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Declaration of Financial Interests or Relationships

Speaker Name: Leslie MAZUEL

I have no financial interests or relationships to disclose with regard to the subject matter of this presentation.

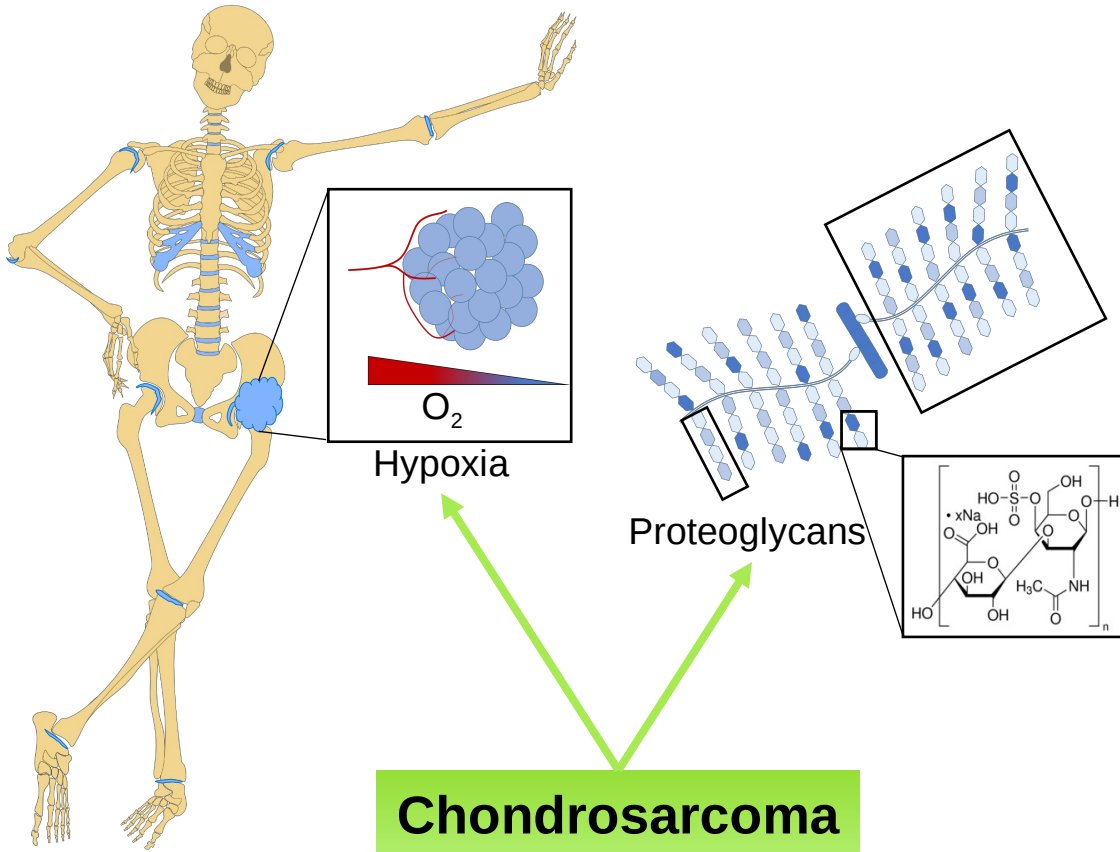
CEST MRI to contrast chondrosarcoma tumors: two contrasts in one acquisition

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Pathological Context



- **Malignant cartilage tumor**
- **2nd bone cancer**
- **Diagnostic by imaging**

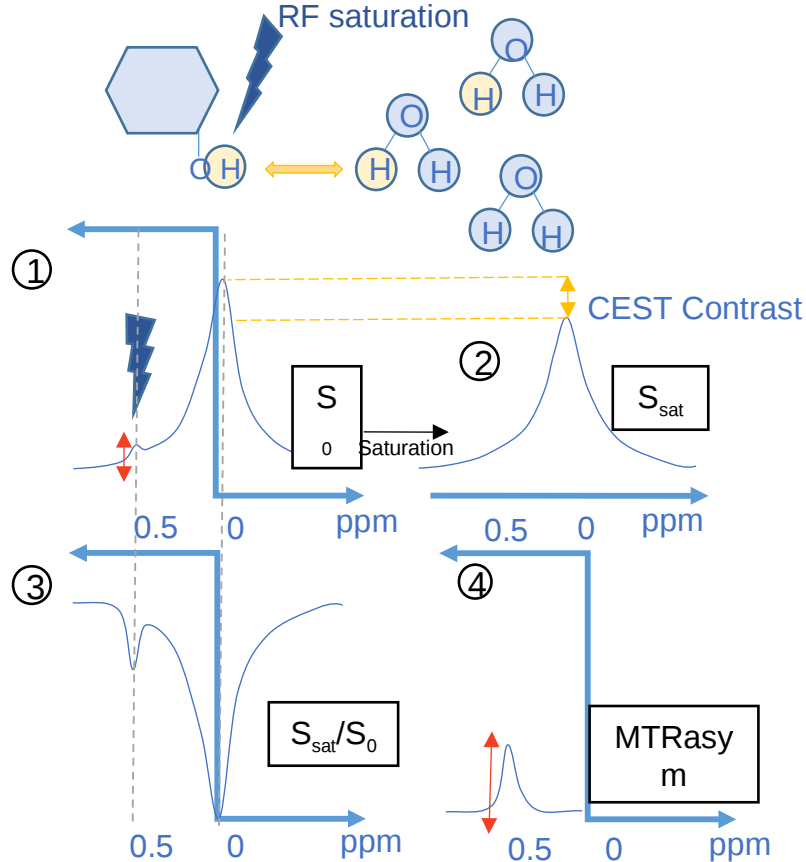


- no specific method

- 2 mains characteristics :
 - Hypoxia

Could be used to develop a new imaging strategy?

CEST MRI principle



Functions

Frequency

Hydroxyl (OH)

250 - 750 Hz

Amines (NH₂)

800 - 1400 Hz

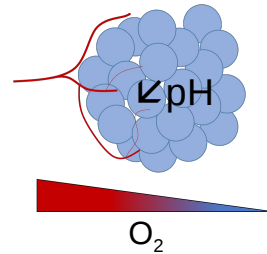
Amides (NH)

1500 - 2100 Hz

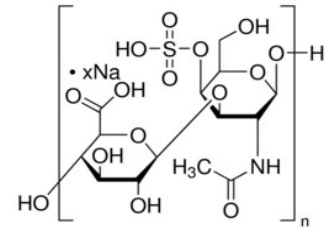
APT CEST

GAG CEST

Hypoxia



Proteoglycan



CEST-MRI should be able to simultaneously image both properties

In vivo study – Experimental design

H-EMC-SS Model

3M cells H-EMC-SS
Implanted orthotopically (tibia)

Human Chondrosarcoma

7 weeks



Swarm Model

Rat Chondrosarcoma

Swarm tumor implanted sub-cutaneously

2 weeks

CEST MRI

PET

^{18}F -MISO

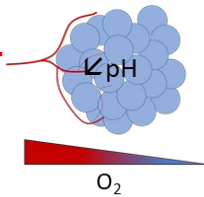
SPECT

$^{99\text{m}}\text{Tc}$ -NTP 15-5

MRI

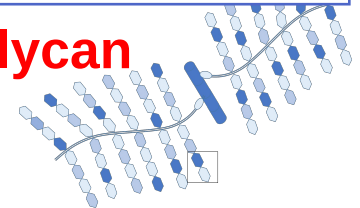
^{23}Na

Hypoxia



Proteoglycans

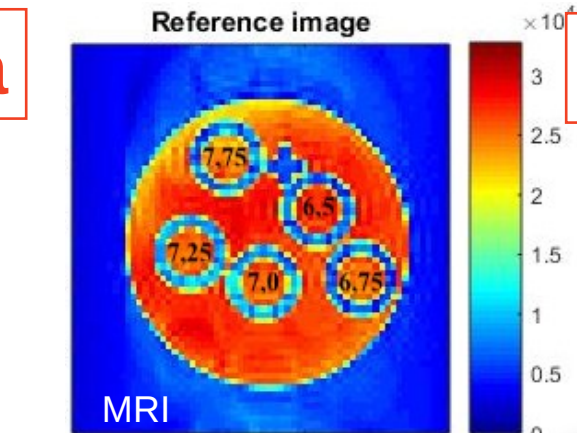
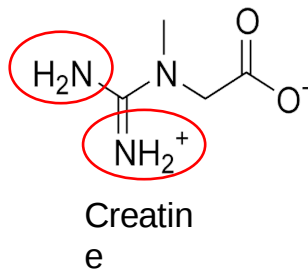
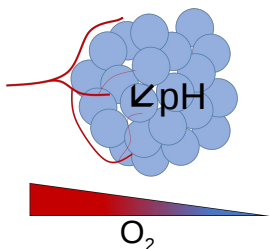
S



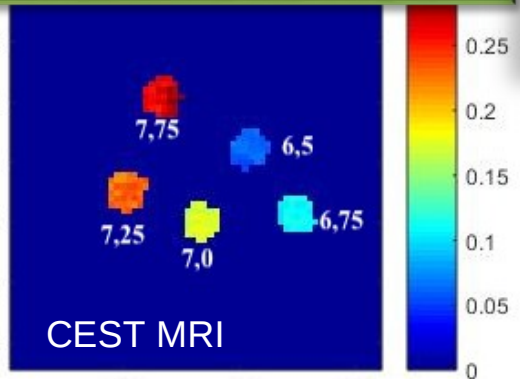
Reference imaging

CEST MRI *in vitro*

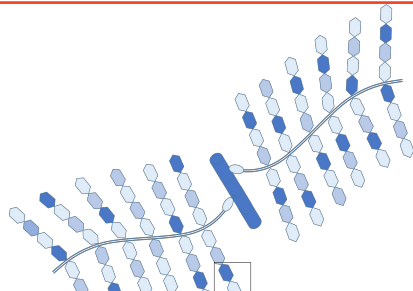
Hypoxia



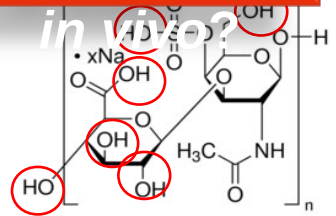
\nearrow pH = \nearrow CEST effect



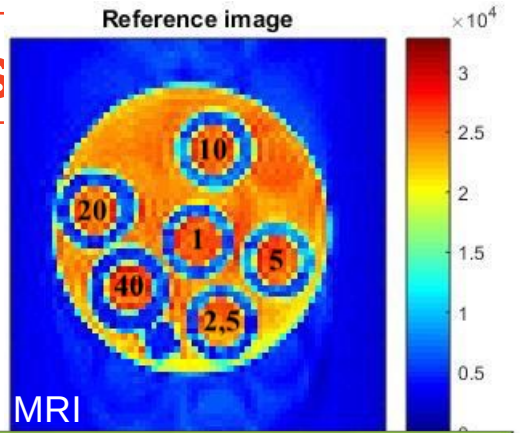
Proteoglycans



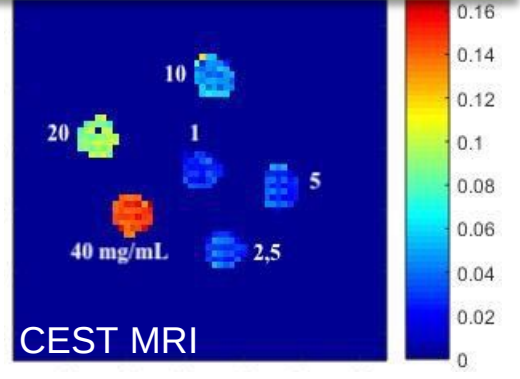
What happens *in vitro*?



Chondroitin 4 sulfate



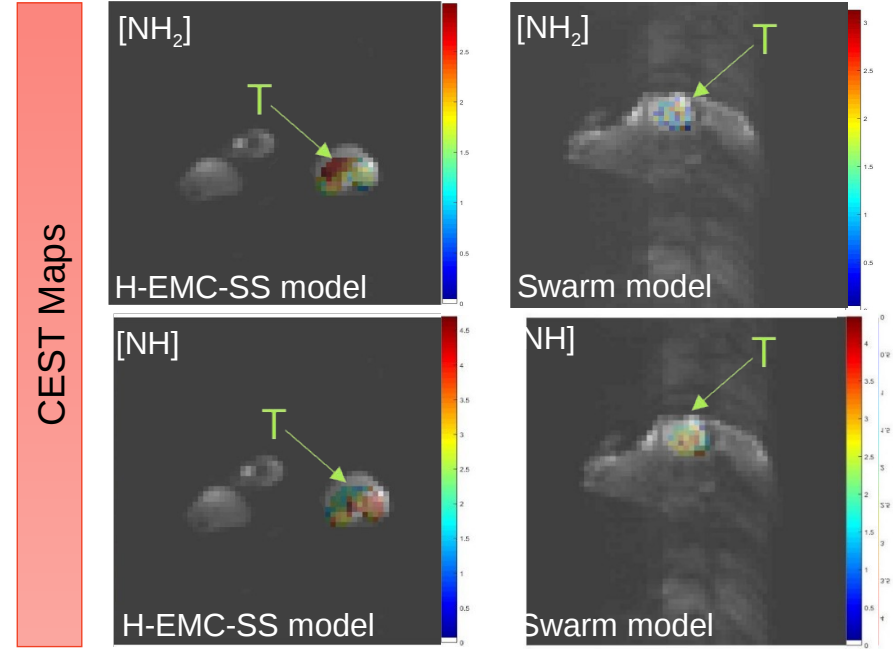
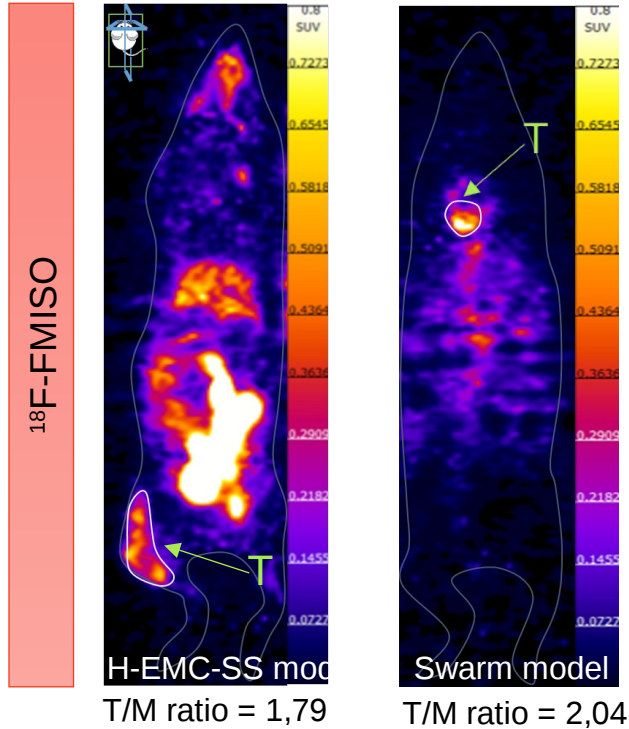
\nearrow PG = \nearrow CEST effect



PET

VS

CEST MRI



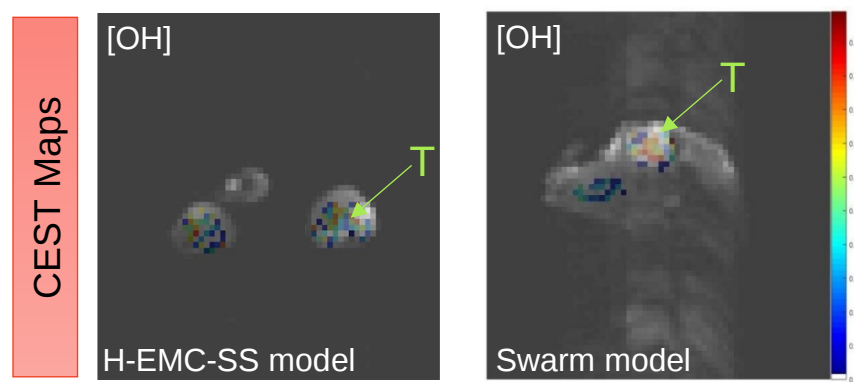
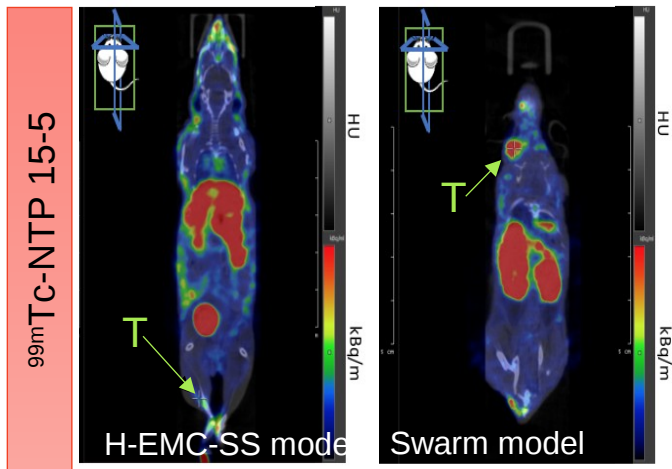
The two models are hypoxic

Difference in CEST effect observed
in the two different models =>
difference in pH

SPECT

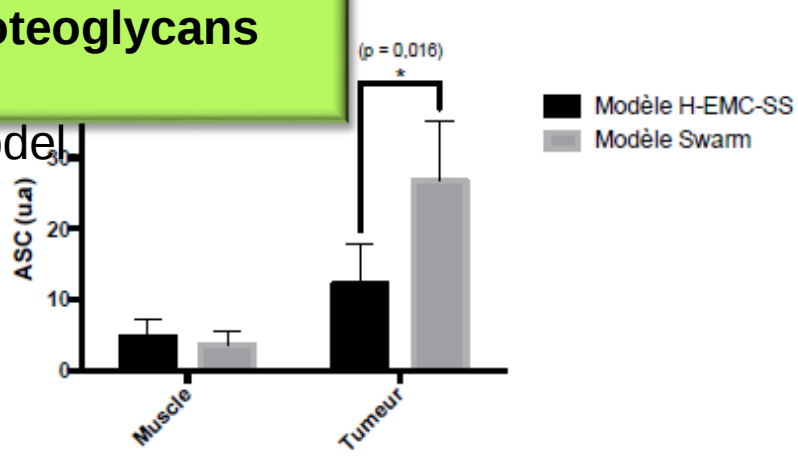
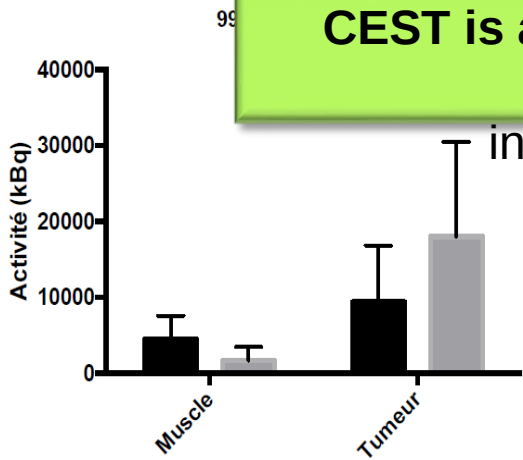
VS

CEST MRI

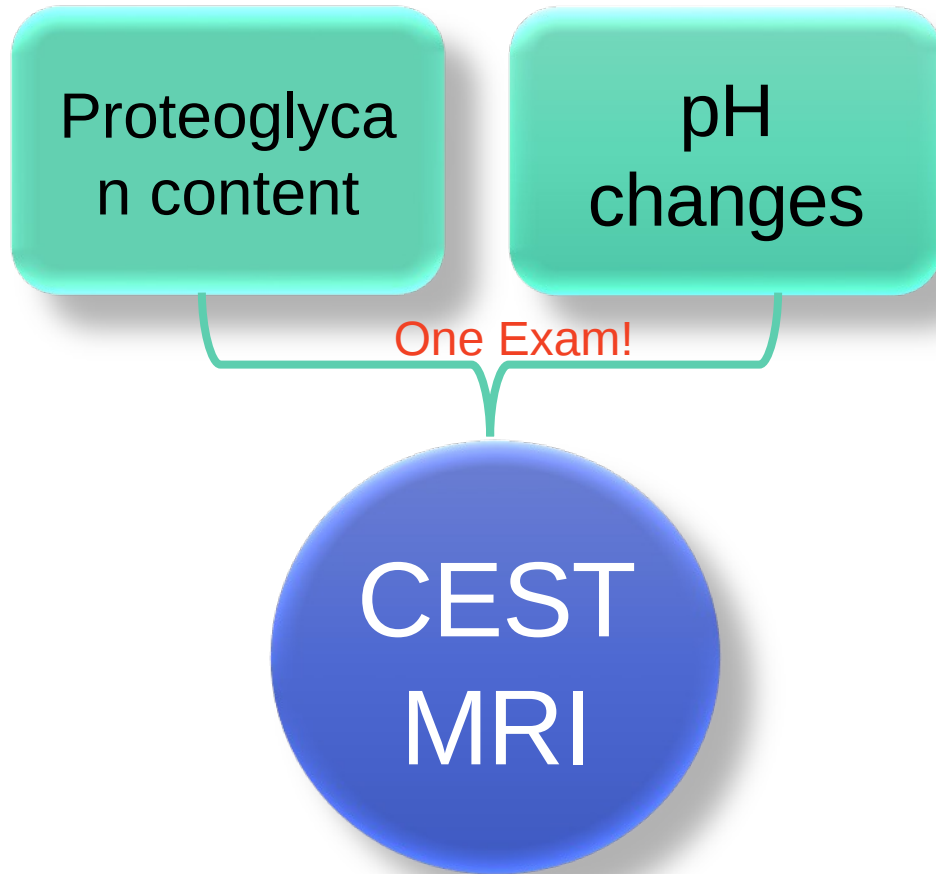


CEST is able to assess proteoglycans content

in different tumor model



Conclusion - Perspectives



New diagnostic tool
for
chondrosarcoma

Therapeutic efficiency
=> prognostic tool?

A red-bordered box is tilted to the right and contains the text 'New diagnostic tool for chondrosarcoma'. A blue arrow points from the bottom-left corner of this box towards the text 'Therapeutic efficiency => prognostic tool?' located below and to the right.