VARIAN REAL-TIME POSITION MANAGEMENT SYSTEM OVERVIEW – VERIFICATION OF MARKER BLOCK POSITION AFTER TREATMENT COUCH SHIFTS

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TYPES OF MOTION MANAGEMENT

Object tracking

Surface tracking

PATIENT MOTION AND POSITION MANAGEMENT

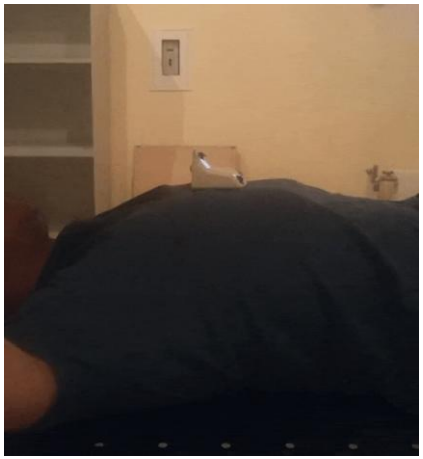
What do we expect from a motion and position management system:

- Ensuring that the patient does not move after position verification.
- Control of patient motion (breathing and position) during couch travel.
- Control of patient motion (breathing and position) during beam on.

DEEP INSPIRATION BREATH HOLD (DIBH) USING RPM

Real time position management system (RPM):

- Lets us manage respiratory motion.
- Used in DIBH treatment, tracks and controls the beam using vertical position of the marker.



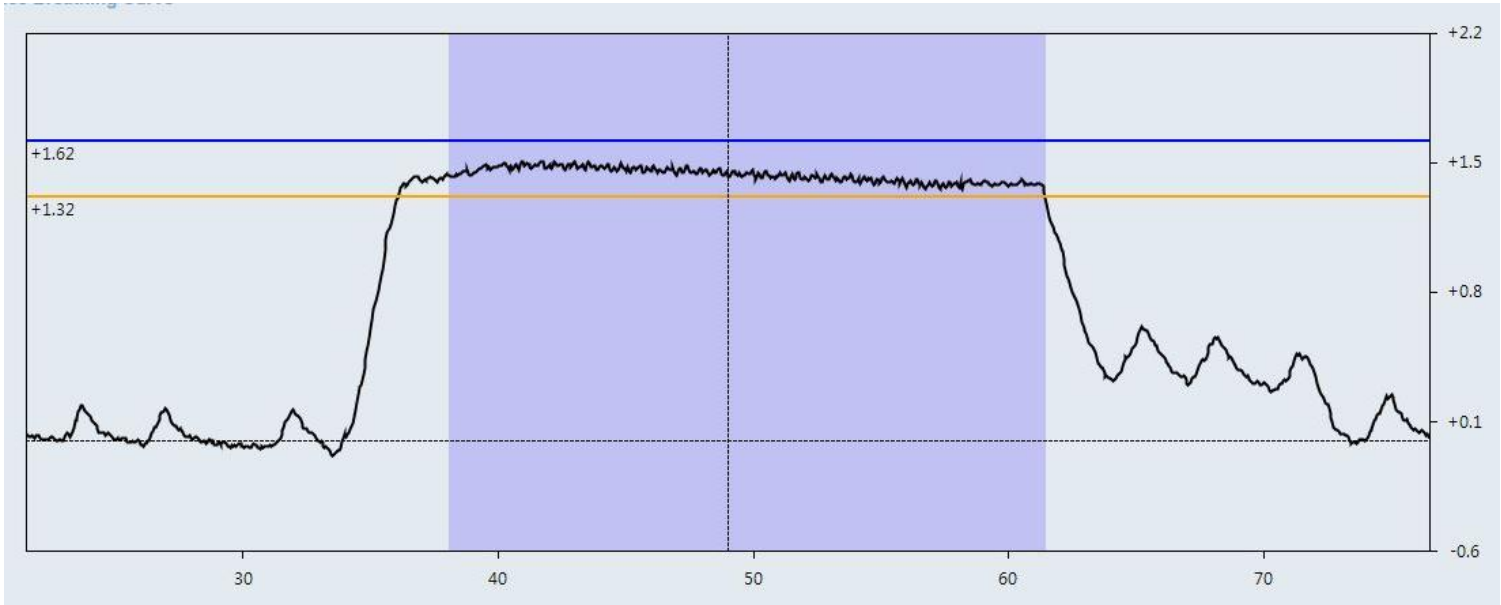
DEEP INSPIRATION BREATH HOLD (DIBH) USING RPM

Phase One:

- Tracking of regular patient breathing.
- Baseline and breathing pattern acquisition.

Phase Two:

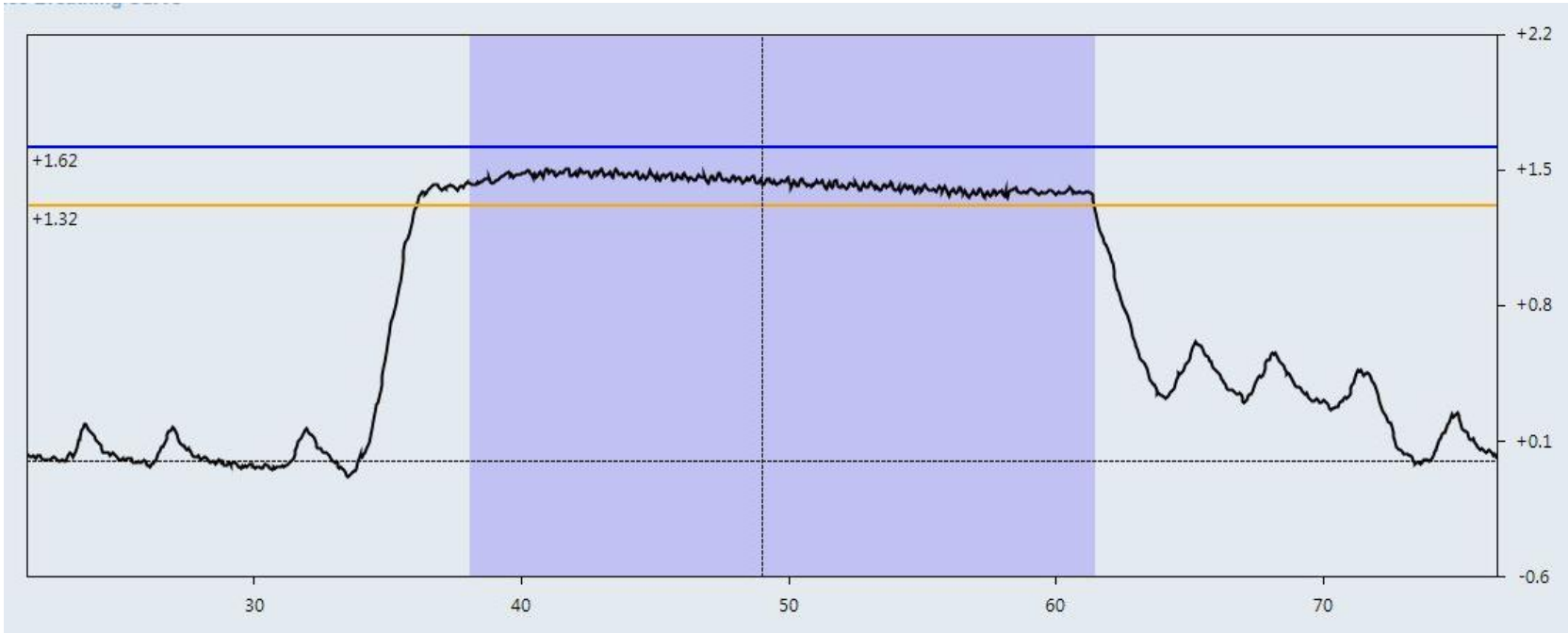
- Deep inspiration and hold. Then exhale and return to baseline



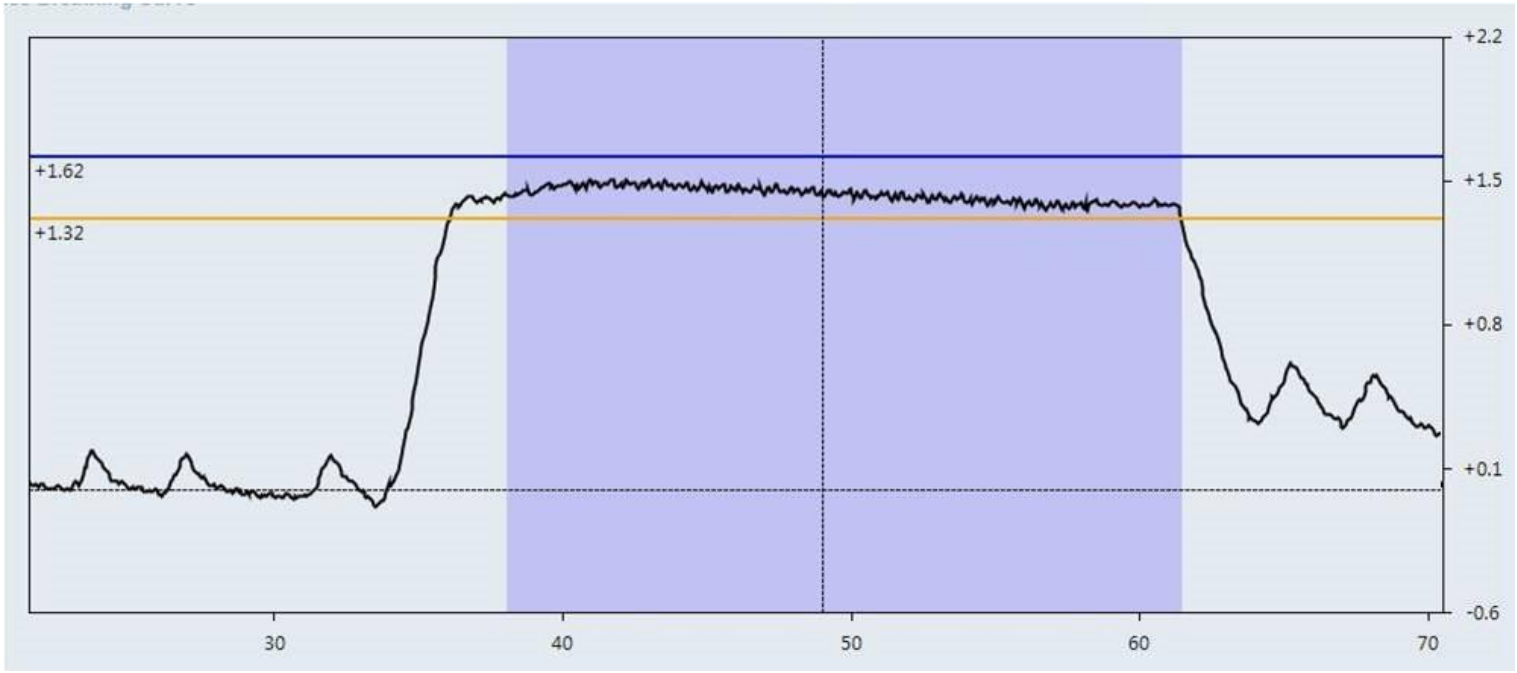
DEEP INSPIRATION BREATH HOLD (DIBH) USING RPM

3 main parts of DIBH gating:

- Relative baseline.
- Absolute vertical breathing thresholds.
- Vertical marker position represents the patient breathing curve.



PROBLEM WITH RPM



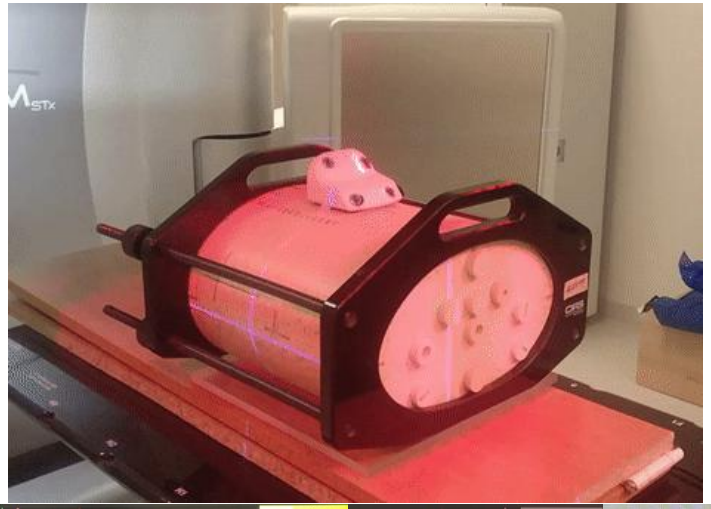
•What happened to the patient breathing curve?

• What happens if we move the couch?

Automatic restart–> New relative baseline–> Same absolute thresholds –> Automatic restart–> …

Problem: What if the patient or marker actually moved during the couch travel?

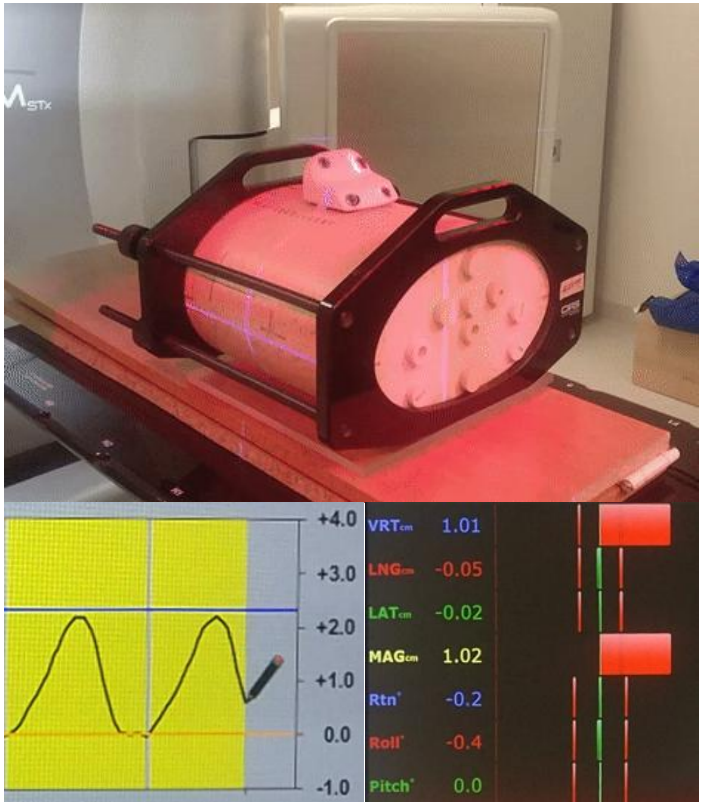
- Using both RPM and OSMS we monitor the marker position.
- The phantom moves with a regular amplitude.
- The goal – to check if we can spot a position change (1cm vertical) with any system after couch moves.



Problem: What if the patient or marker actually moved during the couch travel?

What will we see, when we move the couch?

- According to RPM – we can treat the patient.
- According to OSMS – patient is in the wrong position – we cannot treat the patient.



CONCLUSIONS

- Using Varian RPM we cannot reliably monitor the change in patient or marker position, if it happens during couch travel.

- If patient breathing pattern (esp. expiration) changes before or during couch motion and the RPM restarts – we are missing our planned and matched thresholds and therefore – the target (tumor).

- There is nothing more important than a correct baseline in DIBH.

CAN WE DO BETTER?

RECOMMENDATIONS

1. Good patient selection and instruction protocols!

2. Staff that knows not only how the system works, but also why and when it doesn't.

3. An additional patient tracking system.

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QUESTIONS, THOUGHTS, COMMENTS?