Contemporary Utilization of Liver Radiation Therapy

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Disclosures

- Employer: Baptist Health South Florida

- Conflicts of interest
  - Honoraria: ViewRay, Sirtex
  - Medical advisory board: ViewRay, Advanced Accelerator Applications
  - Research: ViewRay, AstraZeneca

Brand names are included in this presentation for participant clarification purposes only.

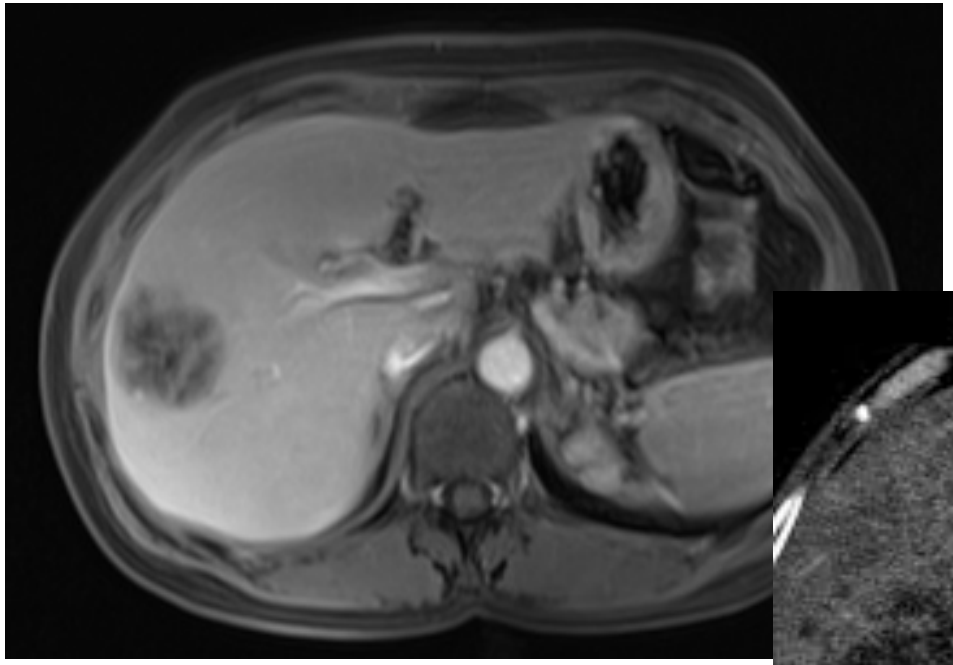
No product promotion should be inferred.

Basic Tenants of Radiation Therapy

Any tumor will be completely eradicated if high enough dose is delivered to its entirety

The liver is among the most radiosensitive organs but tolerant of high dose to limited volumes

How Do We Optimize Tumor vs. Liver Dose?



3DCRT

SBRT

SRS

IMRT

PBT

IGRT

Y90

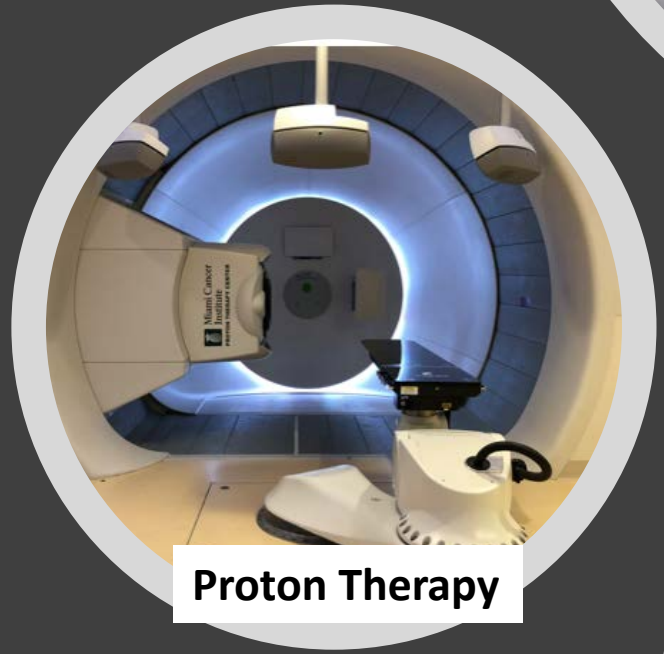
MRgRT

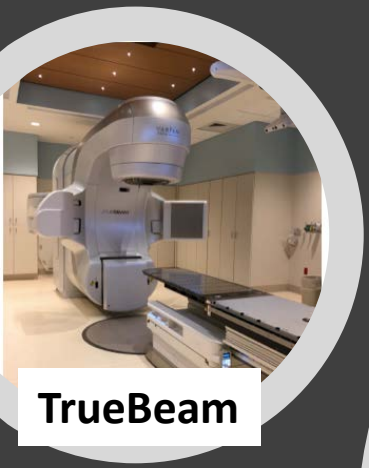
Miami Cancer Institute

- Brachytherapy
- Total skin electron
- Total body irradiation
- Radioembolization
- GRID
- Tumor treating fields
- I-131
- Lutathera®
- Xofigo®
- Zevalin®

Radixact

MRIdian Linac


Proton Therapy

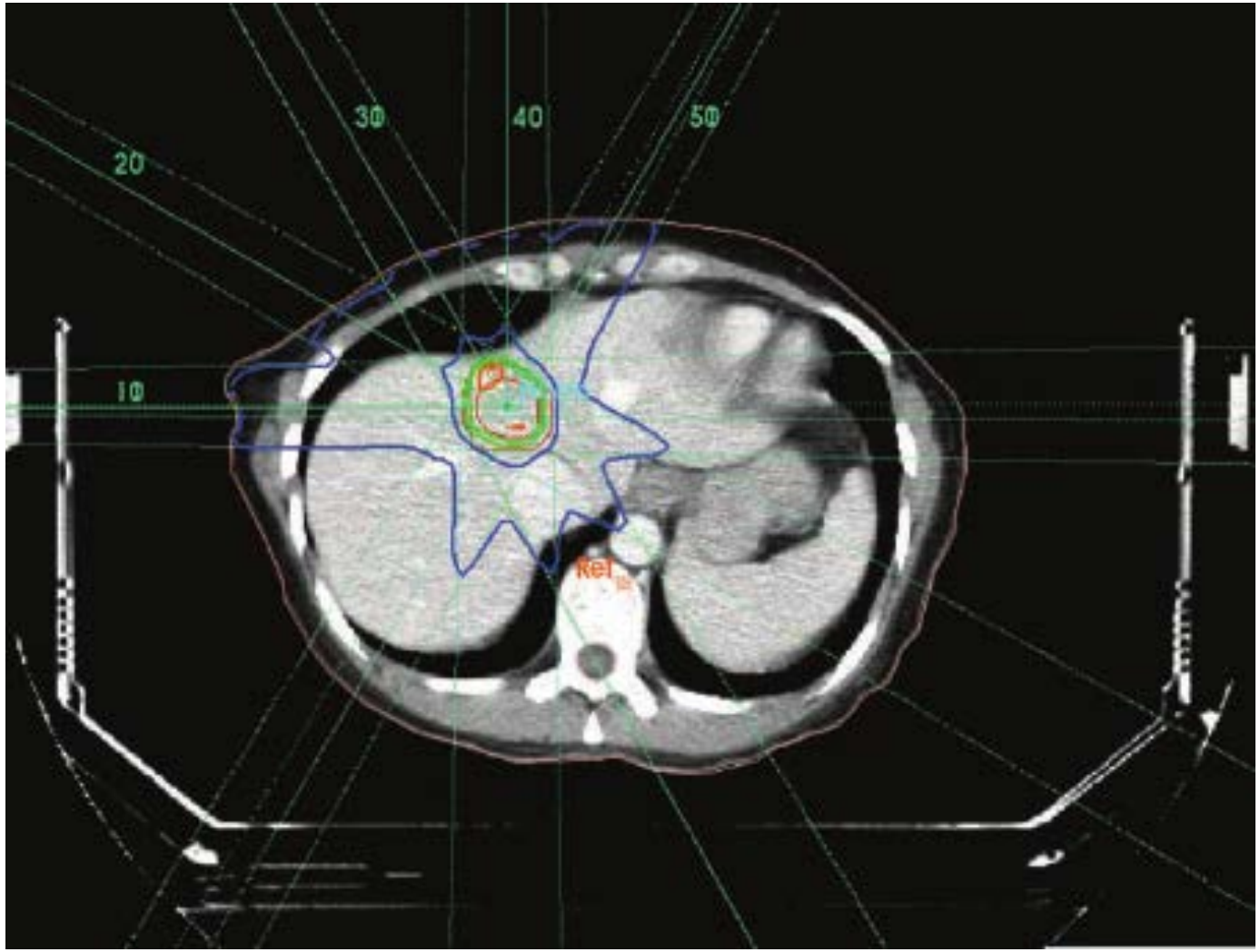

TrueBeam

GammaKnife Icon

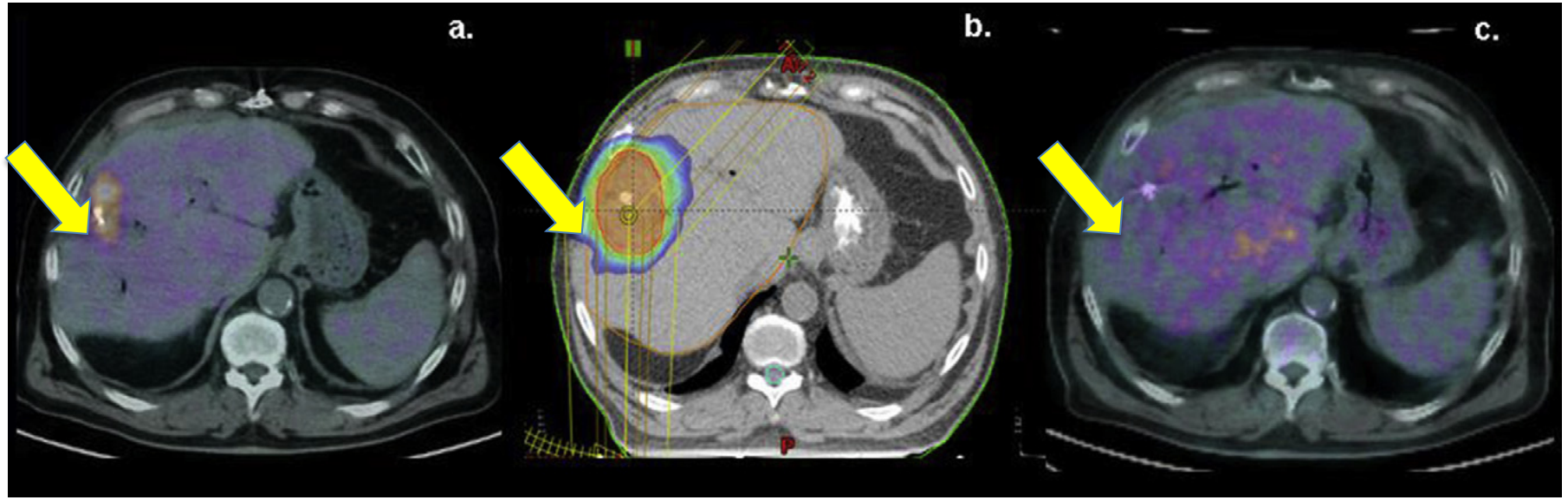
CyberKnife M6

Cancer Institute
SOUTH FLORIDA

Typical Liver SBRT Case



Phase II Trial – SBRT for Metastases



76 lesions (~2/3 colon or breast)
75 Gy in 3 fractions (BED_{10} = 262.5 Gy)
Local control: 1-year 94%, 2-year 91%
No grade 3+ acute toxicity

Scorsetti M, et al. *Int J Radiat Biol Phys*. 2013;86(2):336-342.

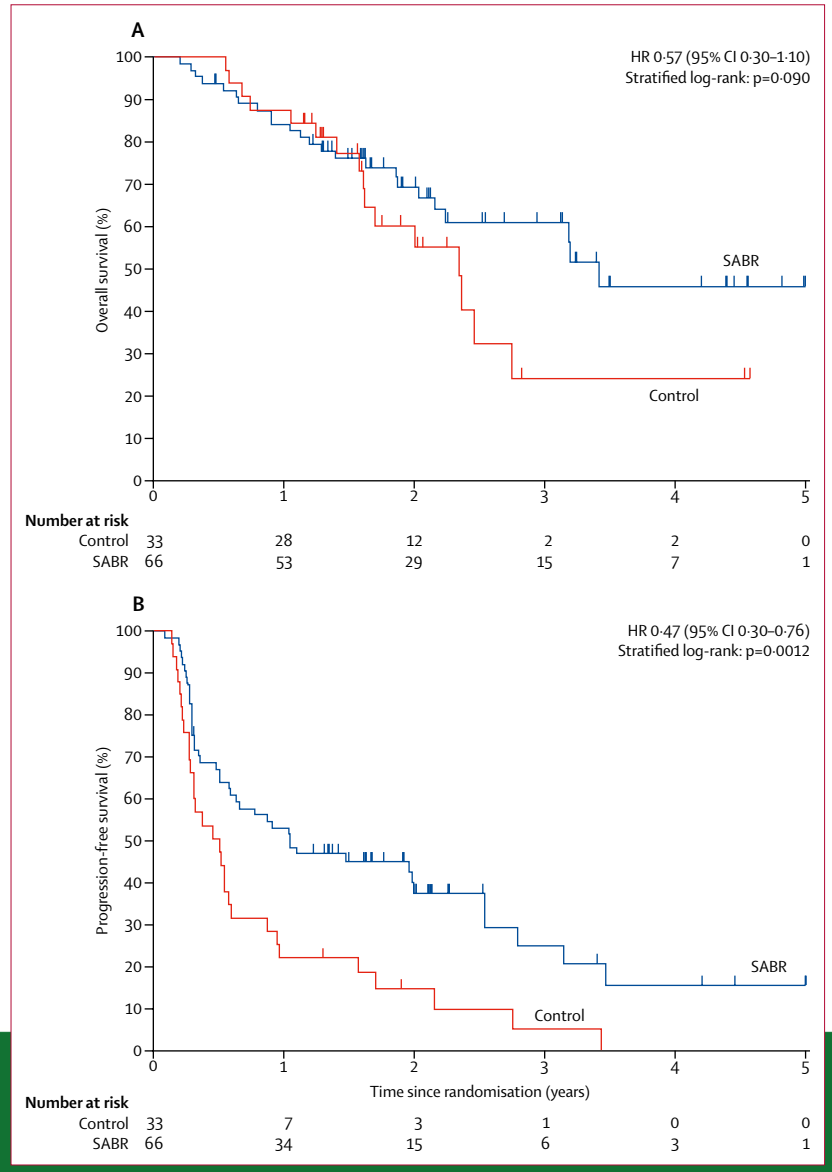
SBRT Improves OS for Oligometastatic Disease

Stereotactic ablative radiotherapy versus standard of care palliative treatment in patients with oligometastatic cancers (SABR-COMET): a randomised, phase 2, open-label trial

David A Palma, Robert Olson, Stephen Harrow, Stewart Gaede, Alexander V Louie, Cornelis Haasbeek, Liam Mulroy, Michael Lock, George B Rodrigues, Brian P Yaremko, Devin Schellenberg, Belal Ahmad, Gwendolyn Griffioen, Sashendra Senthi, Anand Swaminath, Neil Kopek, Mitchell Liu, Karen Moore, Suzanne Currie, Glenn S Bauman, Andrew Warner, Suresh Senan

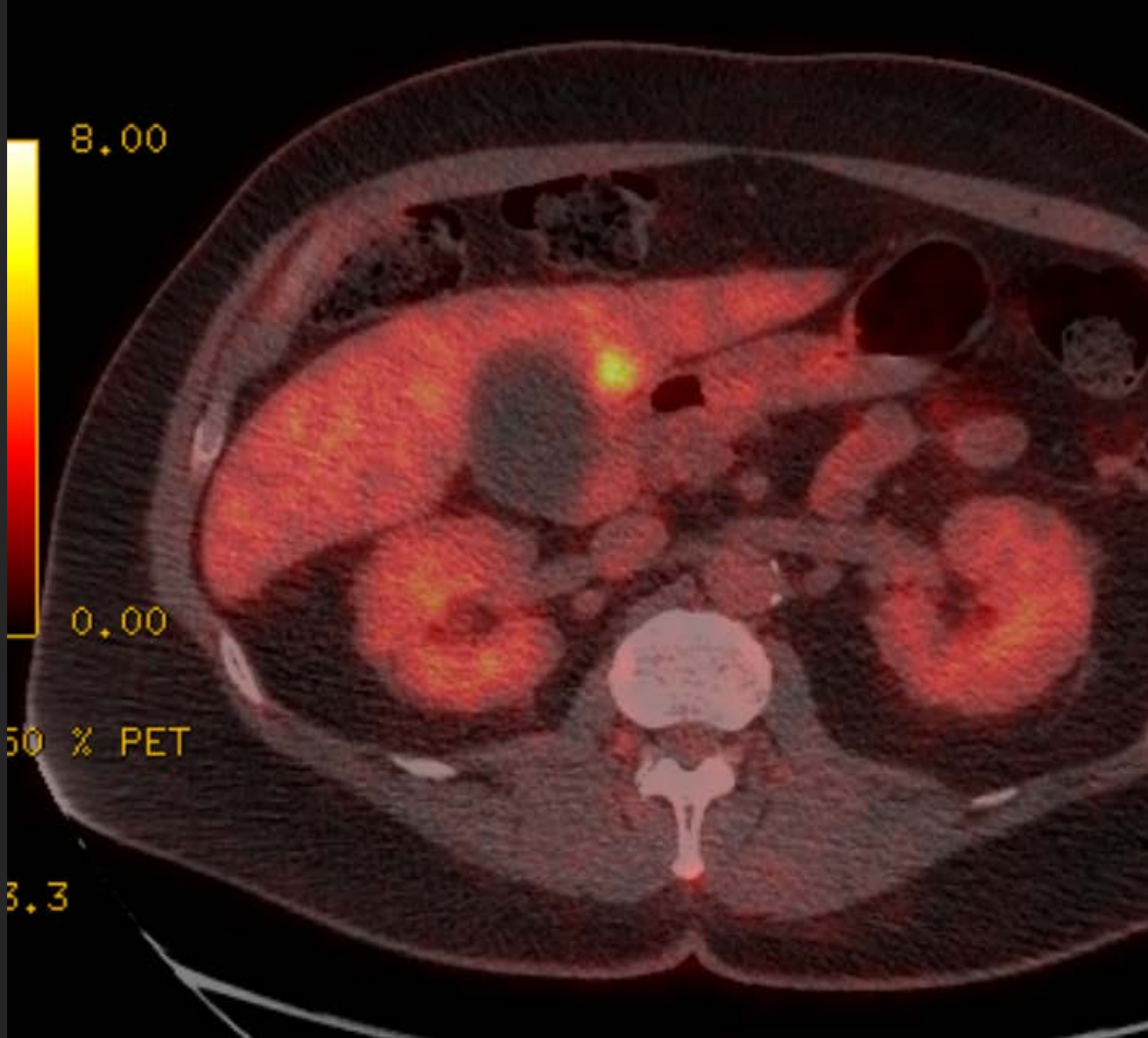
Published online April 11, 2019 http://dx.doi.org/10.1016/S0140-6736(18)32487-5

Liver metastases were 3rd most commonly treated site

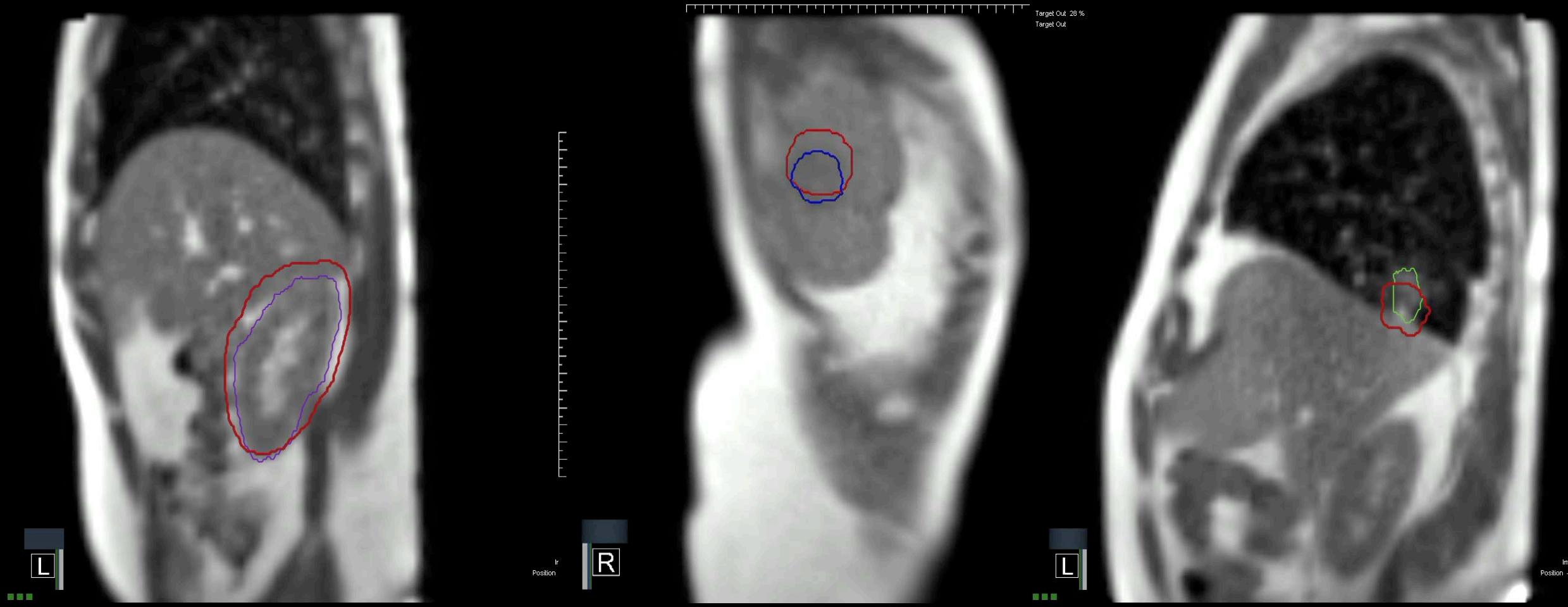


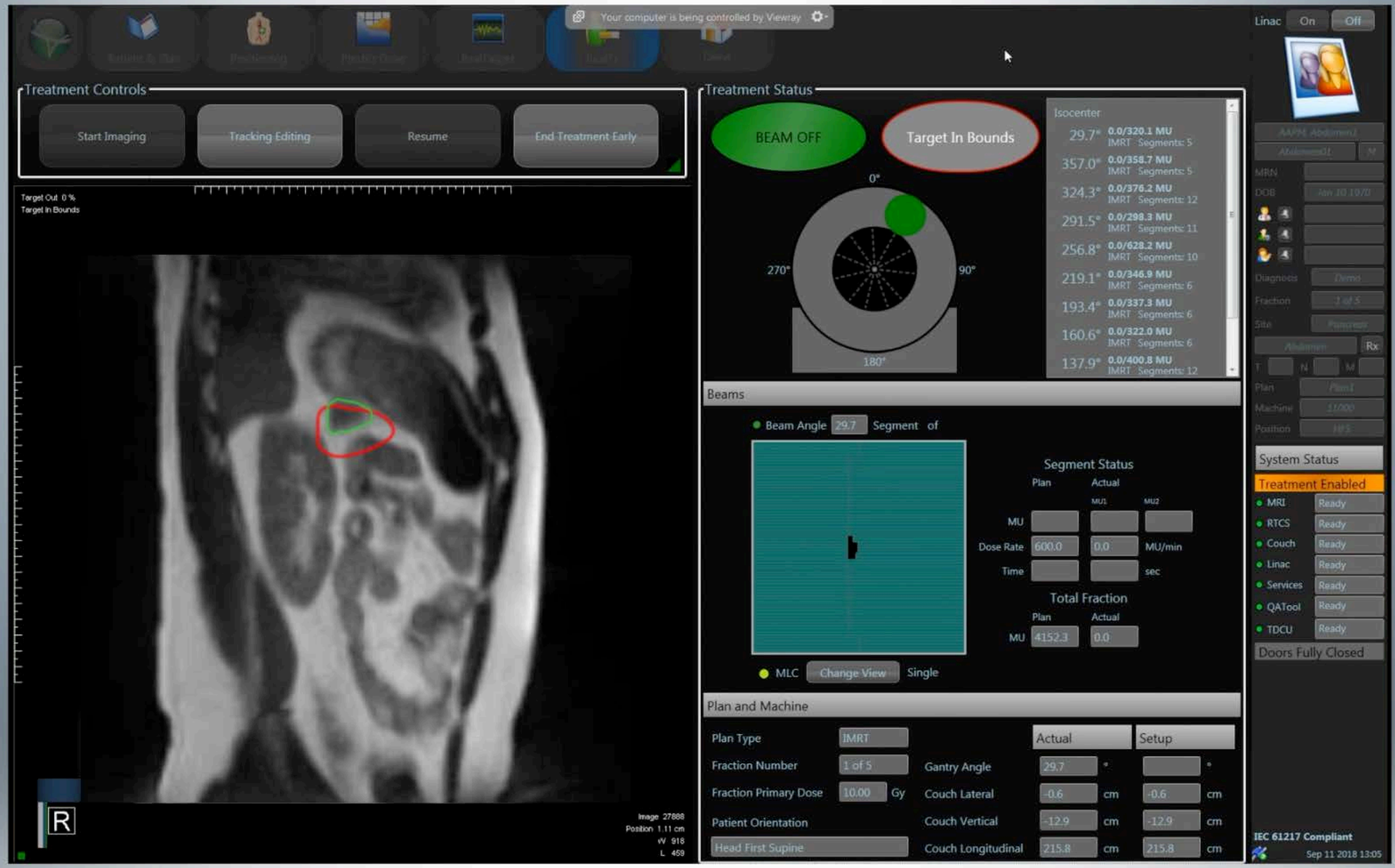
Palma DA, et al. *Lancet*. 2019;393(10185):2051-2058.

Liver Metastasis Near Duodenum

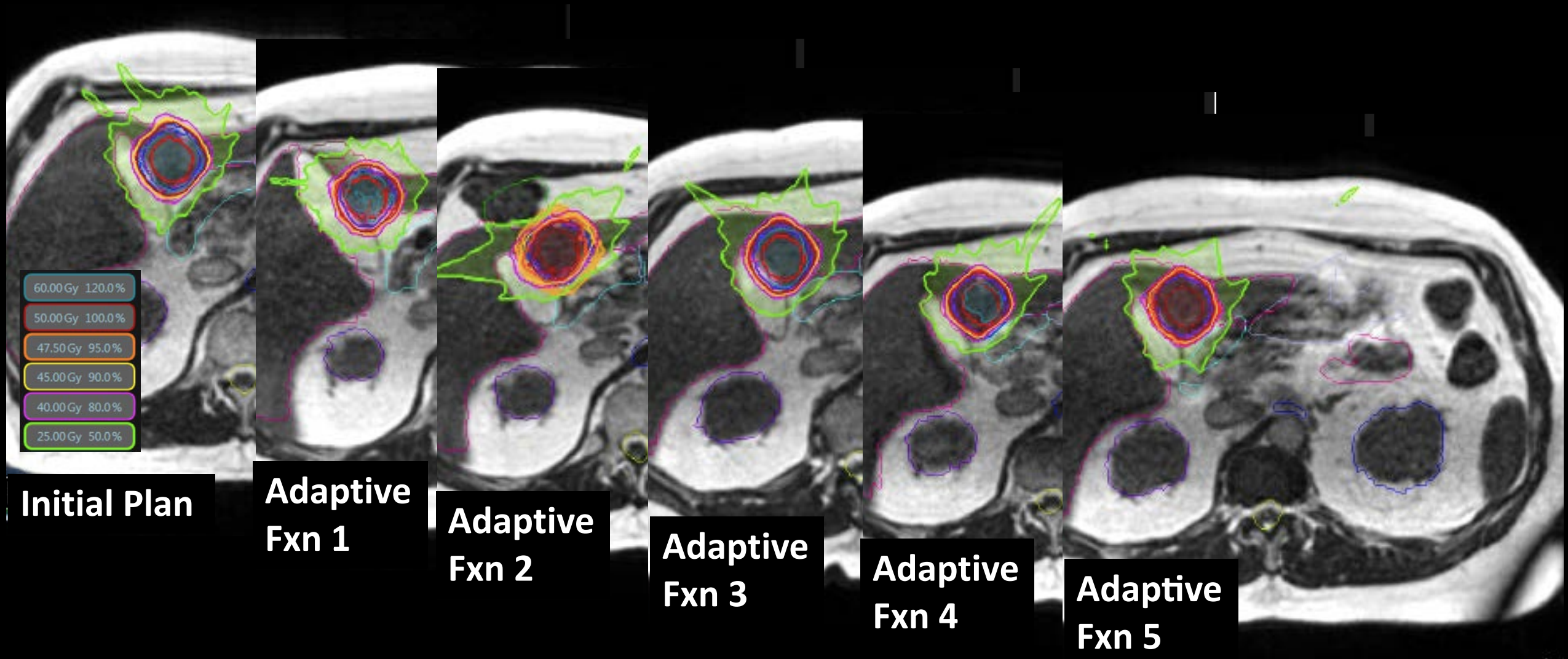


Continuous Imaging Through Treatment



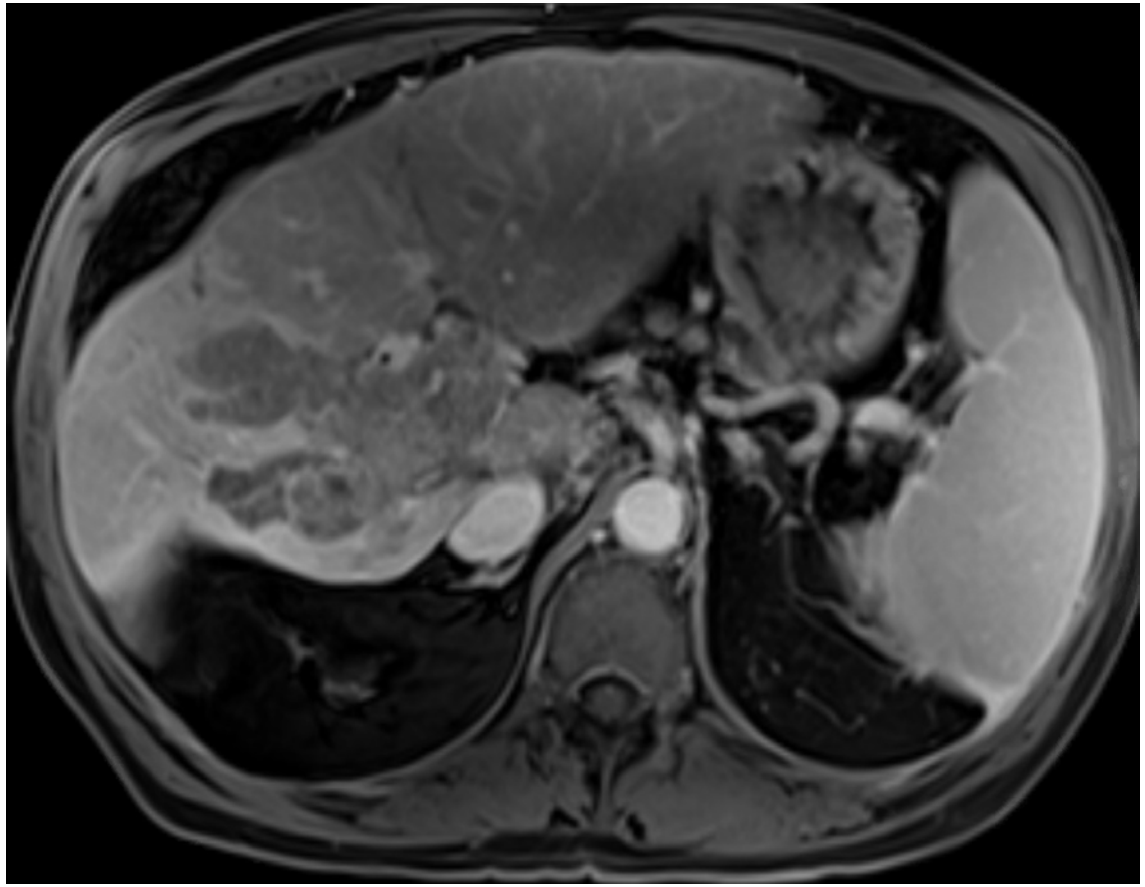

Your computer is being controlled by Viewray
Linac On Off
Treatment Controls
Start Imaging
Tracking Editing
Resume
End Treatment Early
Target Out 0 %
Target In Bounds
R
Image 27888
Position 1.11 cm
W 918
L 459
Treatment Status
BEAM OFF
Target In Bounds
0°
270°
90°
180°
Isocenter
29.7° 0.0/320.1 MU IMRT Segments: 5
357.0° 0.0/358.7 MU IMRT Segments: 5
324.3° 0.0/376.2 MU IMRT Segments: 12
291.5° 0.0/298.3 MU IMRT Segments: 11
256.8° 0.0/628.2 MU IMRT Segments: 10
219.1° 0.0/346.9 MU IMRT Segments: 6
193.4° 0.0/337.3 MU IMRT Segments: 6
160.6° 0.0/322.0 MU IMRT Segments: 6
137.9° 0.0/400.8 MU IMRT Segments: 12
Beams
Beam Angle 29.7 Segment of
MLC Change View Single
Segment Status
Plan Actual
MU1 MU2
MU
Dose Rate 600.0 0.0 MU/min
Time sec
Total Fraction
Plan Actual
MU 4152.3 0.0
Plan and Machine
Plan Type IMRT
Fraction Number 1 of 5
Fraction Primary Dose 10.00 Gy
Patient Orientation
Head First Supine
Actual Setup
Gantry Angle 29.7 °
Couch Lateral -0.6 cm -0.6 cm
Couch Vertical -12.9 cm -12.9 cm
Couch Longitudinal 215.8 cm 215.8 cm
MRN
DOB
Diagnosis Demo
Fraction 1 of 5
Site Pancreas
Rx
Plan
Machine
Position
System Status
Treatment Enabled
MRI Ready
RTCS Ready
Couch Ready
Linac Ready
Services Ready
QATool Ready
TDCU Ready
Doors Fully Closed
IEC 61217 Compliant
Sep 11 2018 13:05

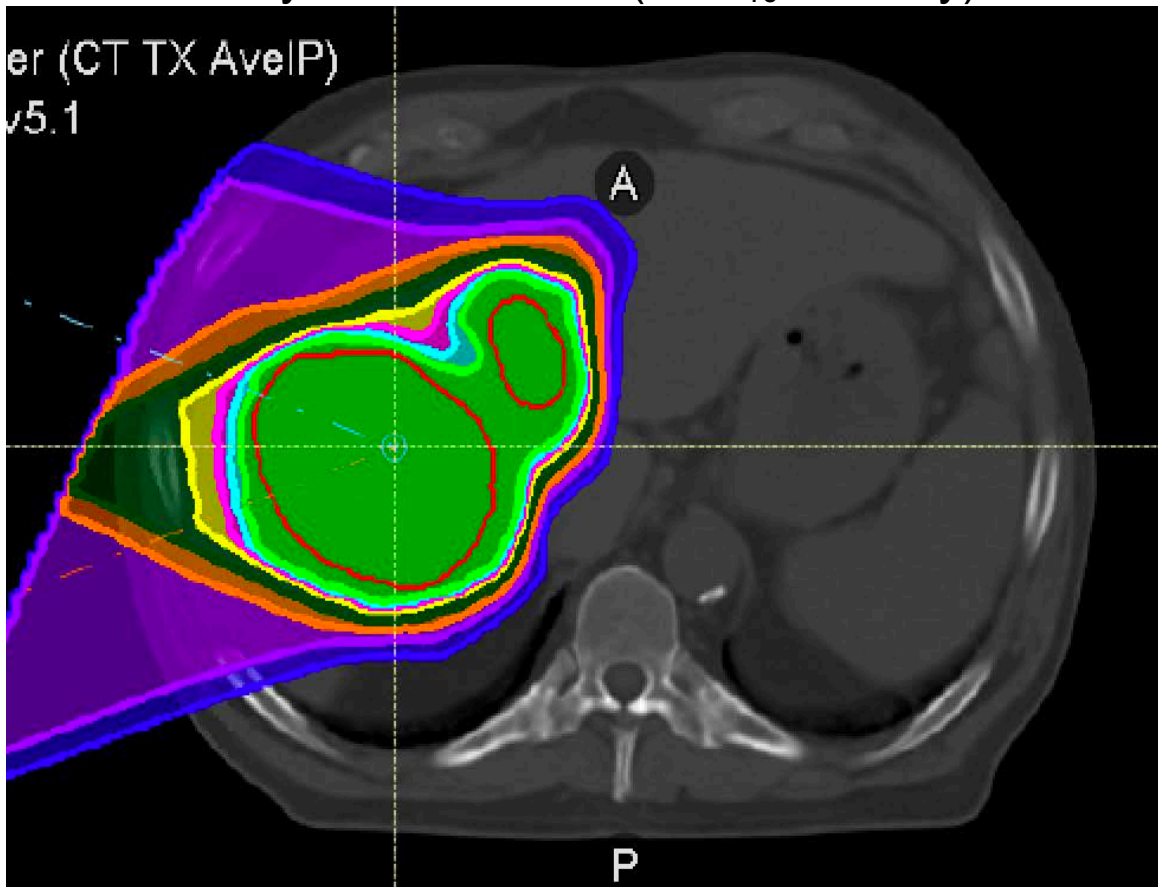
10 Gy x 5 (BED_{10} = 100 Gy)

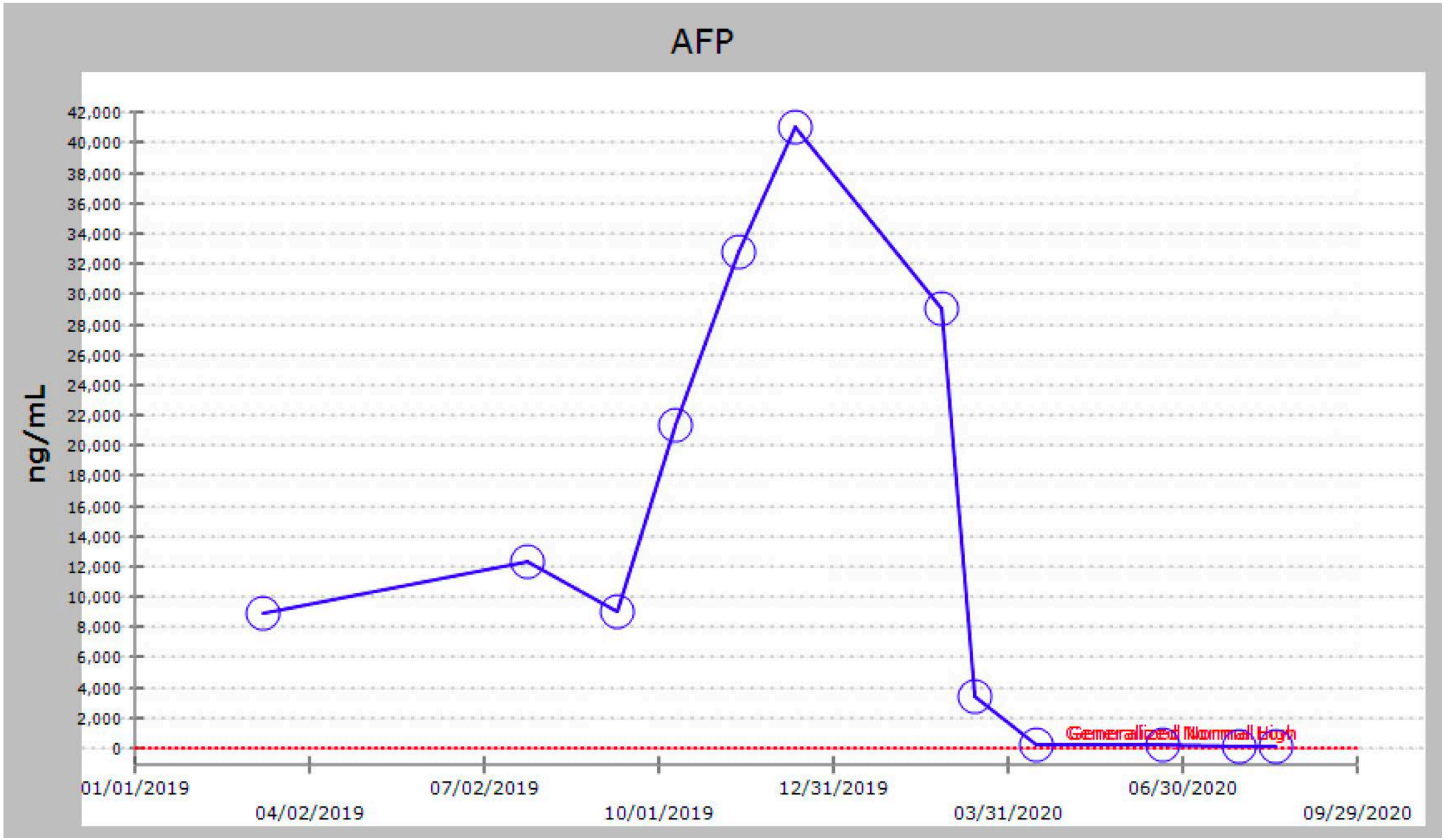


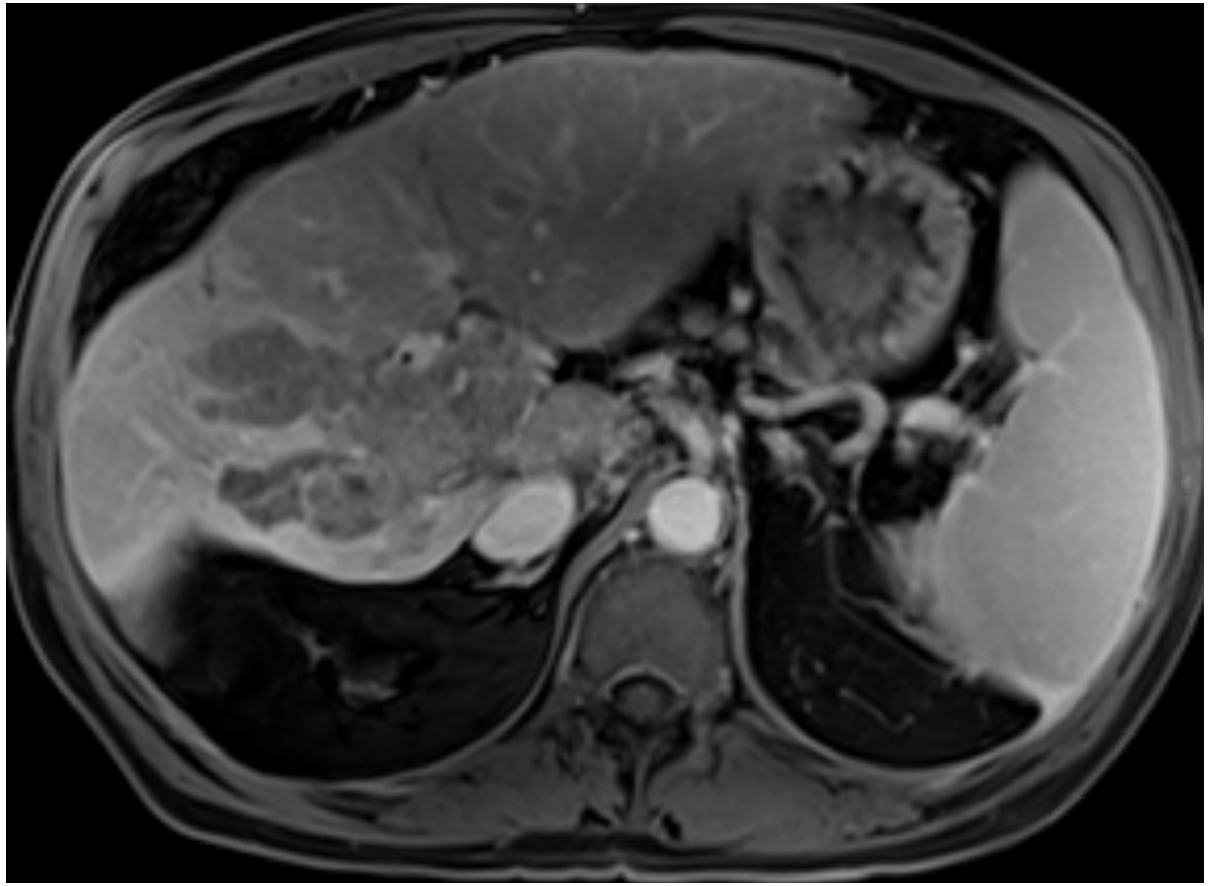
HCC (CP B7)

40 Gy in 10 fractions (BED_{10} = 56 Gy)

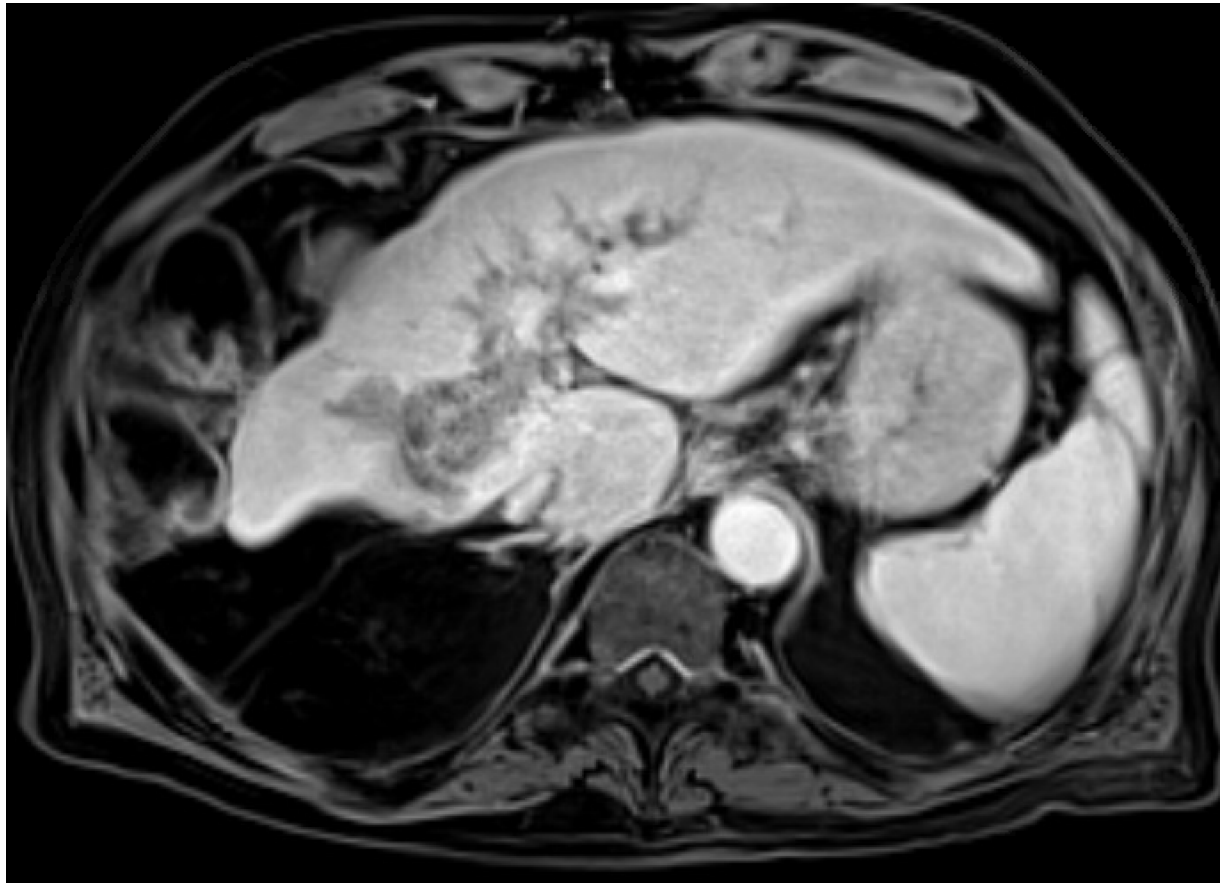





AFP
ng/mL
42,000
40,000
38,000
36,000
34,000
32,000
30,000
28,000
26,000
24,000
22,000
20,000
18,000
16,000
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0
Generalized Normal High
01/01/2019
04/02/2019
07/02/2019
10/01/2019
12/31/2019
03/31/2020
06/30/2020
09/29/2020



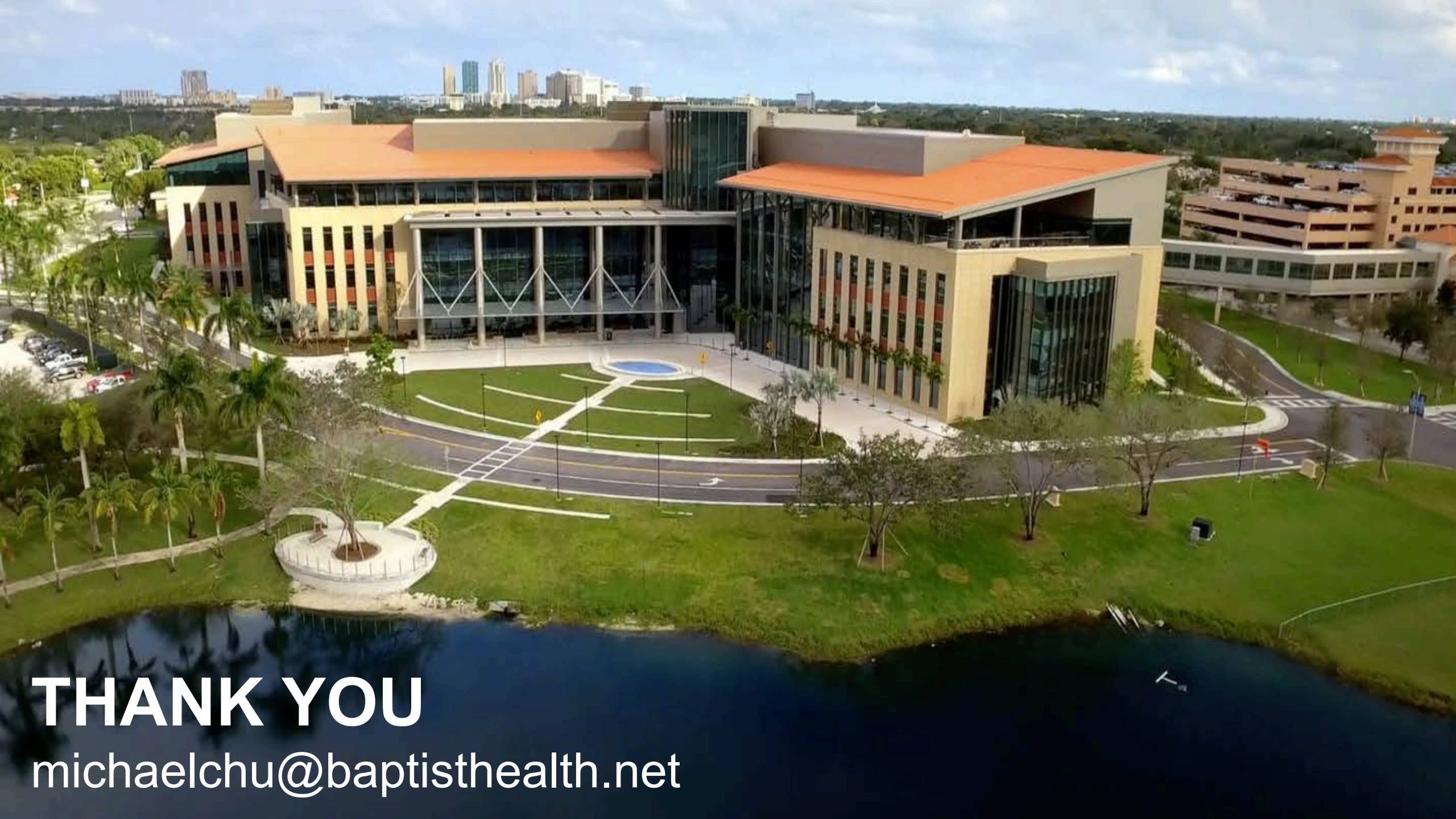
December 2019



August 2020

Conclusions

- Radiation therapy is an effective noninvasive local therapy for primary and metastatic liver cancer
- Recent technological advancements have expanded selection criteria for delivery of ablative dose
- Future directions include novel systemic and regional therapies and shortening regimens to 1 fraction



THANK YOU

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