

OPTADOM – **OP**timization of anti-VCAM-1 **T**argeted **A**lpha Therapy based on predictive **DO**simetry for brain **M**etastases treatment

Coordinator : Anne-Marie Frelin (GANIL)

Partners : GANIL – CERMN – ISTCT – INTHERES – CLCC François Baclesse – LPC Caen GANIL



AphaBioDose: Modélisation Multi-Echelle En Radiothérapie Vectorisée α Des Métastases Cérébrales Précoces

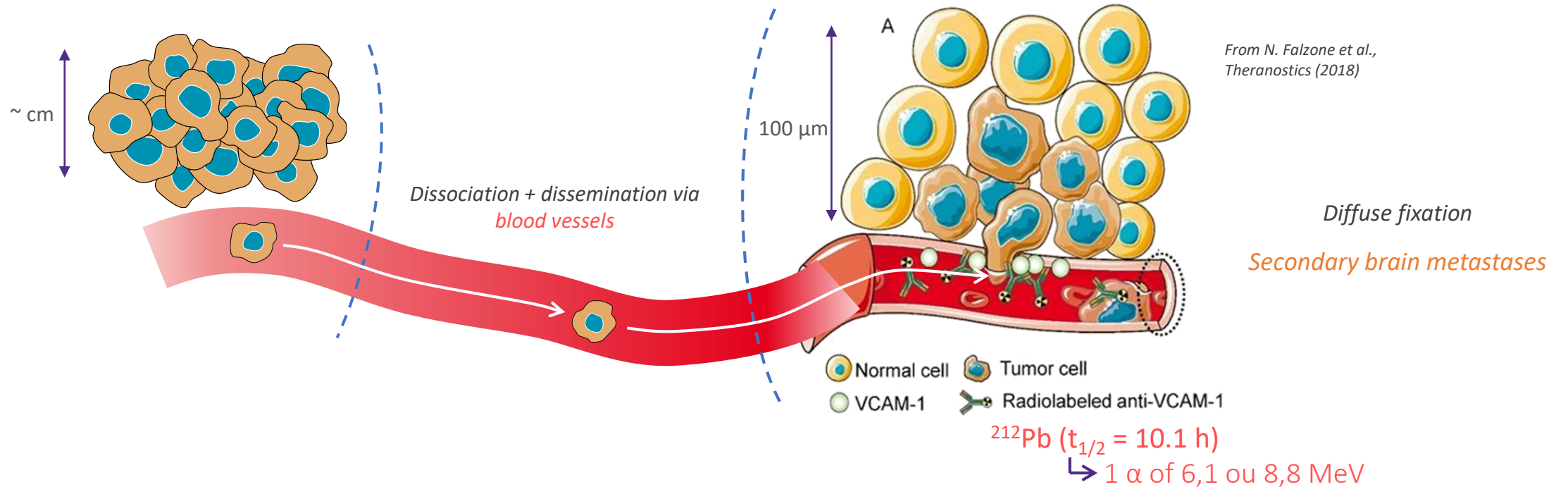
Coordinator : Rachel Delorme

Partners : LPCC, ISTCT, LITO, GANIL, LPSC



Contexte: Traitement des métastases cérébrales

Slide from Alexis Doudard



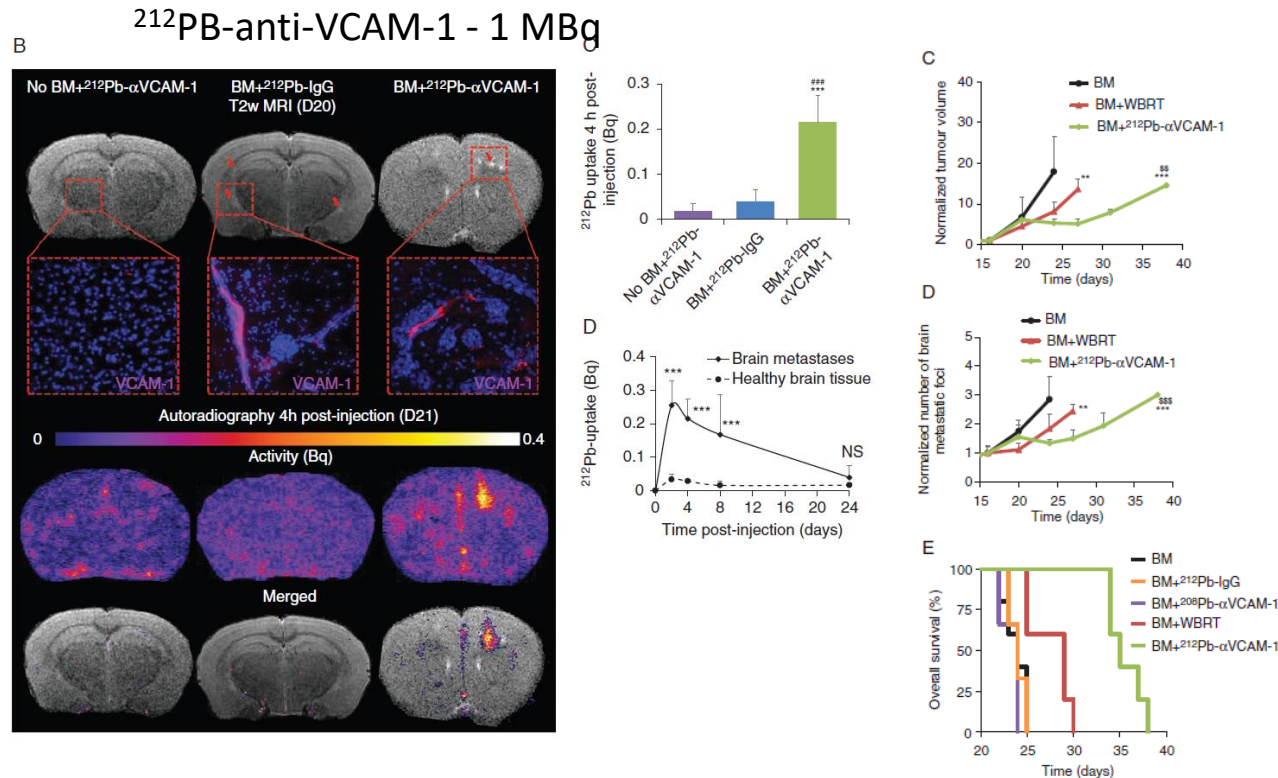
- Complex detection/treatment of metastases (external beam RT, surgery)

↳ Poor prognosis (6 months)
QT Ostrom et al., *Handb. Clin. Neurol.* (2018)

- Early detection of brain metastases : Anti-VCAM-1
- Treatment by Targeted Alpha Therapy → High potential (range/LET)

Objectifs et défis scientifiques

- Efficacy demonstrated in 2019 at the preclinical level (*i.e.*, *in vivo* in small animals)



Corroyer-Dulmont 2019

Objective = Treatment optimization

i.e. tumor control vs. healthy tissue toxicity

Inter-animal variability

⇒ poor reproducibility

⇒ Improved quantification

- personalized dosimetry
- multi-scale study/implementation of biological effects

1

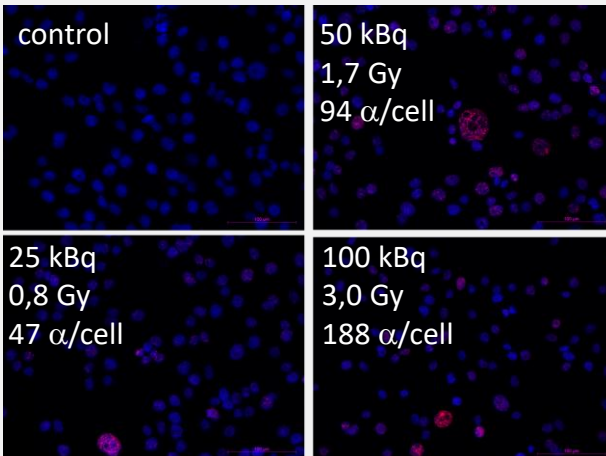
2

Objectifs et défis scientifiques

Mesures in vitro



DNA double-strand breaks (γ -H2AX)



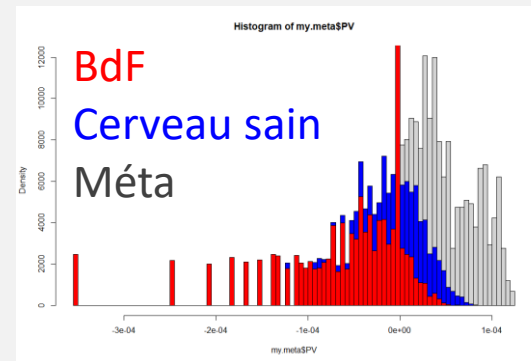
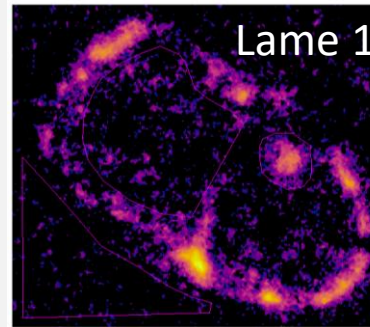
+ Cell Survival

Autoradiographie

IRM plan 16

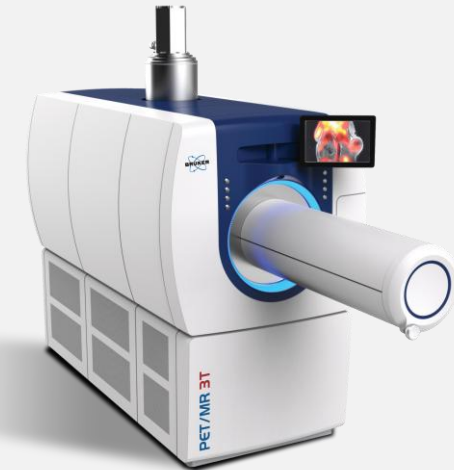


Lame 1 - 06



In vivo

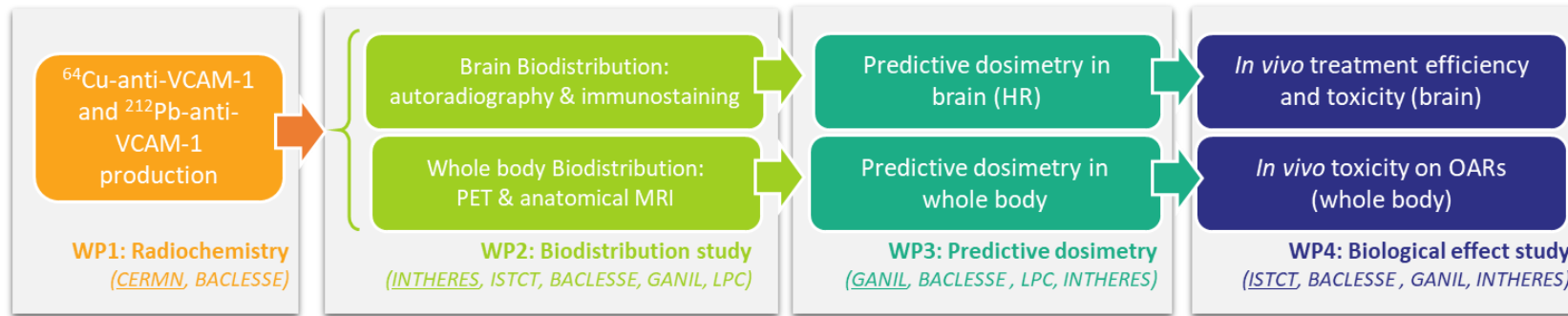
CETTE SEMAINE



- Anatomical imaging: MRI
- Functional imaging: PET Cu-64 ($T_{1/2}=12,7$ h)
- Autoradiography
- Different times after injection

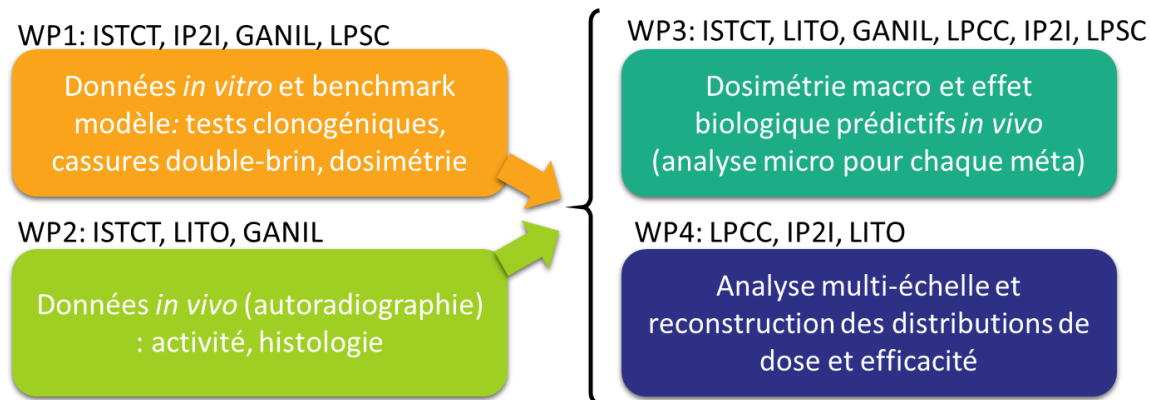
Structure du projet

OPTADOM



Anne-Marie Frelin, Simon Lechien (PhD), Cyril Jaudet, Thomas Cailly, Lucia Alfaya (CDD IR), Samuel Valable, Fabien Fillesoye, Isis Blanchard, Jérôme Toutain, Peggy Gandia, Didier Concordet, Mohamed Ghouila (CDD IR)

AlphaBioDose



Rachel Delorme, Samuel Valable, Fabien Fillesoye, Jérôme Toutain, Isis Blanchard, Etienne Testa, Michael Beuve, Gersende Alphonse, Mario Alcocer Avila, Fanny Orlhac, Anne-Marie Frelin, Simon Lechien, Cyril Jaudet

Faits marquants 2025/26

Pas encore de résultat vraiment marquant – travaux en cours

- Workflow dosimétrie *in vivo* implémenté
- Manips *in vitro* -> des difficultés
=> Prochaine manip en CHO-K1 en novembre
- Manip autoradiographie => Analyse biodistribution/dosimétrie en cours
- Radiomarquage anti-VCAM1-⁶⁴CuManip => Manip biodistribution cette semaine
- Publications:
Refining Risk Assessment in ¹⁷⁷Lu-DOTATATE Extravasation: The Value of 3D Monte Carlo Dosimetry, Simon Lechien et al., accepté à Frontiers (-> Workflow dosimétrique)

Vision 2030

- Intégrer de nouvelles indications
- de nouveaux radioisotopes
- Continuer à travailler sur les outils de dosimétrie pour la RIV à différentes échelles

Nouvelles collaborations

- En cours -> AAP européen PIANOFORTE

AaP en cours et visés (2-5 ans)

- OPTADOM - PCSI (481 k€) 11/2025 – 11/2028
- AlphaBiodose
- Visé: PIANOFORTE

Besoins 2027

- budget
- CDD
- ...