GYRENCEPHALIC BRAINS TO MODEL STROKE IN THE HEART OF EU: WILL PIG OFFER NEW OPPORTUNITIES FOR AN OPTIMAL TRANSLATION?

RICORS-ICTUS | Instituto de Salud Carlos III

Dr. Teresa Gasull
Germans Trias i Pujol

Linea 3: Cerebroprotección. 23 marzo 2023

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Institut Català de la Salut

IGTP Germans Trias i Pujol Research Institute

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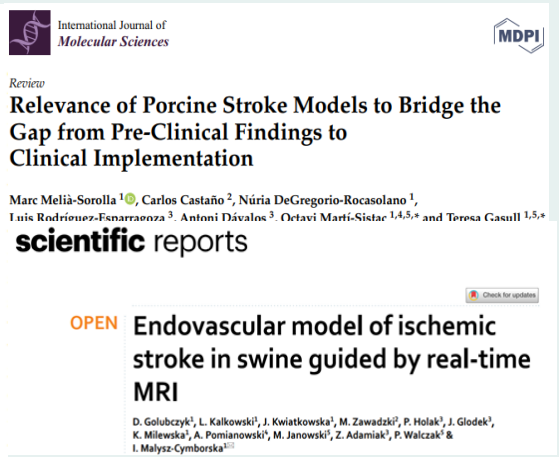
BACKGROUND

Animal models are required to study stroke and new treatments.

- The poor translationality of the preclinical research in stroke in rodents
- Get a “human-like” brain to model human stroke as free as possible of ethical cornerns



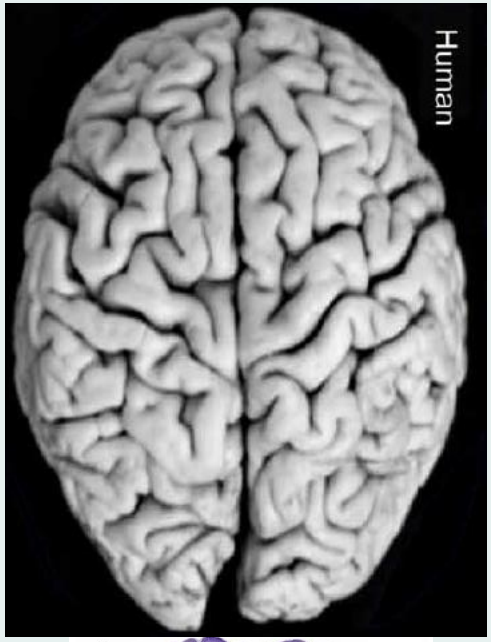
Expertise

Germans Trias i Pujol Hospital
Institut Català de la Salut

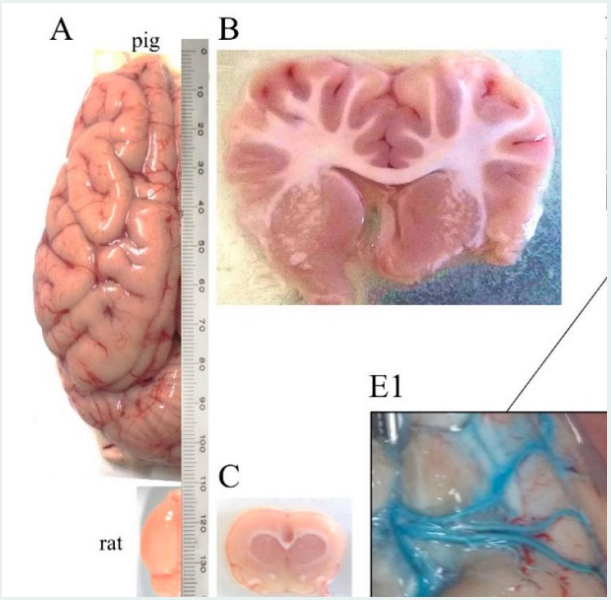
Dedicated facility

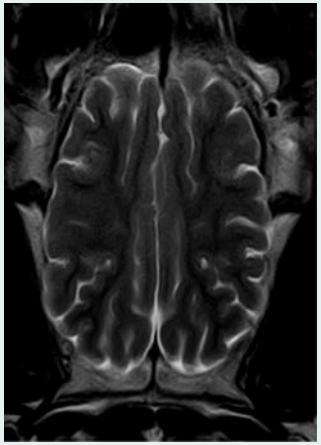
BIOFIDELIC TO HUMAN BRAINS

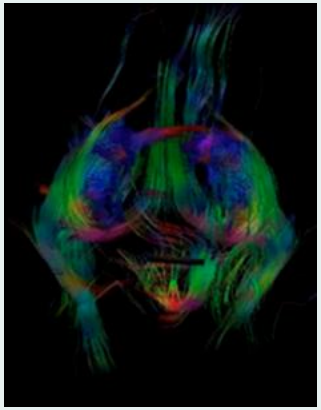
- Pigs vs rodents

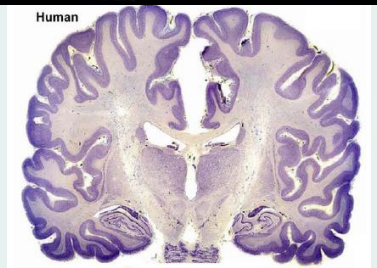


15 cm



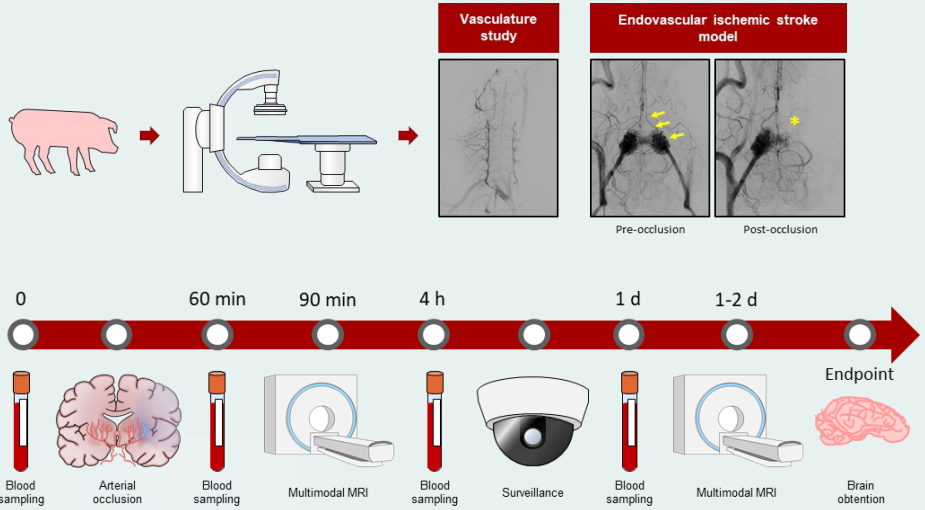


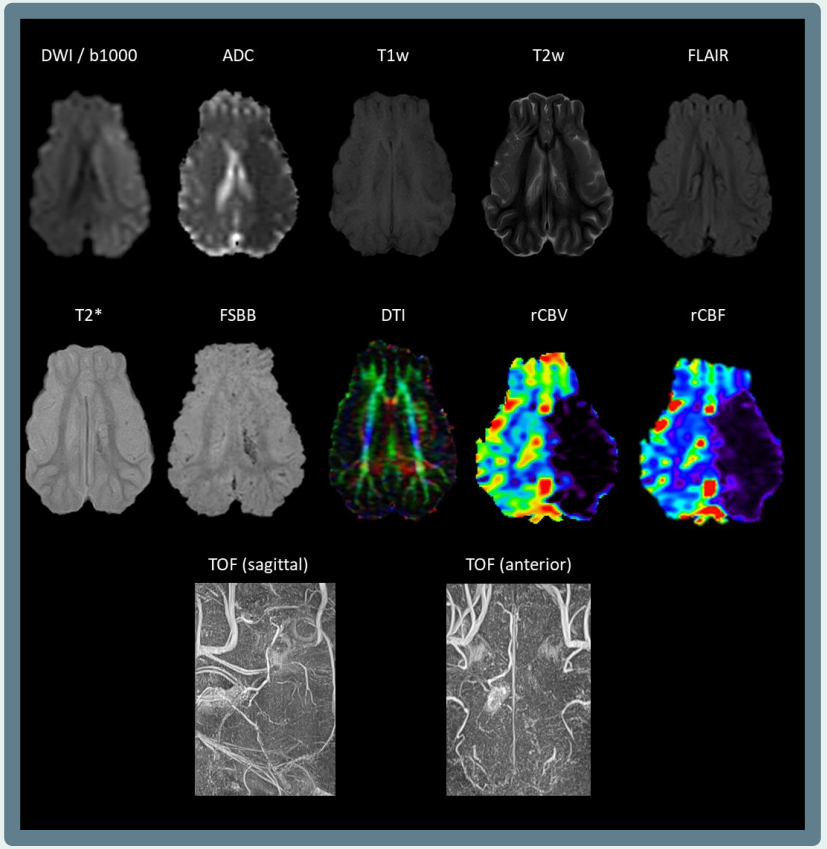




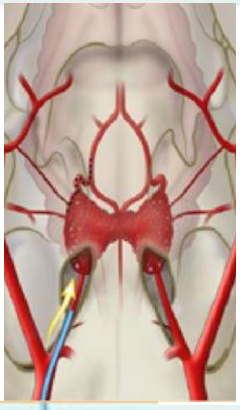
NEW ASSESSMENT OF MODELLING POSSIBILITES & EXPERIMENTAL SET UP

DUROC, LANDRACE, PIETRAIN, MINIATURE PIG-SPECIPIG

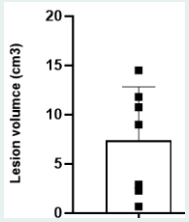


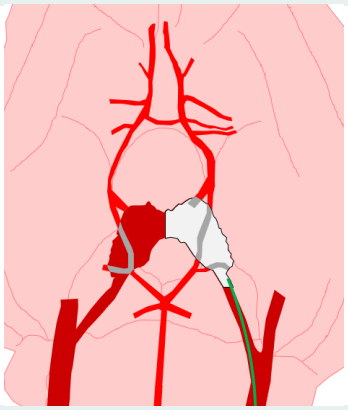


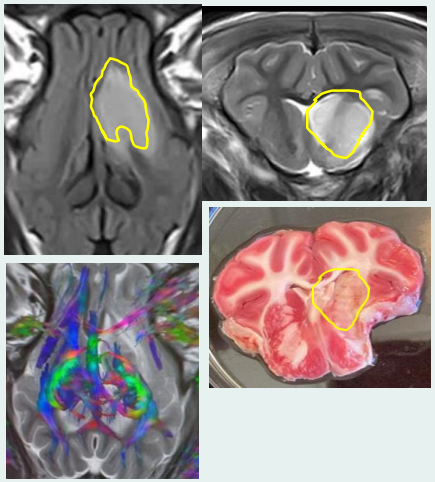
MODEL STROKE IN PIG IN A MINIMALLY INVASIVE WAY



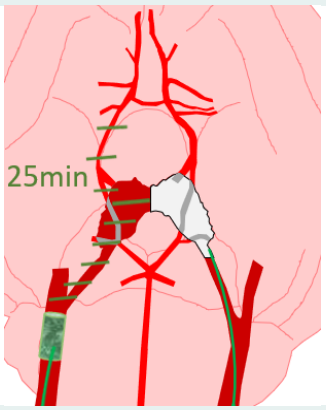
Thrombin
Thrombin+tPA
Difficult to control the area and extent of the damage. Golubczyk et al, 2020

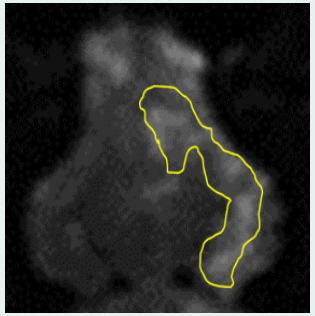






Permanent occlusion of one wing of the RM

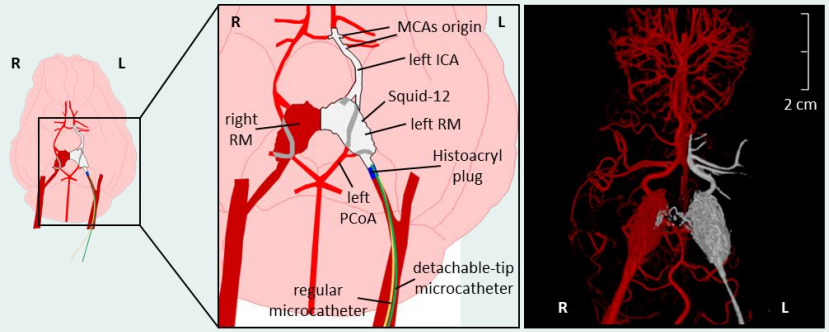


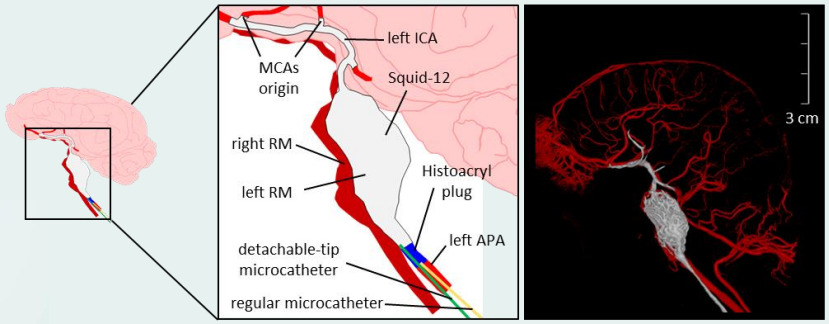


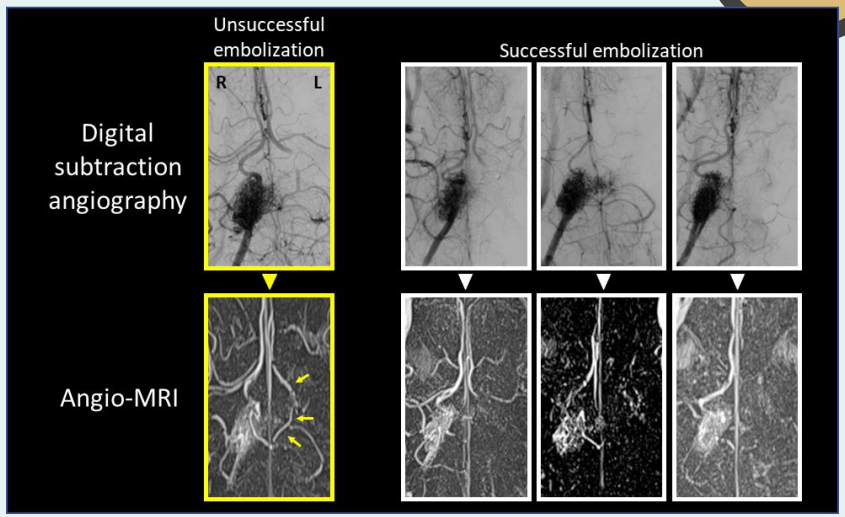
Transient occlusion affecting the left MCA area

SQUID-12+ THE PRESSURE COOKER TECHNIQUE

DUROC x LANDRACE BOTH SEXES

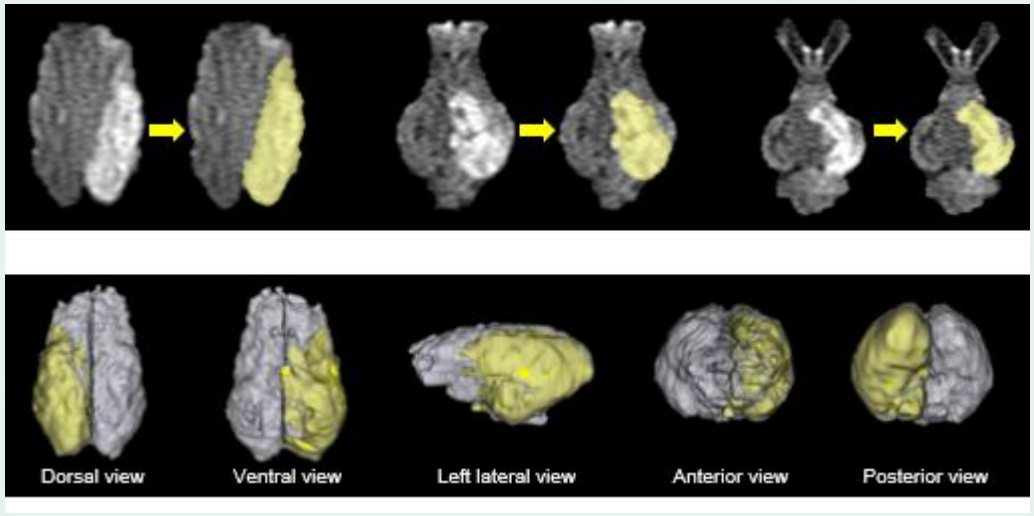


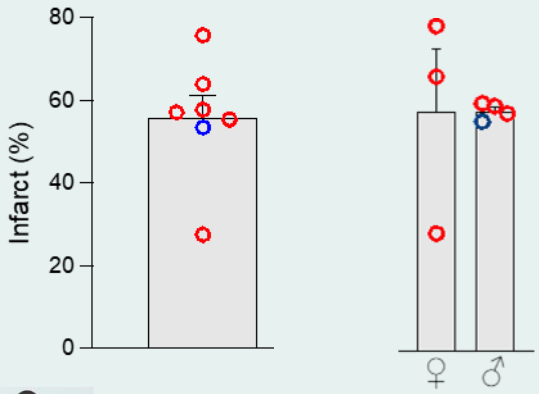




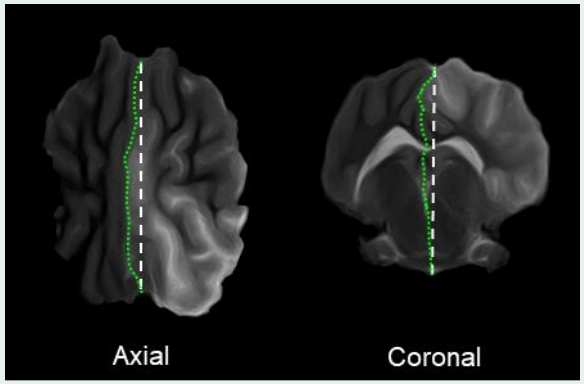
7/8

REPRODUCIBLE, MINIMALLY INVASIVE, ISCHEMIC STROKE MODEL

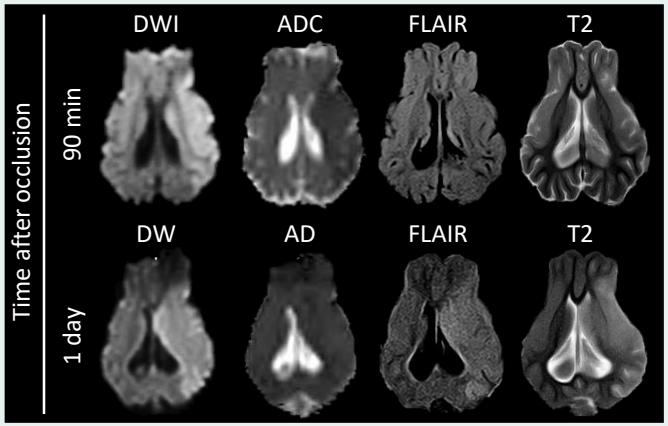


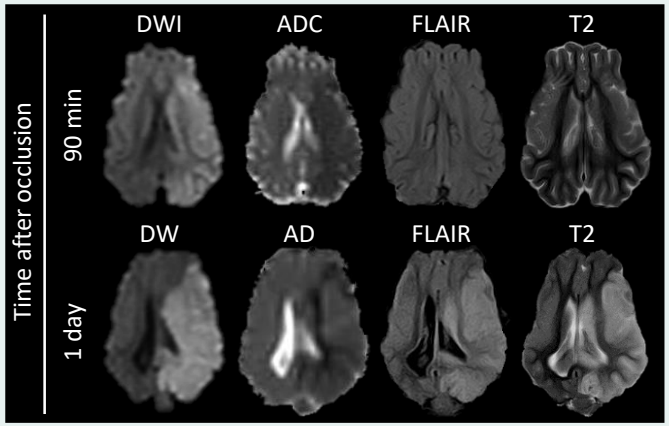


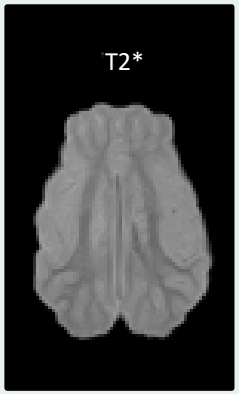
ADULT MINIATURE PIG

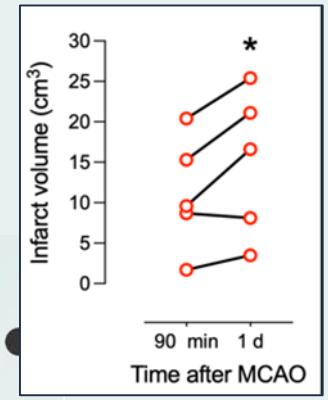


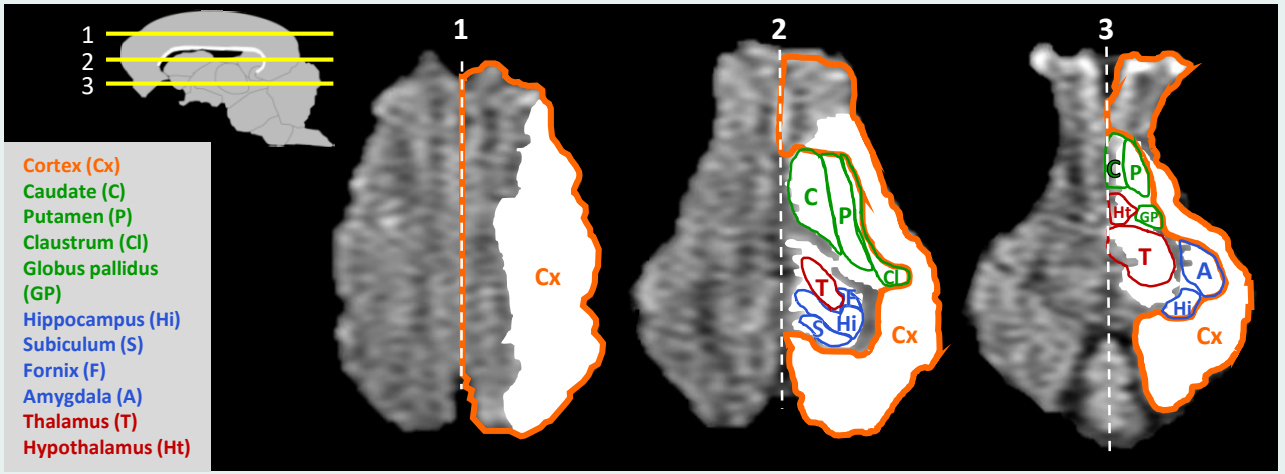
BRAIN AREAS AFFECTED



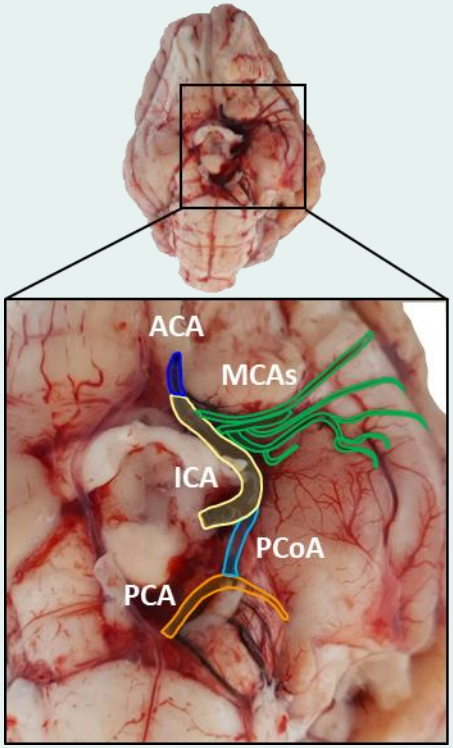


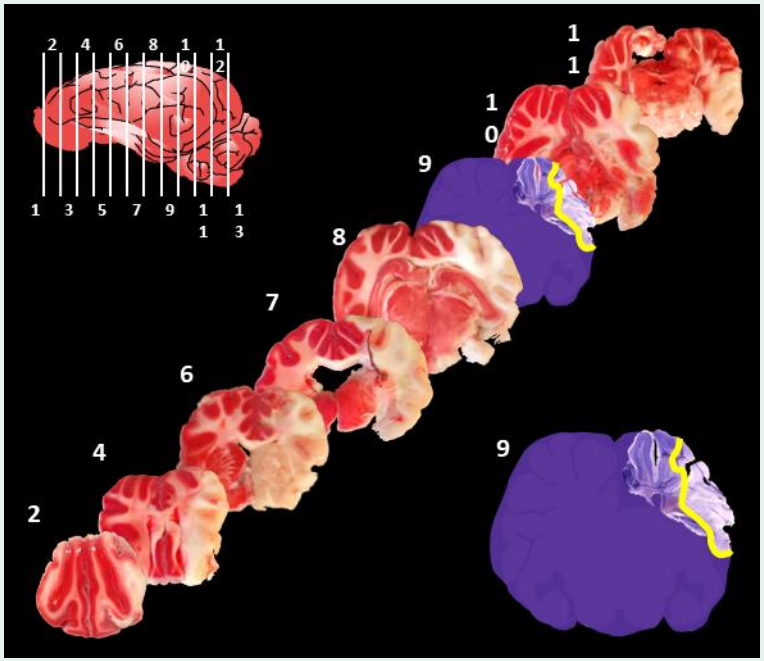






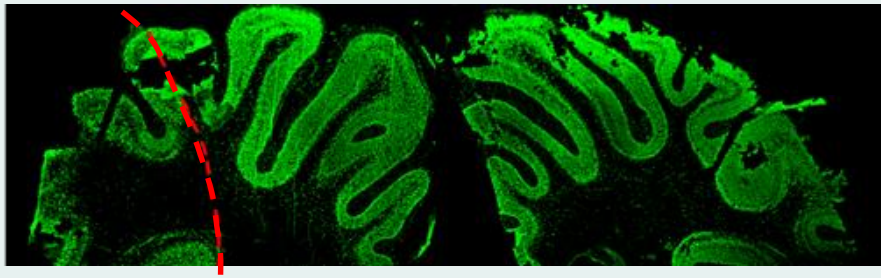
EX VIVO ASSESSMENTS



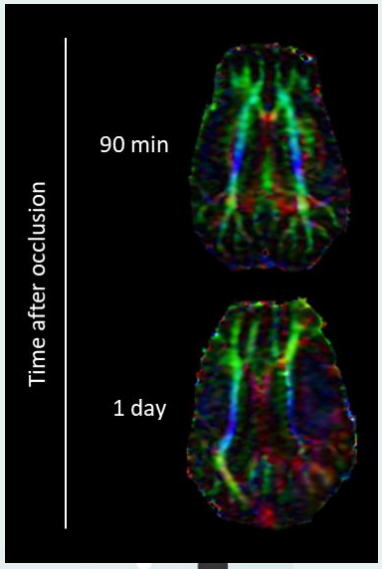


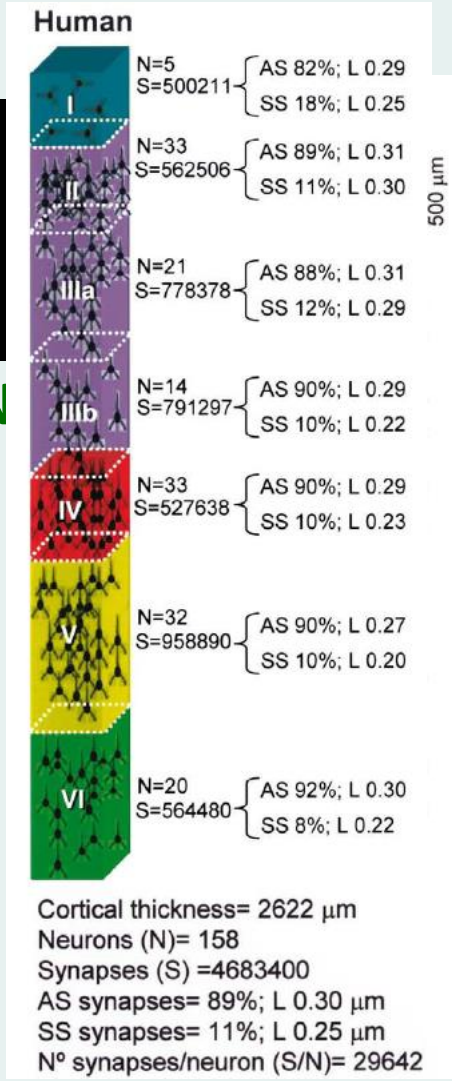
TTC stain **Nissl stain**

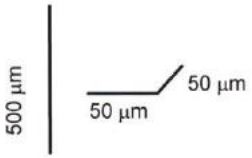
GREY AND WHITE MATTER DAMAGE



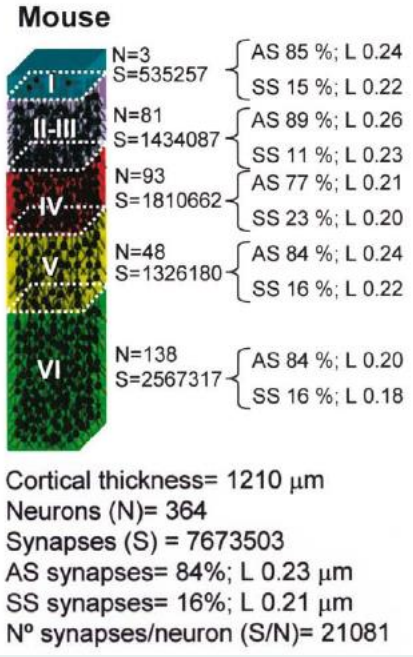
NeuN



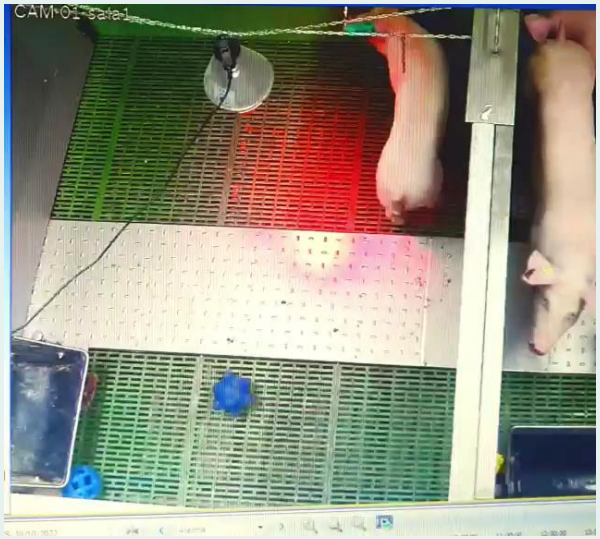


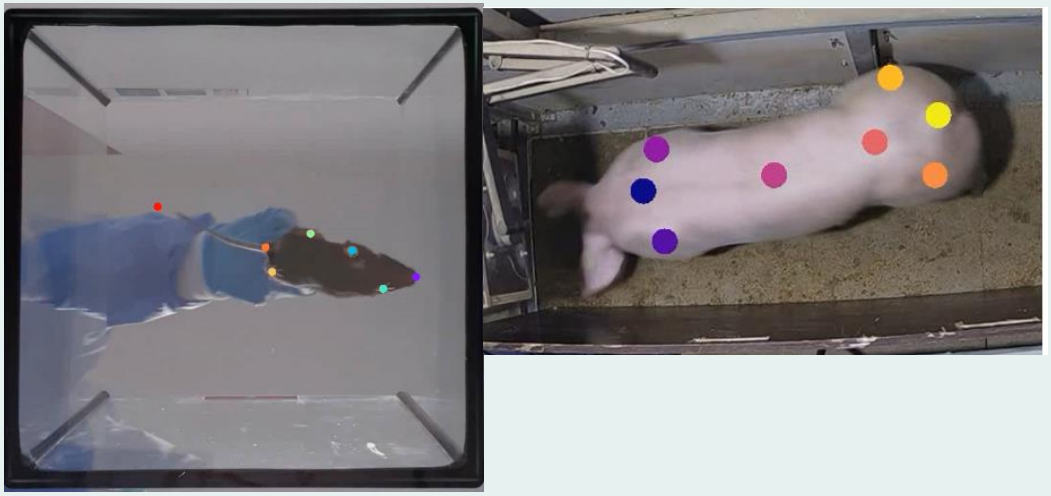


DeFelipe J. Rev. 2011

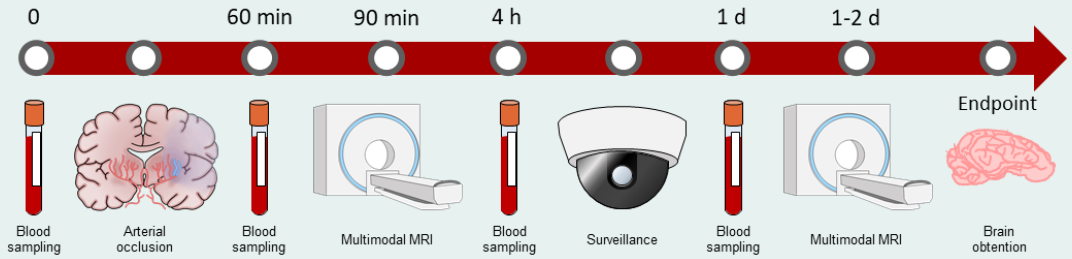


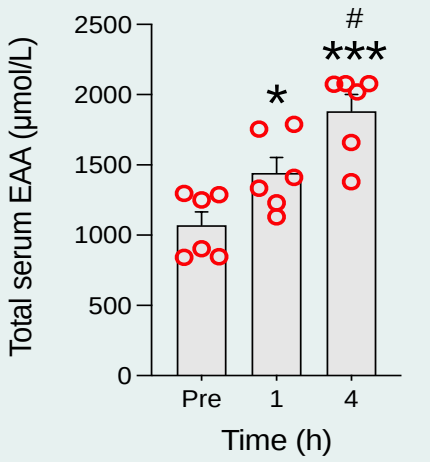
FUNCTIONAL IMPAIRMENT

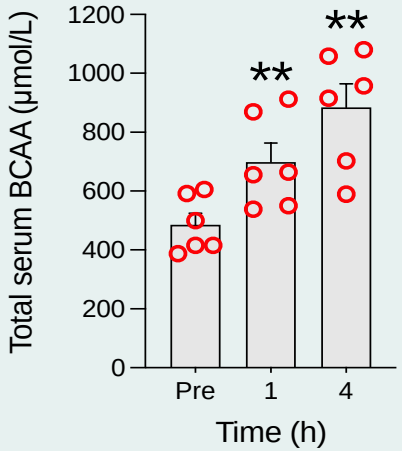


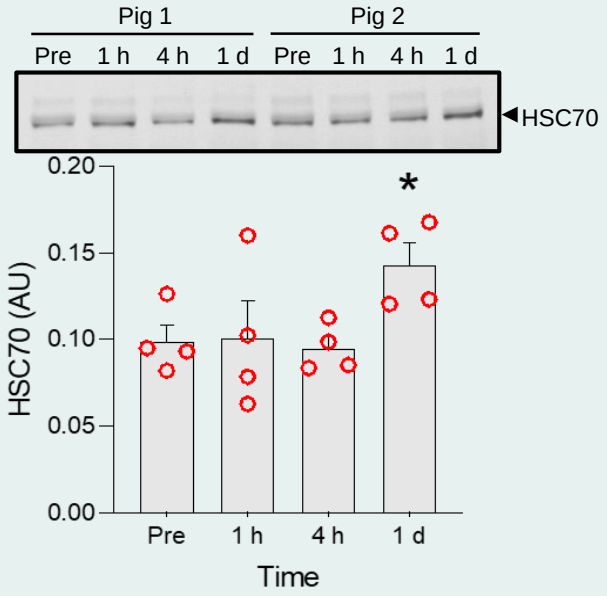


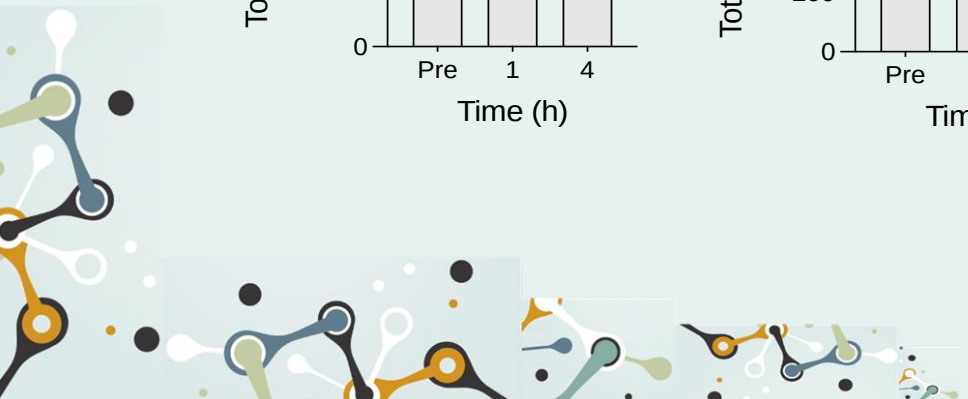
BLOOD AA & PROTEIN STROKE BIOMARKERS









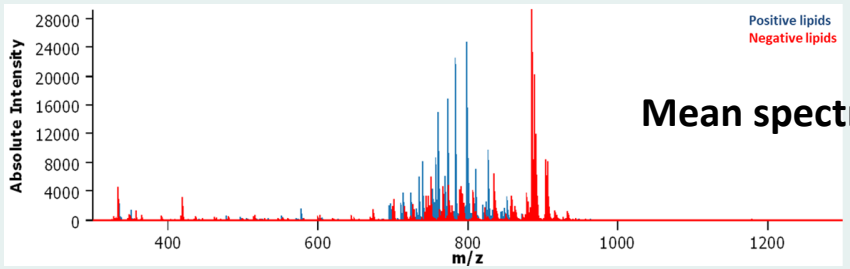


JCI Insight. 2023 Feb 28;e163398. doi: 10.1172/jci.insight.163398. Online ahead of print.

Establishment of a reproducible and minimally invasive ischemic stroke model in swine

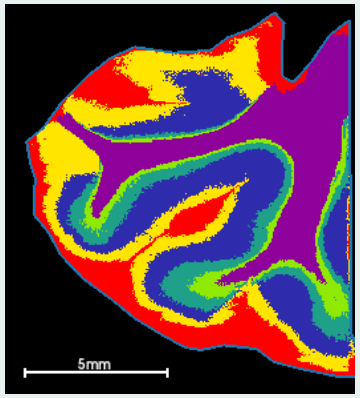
Carlos Castaño [1], Marc Melià-Sorolla [2], Alexia García-Serran [2], Núria DeGregorio-Rocasolano [2], Maria Rosa García-Sort [1], María Hernandez-Pérez [1], Adrián Valls Carbó [1], Osvaldo A Pino [3], Jordi Grifols [4], Alba Iruela-Sánchez [5], Alicia Palomar-García [5], Josep Puig [4], Octavi Martí-Sistac [6], Antoni Davalos [1], Teresa Gasull [2]

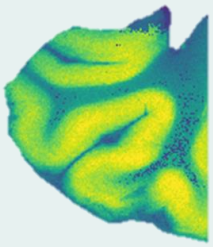
BRAIN SPATIAL LIPIDOMIC STUDY



Mean spectra

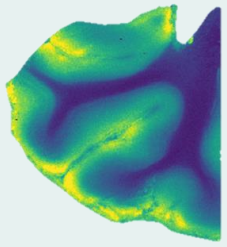
Positive lipids





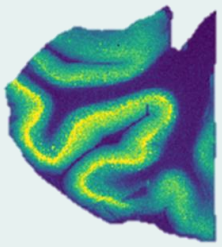
m/z= 801.540 $[M+Na]^+$

phosphatidate



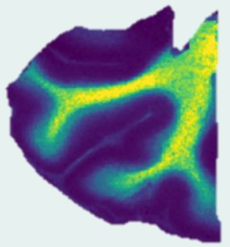
m/z= 697.464 $[M+H]^+$

phosphatidylinositol



m/z= 872.541 $[M+Na]^+$

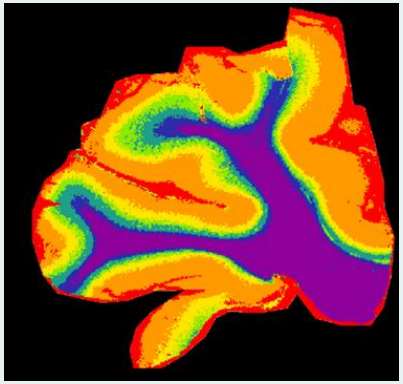
phosphatidylserine



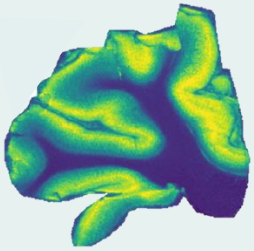
m/z= 792.554 $[M+H]^+$

phosphatidylethanolamine

Negative lipids

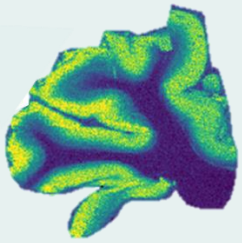


MIN — MAX



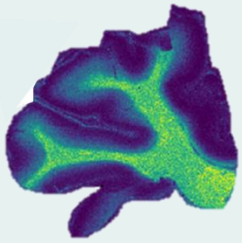
m/z= 885.551 $[M-H]^-$

phosphatidylinositol



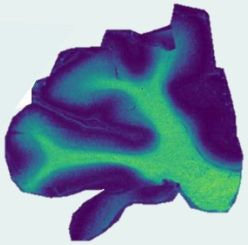
m/z= 792.554 $[M-H]^-$

phosphatidylcholine



m/z= 862.610 $[M-H]^-$

3-O-Sulfogalactosylceramide



m/z= 888.625 $[M+Cl]^-$

phosphatidylethanolamine

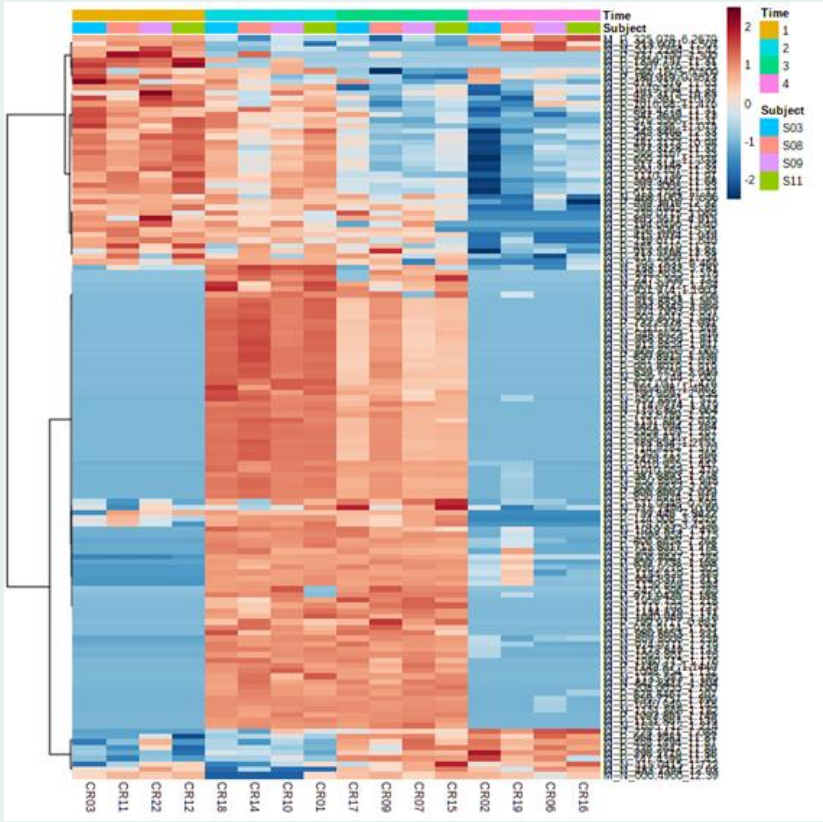
CURRENT COLLABORATIONS RICORS

- Hospital Universitari Arnau de Vilanova/IRB Lleida/ Universitat de Lleida. **Metabolomics/Lipidomics in blood**

- We are currently col.laborating with some international groups **(Tim Magnus/Eva Tolosa in Hamburg; Piotr Walczak Malysz-Cymborska in Poland/USA)** in inflammatory markers in blood.

- We have plenty of brain samples, fixed and cryopreserved and some freshly cryopreserved brain slices that could be used to study senescence-induced stroke or other interesting things.

- We have MRI-data



THANKS

Cellular and Molecular Neurobiology Research Group

IGTP Germans Trias I Pujol Research Institute

UAB Universitat Autònoma de Barcelona

Germans Trias i Pujol Hospital
Institut Català de la Salut

CMCiB Comparative Medicine & Bioimage Centre of Catalonia

INc Institut de Neurociències

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THANKS