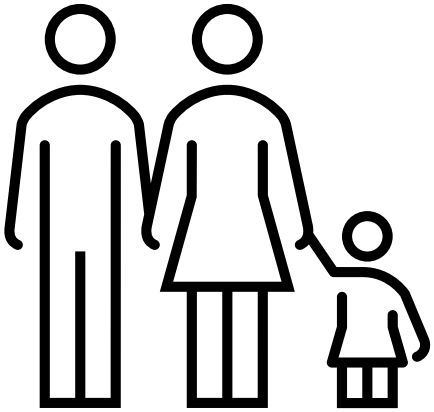
Intermountain Health

Less is More:

Embrace the strength of a markless SGRT centric workflow

Ryan Hecox, MS, DABR
Lead Medical Physicist
Intermountain Health

Safety



Simplicity

Reliability

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How Can We Improve All 3?

Embrace the strength of a markless SGRT centric workflow:

- Indexing of Immobilization
- Predict Absolute Couch Values From Sim
- Eliminate Unnecessary Steps & Focus On Your Patients

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Indexing of Immobilization

RELIABILITY

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PROGRAM SCHEDULE

SGRT 2019 LAS VEGAS THURSDAY MAY 16

07.30 - 08.30am **REGISTRATION & BREAKFAST** — **LOCATION: SILK ROAD 1**

08.30 - 10.30am — **LOCATION: VINOLY**

8:30 - 8:45am

Welcome and Introduction

Katie McCurdy BSRT(T)
SGRT Program Director

Megan Sank RTT
Master of Ceremonies

8:45 - 9:30am

Elevating Safety and the Patient Experience

Kenneth Wong MD
USC Department of Radiation Oncology and Children's Hospital Los Angeles

9:30 - 10:00am

Experience from a Patient's Perspective

Maureen Roadman
Patient treated at UCSD

10:00 - 10:30am

The Role of Surface Guided Radiotherapy in Intra-cranial Radiosurgery and Mediastinal Lymphoma

Parag Sanghvi MD MSPH
UCSD

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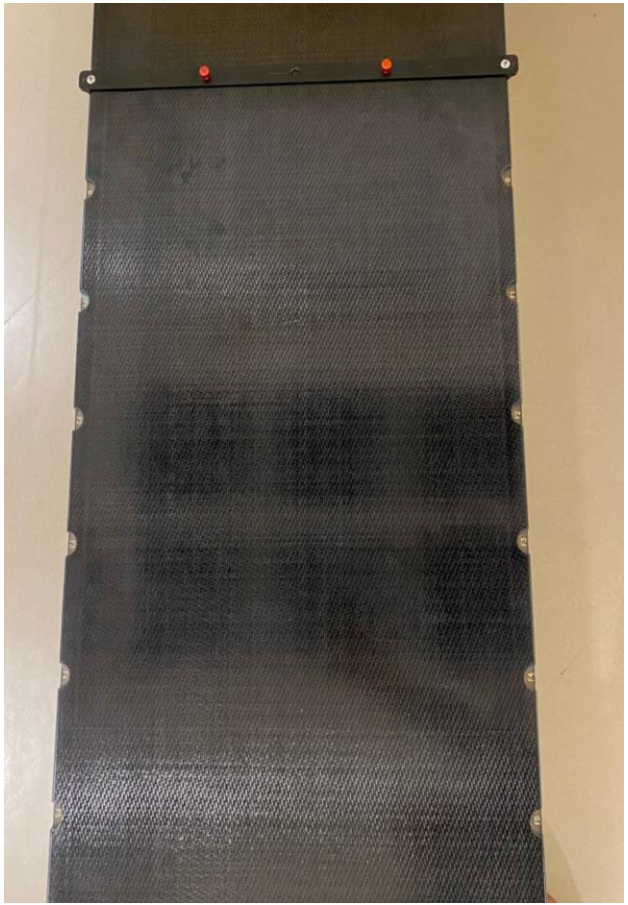

Indexing of Immobilization

Secret (not secret) to improving efficiency

- After first day when couch values are acquired:
  - The couch position is known before the patient lays down
  - Use Auto-Go functions of the linac to move your patient into treatment position even while they are settling into position.
  - The patient will then be “close enough” for SGRT to refine the position
  - Use position deltas & video overlay to finalize
- **Beneficial even if still using marks! Start Today!**

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Indexing of Immobilization

Easy to Advanced

Pelvis

Wingboard

Mask

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Indexing of Immobilization

KEEP IT SIMPLE!!!

Pelvis & Abdomen

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Indexing of Immobilization

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Indexing of Immobilization

The couch **IS PART** of the immobilization system!

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Indexing of Immobilization

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Indexing of Immobilization

I can put reference marks anywhere I want!

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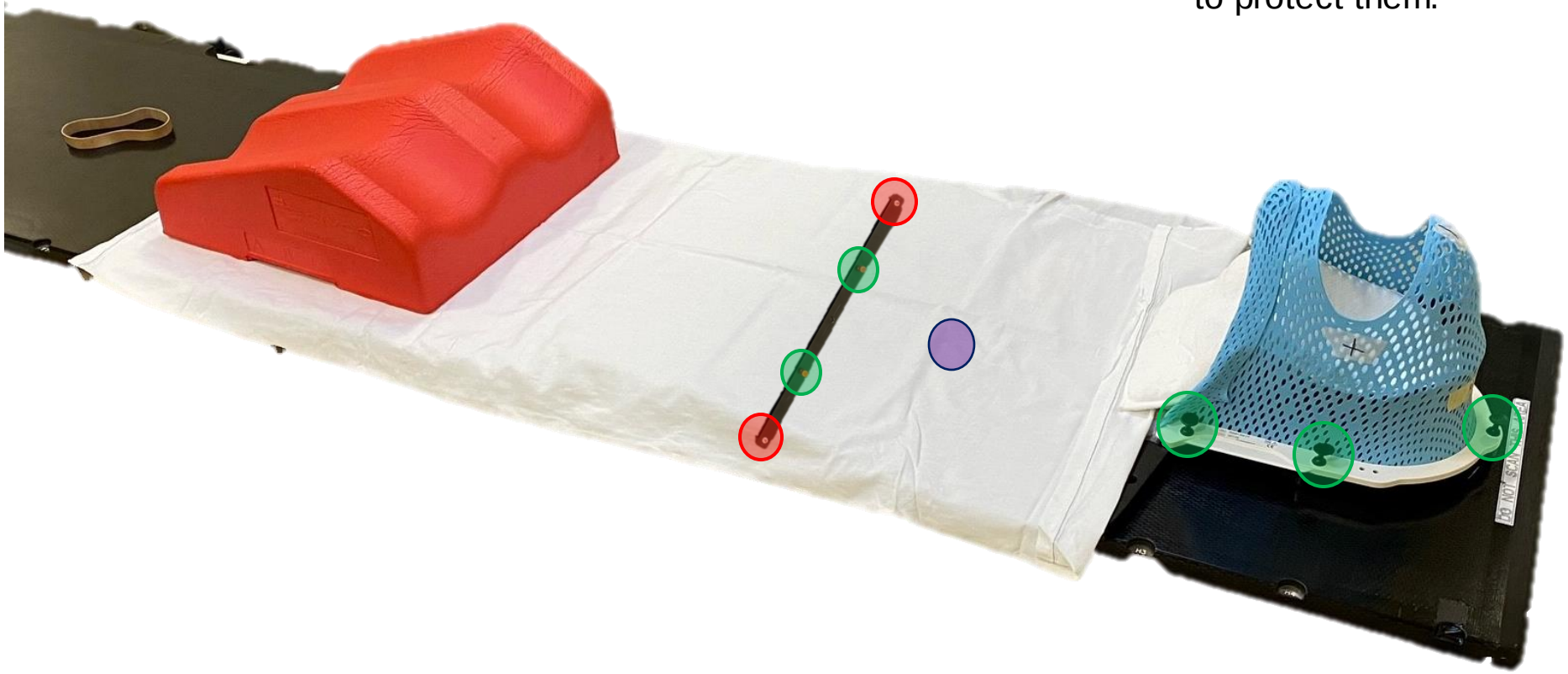
Indexing of Immobilization

Let's put them under the couch to protect them.



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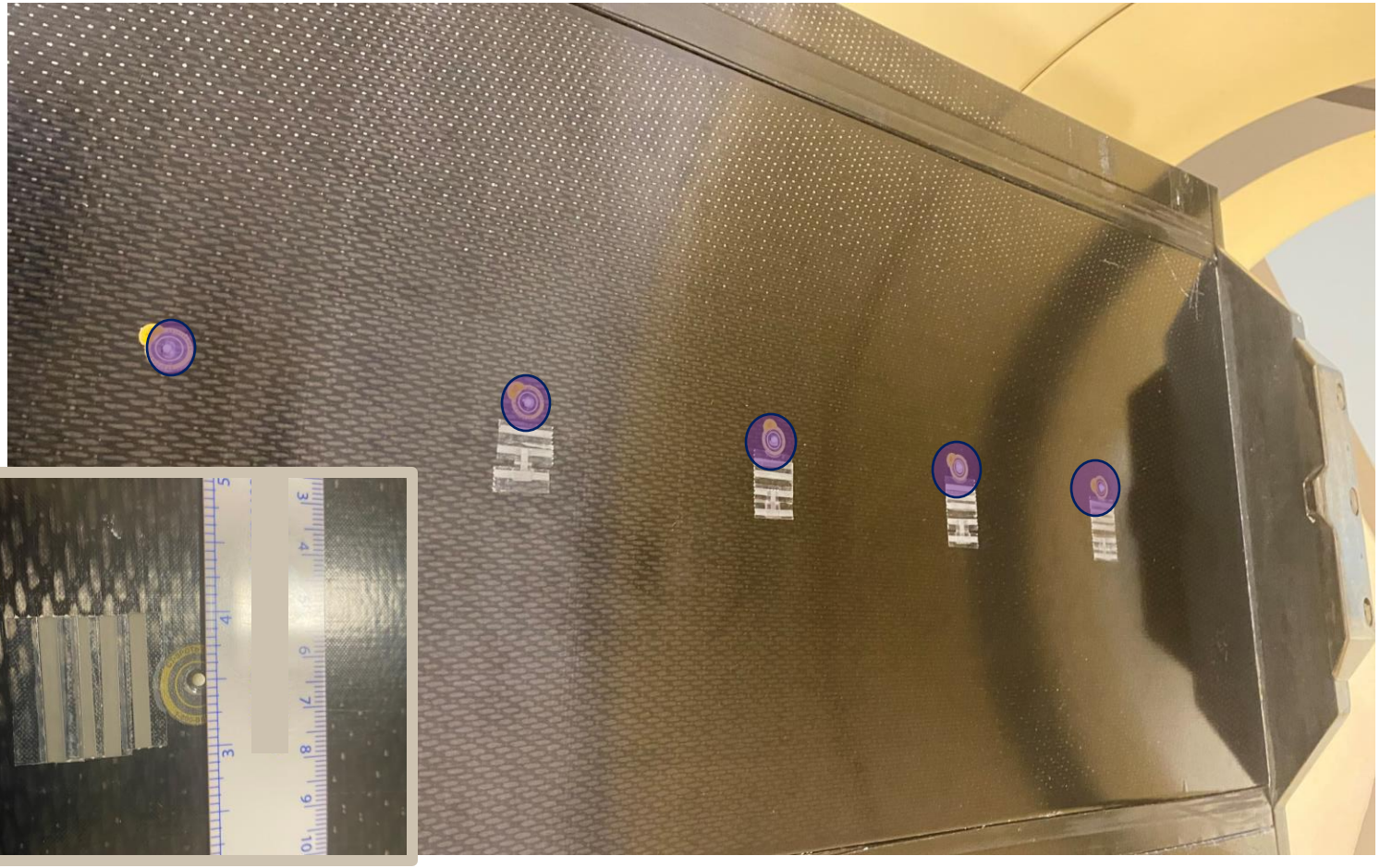

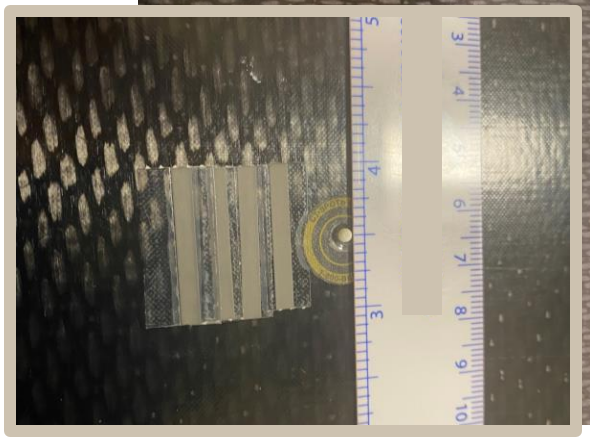

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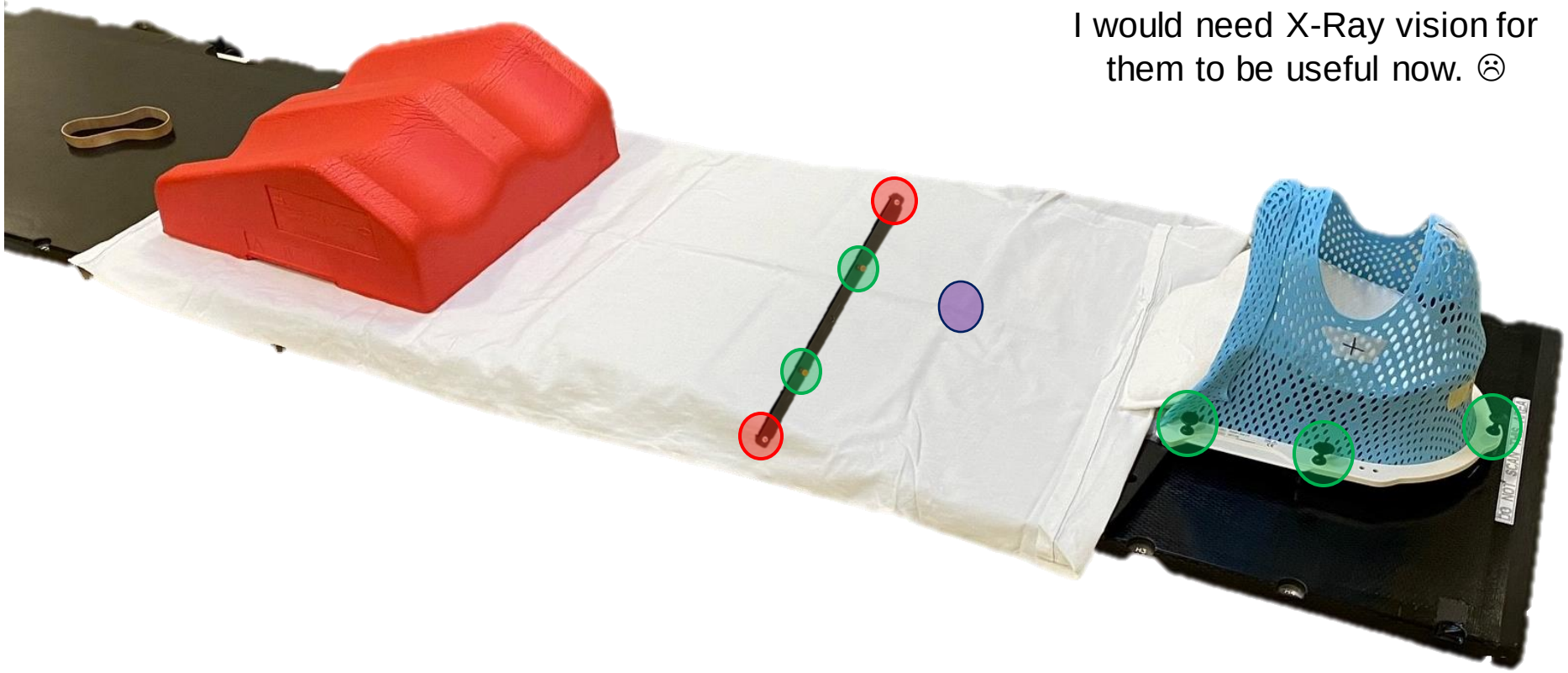
Indexing of Immobilization

But I can't see them anymore!?!

I would need X-Ray vision for them to be useful now. ☹



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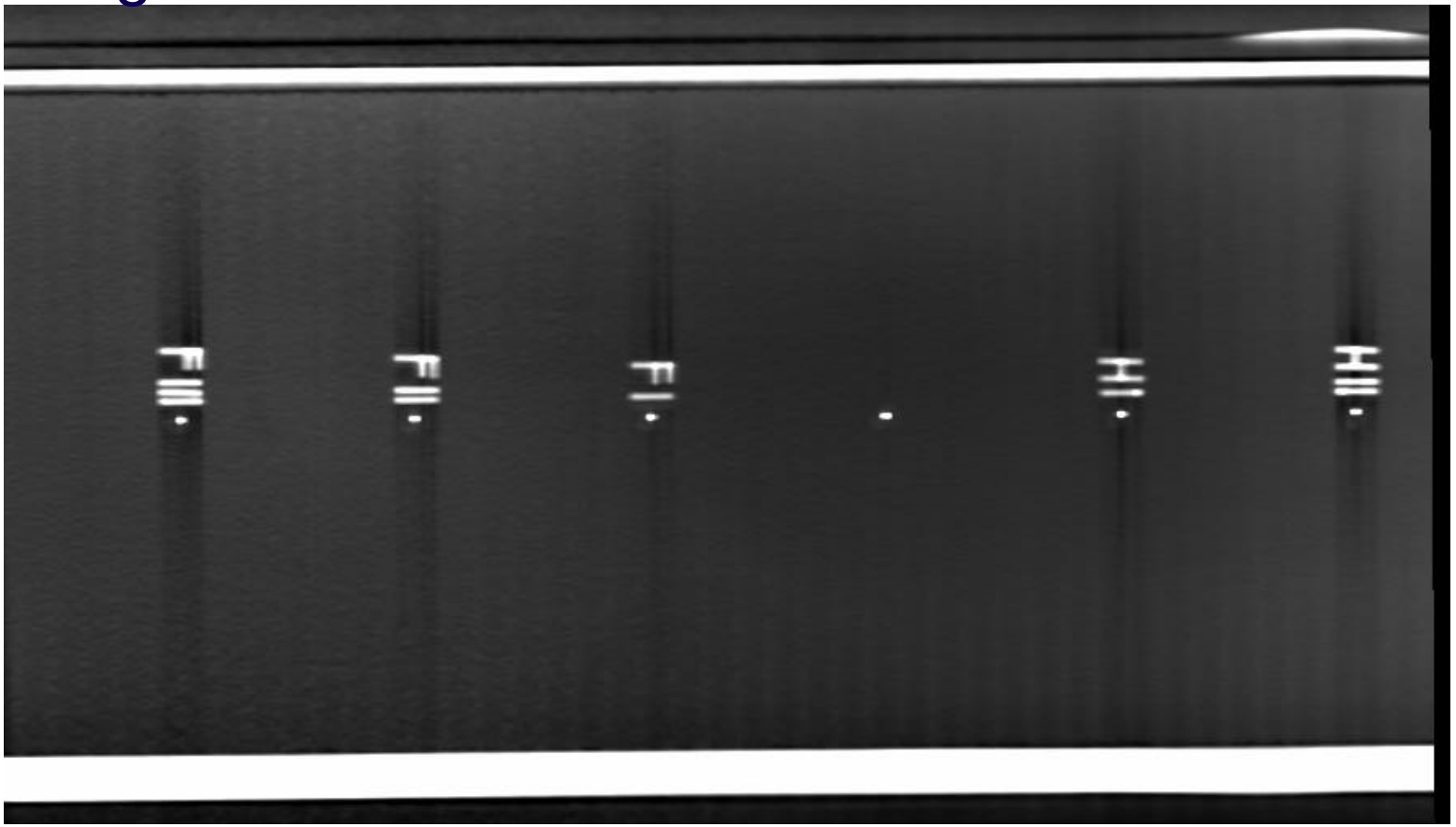
Indexing of Immobilization

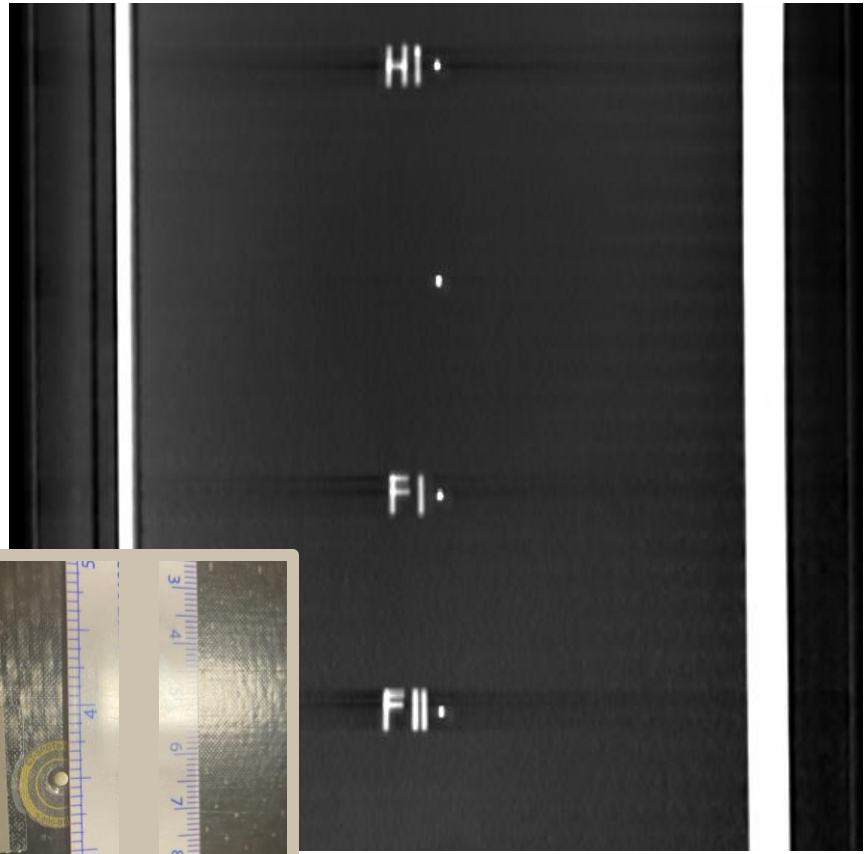


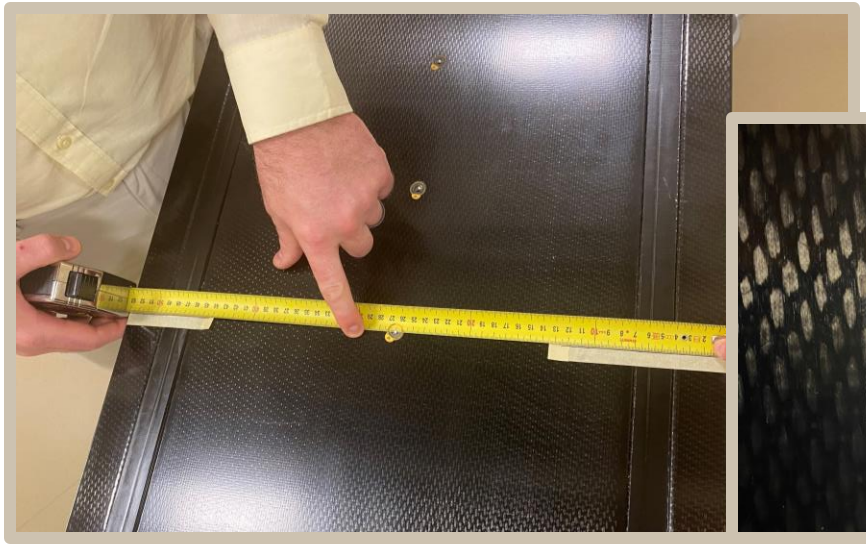
CT image of couch **bottom** with permanent x-ray visible markers that produce minimal artifacts

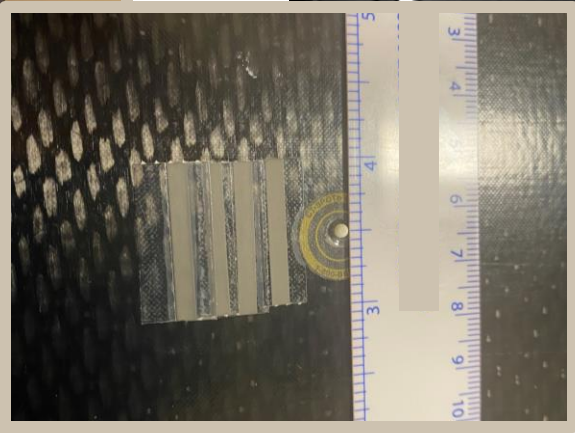
Indexing of Immobilization

RELIABILITY ACHIEVED!

- **ANY** immobilization on top of this couch has permanent refence marks included in the scan with ZERO effort
- **Maximum** freedom at simulation
- **Universal** solution







Predicting Couch Position

SIMPLICITY

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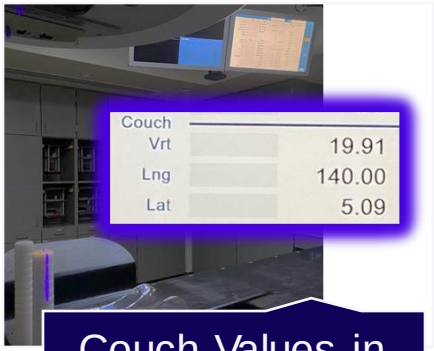
Start With The End In Mind

We need to know where to position the patient/couch **in the treatment room**



Couch Values in Tx Room

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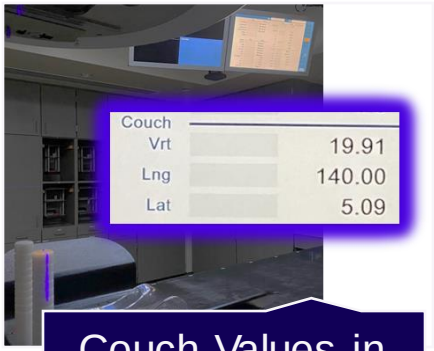

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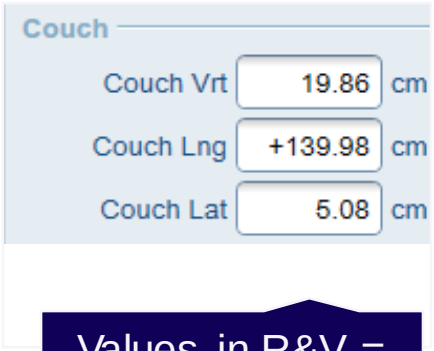
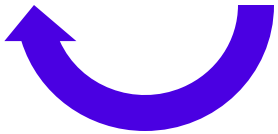


Values in R&V = Couch Position



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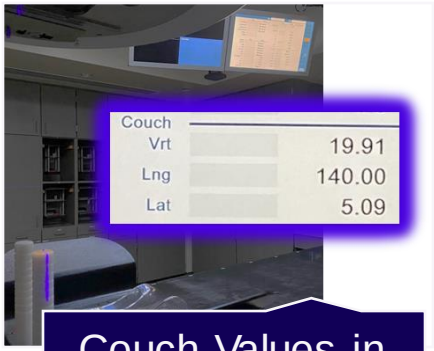

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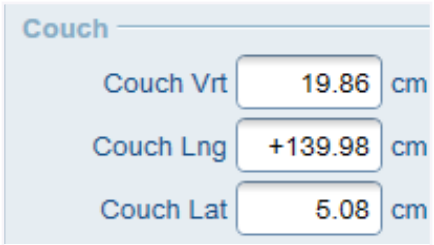

Values in R&V = Couch Position

X [cm]	Y [cm]	Z [cm]
-5.08	-19.86	-139.98

Isocenter in TPS = Couch position

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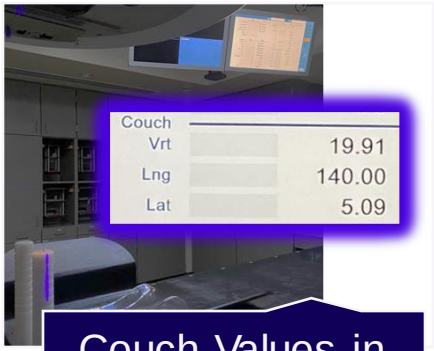
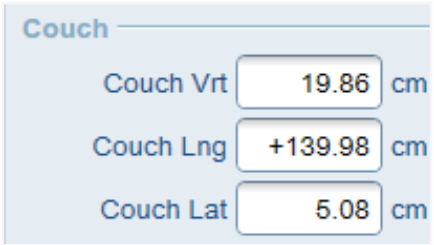
Start With The End In Mind

We need to know where to position the patient/couch **in the treatment room**



Couch Values in Tx Room



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Reference Markers from Sim

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Start With The End In Mind

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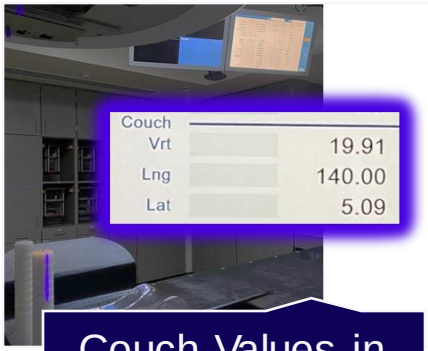
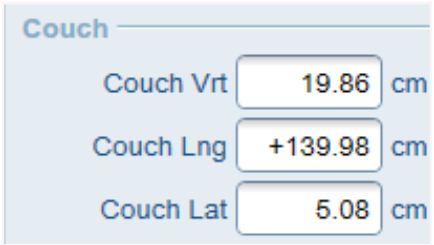


Couch Values in Tx Room



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-5.08	-19.86	-139.98

Isocenter in TPS = Couch position

Reference Markers from Sim

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Its ok to not follow the next 5 slides. If its not for you its ok. These slides are for SOMEONE in your clinic to help implement this workflow. ☺

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Its ok to not follow the next 5 slides!

If you are not the person responsible for setting this up, just relax for 2 minutes.

These slides are for SOMEONE in your clinic to help implement this workflow. ☺

Just write down my email and I can send you this presentation.

Ryan.Hecox@imail.org

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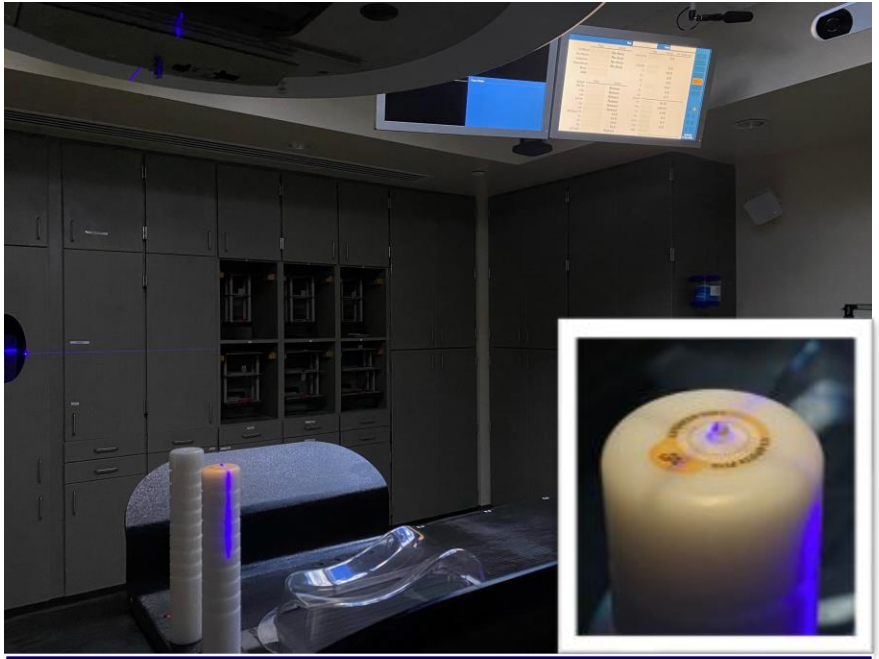
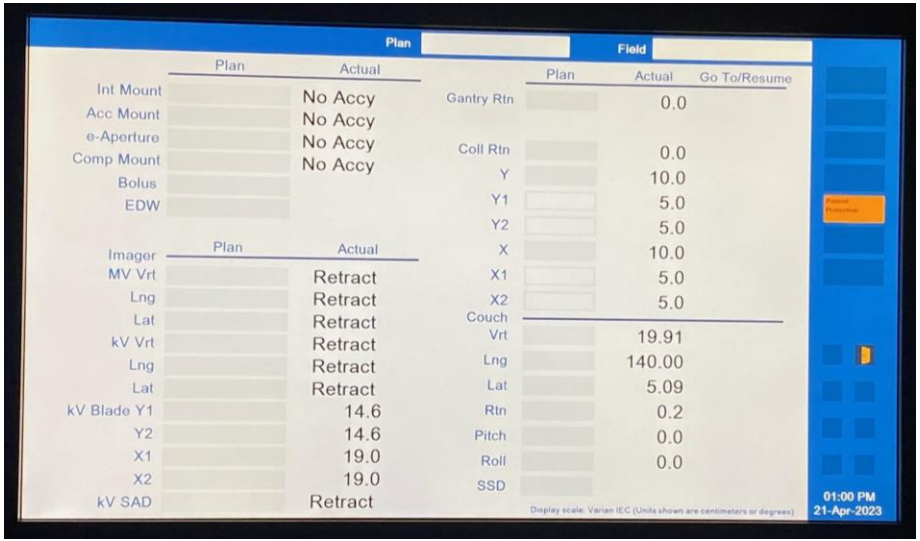
Sim to Treatment Room Conversion Setup



1) Reference object setup at linac isocenter. Index position at ~mid-LNG.



2) Record in-room couch values

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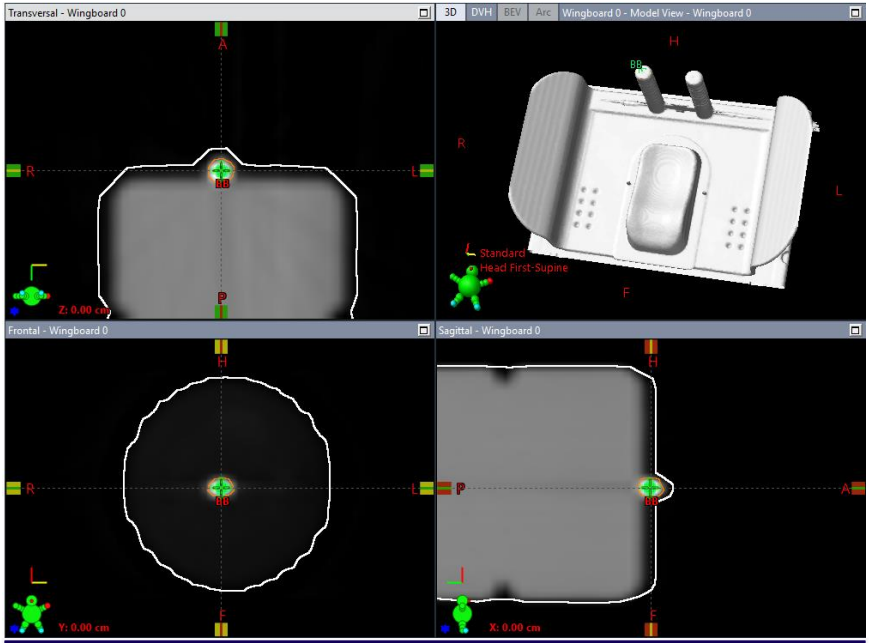
Sim to Treatment Room Conversion Setup

3) Reference object setup at on CT Sim. Position at same LNG index.



4) Import CT and set user origin (0,0,0) at reference object, add marker at this point

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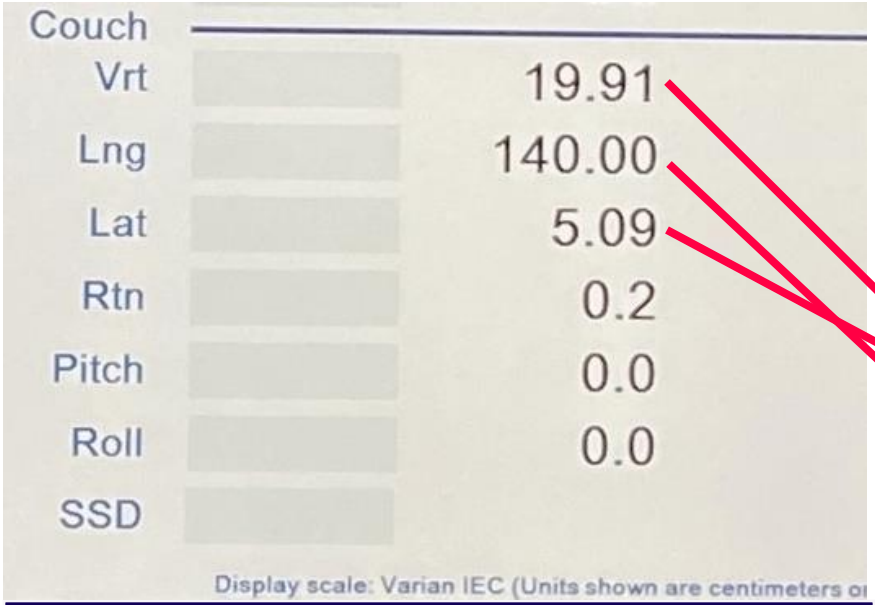
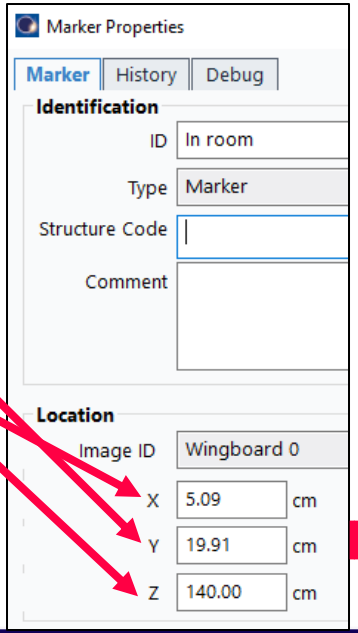
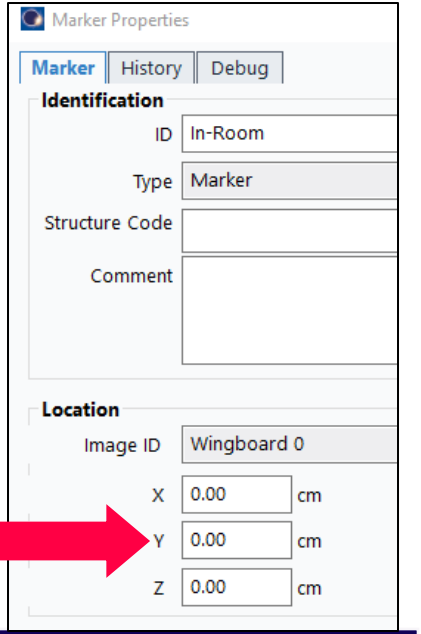
Sim to Treatment Room Conversion Setup



5) Recall treatment room couch positions





6a) Add marker with coordinates of treatment room couch
6b) Set this marker to be the user origin (0,0,0)

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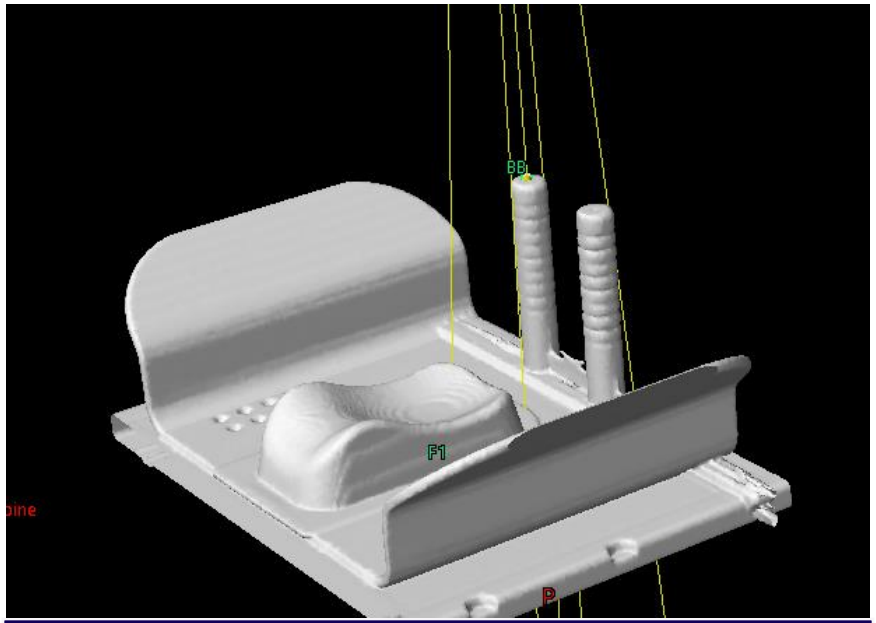
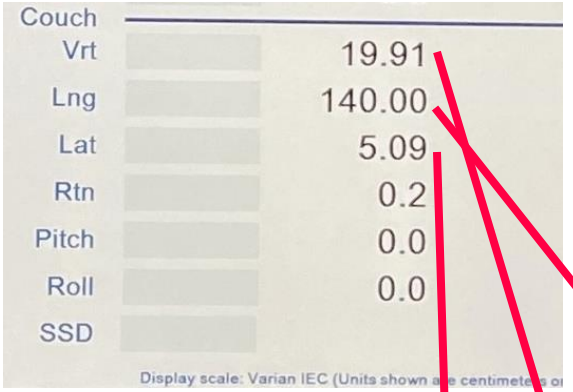
Sim to Treatment Room Conversion Setup



7) Create beam with isocenter on your reference object



Field ID	Technique	Machine/Energy	X [cm]	Y [cm]	Z [cm]
Field 1	Static-I	UVTB1 - 6X	-5.08	-19.86	-139.98

8) Verify the coordinates of the beam isocenter now match your treatment room couch values

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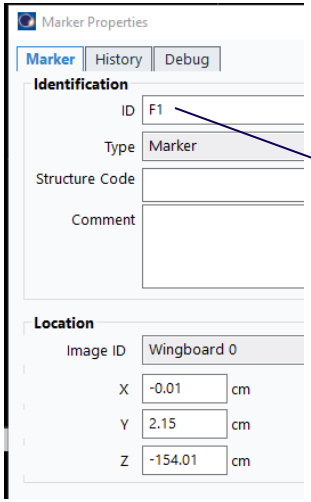
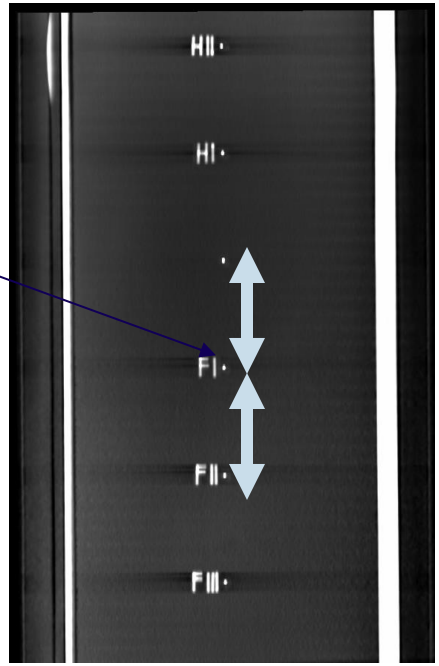
Sim to Treatment Room Conversion Setup





9) Extract values of under-table bbs
Note only LNG changes for each mark

X = 0

Y = -2.2

Z =

H4	84
H3	98
H2	112
H1	126
0	140
F1	154
F2	168

10) Create table that is the INVERSE of these values.

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Come Back Now!

Its time for the payoff

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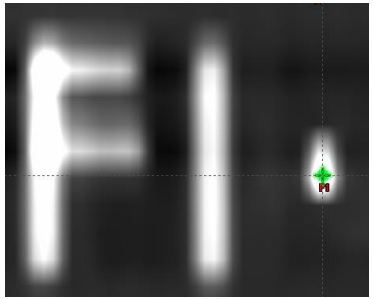
Sim Process

SIMPLICITY ACHIEVED!

1. Focus on immobilize and scan
   - **Scan is done = Patient is done**
   - **15 minutes in-room at sim**
2. Import CT into TPS
3. Pick **ANY** under table marker and set it as user origin



4. Create Linac Origin marker located at previously determined values:

X = 0

Y = -2.2

Z =

H4	84
H3	98
H2	112
H1	126
0	140
F1	154
F2	168

5. Set Linac Origin marker to be the user origin. All beam isocenter coordinates are now couch positions

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Eliminate Unnecessary Steps & Focus On Your Patient

SIMPLICITY

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- **No** setting isocenter at Sim
- **No** aligning bbs stickers with lasers
- **No** training on CT Sim software or laser software needed
- **No** sending in laser coordinates
- **No** motion concern between scan and making marks/tattoos
- **No** marking or tattooing
  - **Zero chance for needles stick injury(!!!!)**
- **No** time spent doing "computer work" with your patient in an uncomfortable position
- **No** laser QA for sim to perform each day
- **No** laser QA for physics to perform monthly
- **No** expense of laser system for future CT sim purchase

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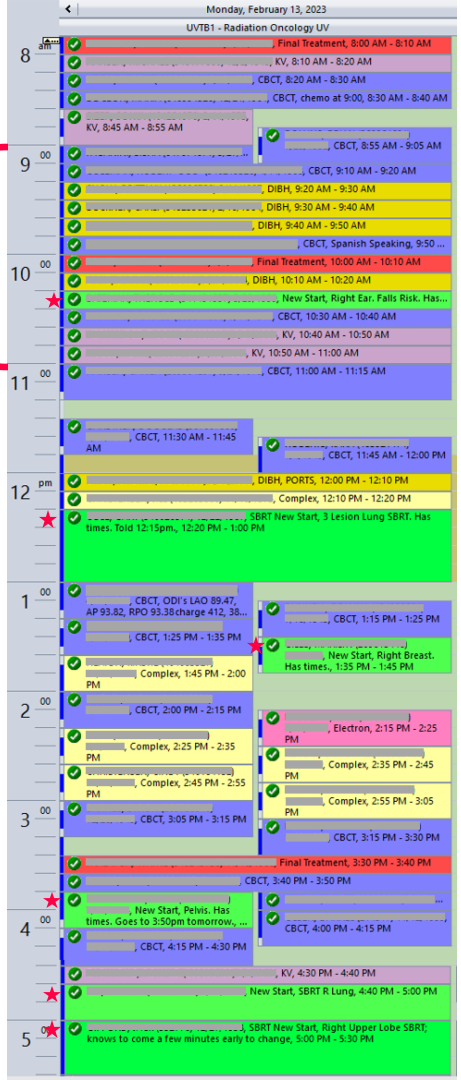
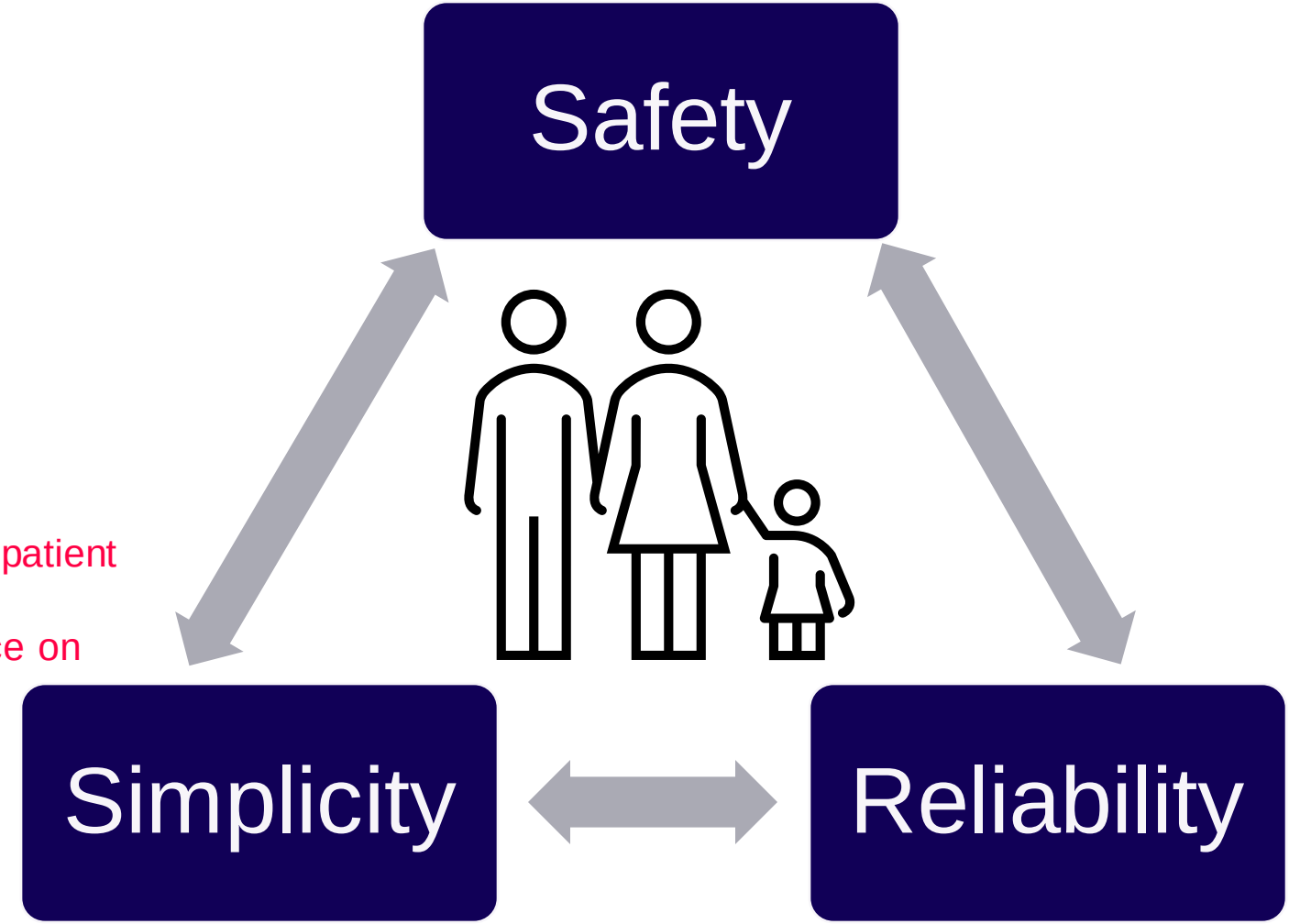
Reap the Rewards at Treatment Too!

- 47 pts 8-5:30/ 9.5 hours
  - CBCT/SBRT/DIBH/….
  - 6 new starts
  - 3 Lesion SBRT new start in 40 min
  - 12 pt in 120 minutes including 4 DIBH and 1 new start

- New starts go as quickly & easily as a well-established pt
  - Everything is already known
- Every case, every day follows the same routine.
  - Setup immobilization->position patient on couch->auto-go->SGRT->IGRT->treat

- **Therapists spend all their focus on pt setup & image alignment.**
  - Every action is meaningful and getting the patient closer to the optimal position
  - This level of efficiency comes from putting our patient's treatment quality above all else, **not** cutting corners
  - Be willing to learn and let go of past methods
- Provides acceptable backup setup in cases where SGRT is not available.





- Focus on patient
- No marks
- No reliance on lasers

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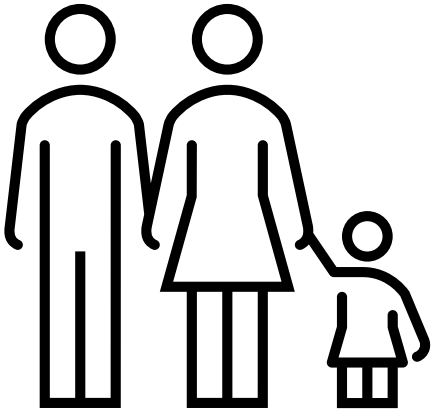
Safety



- Focus on patient
- No marks
- No reliance on lasers

- Universal process
- No user variability
- No calculations

Simplicity

Reliability

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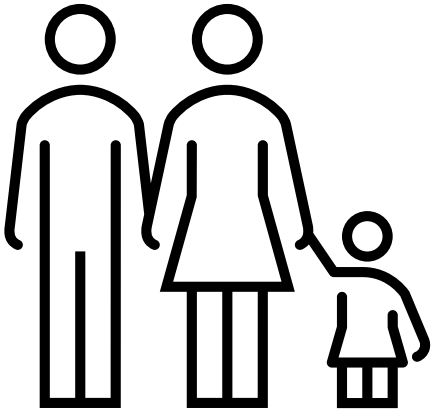
- **Consistent** start & treat process
- **Obvious** if anything is incorrect
- **Redundancy** with couch values & SGRT surface

Safety



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Simplicity

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Questions?

Ryan.Hecox@imail.org

Questions?

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