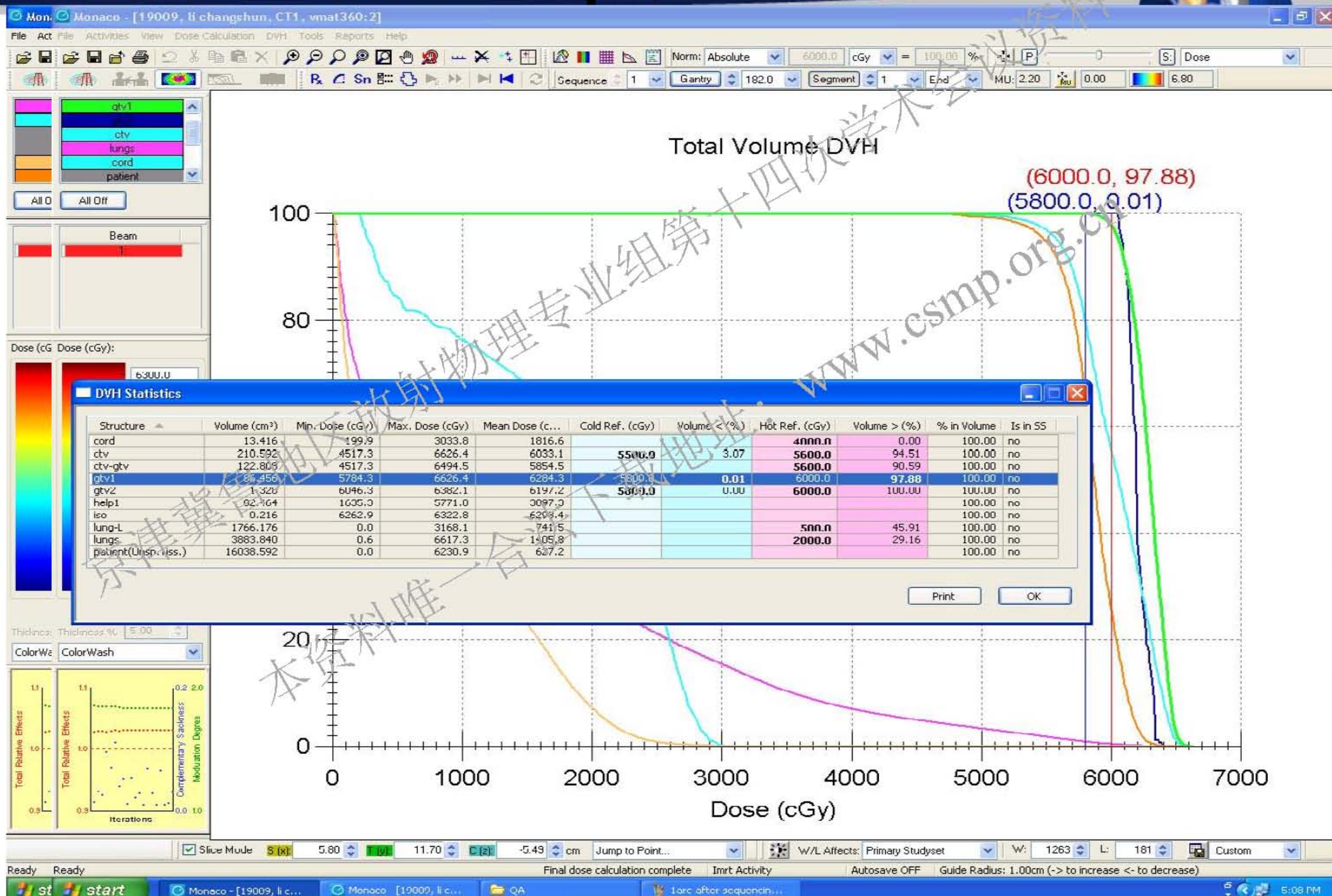
1arc-360 VMAT plan

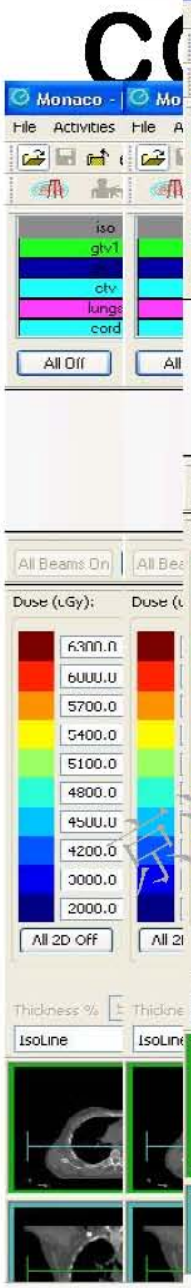


1arc-360 VMAT plan

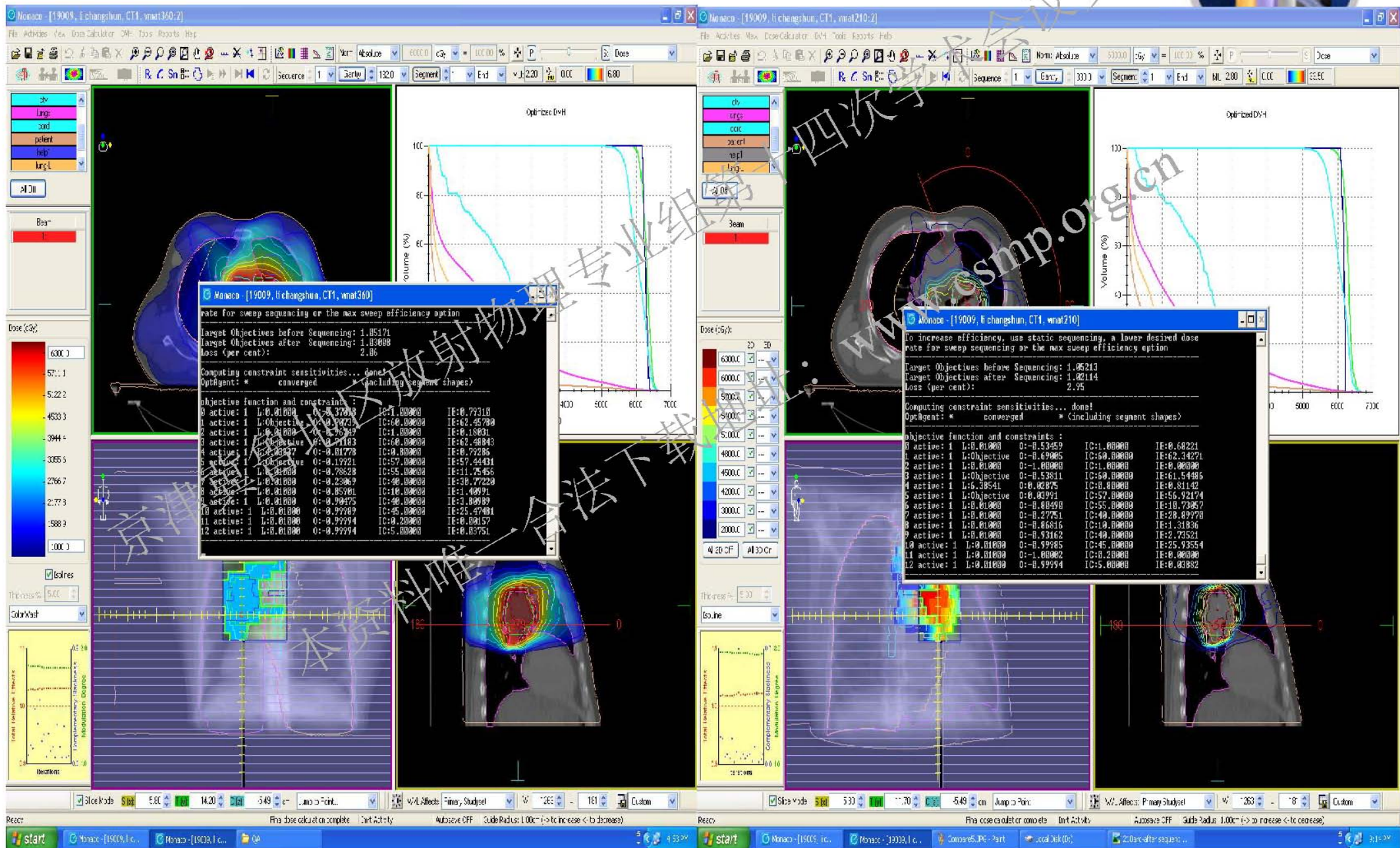


1arc-360 VMAT plan

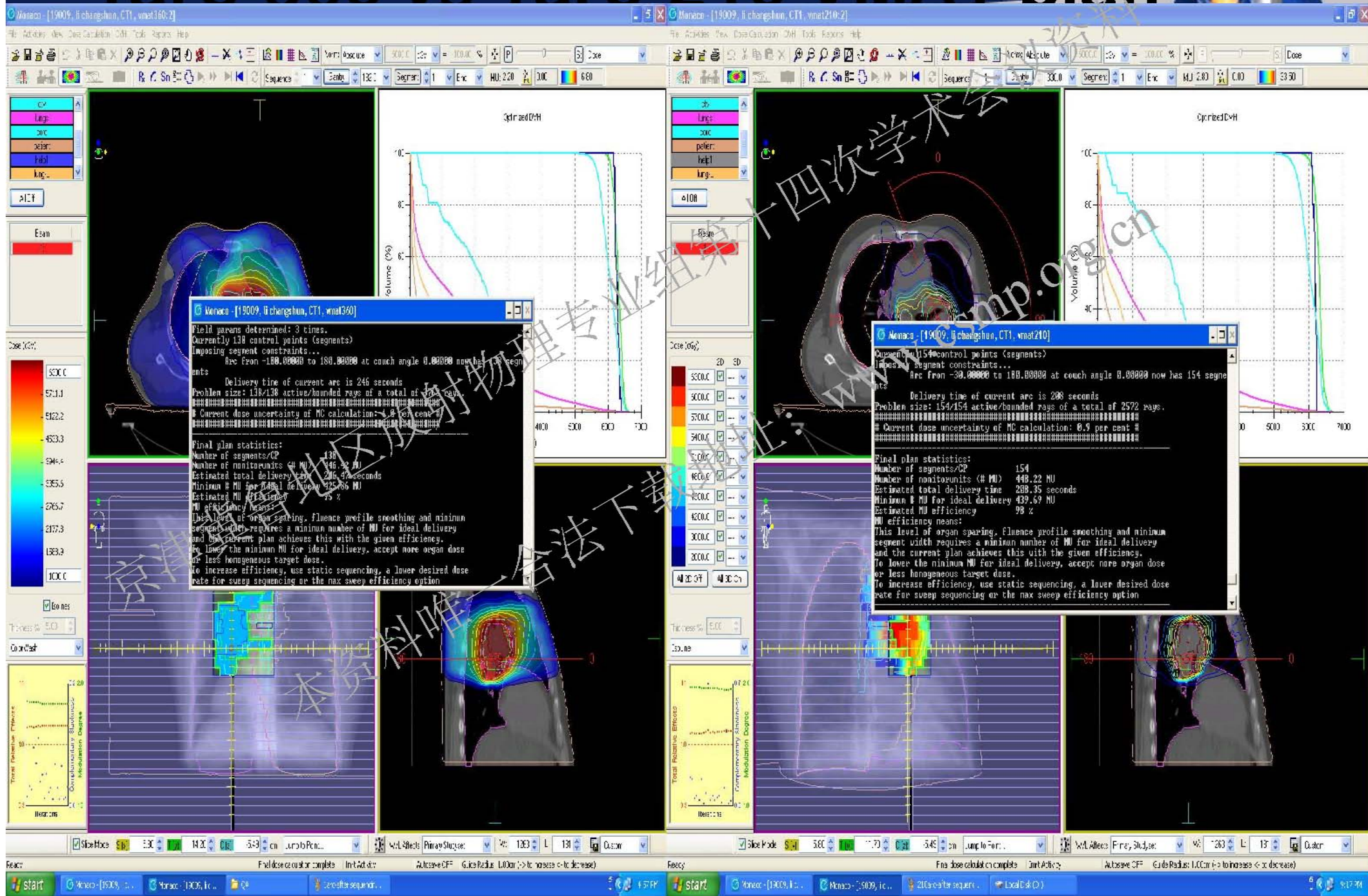




1arc-360 vs 1arc-210 VMAT plan COMPARE



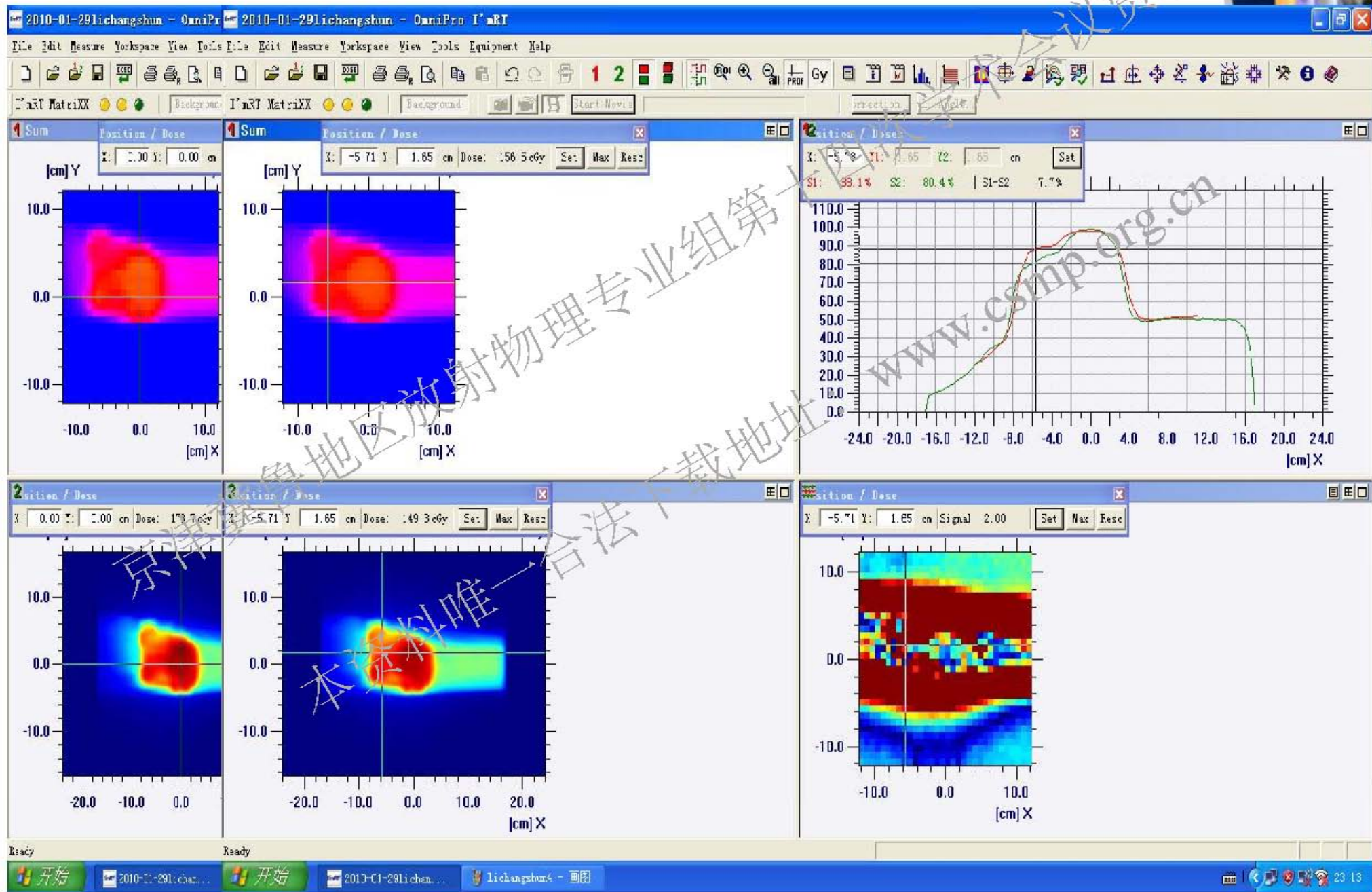
1arc-360 vs 1arc-210 VMAT plan



1arc-210 VMAT plan QA



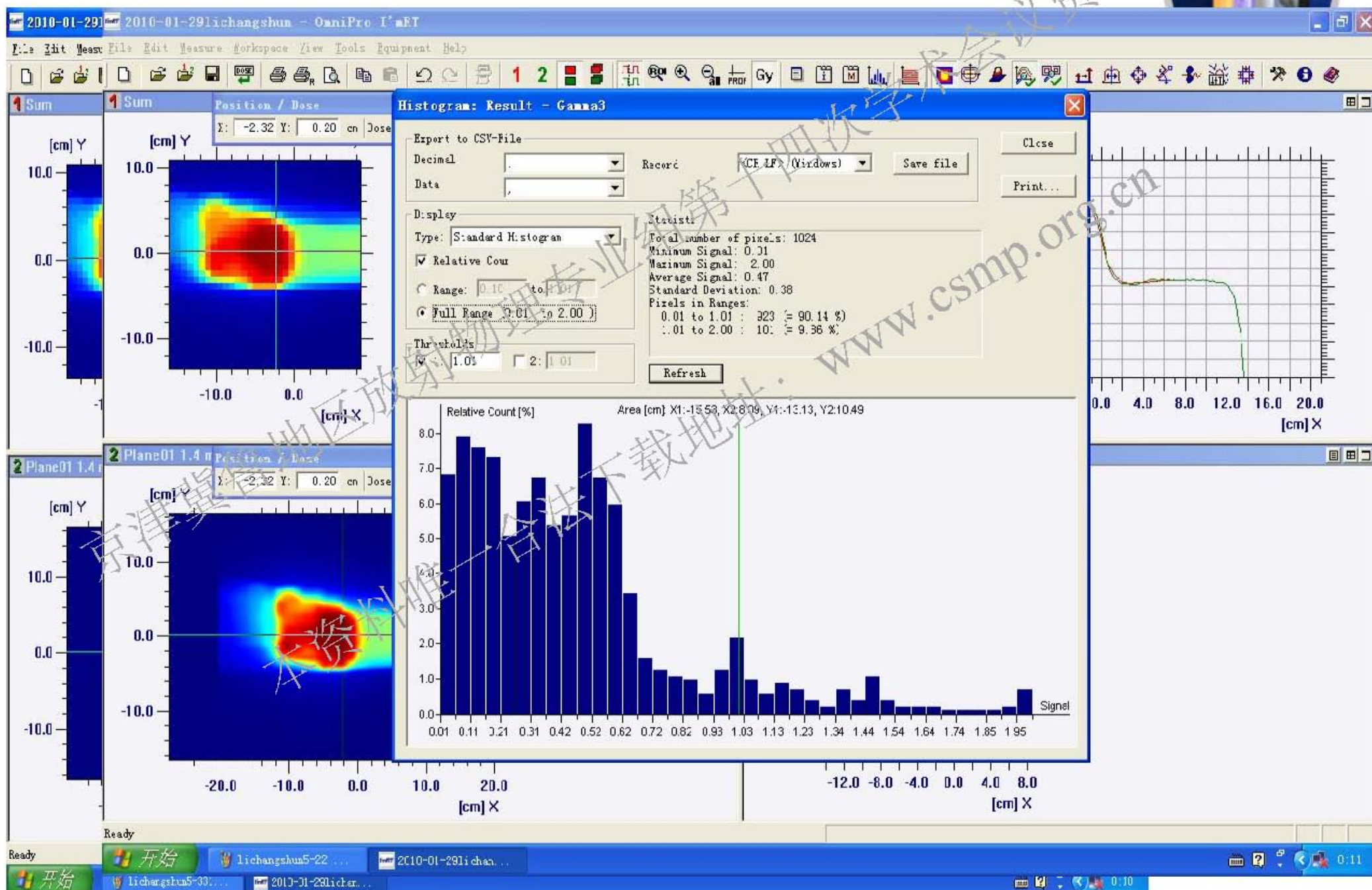
1arc-210 VMAT QA

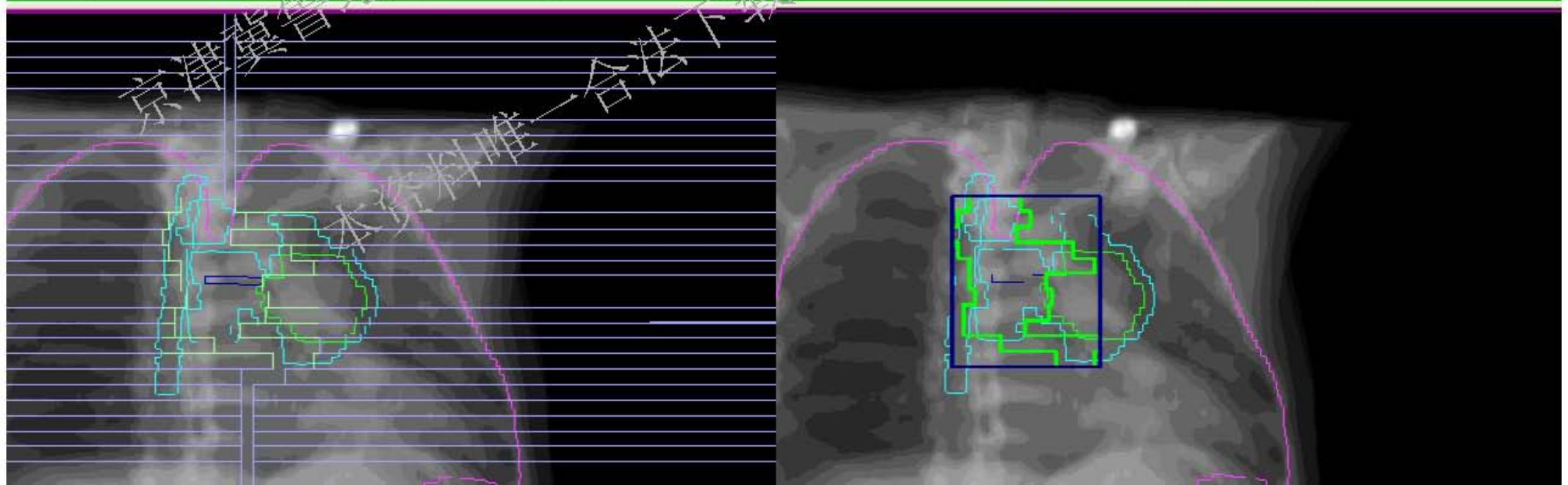
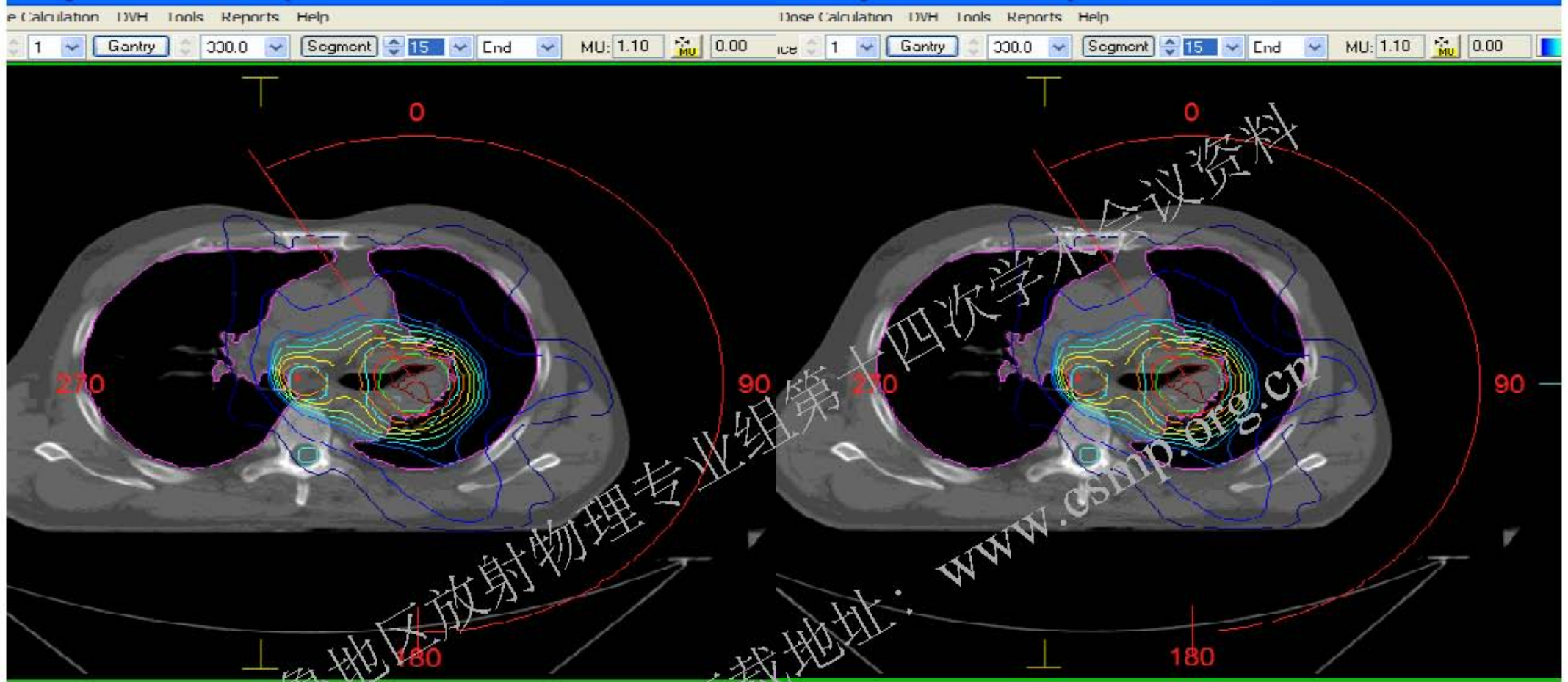


A bar chart with a blue background and white grid lines. The y-axis is labeled 'Sales' and ranges from 0 to 100. The x-axis is labeled 'Sales' and has two categories: 'Q1' and 'Q2'. The bar for 'Q1' is yellow and reaches the 97 mark. The bar for 'Q2' is purple and reaches the 100 mark. A large '3%' is written in the top left corner, indicating the percentage increase from Q1 to Q2.



1arc-210 VMAT QA-Gamma 2mm 2%







- 治疗过程实况视频

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