
Advanced renderings and AI for medical
applications

JBM

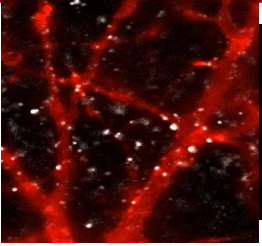
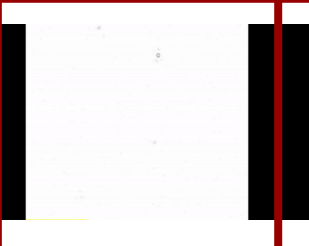

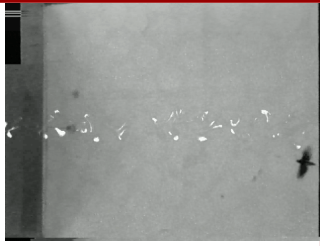
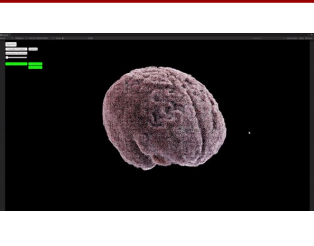
Decision and Bayesian Computation-
Epiméthée
Pasteur - INRIA- CNRS UPC
Pr[AI]rie
Avatar Medical

Paris - 16th January 2026

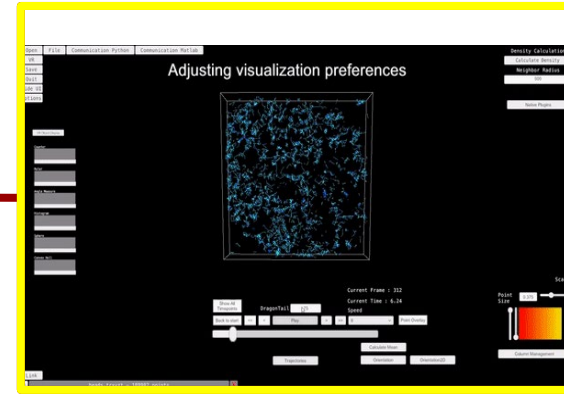
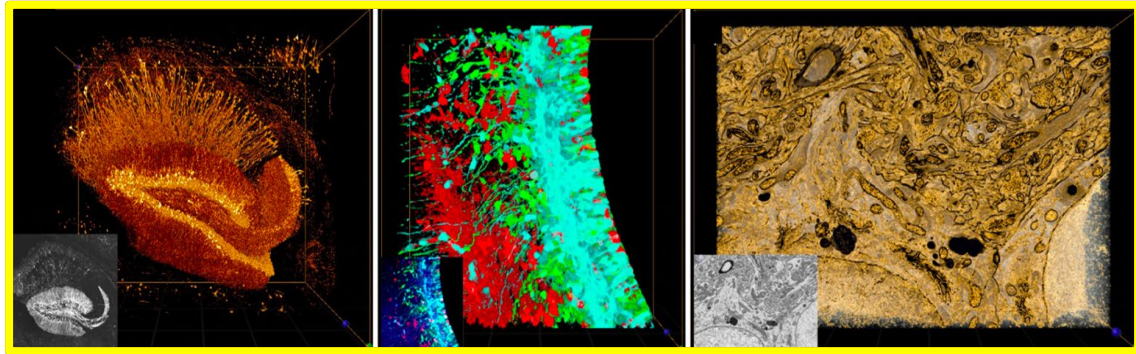
We seek how evolution leverage physics constraints to guide biological function



Physical principles of biological information processing

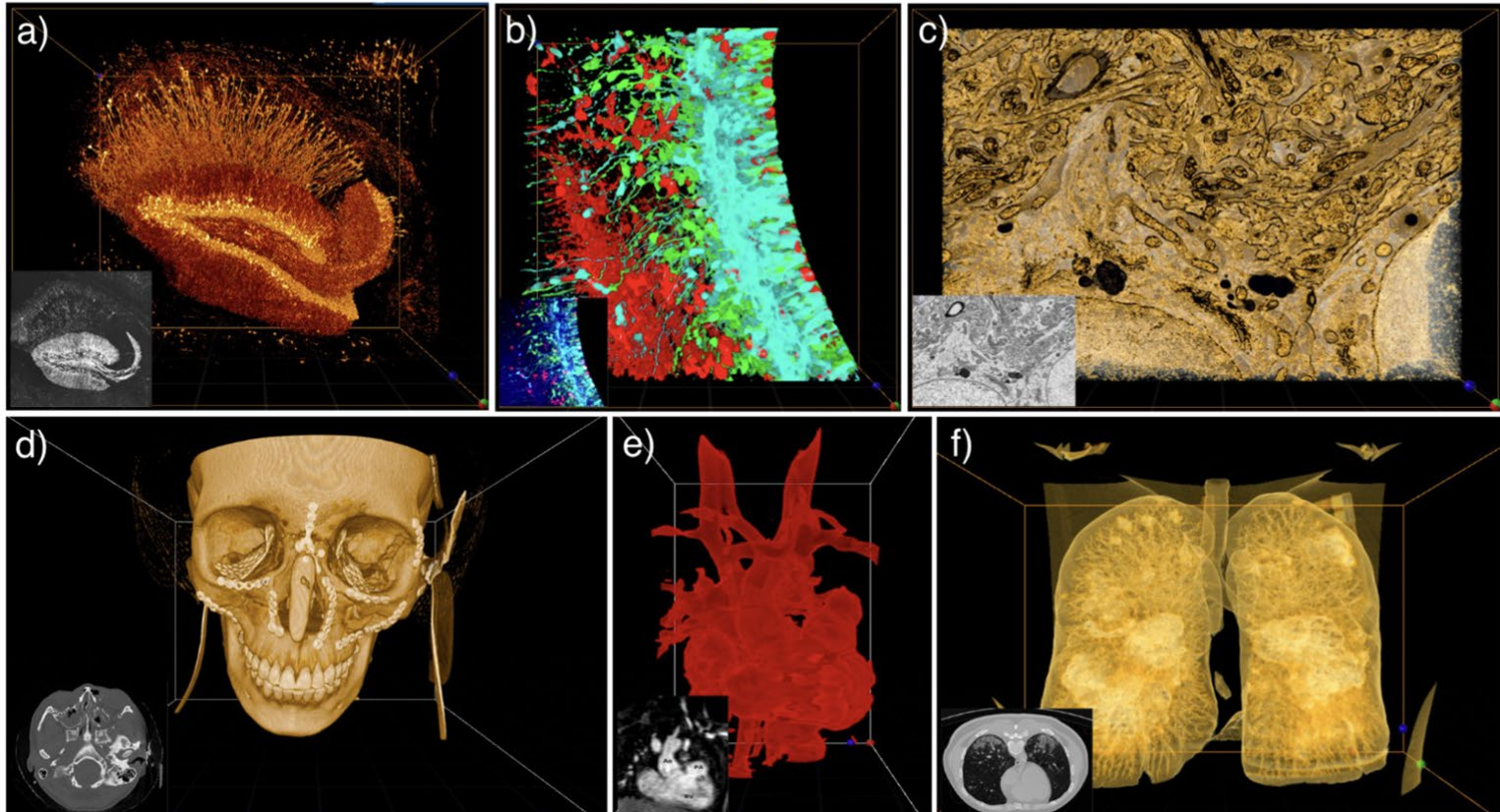
| | | | | | |
|-------------------|---|---|--|---|---|
| |  |  |  |  |  |
| Scales | nm — μm | μm — mm | mm — m | m — km | Cm - m |
| Goals | Going to the target organelle | Finding food | Eat to pupate | Finding a mate | Visualise and analyse 3D data |
| Challenges | Overcome thermal noise and heterogeneity | Climbing time and space varying gradients | Develop fast, Navigate in unpredictable environment, avoid predators | Finding a source with limited & unreliable information | Data diversity, learning on the fly, imperfection in segmentation etc |

Virtual reality and raw data

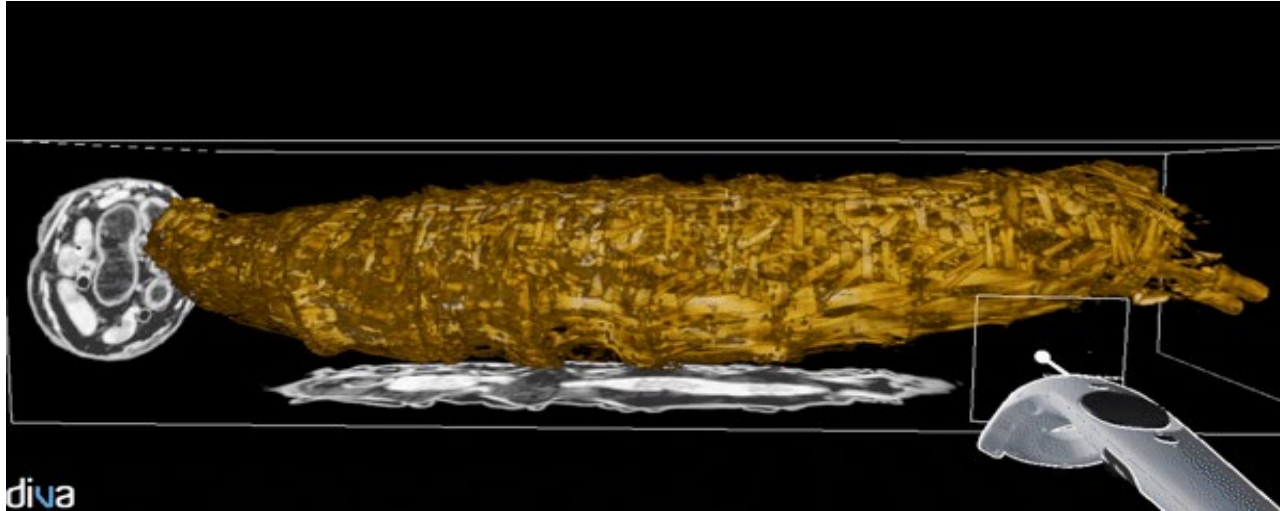


MICROSCOPY
MICE BRAIN

From Microscopy to medical data



Modelling and Simulating the body

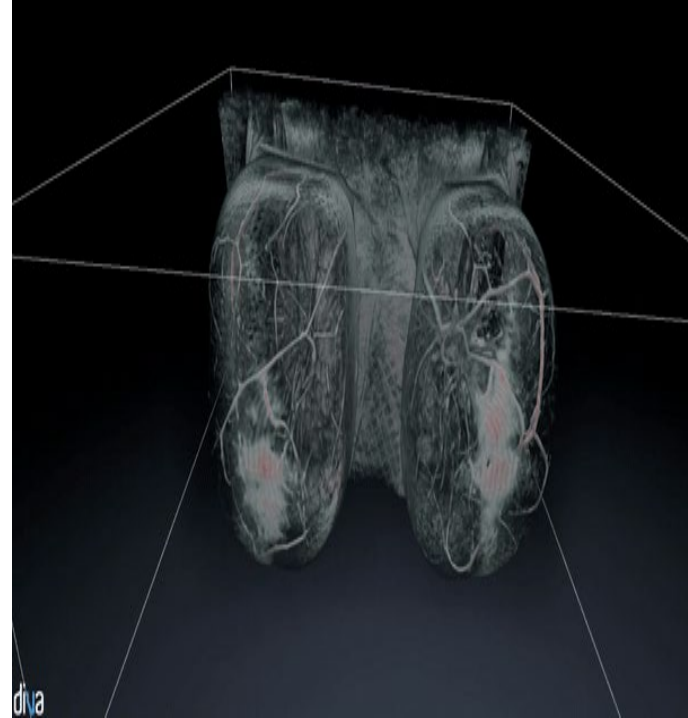
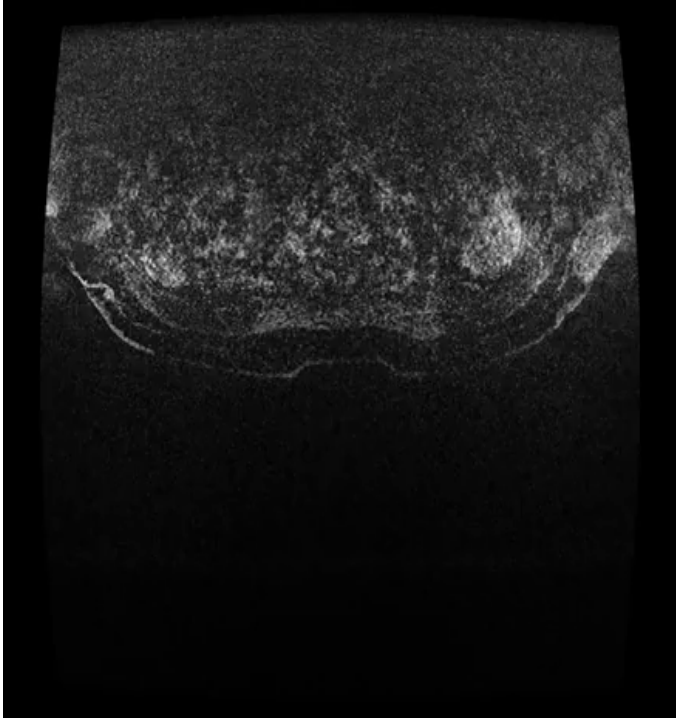


Blanc T. et al, Nat. Meths. 2020

El Beheiry et al , Nat Meth (2015)

El Beheiry et al, J mol Biol (2019, 2020)

Breast cancer MRI



Ruiz et al, J. Ped. Surg. Case Rep. (2021)

El Beheiry et al, JCOS (2021)

Laas et al, Case rep (2021)



Our Mission

To deliver clinically relevant 3D patient -specific visualizations to surgeons in **real-time**, **where they need it**, **when they need it**.



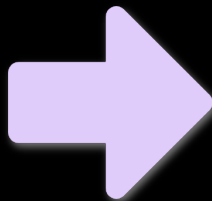
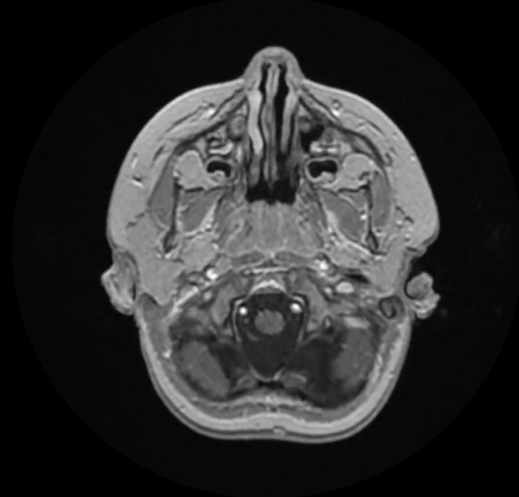
AVATAR MEDICAL

From Medical Imaging To Medical Understanding

Real-time, 3D patient specific avatars for consultations

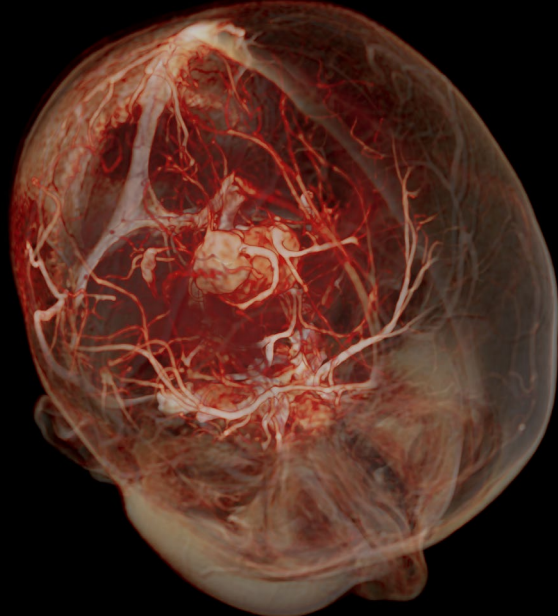
Brain MRI

Difficult to visualize vessels



Patient *avatar*

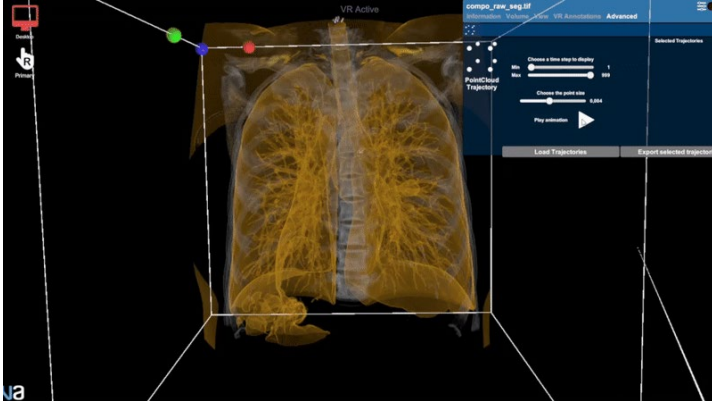
Patient and surgeon assess location of tumor vessels



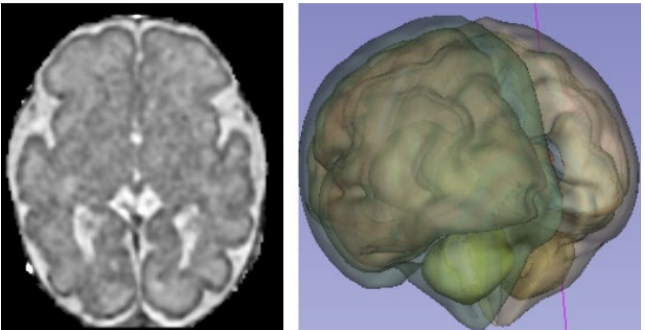
AVATAR MEDICAL

How to annotate data: Local Tool

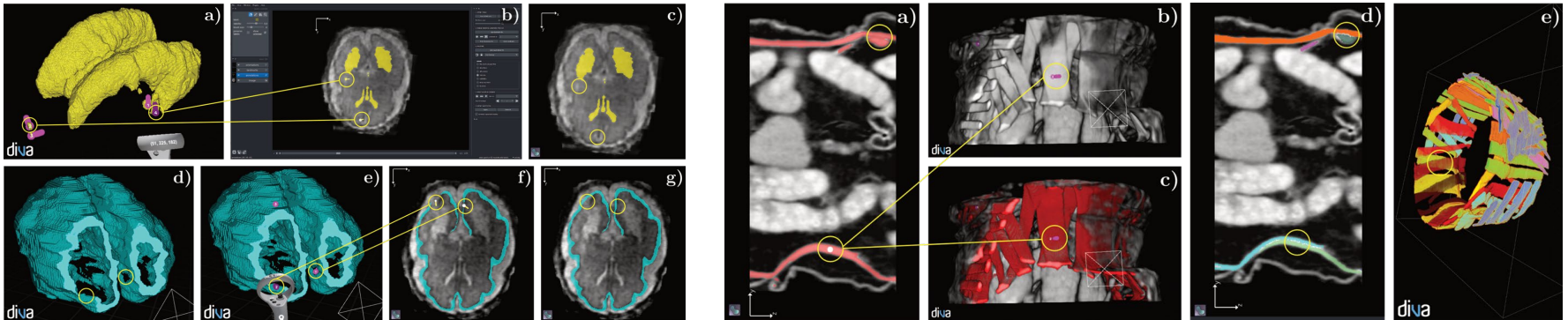
DIVA-Voxel Learning



DIVA-Genuage



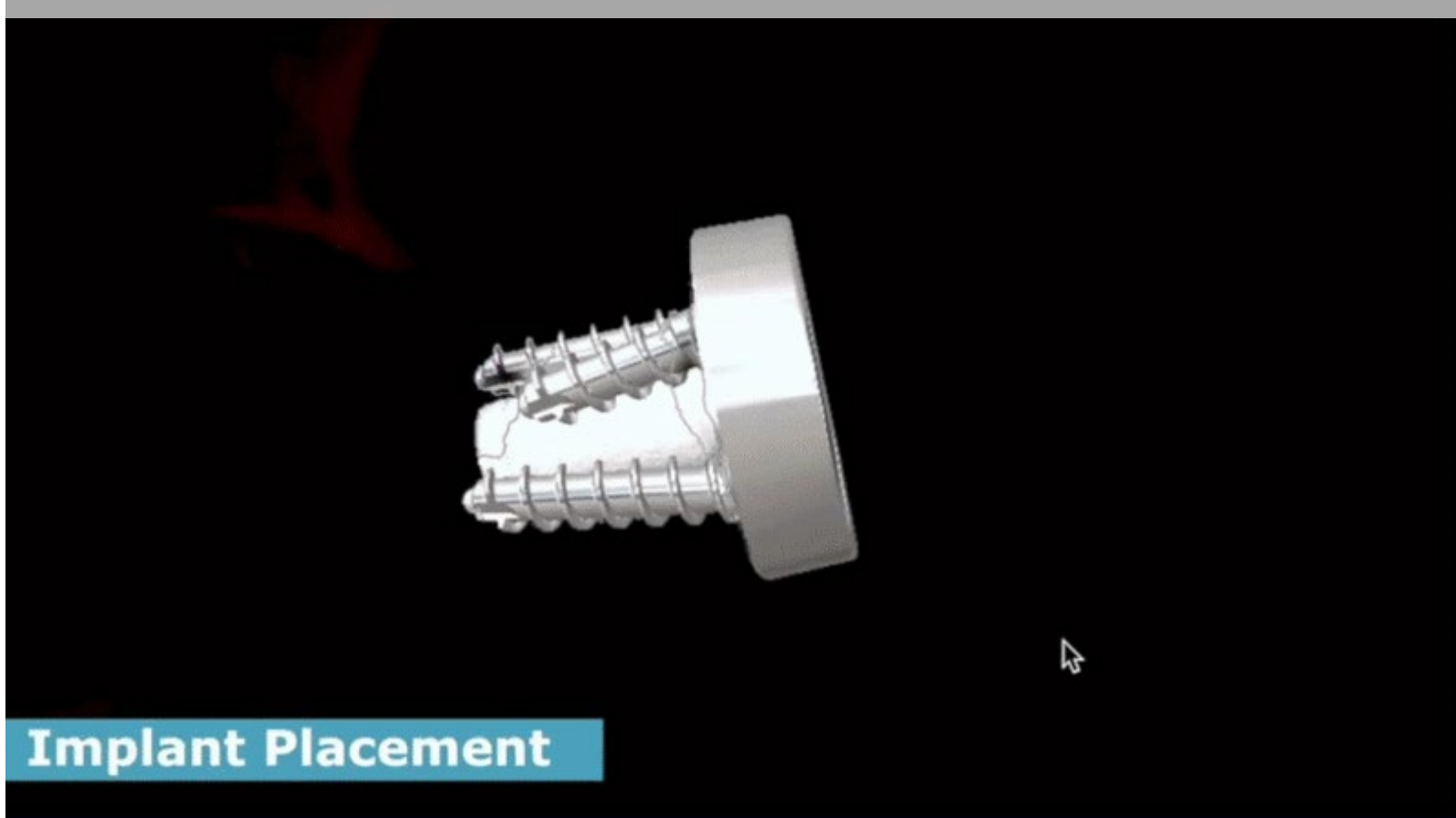
DIVA-Hesperos



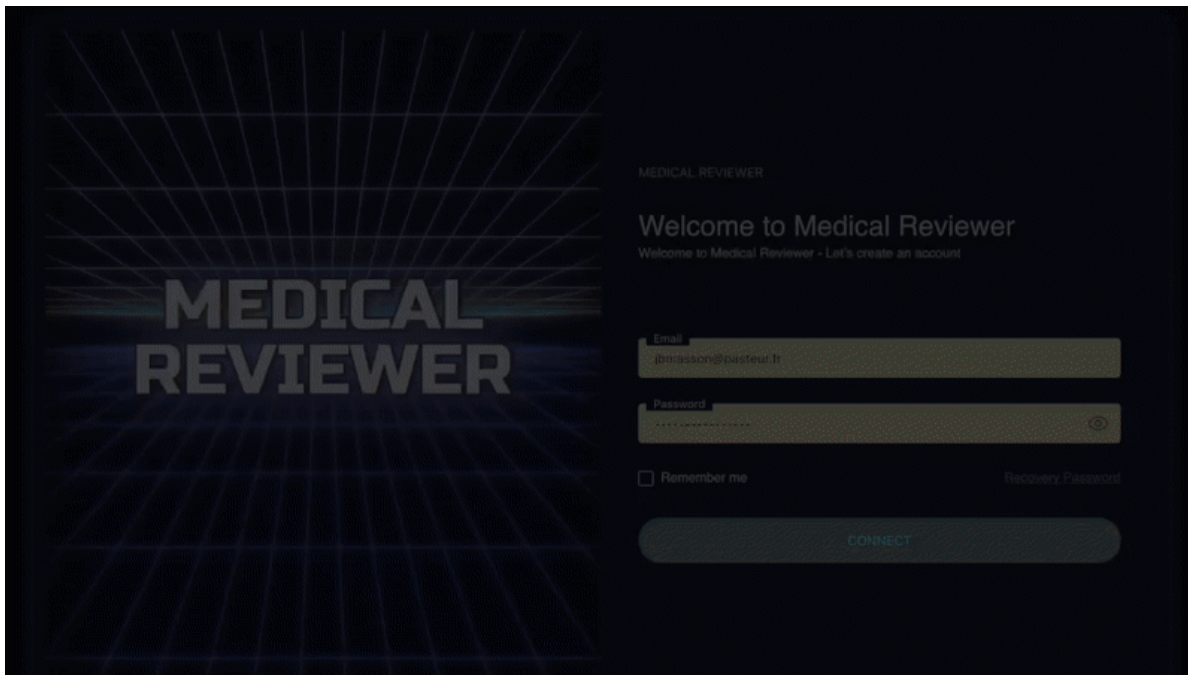
Mixing Cloud rendering - Image segmentation - and implants positioning



Mixing Cloud rendering - Image segmentation - and implants positioning

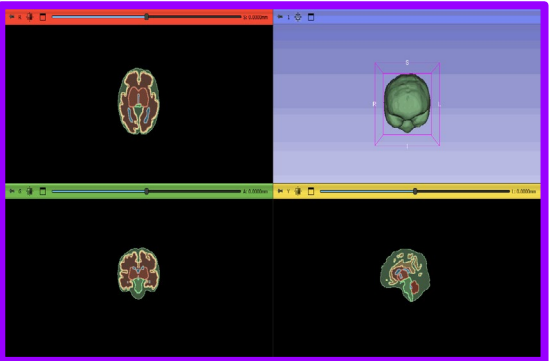
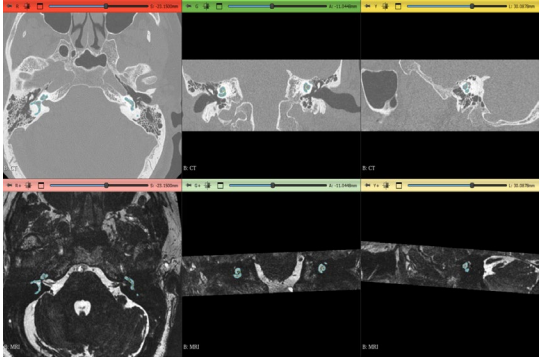
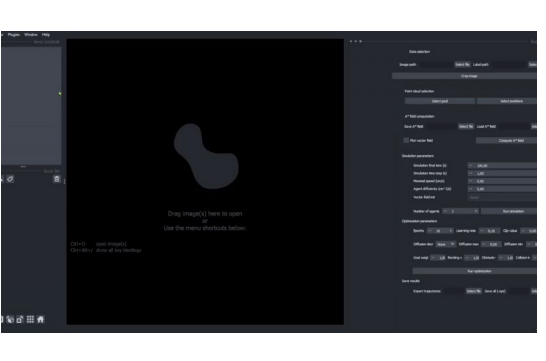


Algorithms within hospitals : annoying PU/PH *in situ*



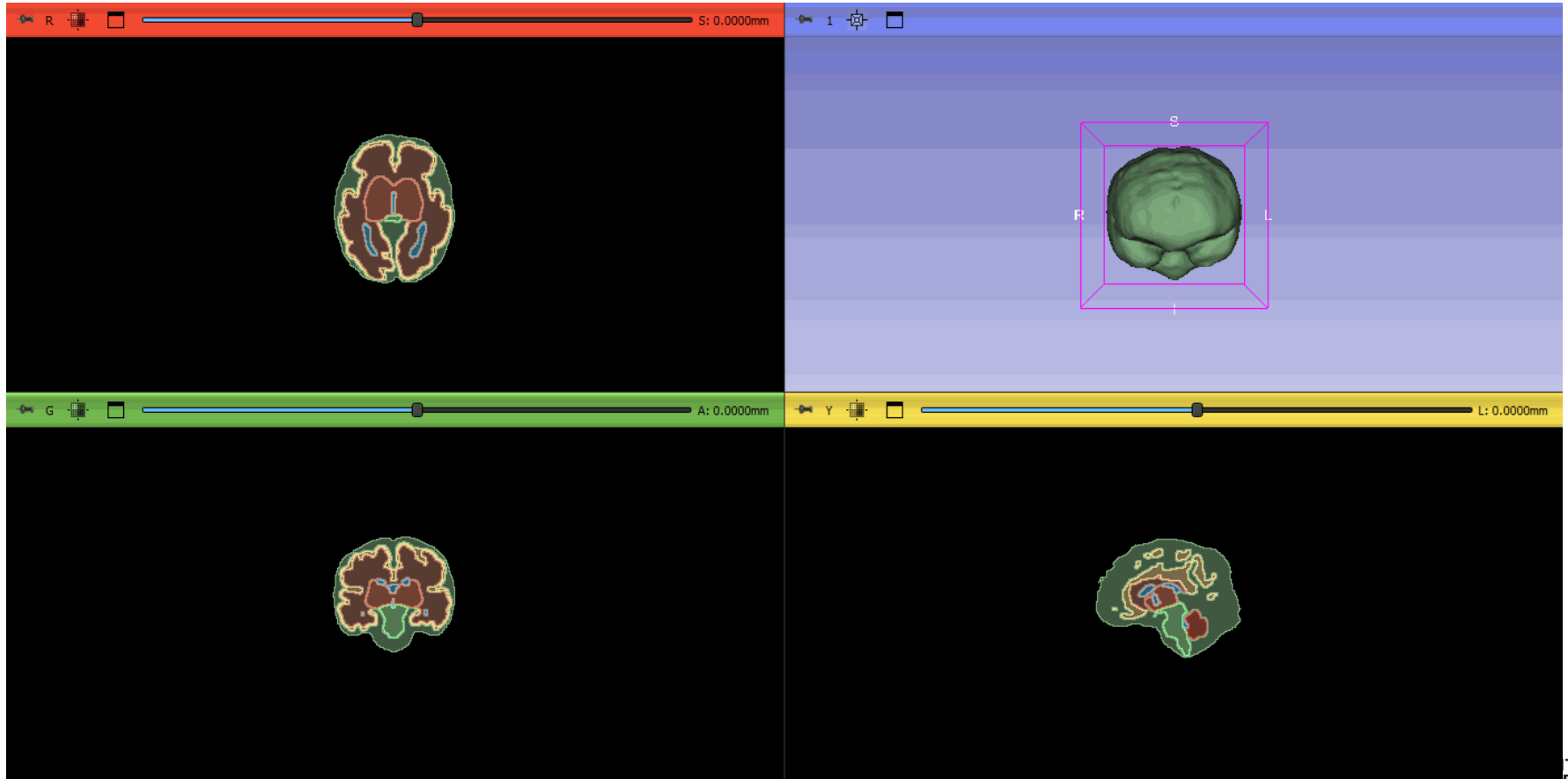
& All the IT team

AI within hospitals

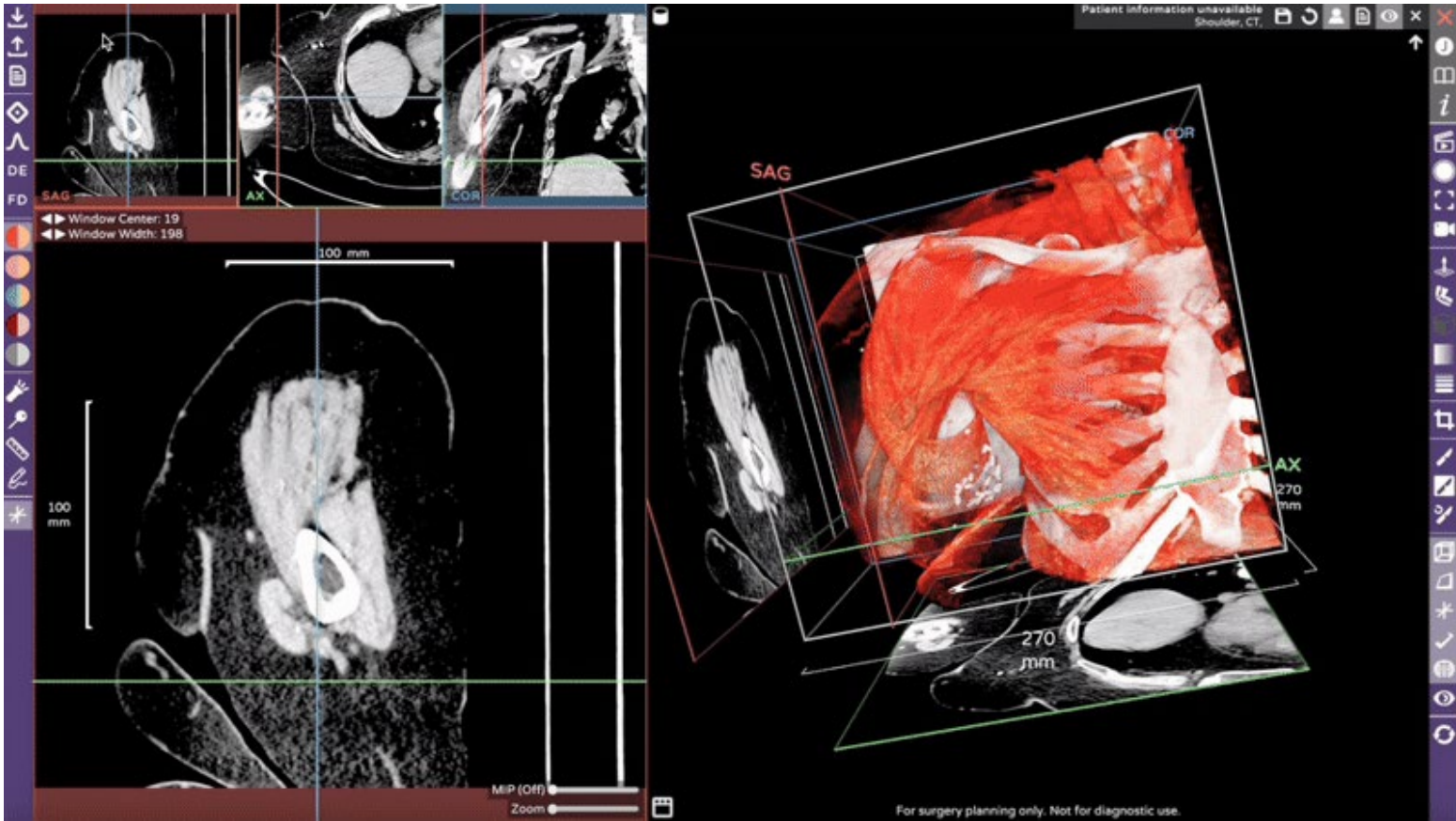
| Fetal brain MRI Segmentation | Ear surgery planning | Automated surgery Planning |
|--|--|---|
|  |  |  |
| Imagine, Lumiere & Necker | IHU reconnect | RHU Rebone |

Cremese et al, Sci. Rep. (2025)
Patent surgery (pending)

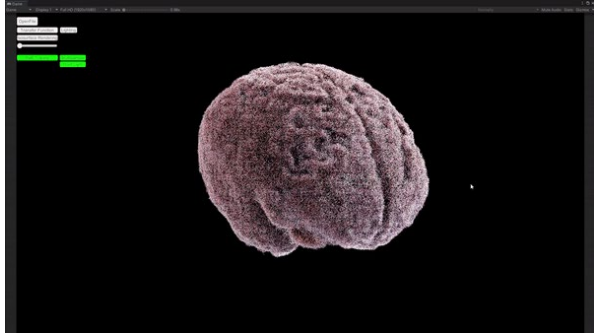
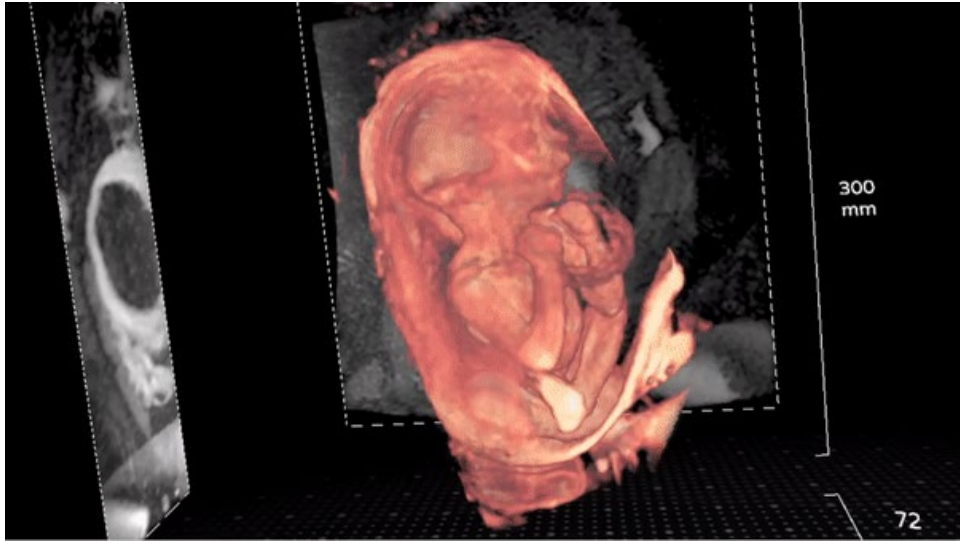
Fetal Brain Segmentation



Cloud based advanced rendering within hospitals



Medical rendering in the hospital



Thank You



Paris - 16th January 2026



INSERM-IA

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