

CT Scan longitudinal study for hepatocellular carcinoma treatments efficiency

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Context and objectives

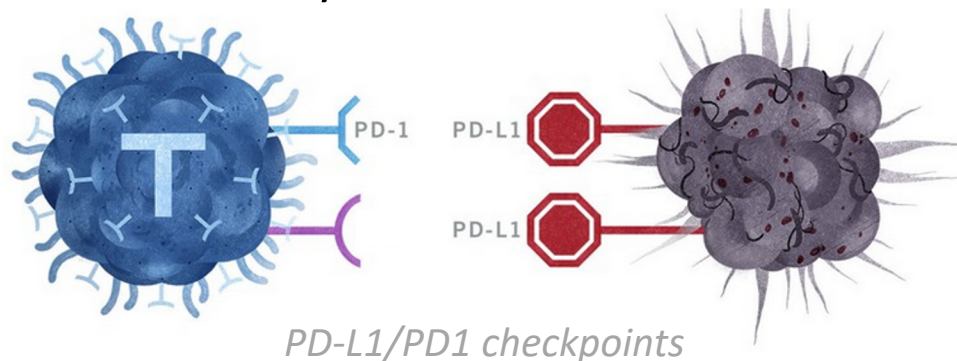
Hepatocellular carcinoma:

- 3rd most deadly cancer in the world
- limited effects of current therapy

Previous studies show efficiency of two types of treatment:

- proteins inhibitors
- epigenetic agents

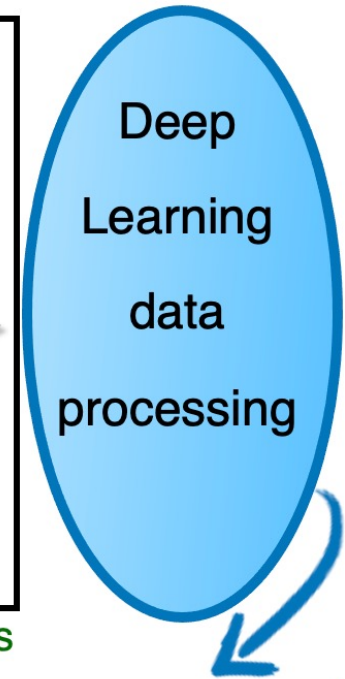
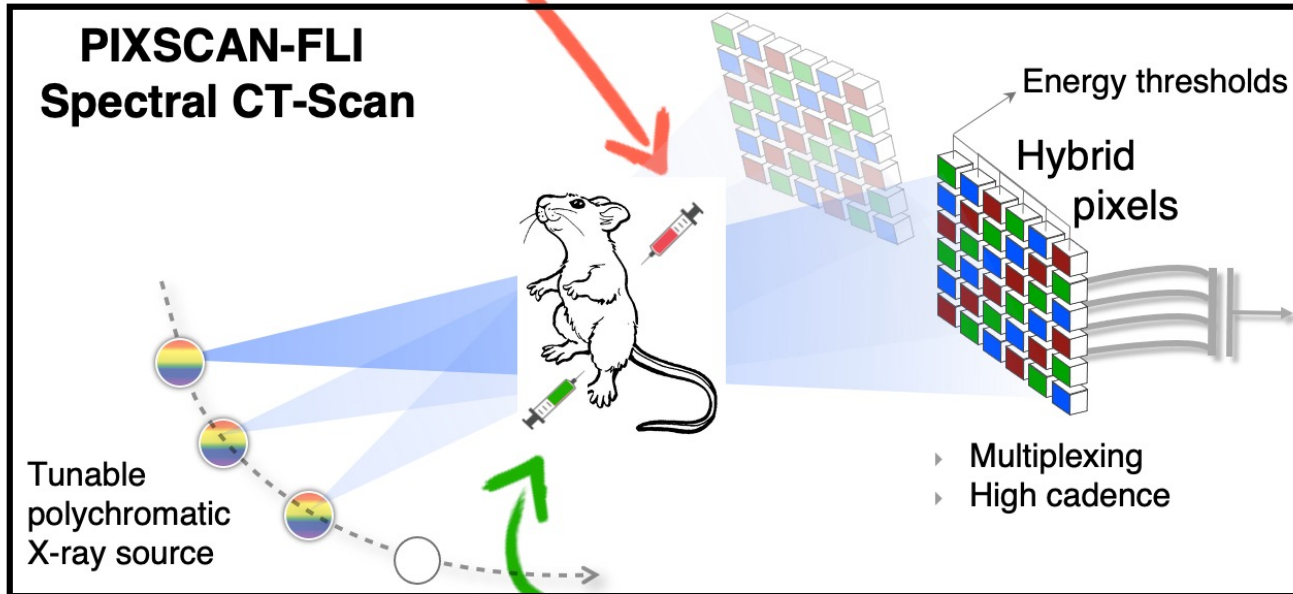
Objective: combine these oncogenes with immunotherapy (targeting immune checkpoints) to boost immune system



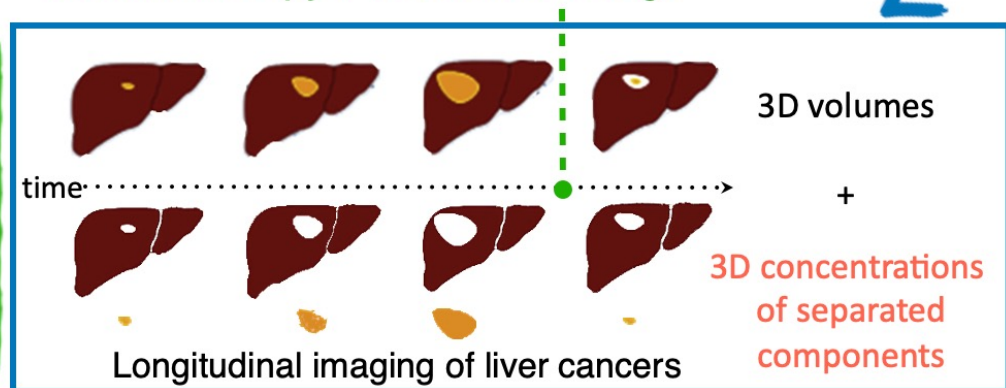
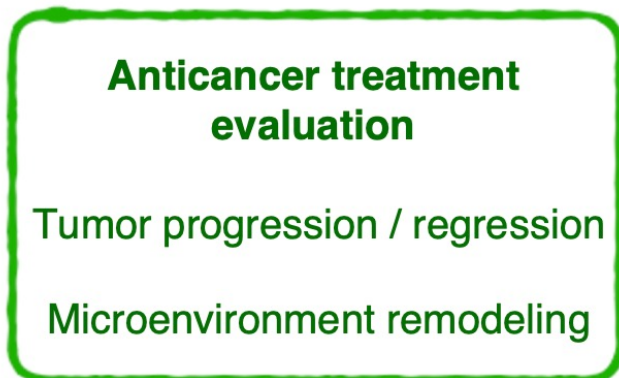
DePicT project

Contrast agents
(barium, iodine, gold)

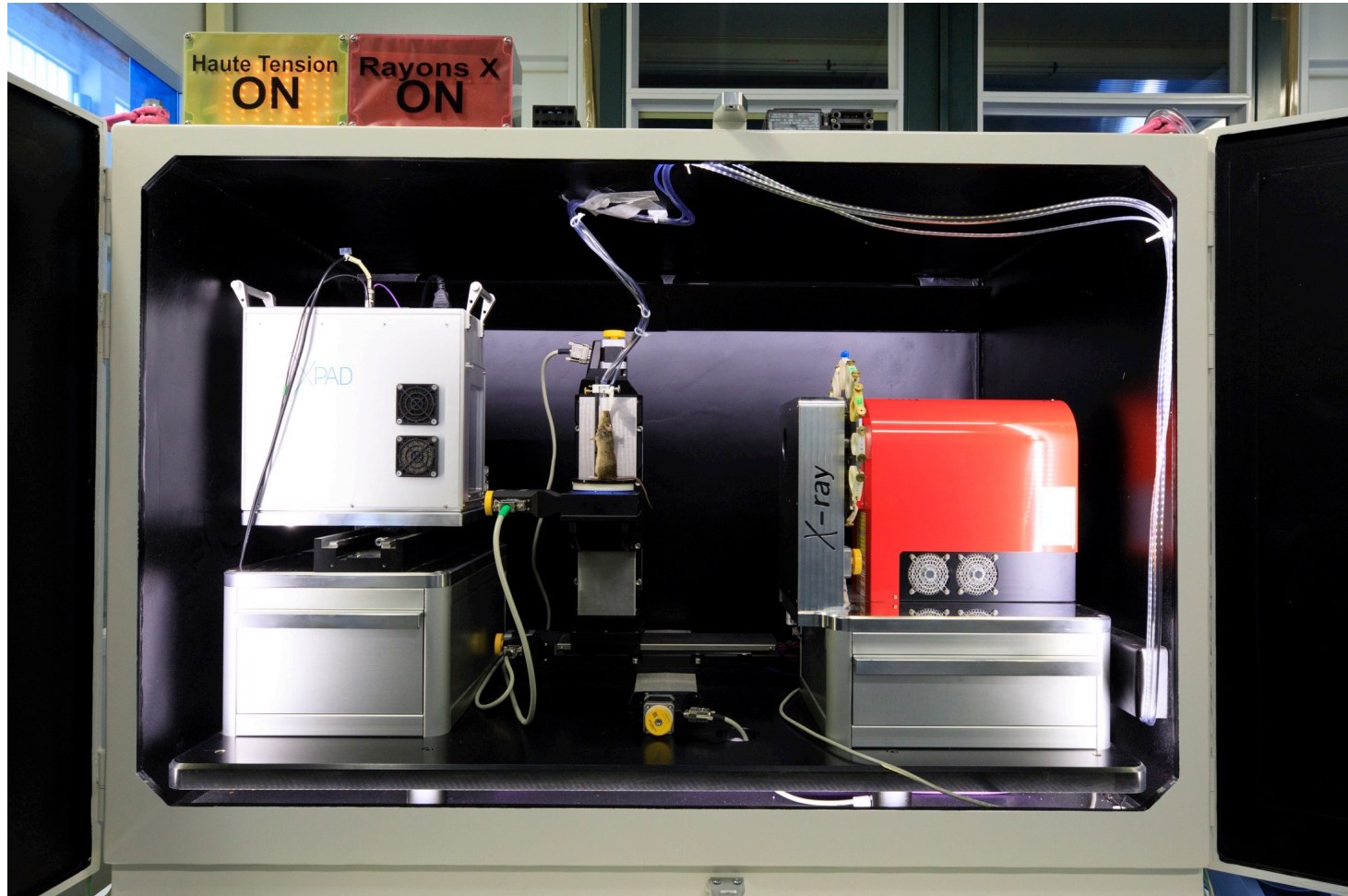
The DePicT concept



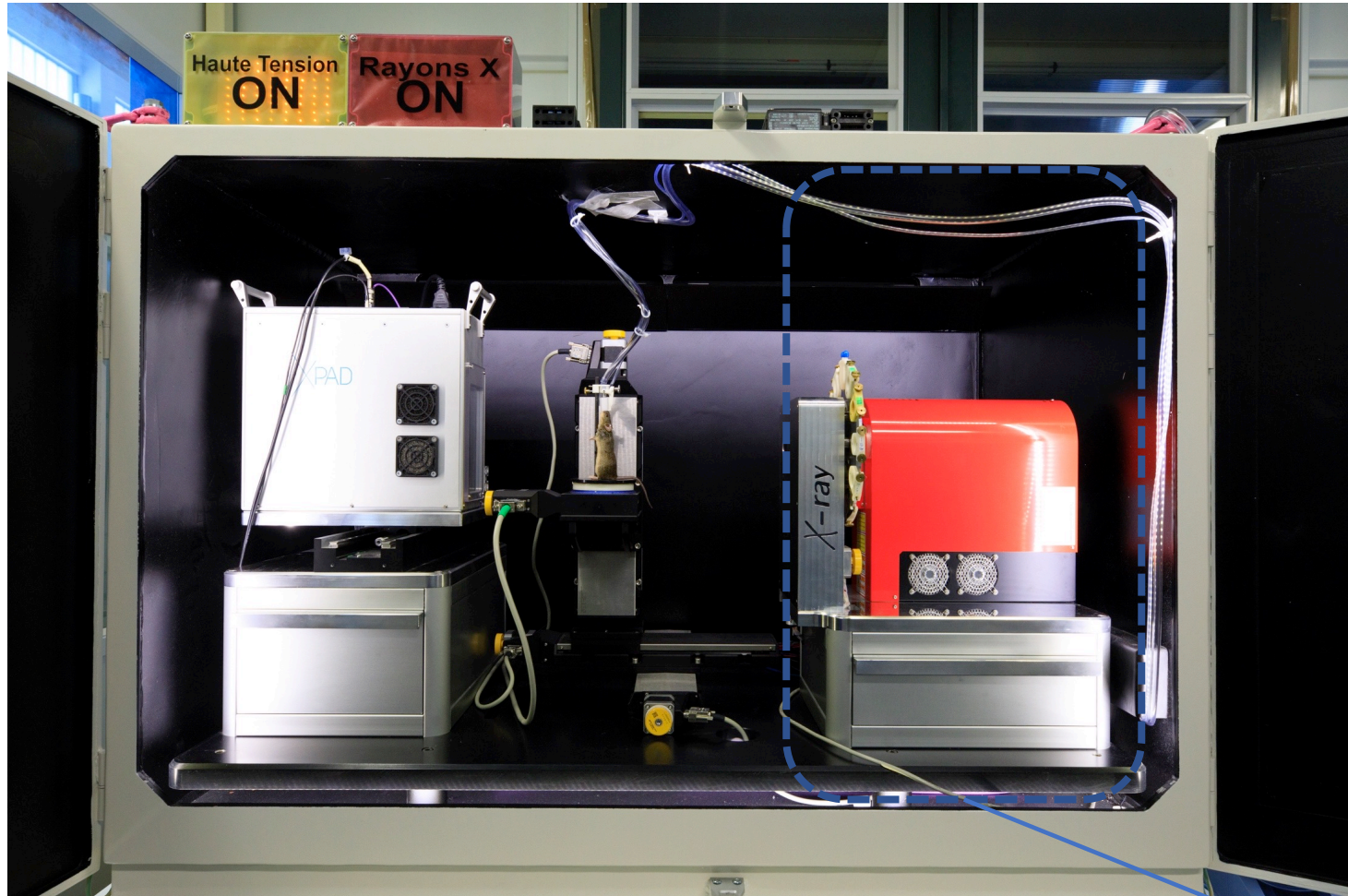
Immunotherapy + Anticancer drugs



PIXSCAN-FLI

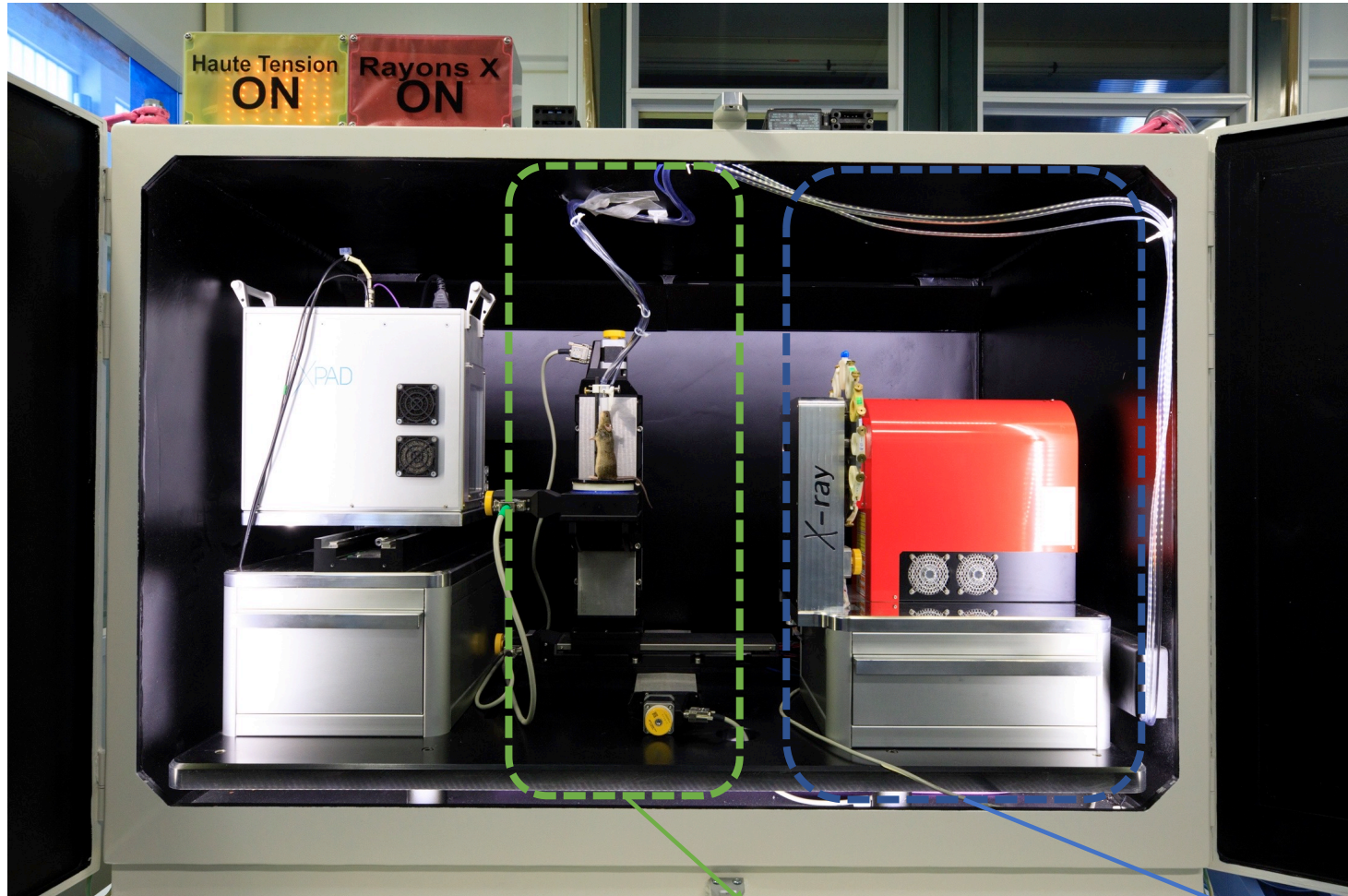


PIXSCAN-FLI



X rays:
- from 40 to 150 kV
- filter wheel

PIXSCAN-FLI



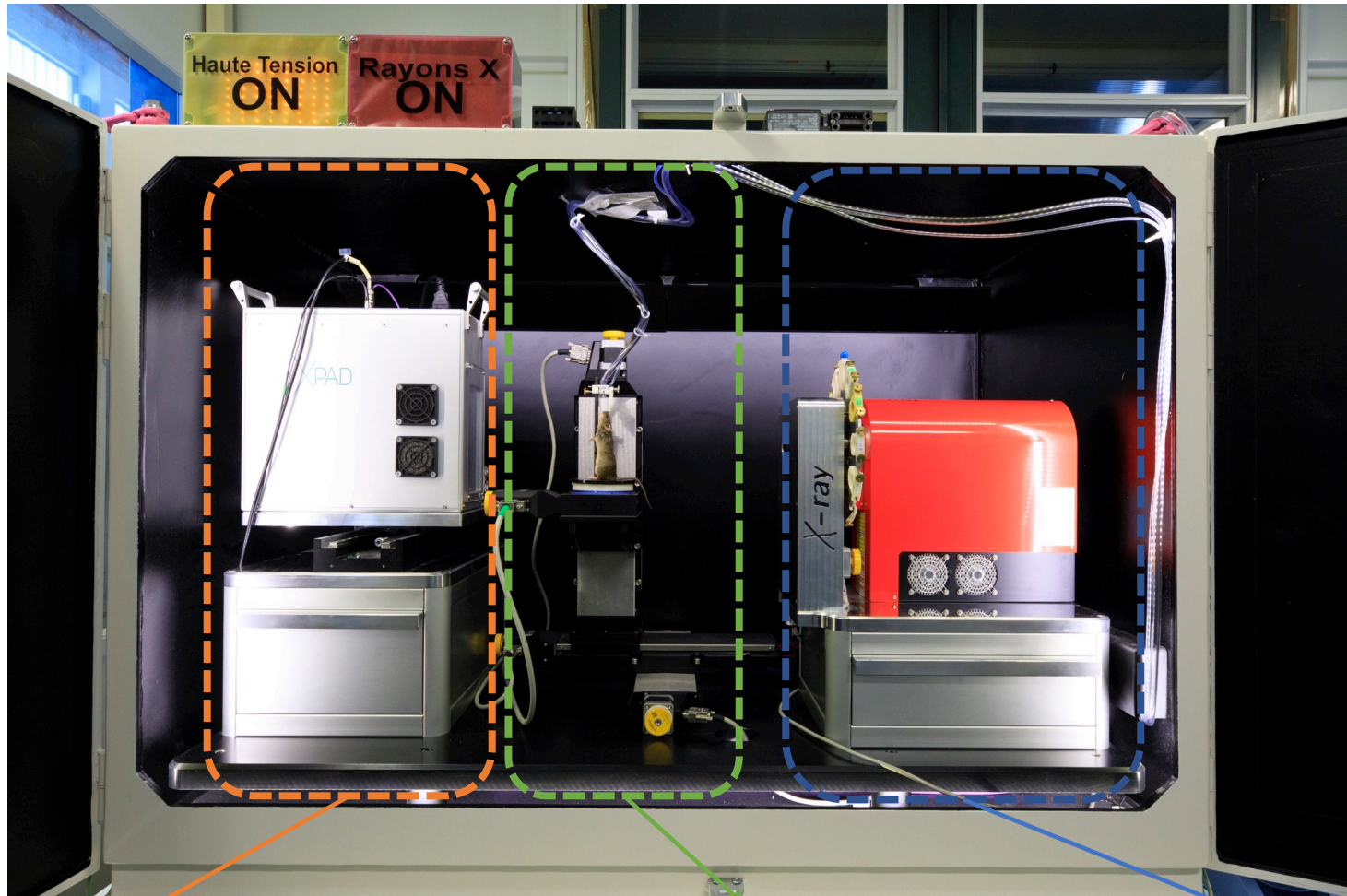
Animal support:

- 3-axis motion + rotation
- gas anesthesia system

X rays:

- from 40 to 150 kV
- filter wheel

PIXSCAN-FLI



Detector:

- Si 500 μm
- hybrid pixels 130x130 μm^2

Animal support:

- 3-axis motion + rotation
- gas anesthesia system

X rays:

- from 40 to 150 kV
- filter wheel

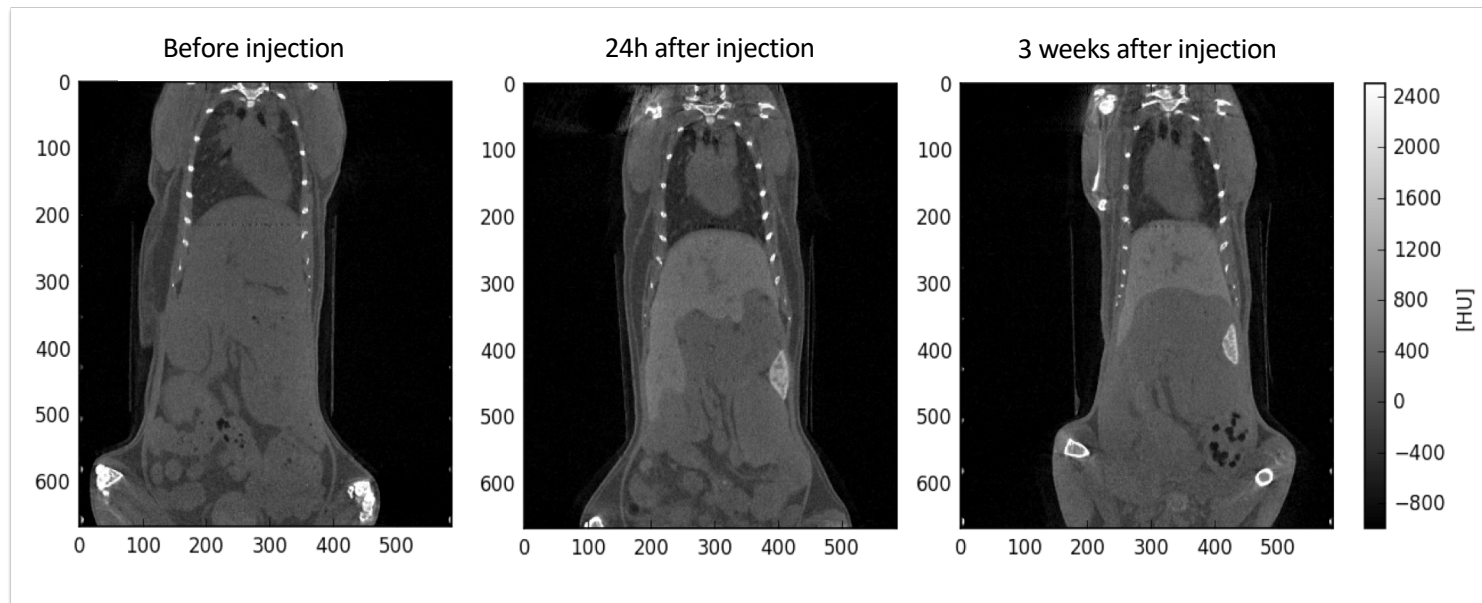
In vivo imaging protocol

- Standard absorption imaging
- Source: 50 kV/500 μ A/0.6 mm Al
- Data acquisition mode: continuous
- Pose duration: 575 ms + 50 ms DT
- Projections: 720 (0.5°)
- Delivered dose: 180 mGy/acquisition

Hepato-specific contrast agent based on barium nanoparticles

-> enhance liver contrast

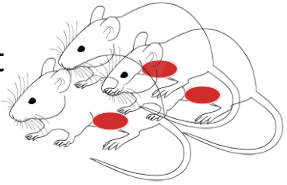
-> Ideal for longitudinal studies



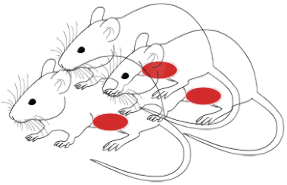
Coronal slices of a mouse images before, one day after and three weeks after injection of Exitron nano 12000

Protocol

1st
cohort

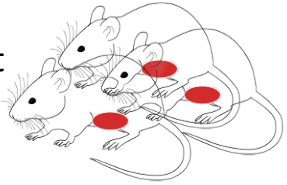


2nd
cohort



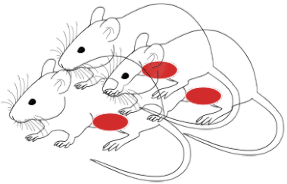
Protocol

1st
cohort



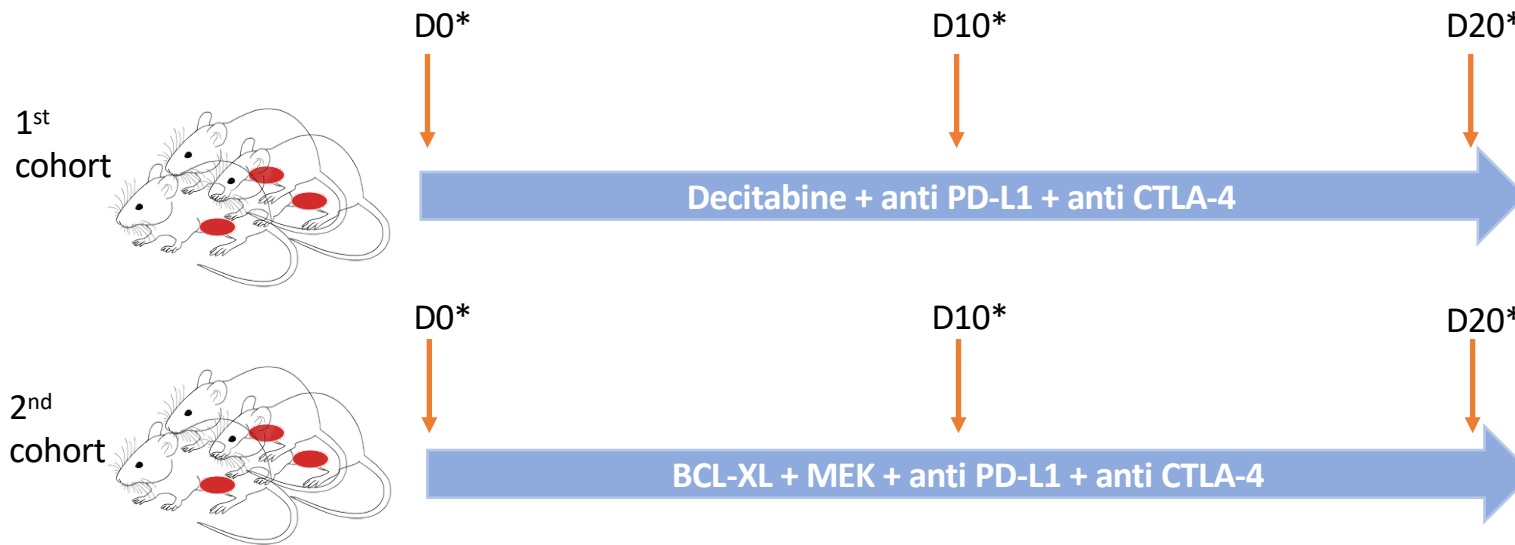
Decitabine + anti PD-L1 + anti CTLA-4

2nd
cohort

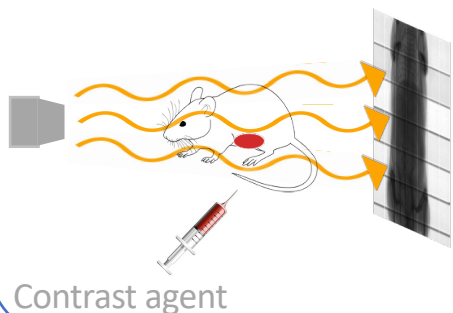


BCL-XL + MEK + anti PD-L1 + anti CTLA-4

Protocol



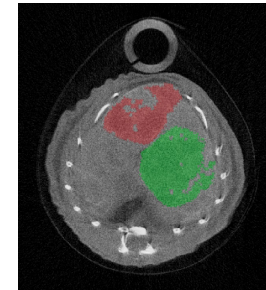
* Longitudinal study with PIXSCAN-FLI prototype



➤ Tumor evolution (1)

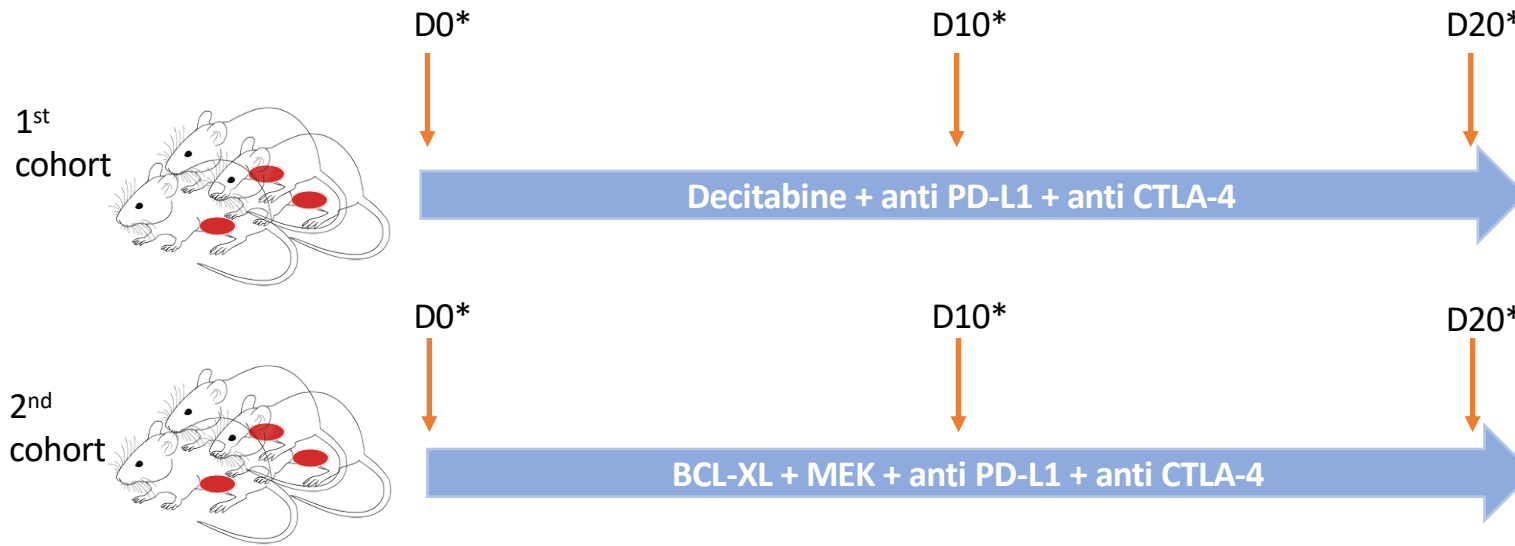


Tumoral volume quantification

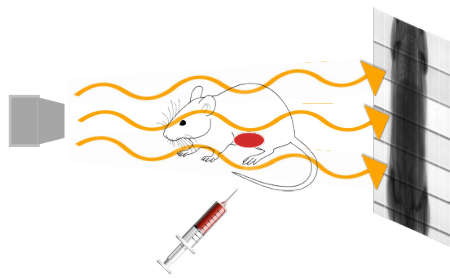


➤ Volume measurement (1)

Protocol



* Longitudinal study with PIXSCAN-FLI prototype

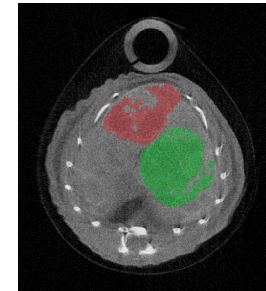


Contrast agent

- Tumor evolution (1)
- Microenvironment remodeling (2)

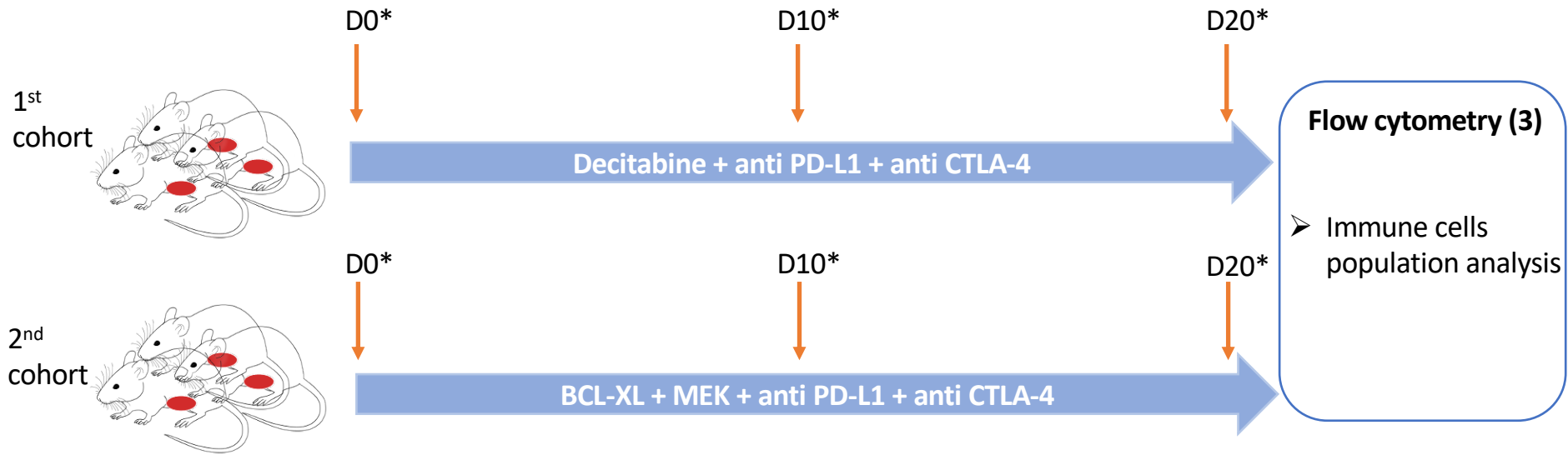


Tumoral volume quantification

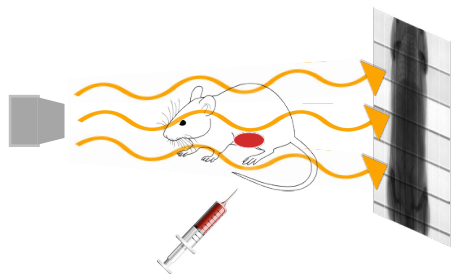


- Volume measurement (1)

Protocol



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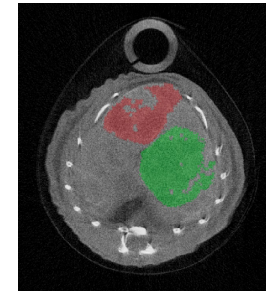


Contrast agent

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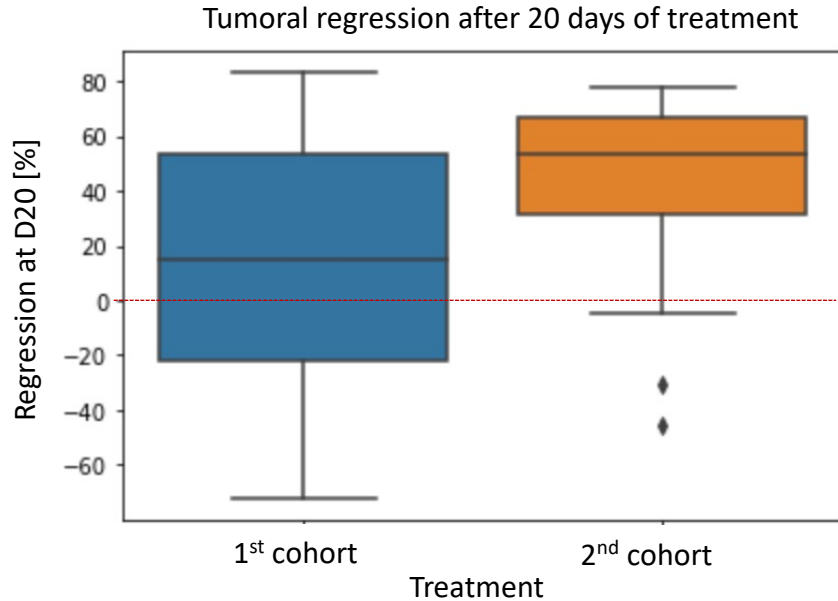


Tumoral volume quantification

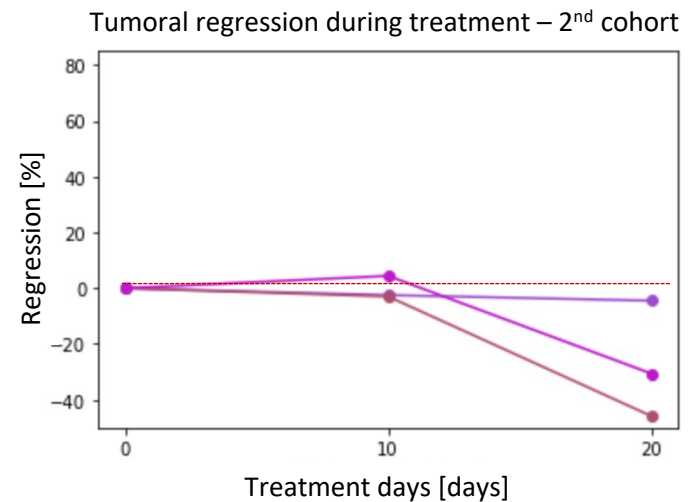
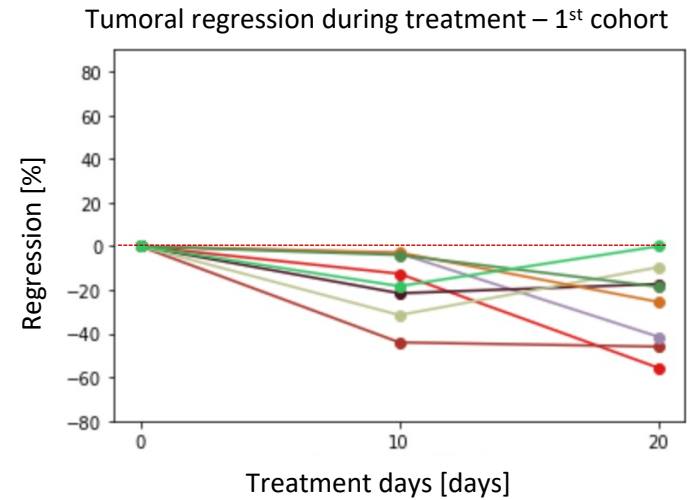


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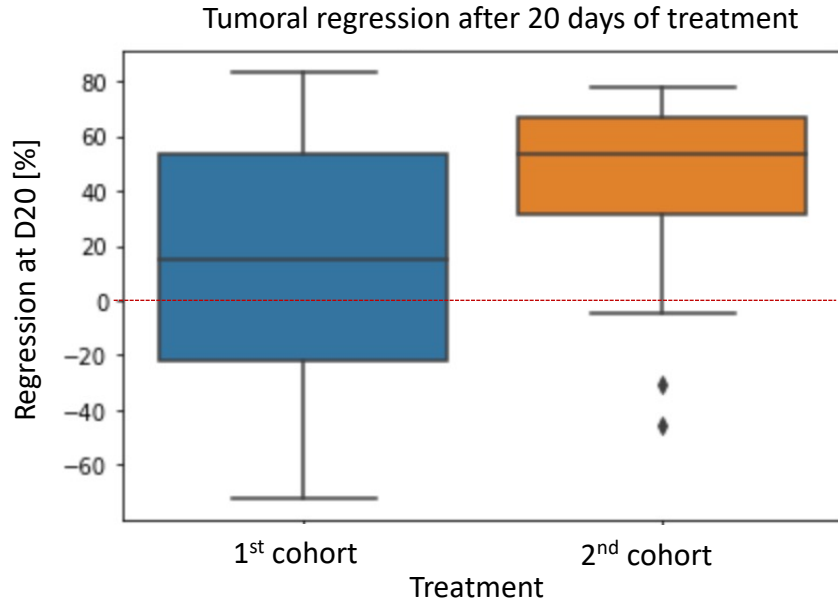
Results – Imaging (1)



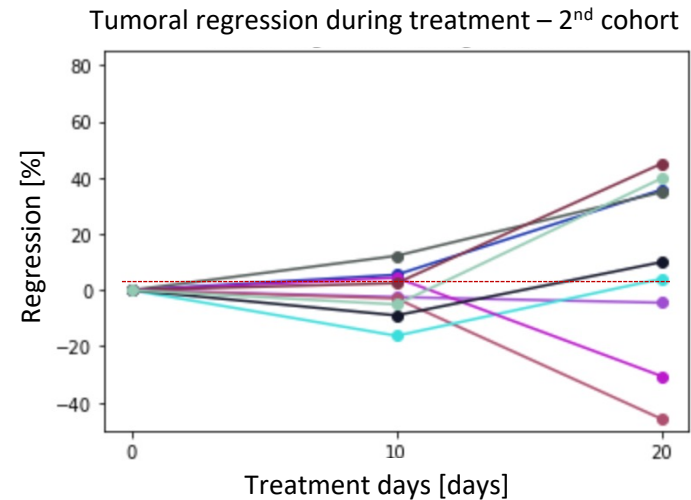
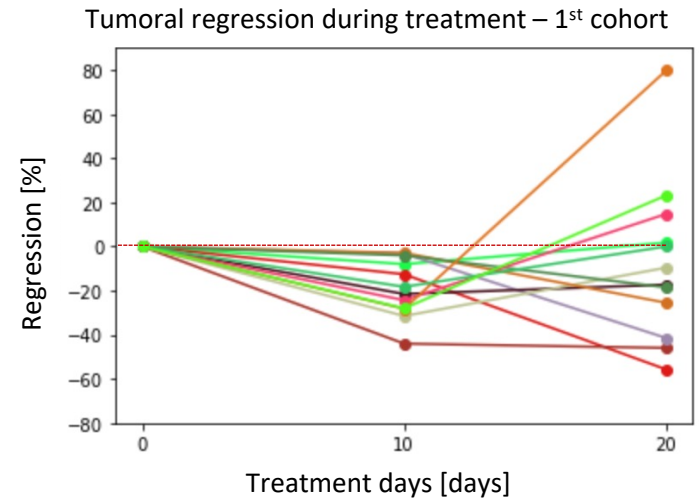
- Heterogeneous treatment response
- More important regression for the 2nd cohort



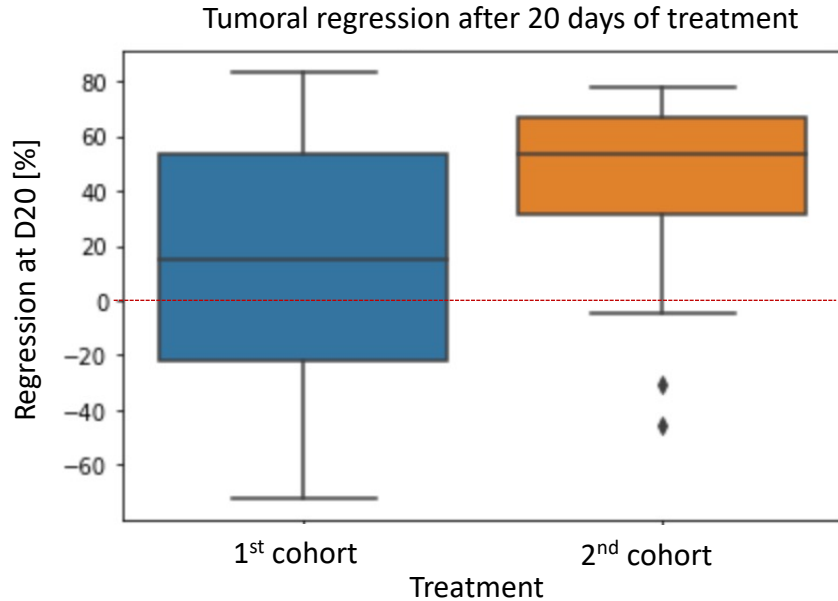
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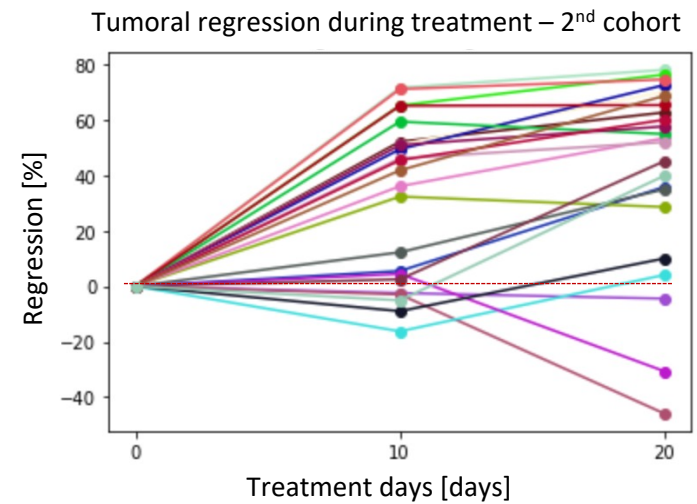
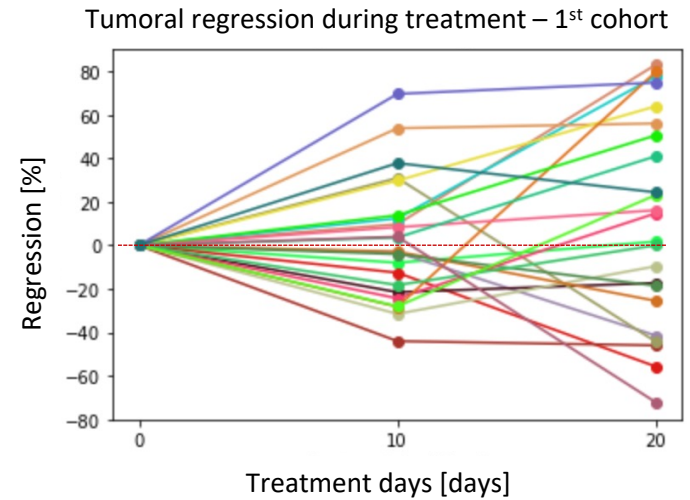
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Results – Imaging (1)



- Heterogeneous treatment response
- More important regression for the 2nd cohort

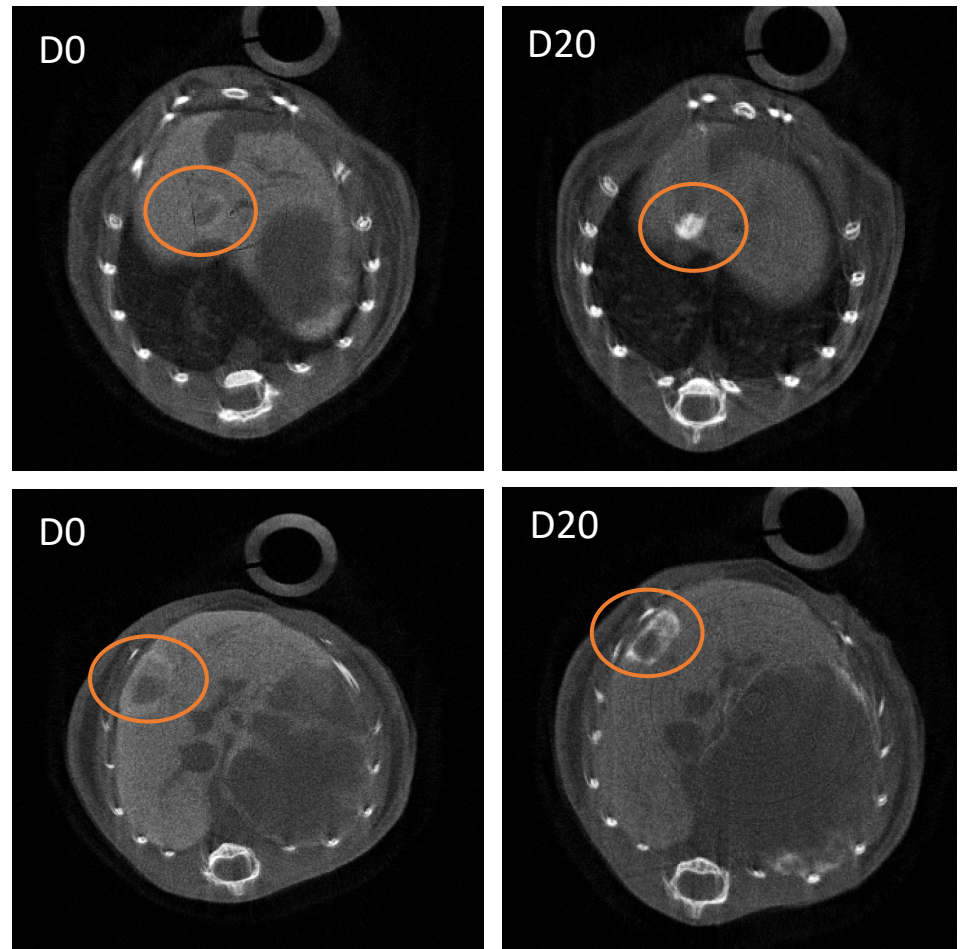
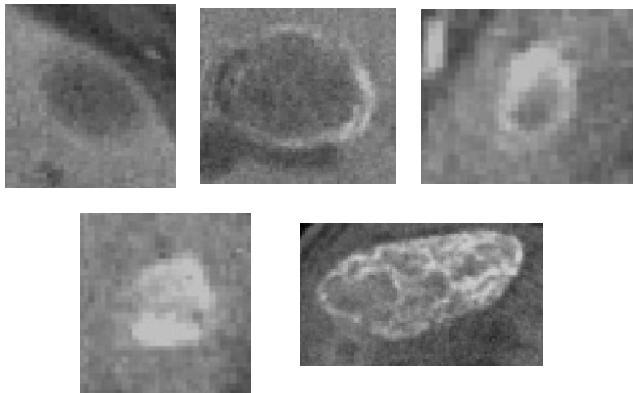


Results – Imaging (2)

Tumoral microenvironment remodeling

- Immune cells accumulation on the tumor area

Initial heterogeneity, different tumoral « classes »



Tumor evolution examples (at D0 in the left and D20 in the right)

Conclusion and perspectives

- Longitudinal study carried out from the tumor analysis to the immune cells analysis
- **Important differences** between both treatments: different action mechanisms
- Huge **heterogeneity** of tumors and response

- Understand correlations between tumoral regression and immune cells populations
- Study recruitment of immune cells at **different steps**

- ❖ A better understanding of tumors heterogeneity will allow to **adapt specifically the treatment**

Thank you for your attention

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