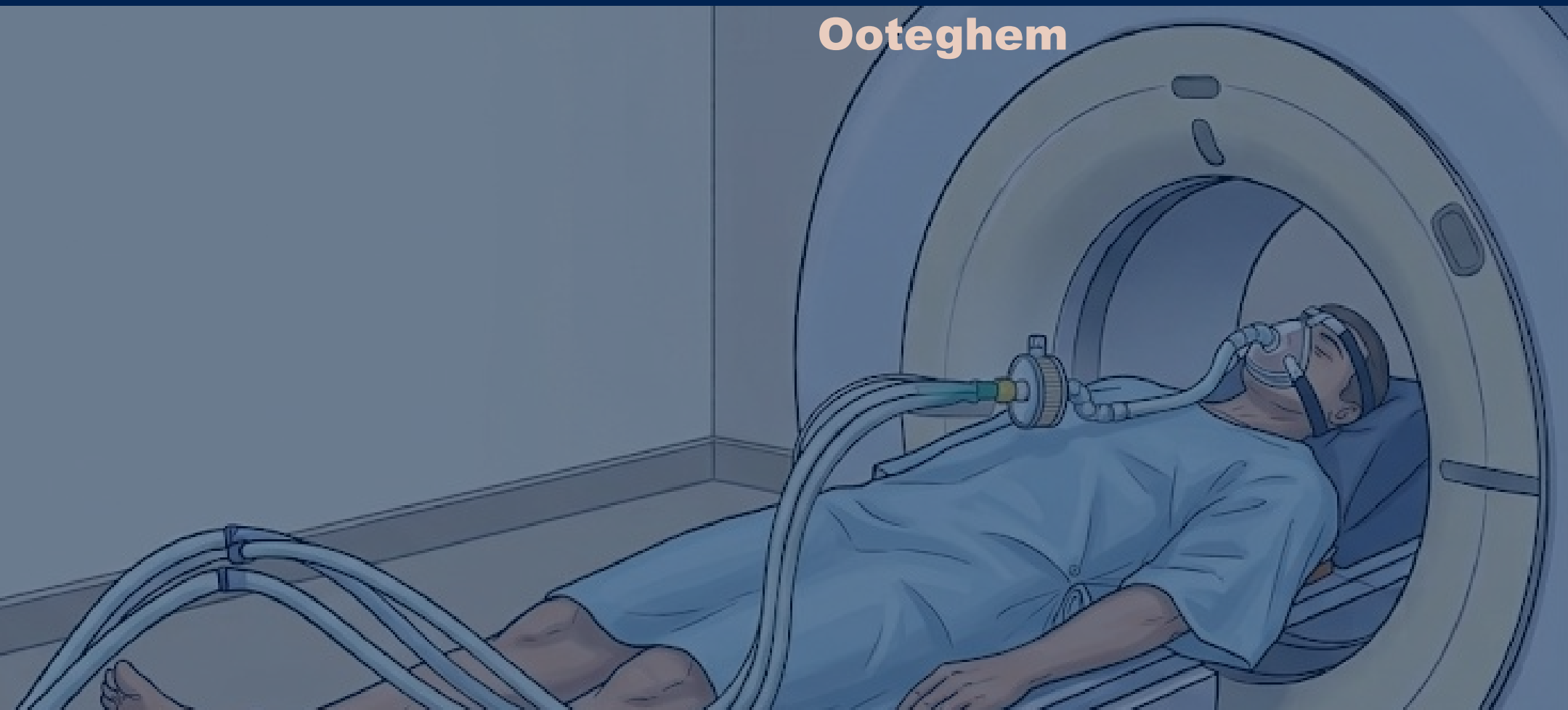
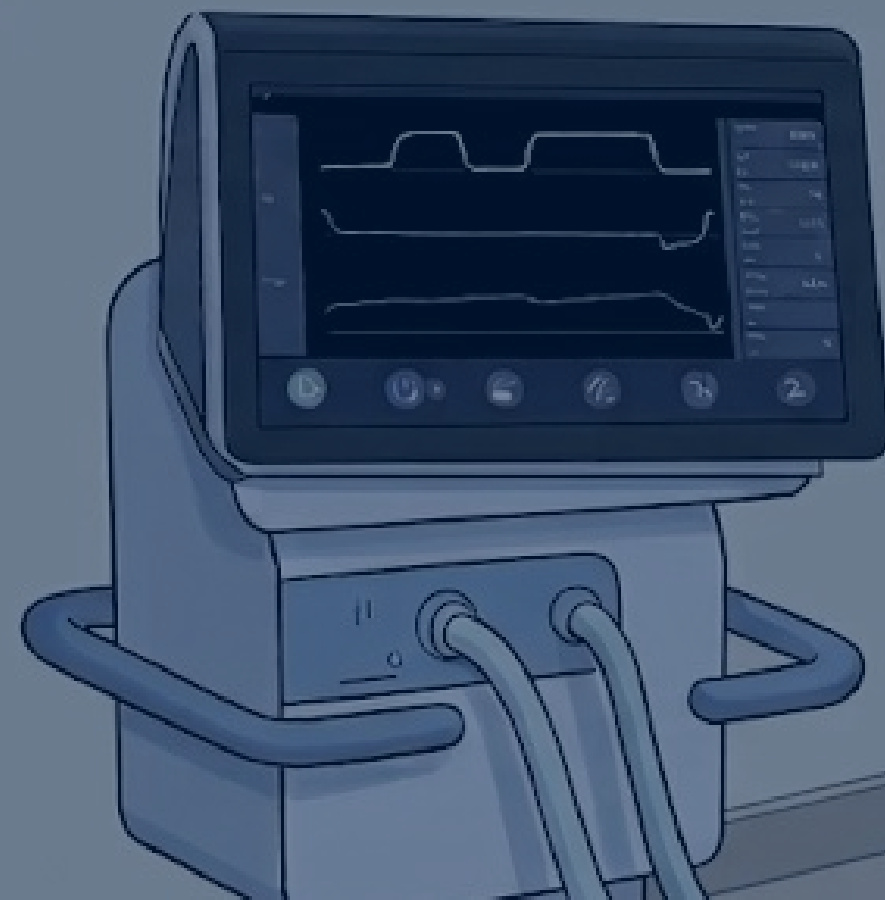
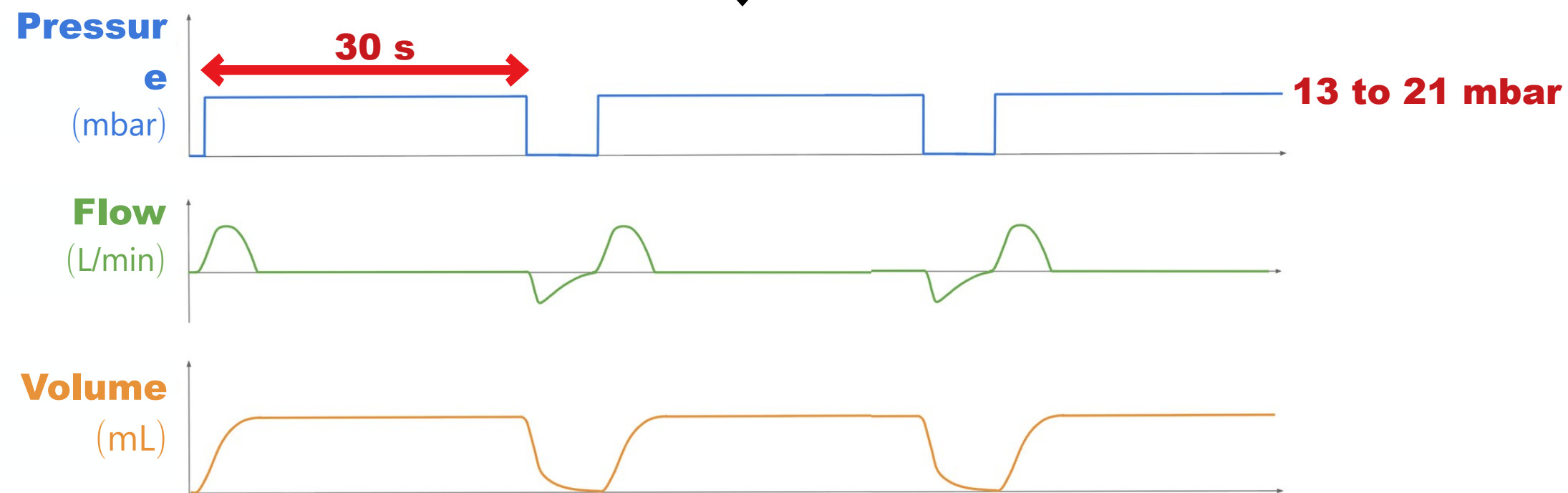
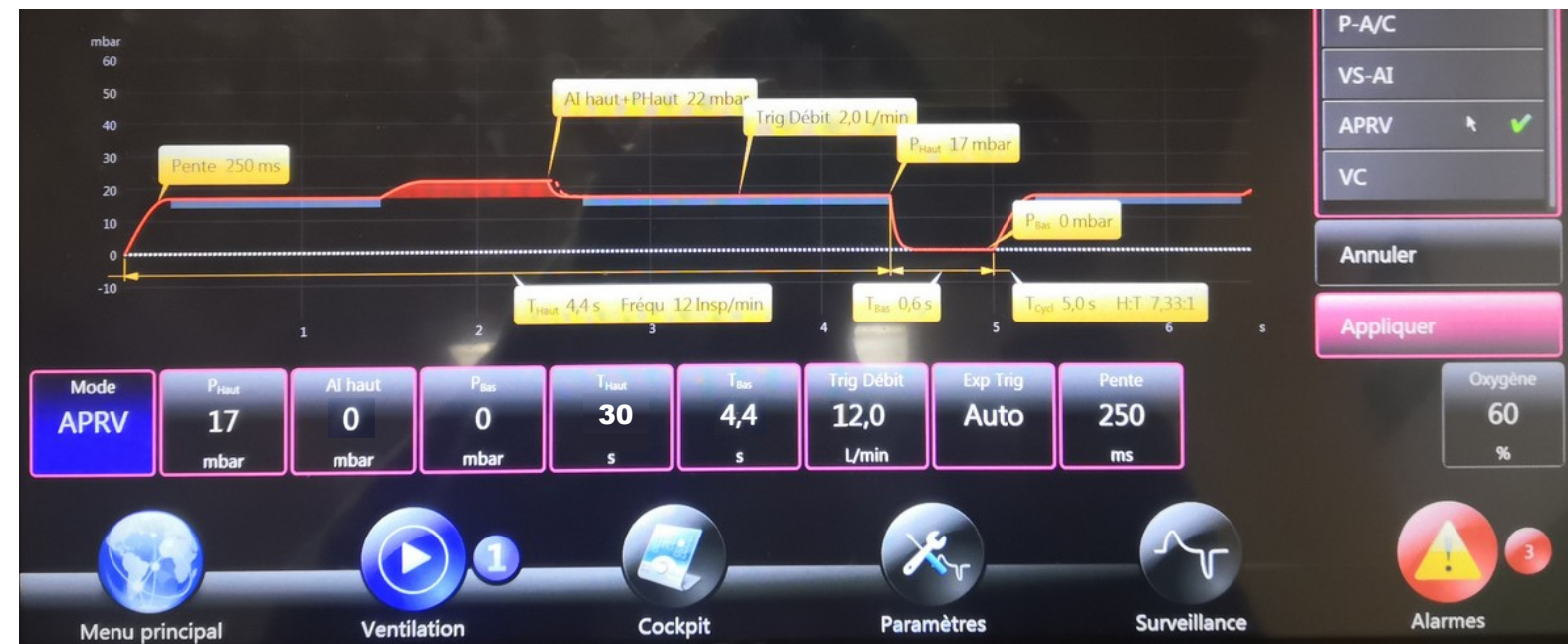
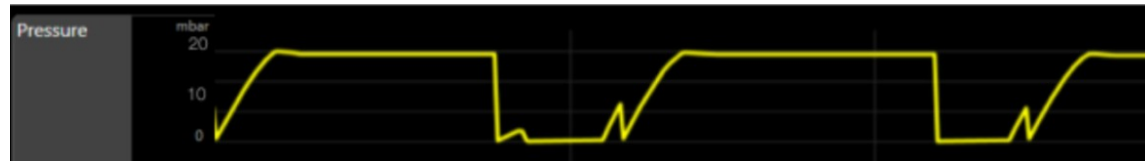


# Tumor Position Stability with MANIV-DIBH: Is Repeated Intra-Fraction Imaging Necessary?

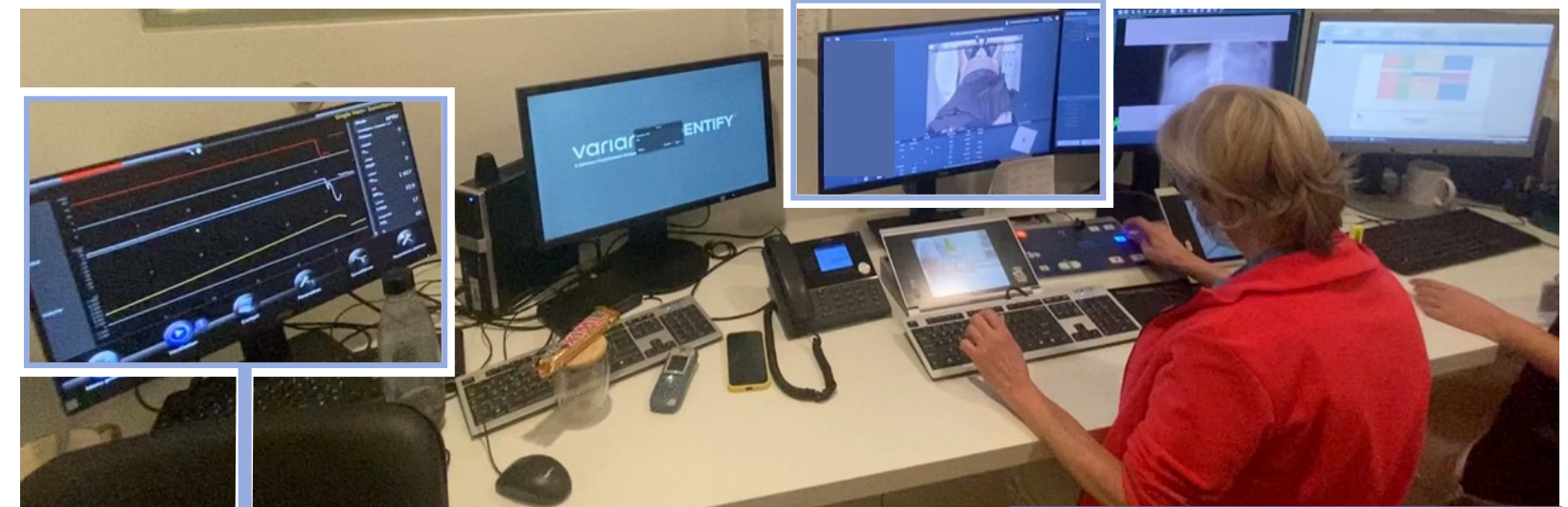
Alicia Hidoud, Nicolas Audag, Geneviève Van  
Ooteghem







**Patient monitoring**

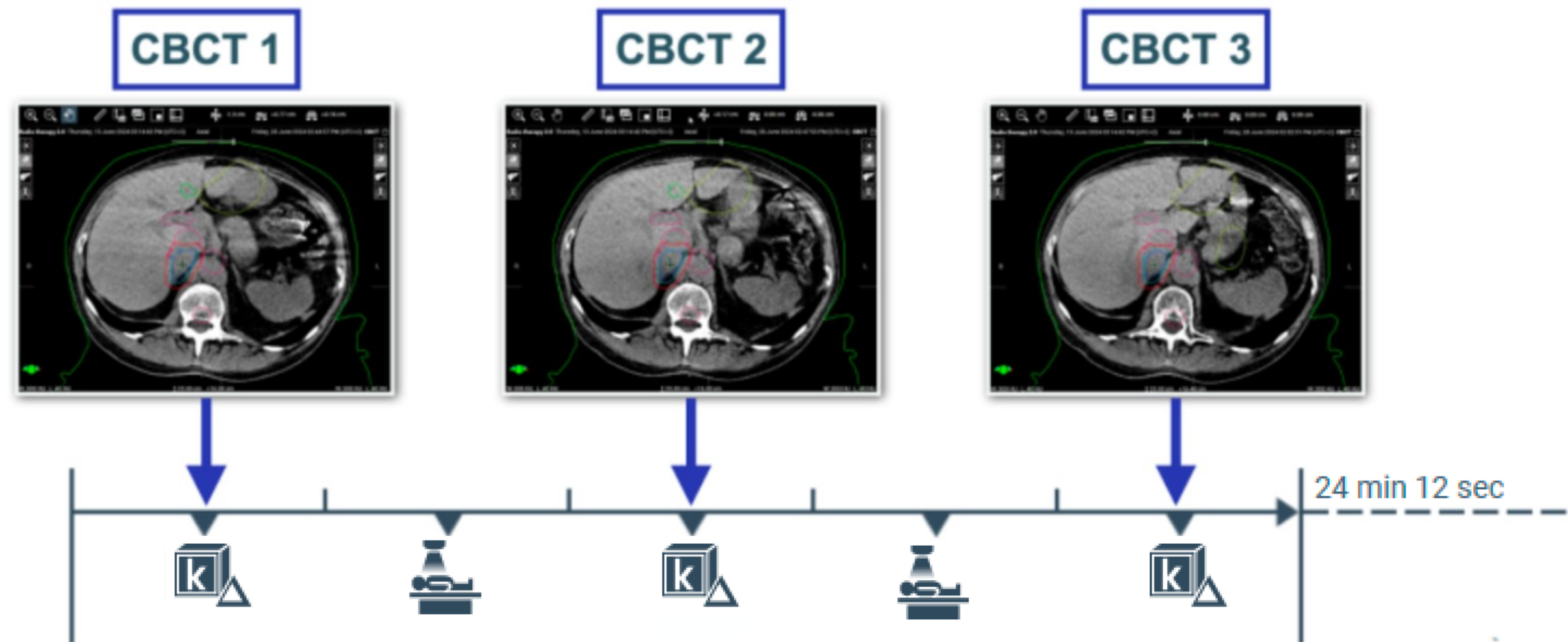


**RTTs control room**



**Ventilator monitoring**

### Overview of a Single SABR Treatment Workflow with Associated CBCT Acquisition Timing



**Inclusion criteria :**

- **All patients treated between:**



**May  
2022**

**January  
2026**



- **SABR: 3 to 5 fractions**
- **Conventional RT: first 5 fractions**

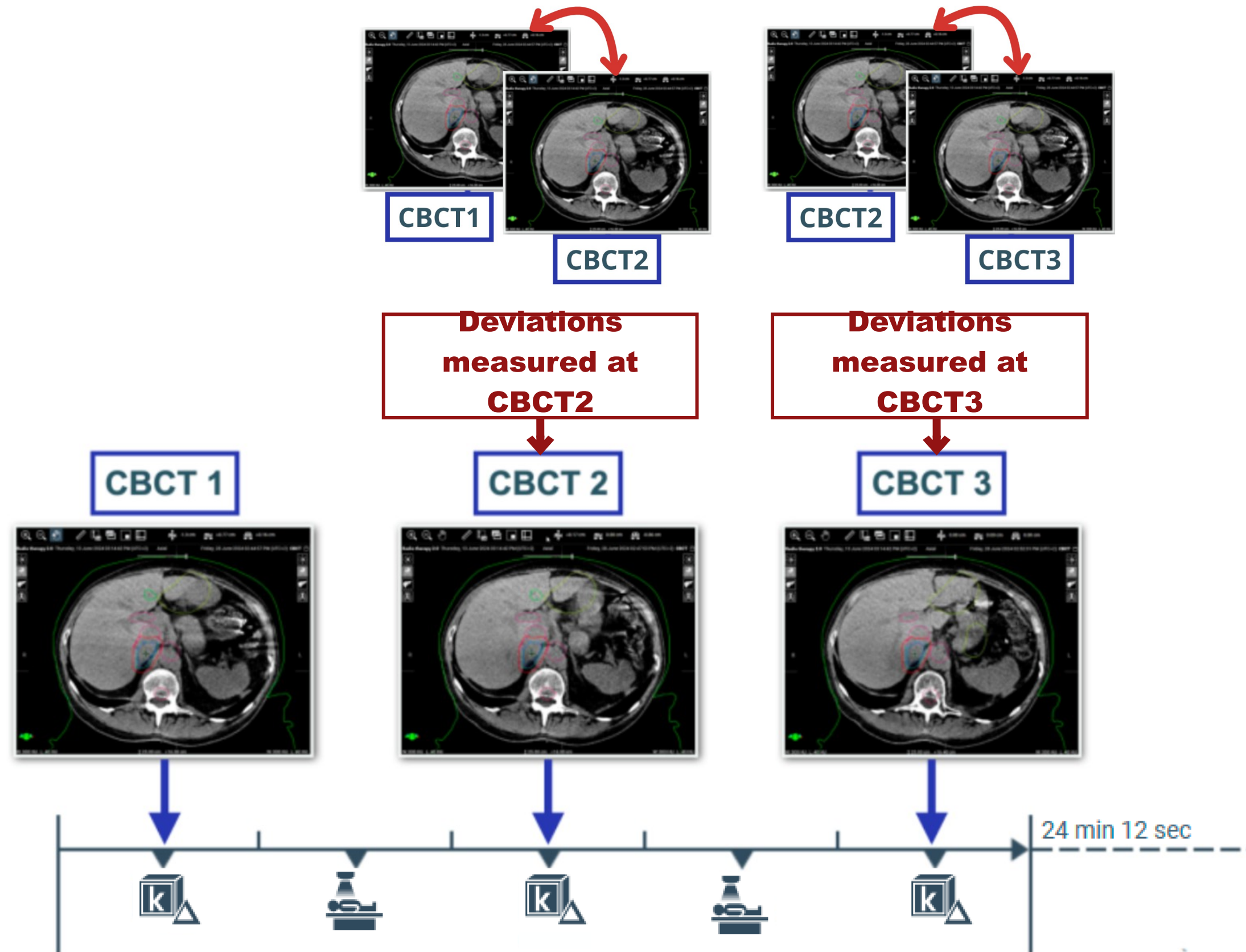


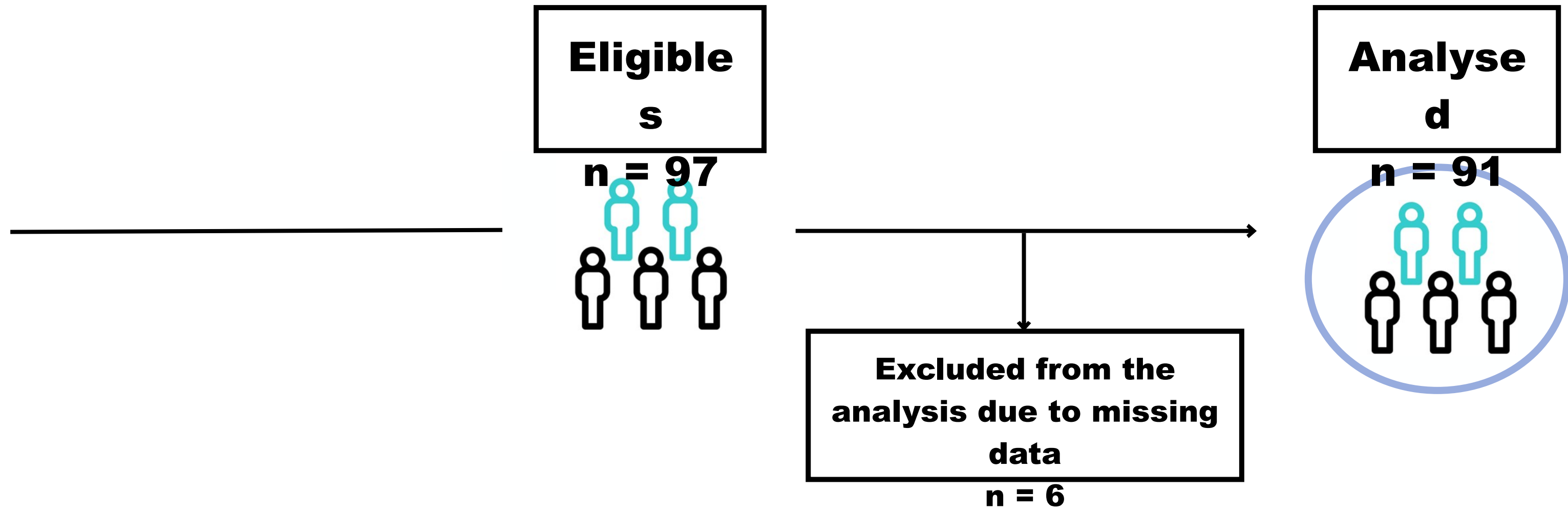
- **With MANIV-DIBH**

**Exclusion criteria :**

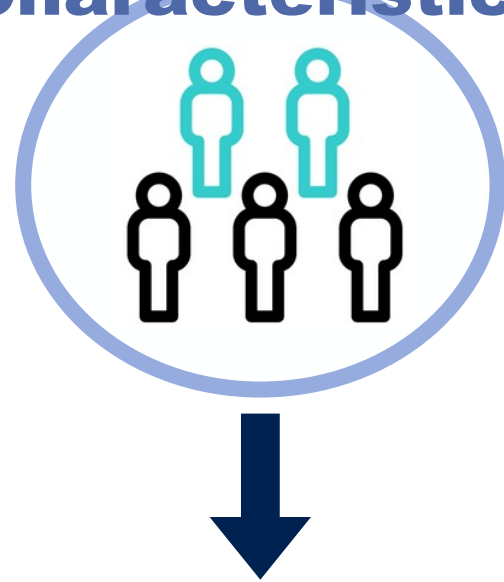


- **No retrievable deviation in the databases**
- **< 3 retrievable measurements per axis on CBCT were excluded from CBCT analyses of mean population deviation and V3D**



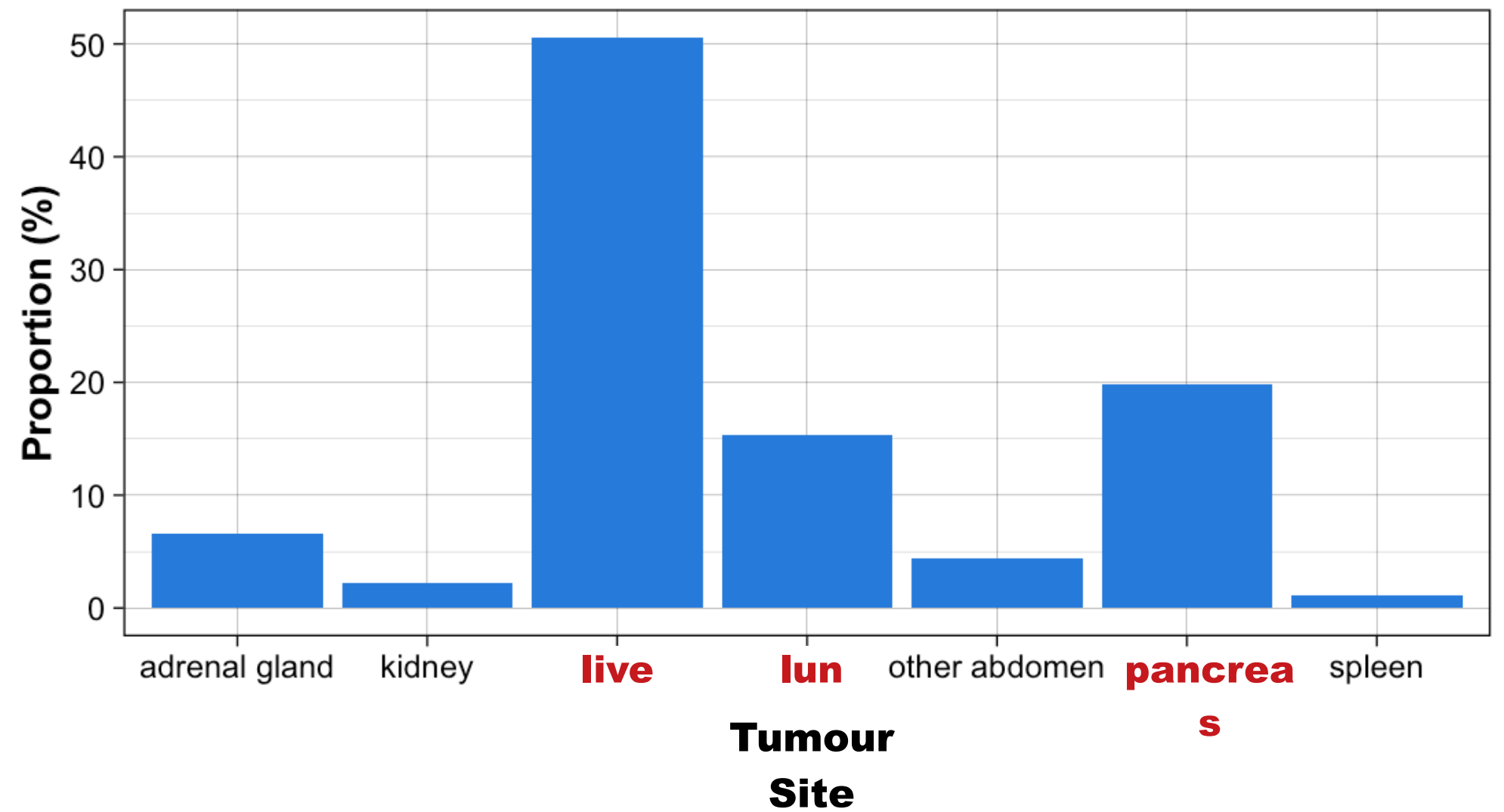


### Sample Characteristics



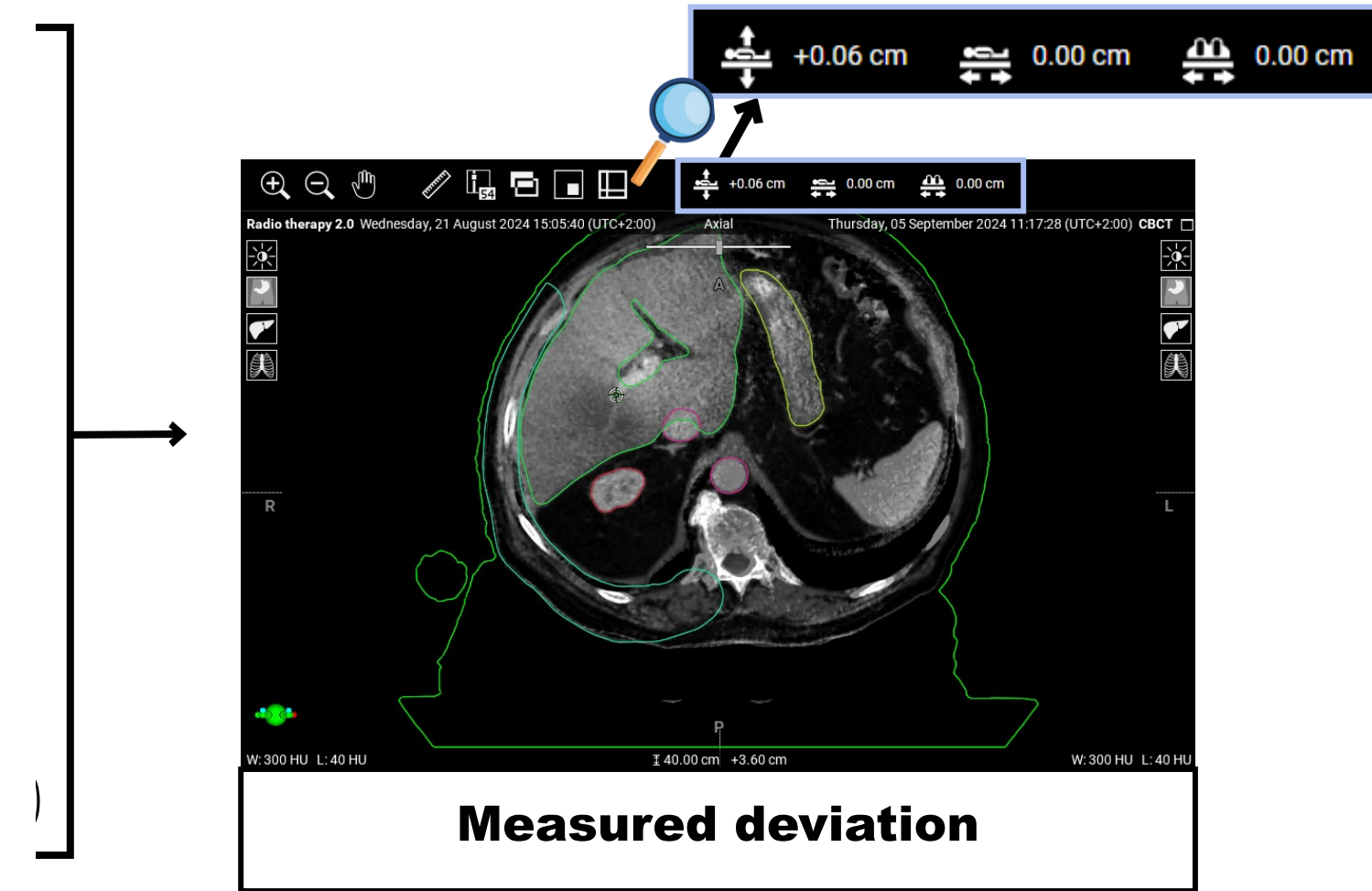
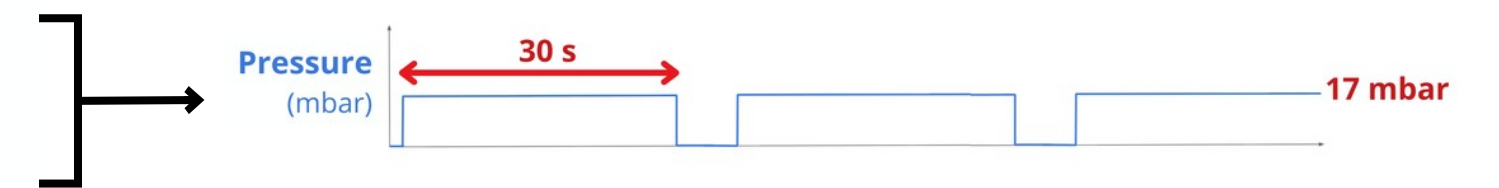
- **31/91 females (34%)**
- **Age : 68.4 ±13.2 years**
- **BMI : 25.9 ±5.1 kg/m2**
- **Ecog : 0 (IQR[0:1] ; max = 3)**

Distribution of tumor locations in the sample

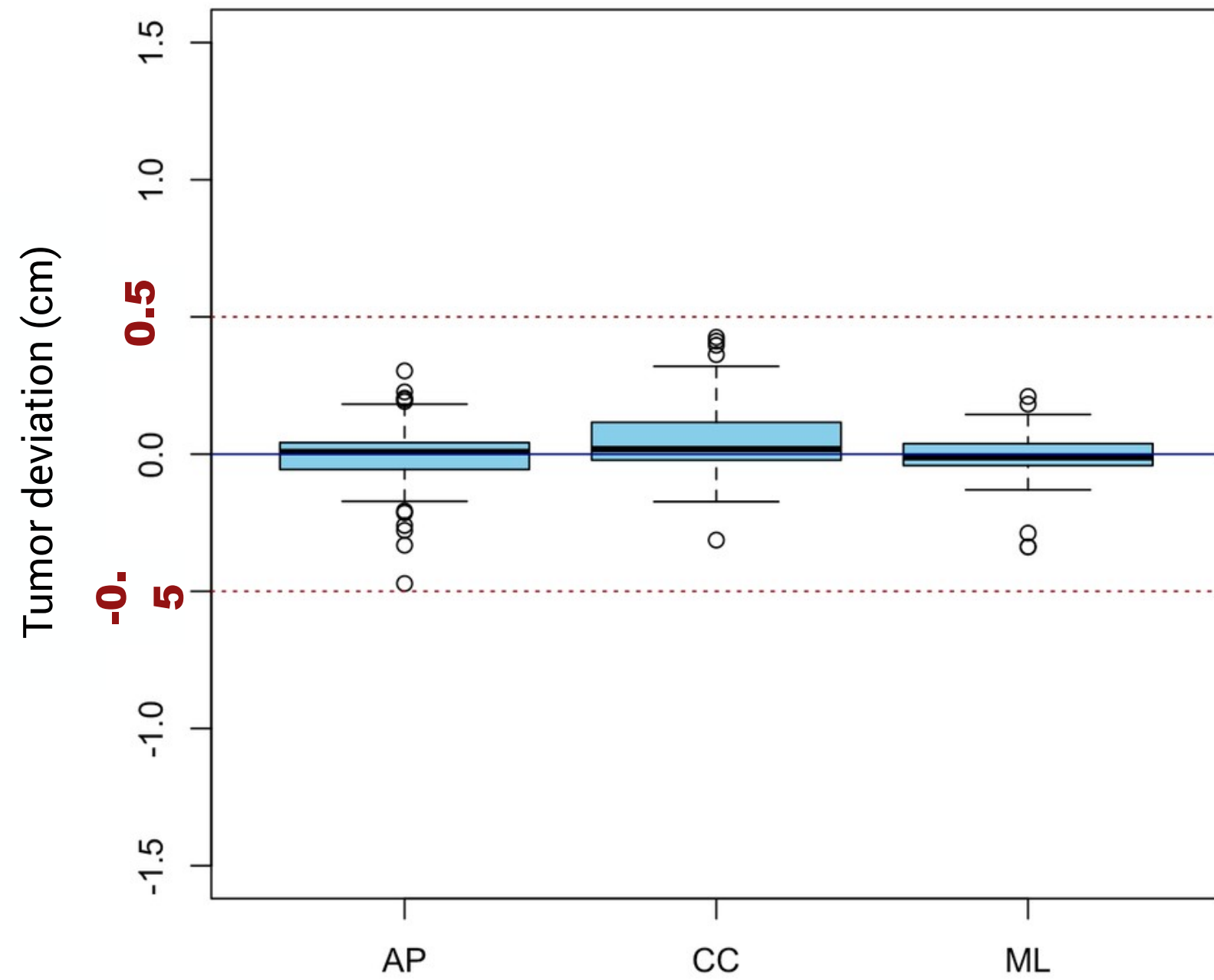


**Tumour deviations analysis:**

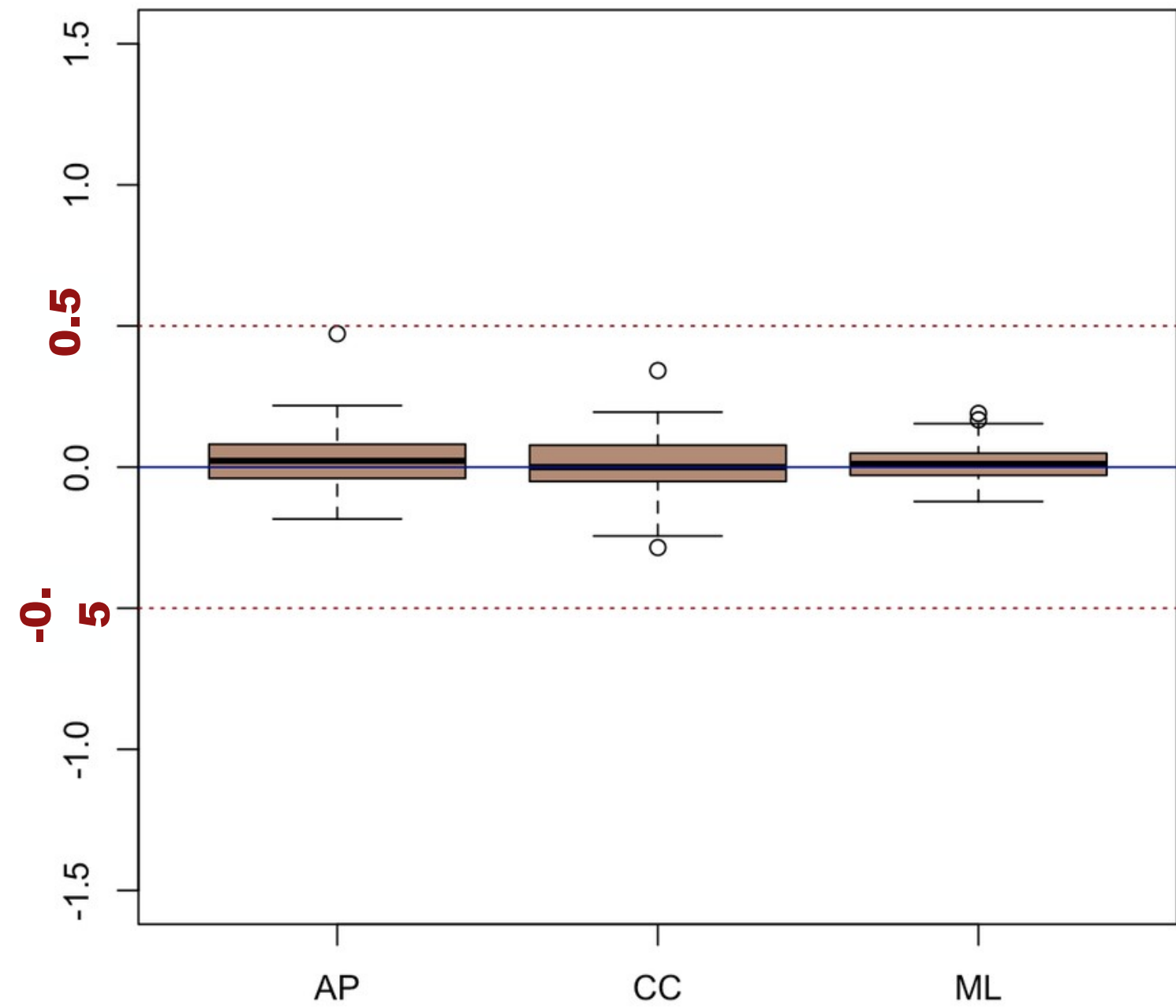
- **BH duration: 30 s for 82/91 (90%) of the treatments**
- **Mean delivered inspiratory pressure:  $17 \pm 1.6$  mbar**
- **Mean 3D displacement vectors:**
  - **CBCT2  $\rightarrow 3.2 \pm 1.9$  mm**
  - **CBCT3  $\rightarrow 3.1 \pm 1.6$  mm**
- **Deviations  $< |5|$  mm (of all recorded deviations):**
  - **CBCT2  $\rightarrow 95.1\%$**
  - **CBCT3  $\rightarrow 96.3\%$**
- **Deviations  $\geq 5$  mm:**
  - **Mainly observed in AP and CC directions ( $\sim 4.5\% - 6.3\%$ )**
  - **Rare in the ML direction ( $< 2\%$ )**



Mean Tumor Deviations per Treatment for CBCT2



Mean Tumor Deviations per Treatment for CBCT3



**Population  
Mean  
Deviations**

**-0.01  
cm**

**0.05  
cm**

**-0.01  
cm**

CBCT2  
axes

**0.02  
cm**

**0  
cm**

**0.02  
cm**

CBCT3  
axes



**MANIV-DIBH ensures stable and reproducible breath-holds**



**> 95% of intra-fraction deviations < 15l mm across all recorded deviation**



**Repeated intra-fraction IGRT may not be systematically needed when using MANIV-DIBH**

~~CBCT2~~

~~CBCT3~~



## So what should we do ?



- **Keep being cautious:**

- **Air filling of the stomach**
- **OARs**
- **Tumour locations at higher risk of deviations (e.g. posterior lung sulcus)**



- **Adapt the protocol to ensure treatment accuracy:**

- **Systematic inter-fraction IGRT**
- **Intra-fraction IGRT adapted to patients and tumour locations**
- **Alternatively, it can be performed during the first fraction, then adjusted**

NOW.





**Any questions ?**



Nicolas AUDAG  
Alicia HIDOUD  
Geneviève VAN OOTEGHEM