

Improving the outcome of malignant brain tumors with tailored immunotherapy

Dr. Calò Pierluigi

Pediatric oncologist

Laboratory for precision cancer medicine (LPCM), KU Leuven University, Leuven, Belgium

A rare cancer, and an unequal one

35,000

children diagnosed in with cancer
in Europe each year

~84%

5-year survival overall, but not for
every tumor

6,000

deaths in Europe each year

- Pediatric cancers are rare diseases: every center sees only a handful of cases
- Survival has improved on average, yet outcomes remain deeply unequal worldwide
- Brain tumors are the most common solid cancer in children with a high burden of mortality and morbidity

For Diffuse Midline Glioma (DMG), there is still no cure

9–12

months median survival from
diagnosis

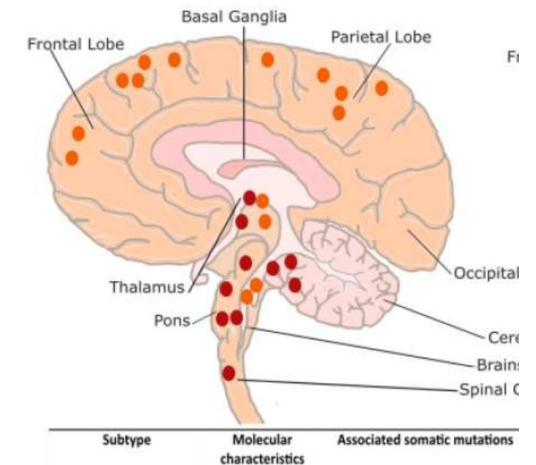
~1,000

children die of DIPG / DMG every
year worldwide

Only **1**

treatment improve symptoms and
prolonge their life : radiotherapy

- No standard-of-care therapy changes the outcome, only radiotherapy buys time
- Early immunotherapy trials show the first exceptional responders (CAR-T, oncolytic virus)
- The signal is real but the numbers are far too small



Why we cannot do this alone

- Every case is rare, biologically heterogeneous and aggressive.
- No single hospital sees enough patients to build cohorts or run trials.
- No single country reaches the numbers immunotherapy research demands.
- Progress requires pooling patients, samples and expertise across borders.

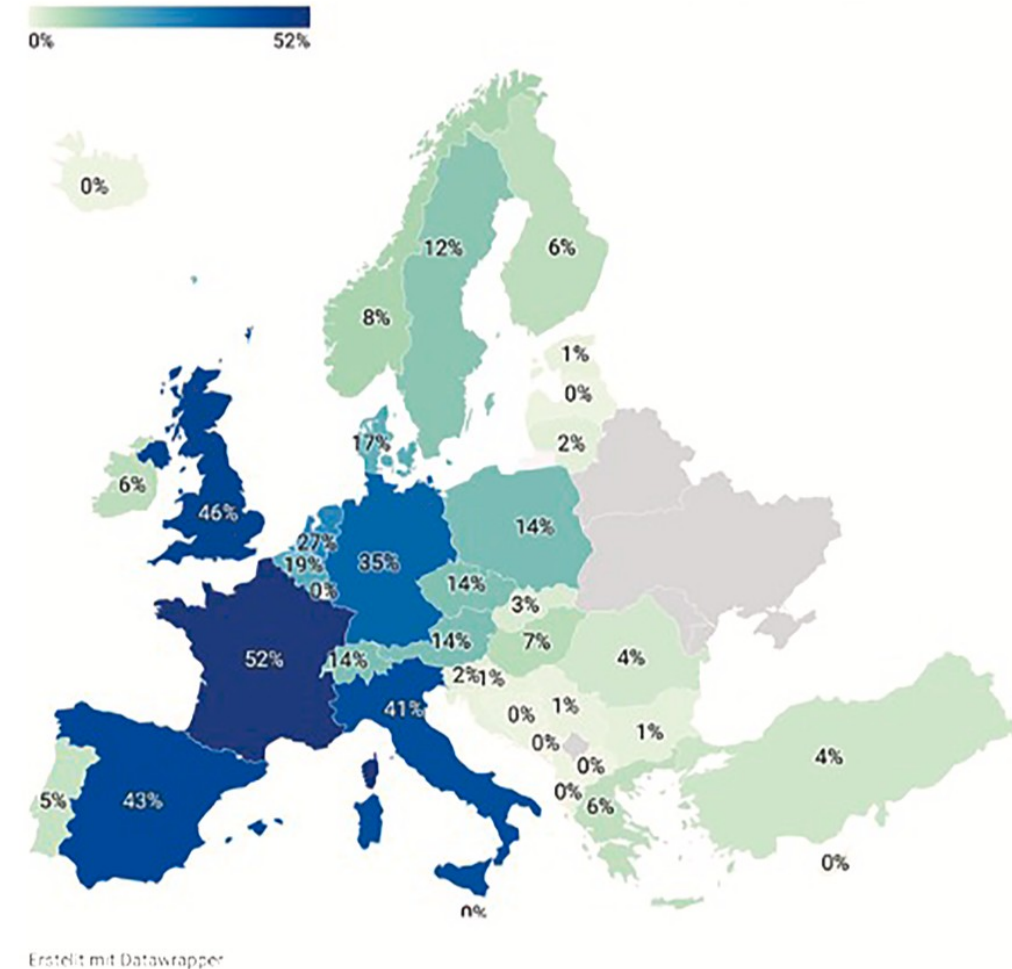
Rare + fatal + fragmented → collaboration is needed

Inequalities do not stop at borders

- Within Europe, access to diagnostics, trials and innovative therapies still varies widely between countries.
- Levelling the field needs shared infrastructure, shared data and shared trials: a pan-European answer.

Characteristics	Belgium		Europe	
› Number of available trials	84		436	
LOCATION TYPE				
› Monocentric / National	6	7%	181	42%
› International	78	93%	255	58%
› Use of novel therapies	72	86%	332	76%

Number of cancer-directed trials in Europe (n=436)



THE FOUNDATION

LPCM: a brain ecosystem built in Belgium, since 2016

2016

LPCM

2020

PEDBRAIN
national network

2024

GLIOMATCH
EU consortium



Single-cell analysis
scRNAseq, CYTOF
multiome

Drug and
crispr
screening

Genetic/pathological
fingerprinting

Biobanking
(+700 samples)

Spatial multi-omics

Patient-
derived
xenografts

Brain tumors

Patient-
derived
Cell lines

Clinical
data
collection



sck cen

Multiple academic
collaborations

umec

KU LEUVEN

VIB

Maastricht UMC+



UZ LEUVEN

Immuno-
oncology

Industry collaborations



QUALITY BY DESIGN



Funding collaborations



PEDBRAIN: a national network (2020)

In 2020 our team, under the lead of Prof. Jacobs connected all 7 Belgium's paediatric neuro-oncology centres into one network

Shared across all centers:

- Retrospective data + prospective collection from new patient.
- Tissue & biobanking · patient-derived cell lines · drug screening · immune profiling



GLIOMATCH a pan-European answer (2024-2028)

KU LEUVEN

SJD

Sant Joan de Déu
Fundació de Recerca



UPPSALA
UNIVERSITET

€12.59M

EU funding

14

partners

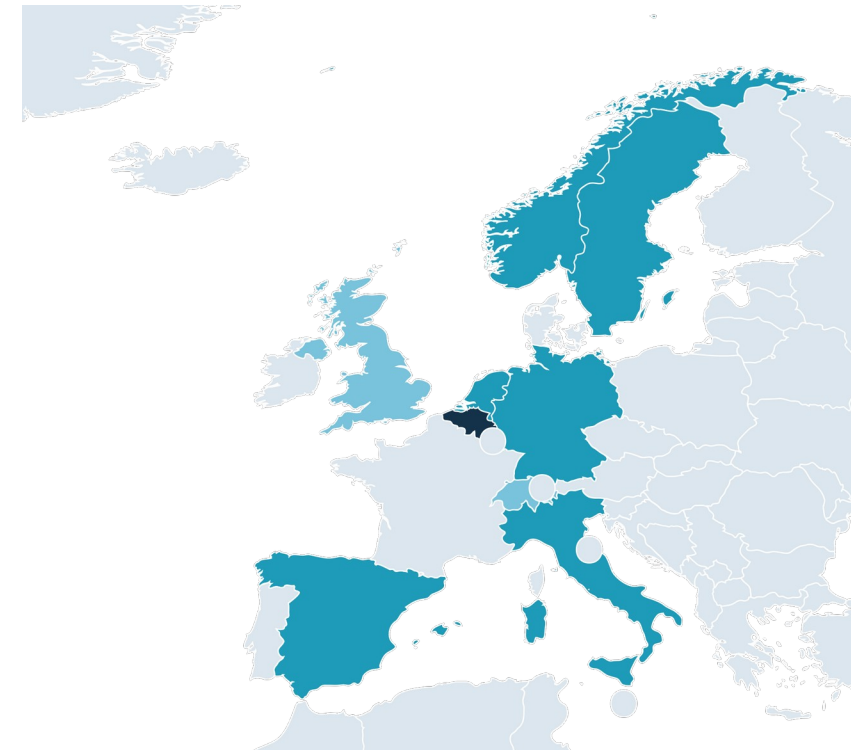
8

clinical centres

10 countries · 5 years (2024–2028) · adults + children · Horizon Europe

Pediatric work package

- Retrospective data collection across all pediatric centers (ongoing)
- MRI anonymized data collection for RAPNO AI (ongoing)
- Spatial multi-omics atlas of pediatric high-grade glioma (ongoing)
- Focus on immunotherapy (DC vaccination) treated patients



● Coordinator

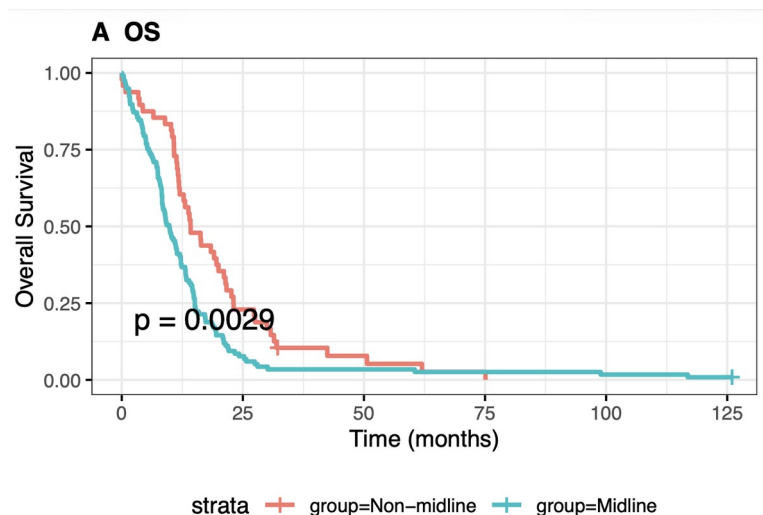
● Clinical centre

● Partner country

MIDNIGHT: Microenvironmental Drivers of Immunosuppression in pediatric Diffuse Midline Glioma

Clinical, radiological and biological (FFPE samples + blood samples) full annotated cohort:

- 191 Belgian patients
- MRI dataset pre and post standard of care treatments



First-line treatment — midline pHGG

% of patients per epoch · modalities reaching $\geq 5\%$ shown · empty = not used

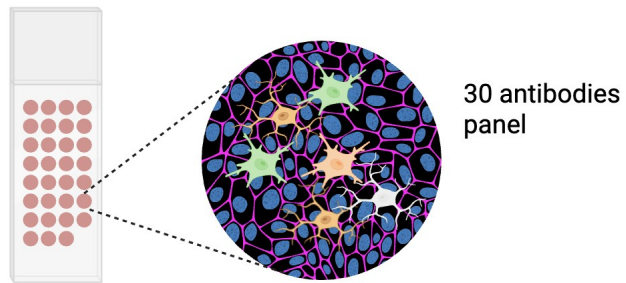
	2000-2010 (n=31)	2010-2020 (n=63)	After 2020 (n=30)
Chemotherapy	54.8%	27.0%	30.0%
Targeted therapy		30.2%	30.0%
Stupp-like (TMZ)	9.7%	15.9%	26.7%
mTOR inhibitors		22.2%	26.7%
HIT-GBM-D	29.0%	1.6%	
HIT-GBM-C	6.5%		
BB-SFOP	6.5%		
Dasatinib		6.3%	

% of patients

MIDNIGHT: Microenvironmental Drivers of Immunosuppression in pediatric Diffuse Midline Glioma

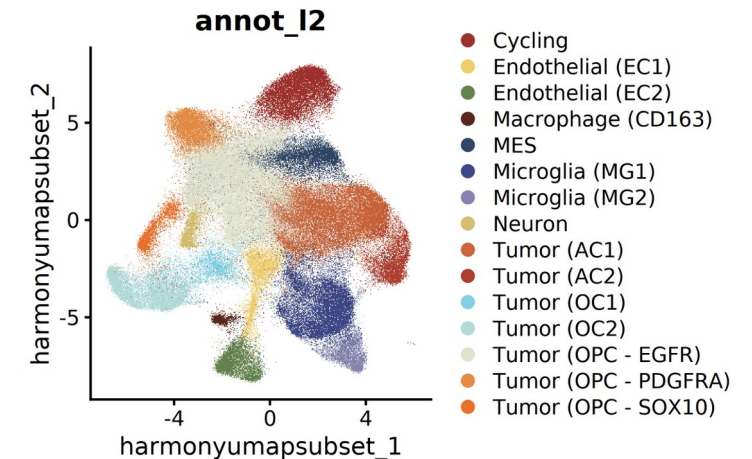
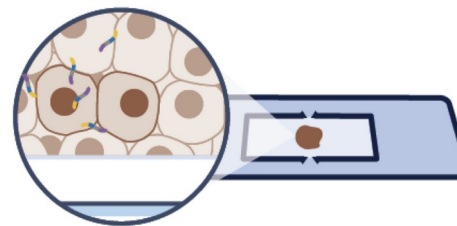
More than 40 FFPE blocks from Belgian patients + 5 patients (naïve and after DC vaccination in Spain) + fully annotated Sweden cohort

Spatial proteomic immune profiling of midline gliomas

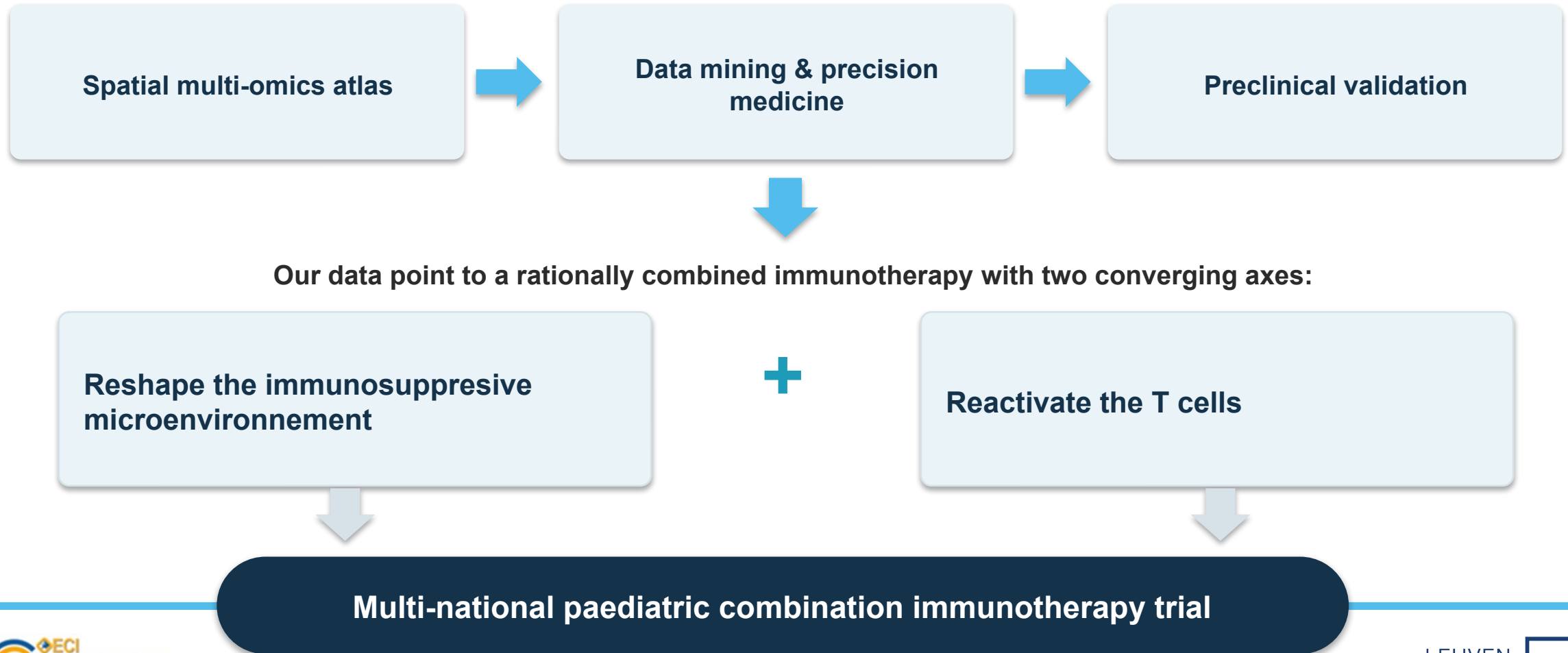


B7-H3, CD147, CD155, EGFRvIII, EphA2, GD2, HER2, IL13Ralpha2, CD155, CD163, CD206, CD47, IDO, CD-40, LAG-3, SPP1, TIGIT

Spatial transcriptome profiling (Dr. Morscio Julie)

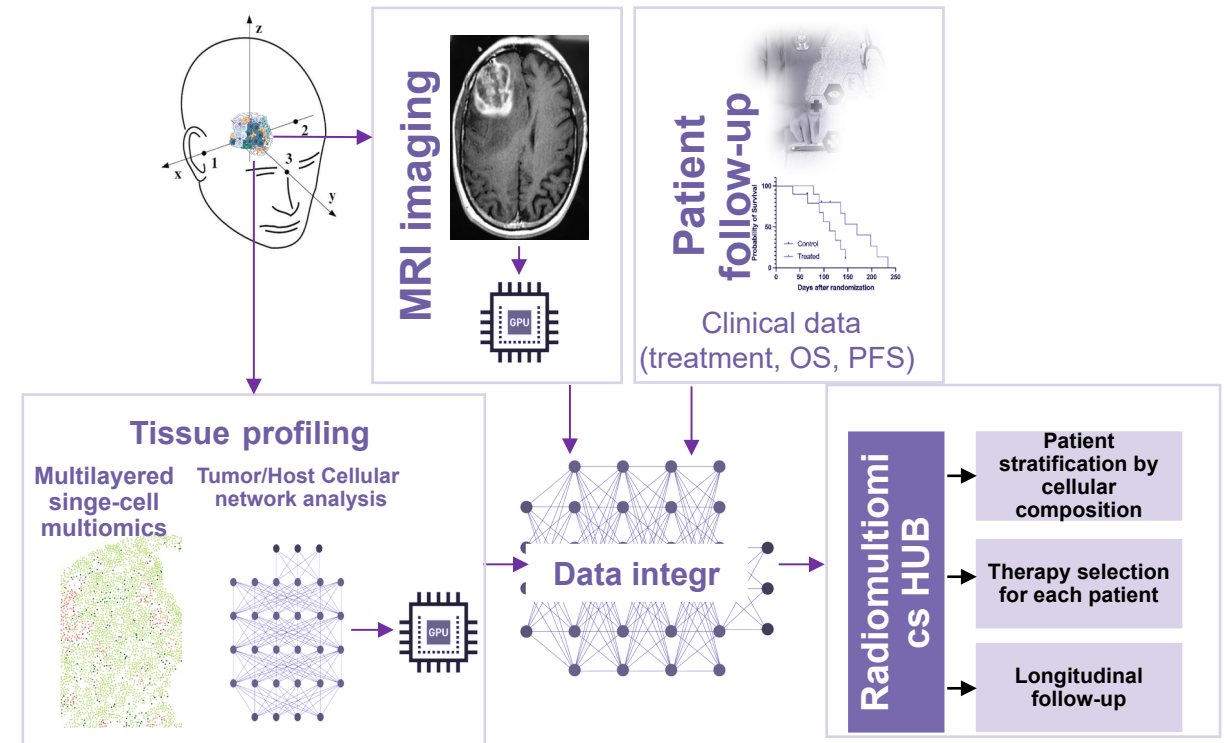


From multi-omics to a combination immunotherapy trial

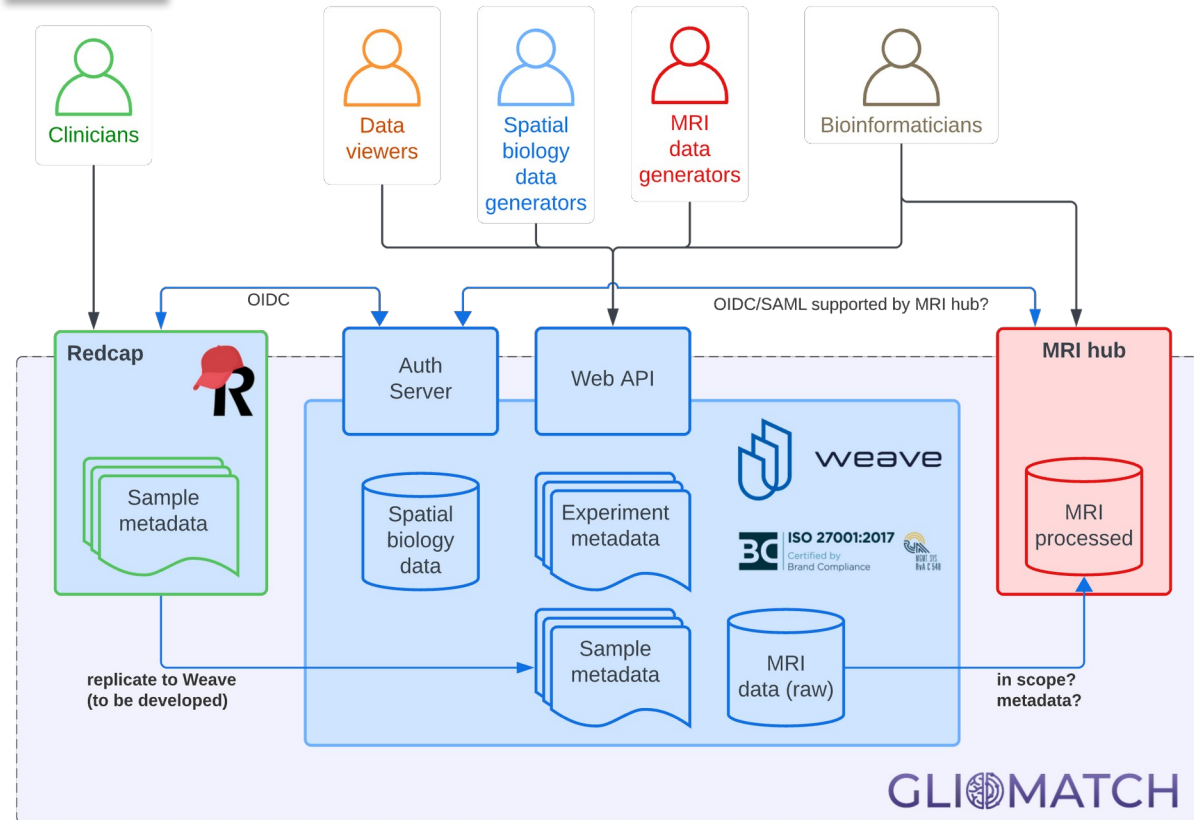


What is working well in our consortium?

- Pediatric and adult neuro-oncology working together in comprehensive cancer centers.
- Connecting with existing partners and international groups : SIOPE BTG, ITCC, DMG-ACT, EN HOPE SMART4CBT



Actual challenges: data accessibility



GOAL: A common, UNCAN-compatible data lake and clearly defined work packages

- Secure storage by highest standards
- Authorization, roles, responsibilities
- Accessibility
- Data processing, analysis, and visualization
- Dissemination

Take home messages

- No single center or country can solve pediatric high-grade glioma alone, need for collaborative immunotherapeutic platform
- Progress is built in layers: local (LPCM), national (PEDBRAIN), European (GLIOMATCH)
- Shared standards turn scattered cases into a learnable cohort: MIDNIGHT (191 annotated patients), spatial multi-omics, MRI for AI, DC-vaccination trials.
- Collaboration runs on trust and data: pediatric and adult teams and international groups enabled by a secure, shared, UNCAN-compatible data lake.

Contacts

Prof. Frederik De Smet

(PI, Study coordinator)
frederik.desmet@kuleuven.be

Prof. Sandra Jacobs

(chief paediatric work package)
sandra2.Jacobs@uzleuven.be

Dr. Julie Morscio

(post-doctoral researcher, main responsible for
paediatric WP)
julie.Morscio@kuleuven.be

Dr. Pierluigi Calò

(pediatric oncologist, PhD researcher)
pierluigi.calo@kuleuven.be

GLIOMATCH

The malignant Glioma immuno-oncology
matchmaker: towards data-driven precision medicine
using spatially resolved radio-multiomics

 gliomatch.eu

 [@GLIOMATCH](https://www.linkedin.com/company/gliomatch)

 info@gliomatch.eu

GLIOMATCH

brings together 14 partners from 10 European and non-European countries



TIMELEX



**Thank you!
Questions?**