



**ALMA MATER STUDIORUM UNIVERSITÀ DI BOLOGNA**

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**Temi ricerca giornata studenti Farmacia**

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**05 Marzo 2025, Navile**

**Laboratorio di Fisiologia Cellulare e Molecolare**

**Università di Bologna, Plesso Ex-Bodoniana,  
Via San Donato 19/2**



# Di cosa ci occupiamo in Lab?

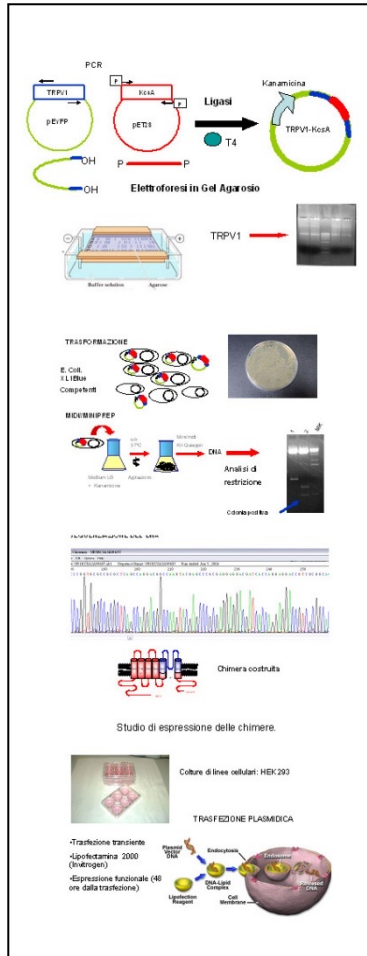
Fisiologia Cellulare e Molecolare. Coordinatore: Caprini — Farmacia e Biotecnologie - FABIT

- 1) Studio dei meccanismi molecolari del dolore cronico/neuropatico e viscerale: identificazione di nuovi target terapeutici – Prof. Caprini**
- 2) Astrociti nella trasmissione sinaptica e malattie degenerative – Prof. Ferroni**
- 3) Modelli “pain in a dish” attraverso biostampa 3D – Dott. Formaggio**

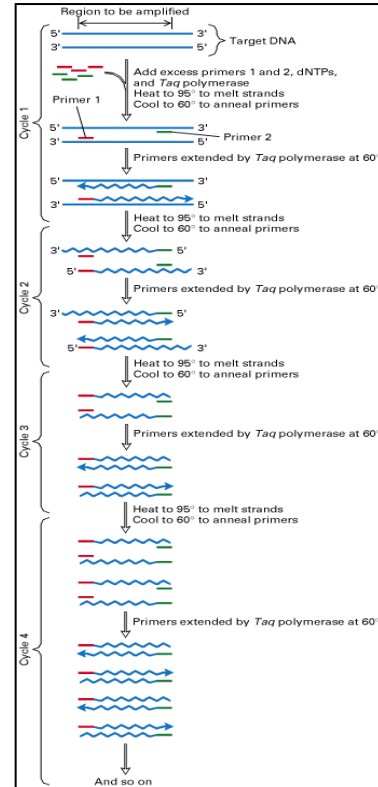


# Analisi biomolecolare e cellulare: cloning, RT-PCR, Western blot, siRNA, Immunofluorescenza, ect.

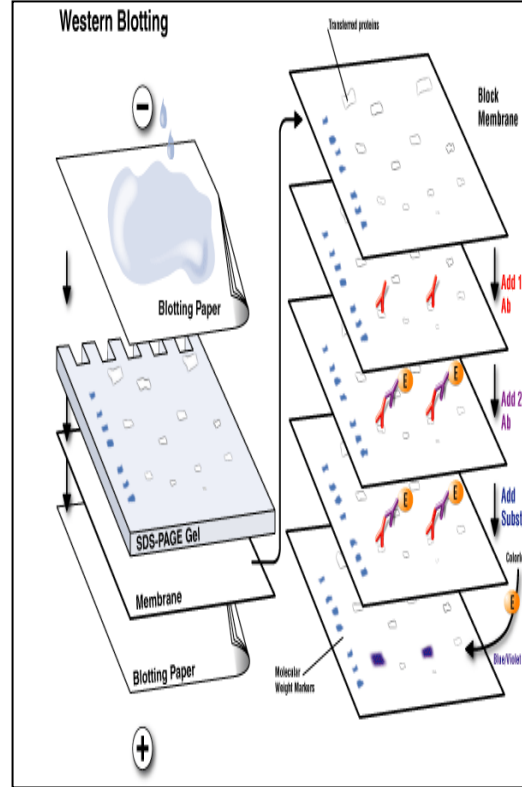
## CLONING



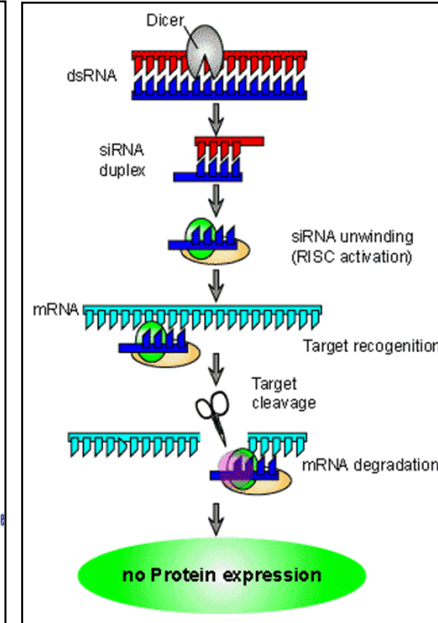
## RT-PCR



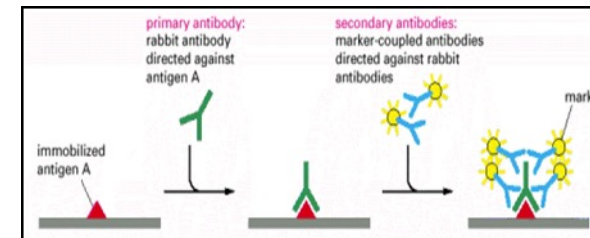
## Western Blot



## siRNA



## Immunofluorescenza e microscopia confocale





# Tecniche funzionali

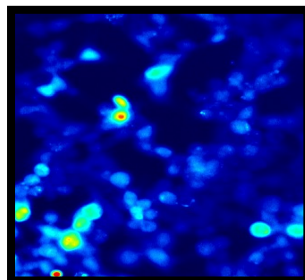
## Single cell microfluorimetry



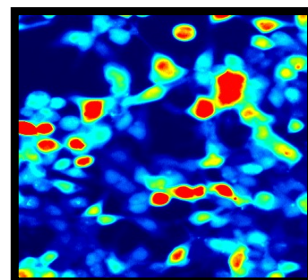
## Patch-clamp



## Channel function by calcium imaging

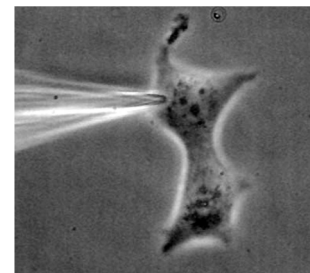


Ctrl

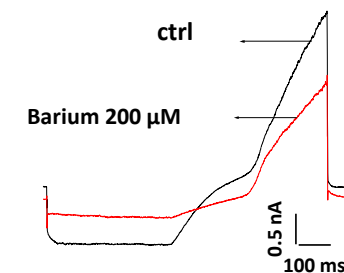


stimulated

## Channel function by whole cell recording



On cell



Whole cell current



# Studio dei meccanismi molecolari del dolore cronico/neuropatico e viscerale

Prof. Caprini

FD is a multi-system disorder, with a wide range of physical signs and symptoms associated with multiple anatomical and histological alterations

↗ cardiovascular (**arrhythmia, heart failure**)

↗ cerebrovascular (**stroke**)

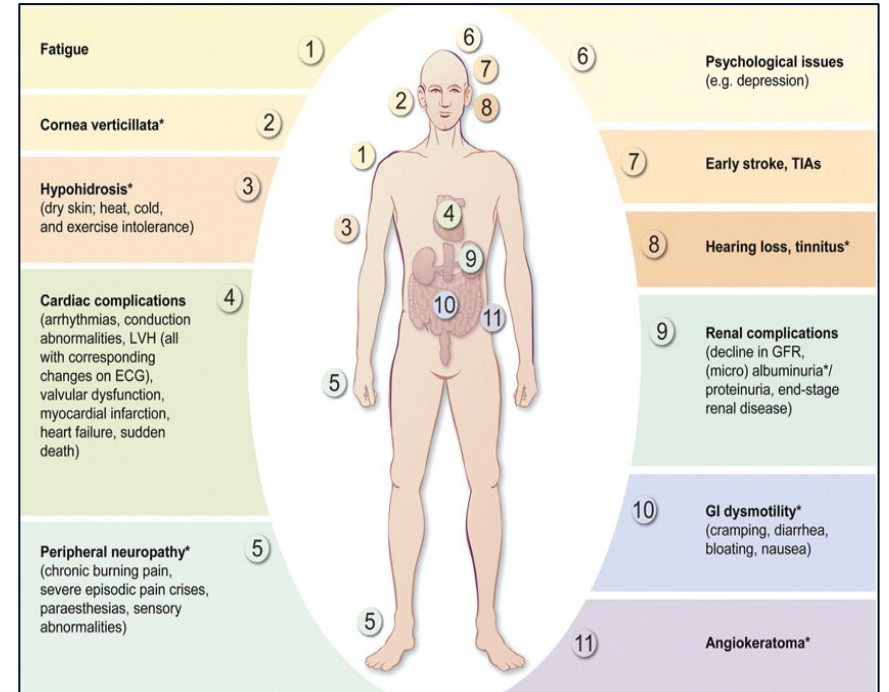
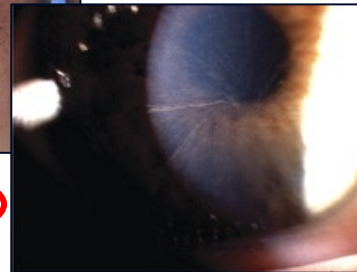
↗ renal (**kidney failure**)

↗ skin (**angiokeratoma**)

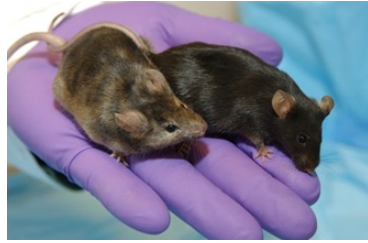
↗ eyes (**cornea verticillata**)

↗ gastrointestinal (**nausea, diarrhea**)

↗ neurological (**neuropathic pain**)

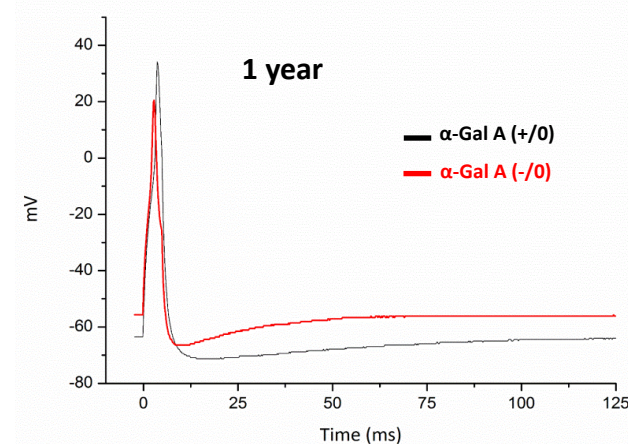
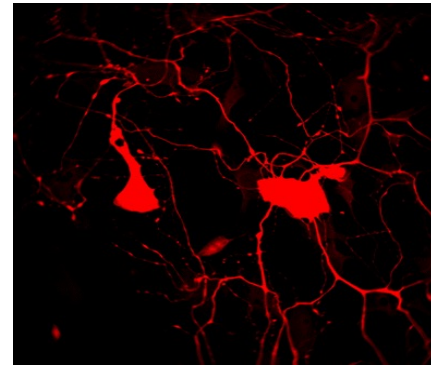
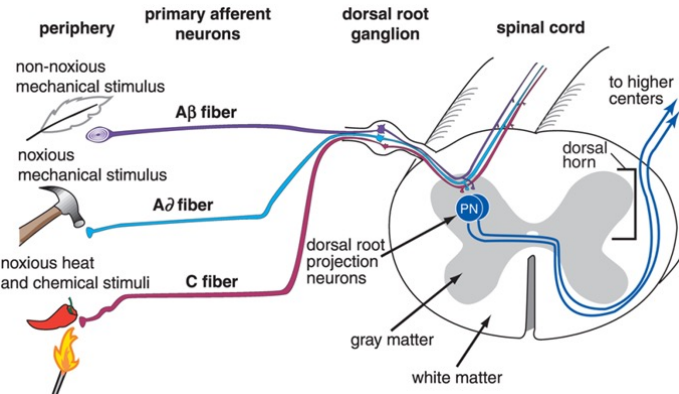


Finding	Childhood	Adolescence	Adulthood
Neuropathic pain	+	+	+
Cornea verticillata	+	+	+
Abdominal pain, recurrent diarrhea, and constipation	+	+	+
Angiokeratoma	(+)	+	+
Electrocardiogram abnormalities	-	+	+
Sensorineural hearing loss	-	(+)	+
Proteinuria	-	(+)	+
End-stage renal disease	-	-	+
Cardiomyopathy	-	-	+
Cerebral white matter lesions	-	-	+
Strokes	-	(+)	+

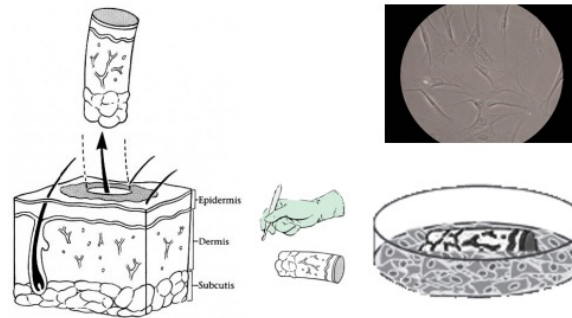
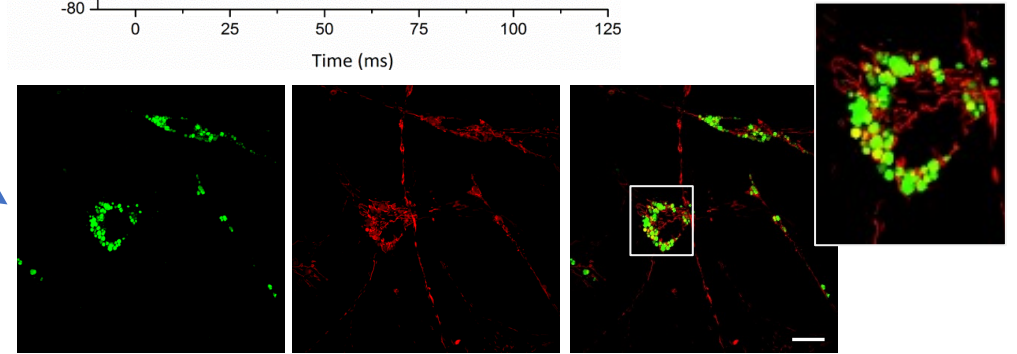


# Male mice $\alpha$ -Gal A WT (+/0) e KO (-/0) JAX strain B6; 129-Gla<sup>tm1Kul/J</sup>

N. Protocol: 141/2019 PR



Neuroni di Gangli delle radici dorsali di topo



Biopsia cutanea (collaborazione con l'Ospedale Bellaria)

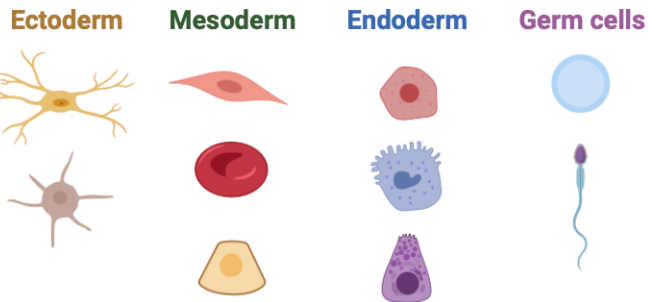
# iPSCs derived sensory neurons



iPSCs

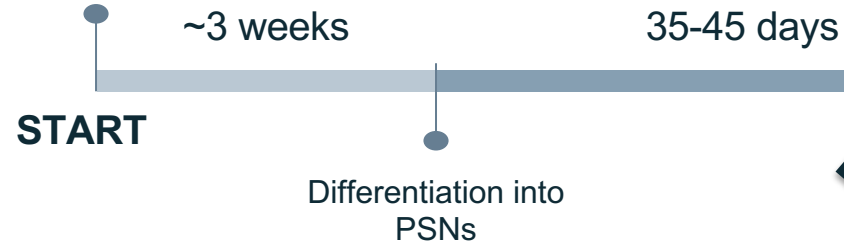


Oct4/Sox2/c-Myc/Klf-4



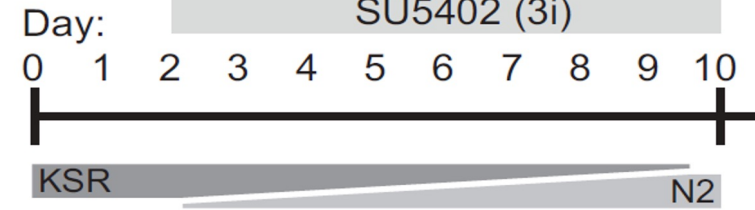
iPSCs

Primary sensory neurons

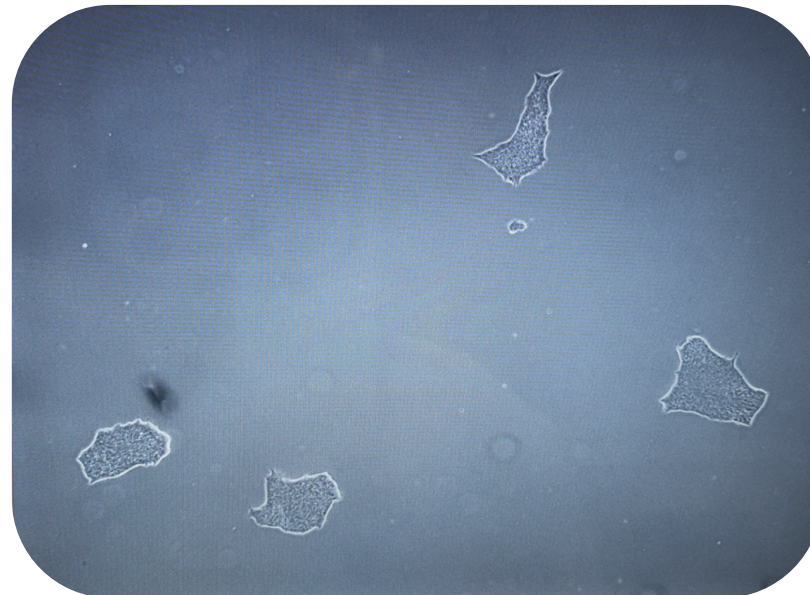


LDN-193189,  
SB431542 (LSB)

CHIR99021, DAPT,  
SU5402 (3i)



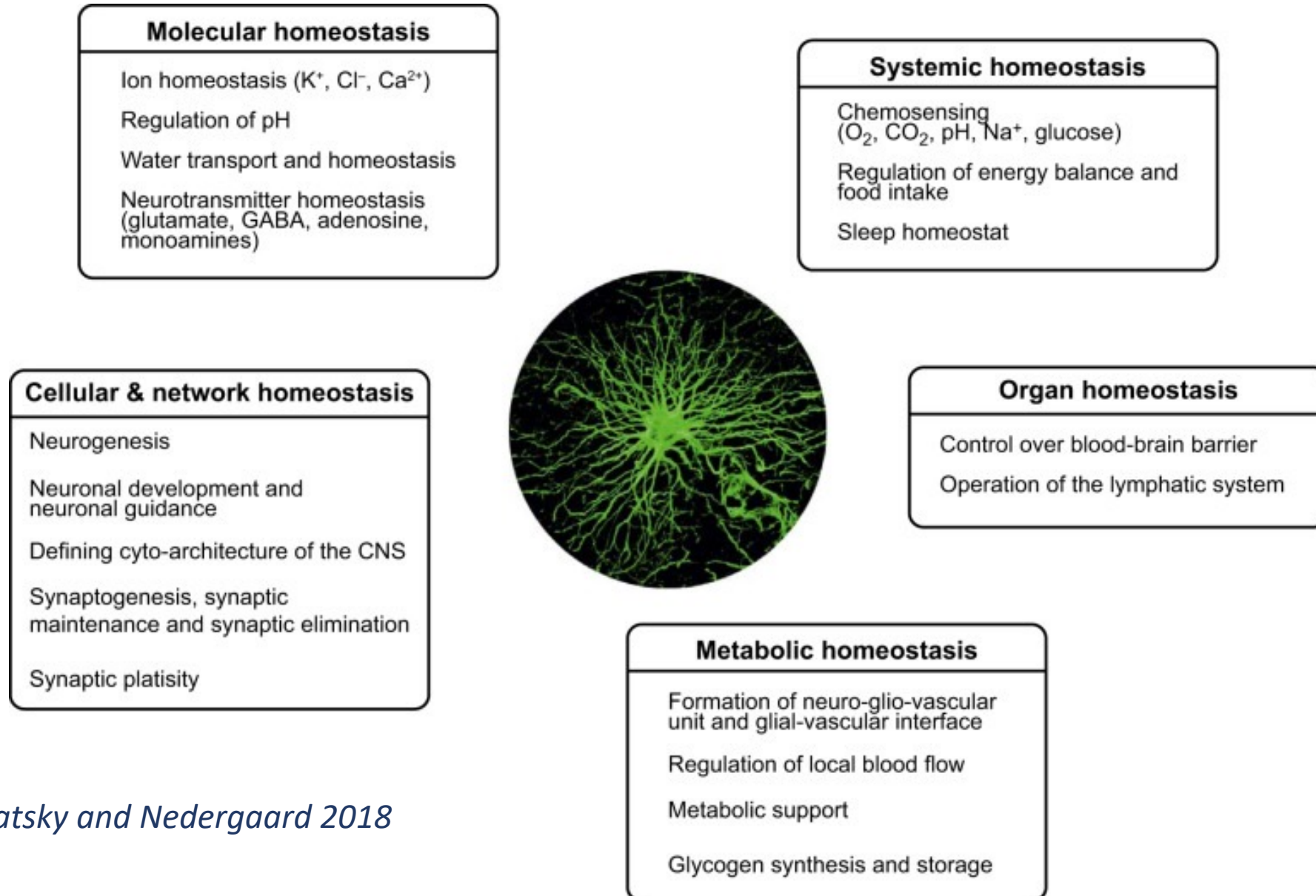
25%



$\alpha$ -Gal A (-/0)

Collaborazione Prof. **Fabiana Morroni**, Dott.ssa **Agnese Graziosi** e Dot.ssa **Giulia Sita** - FABIT

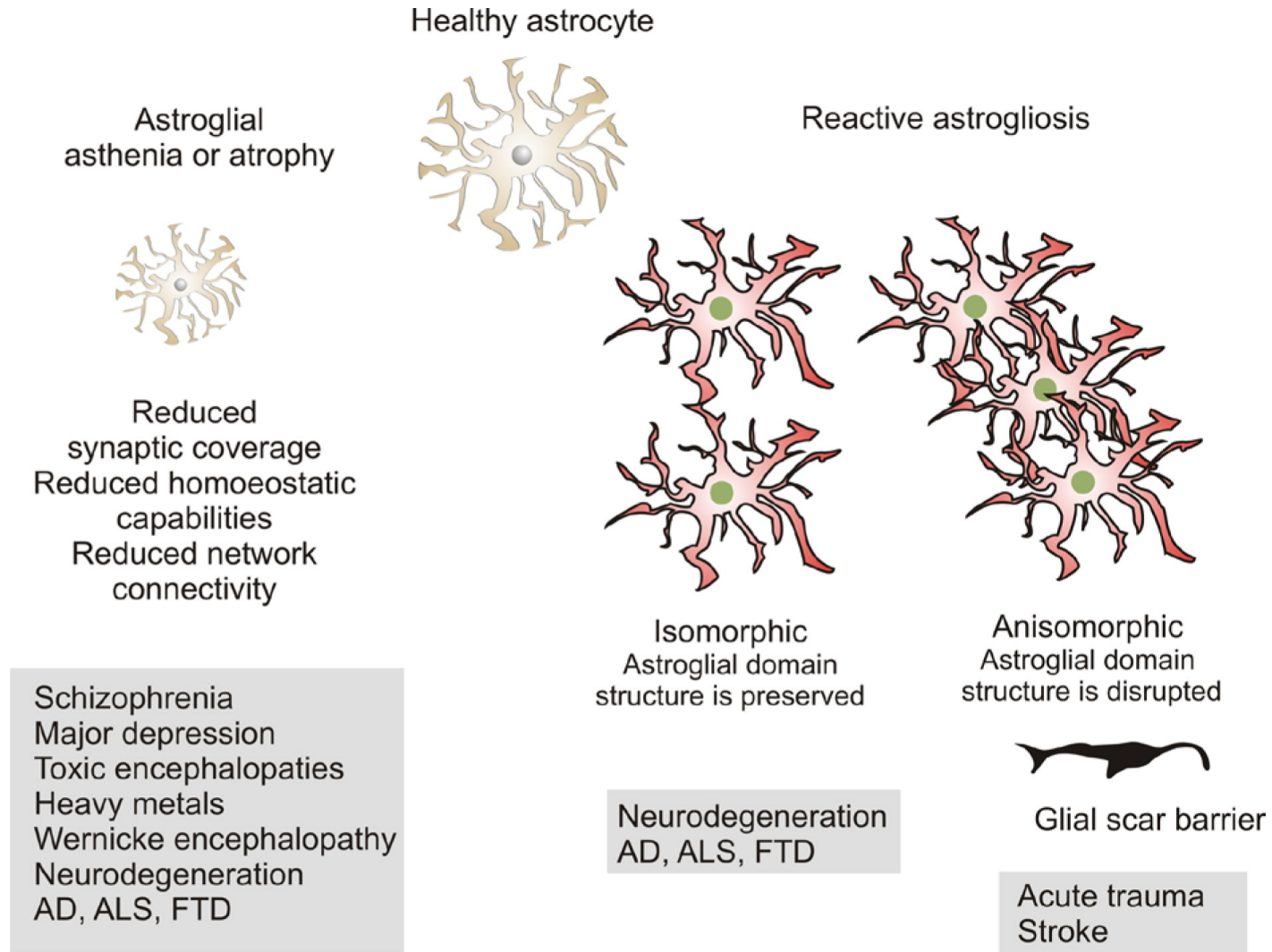
# Astrociti nella trasmissione sinaptica e malattie degenerative – Prof. Ferroni





# PATHOLOGICAL ROLES OF ASTROCYTES

*Verkhratsky et al 2014*



**Astrocyte plasticity underlies several acute and chronic CNS diseases**

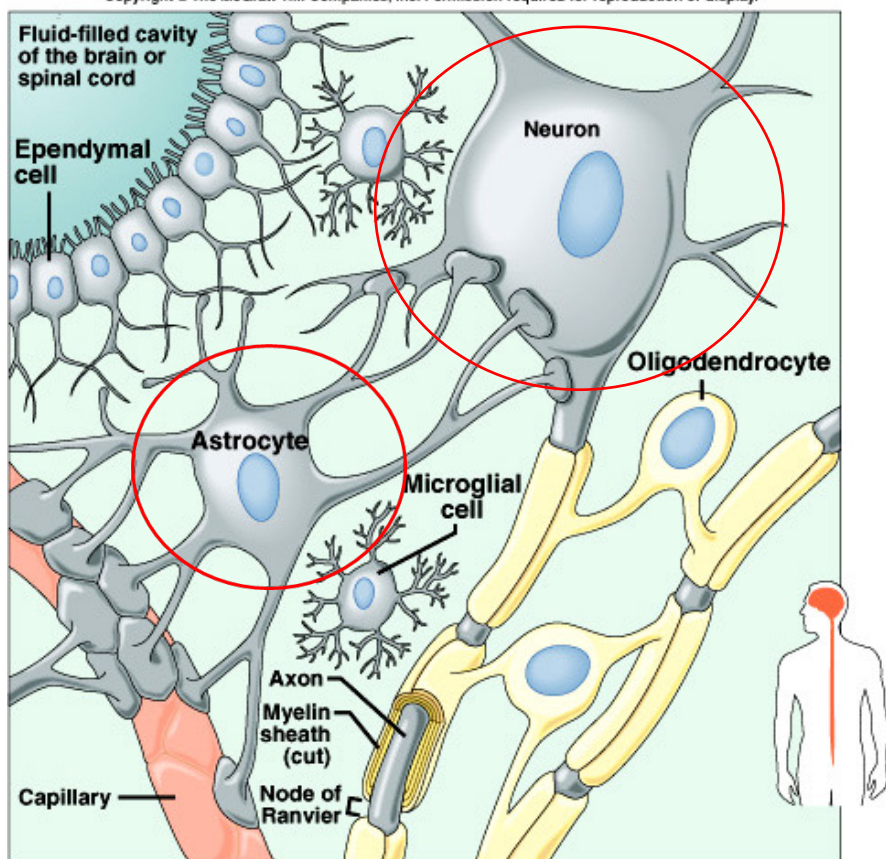
# Cellule del sistema nervoso centrale



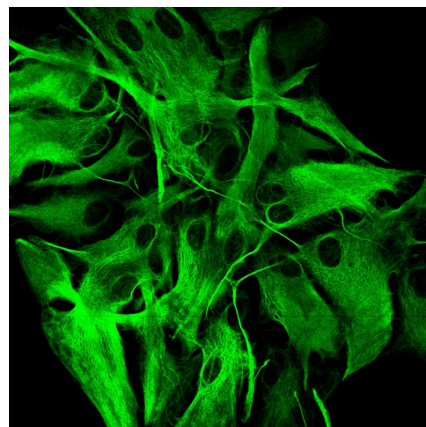
## Ratti Wistar (allevamento)

N. Protocol: 260/2016 PR più rinnovi

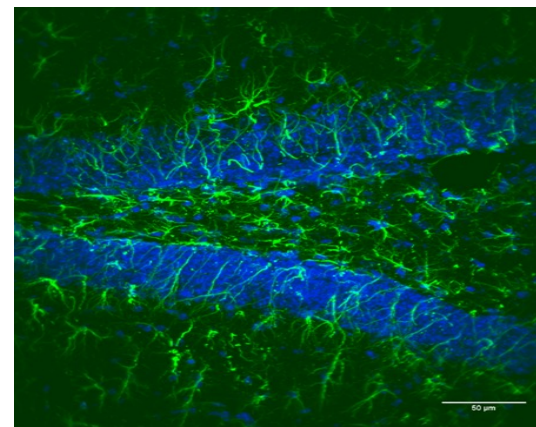
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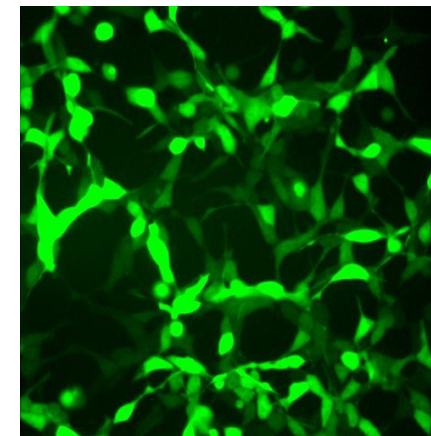
Astrociti corticali di ratto



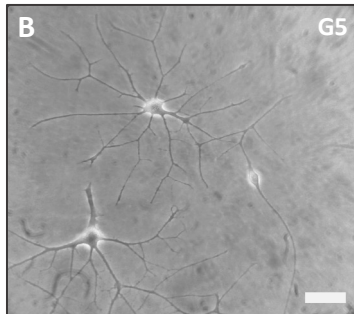
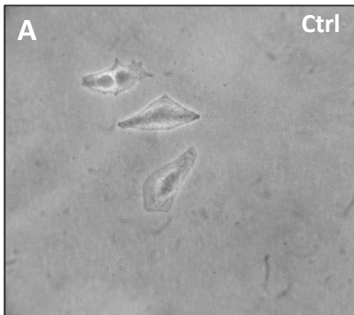
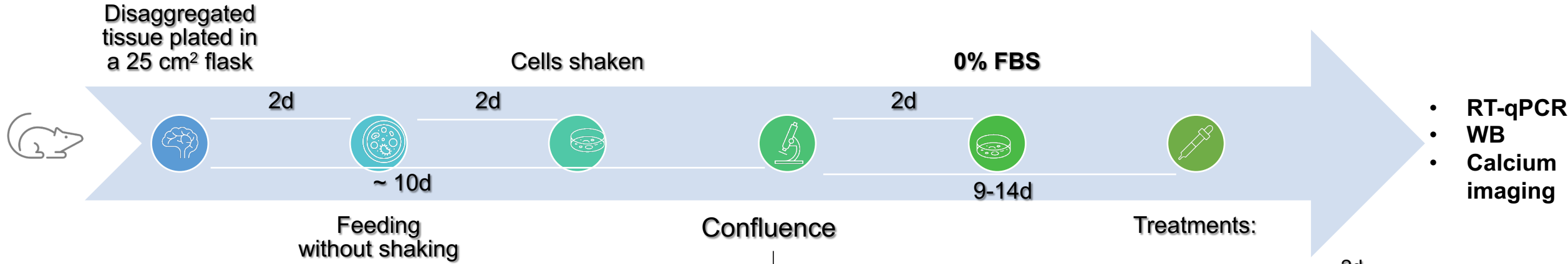
Immuno di fettine corticali



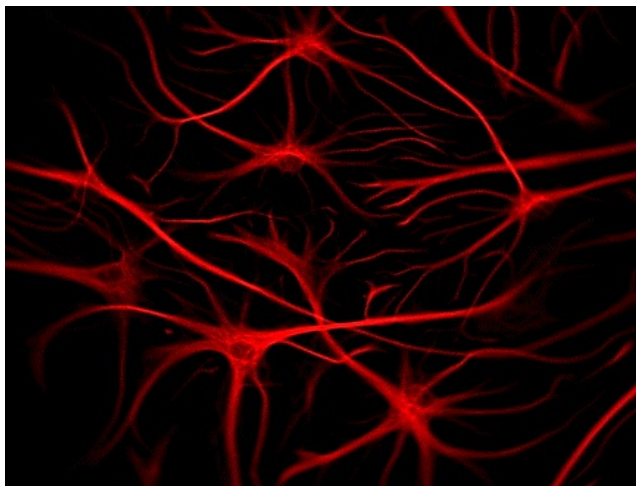
Linee cellulari  
COS, HEK, CHO ect



# LPS treatment astrocyte cell culture



C



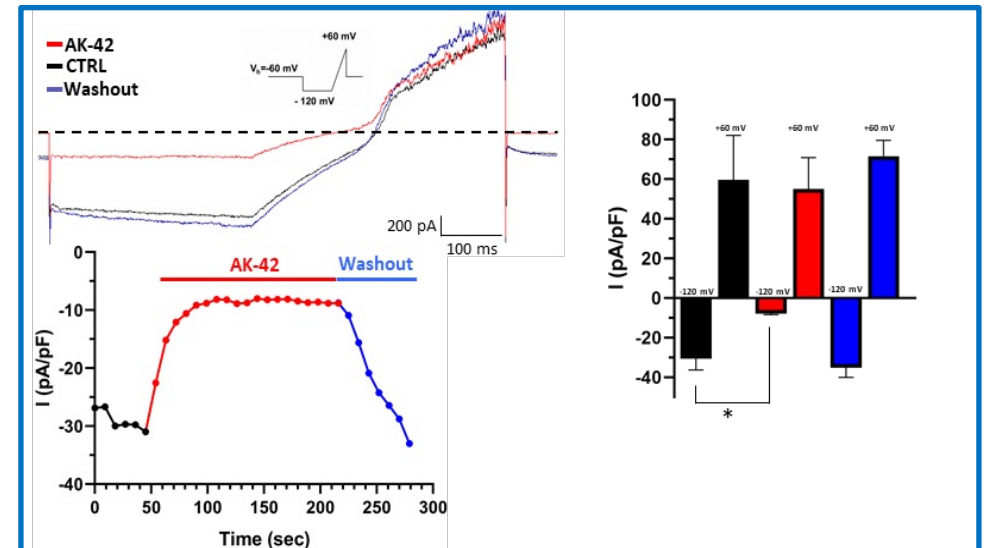
Formaggio et al, Pflügers Arch., 2022

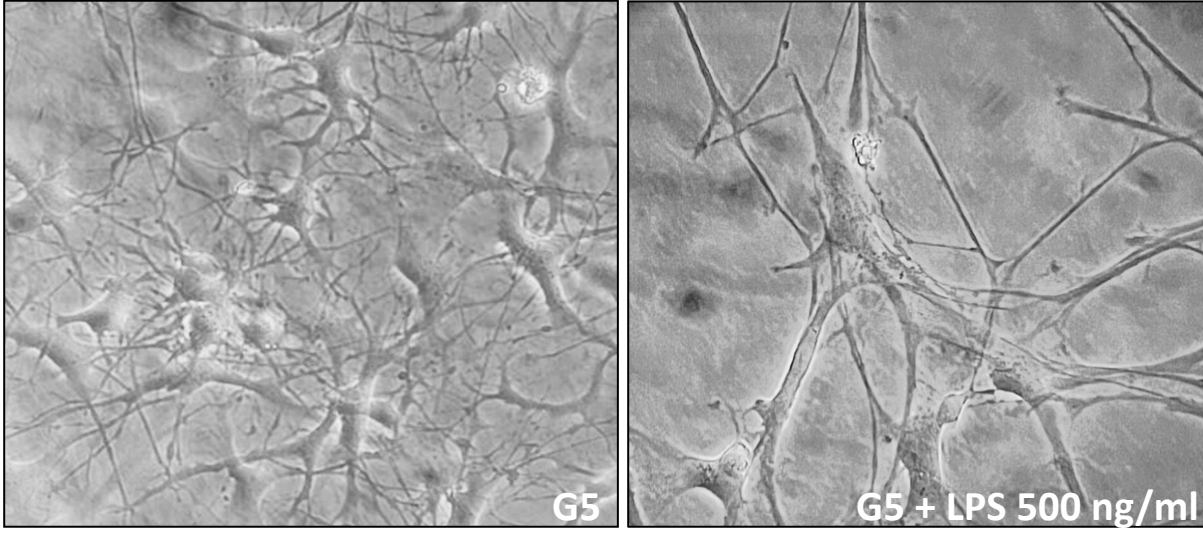
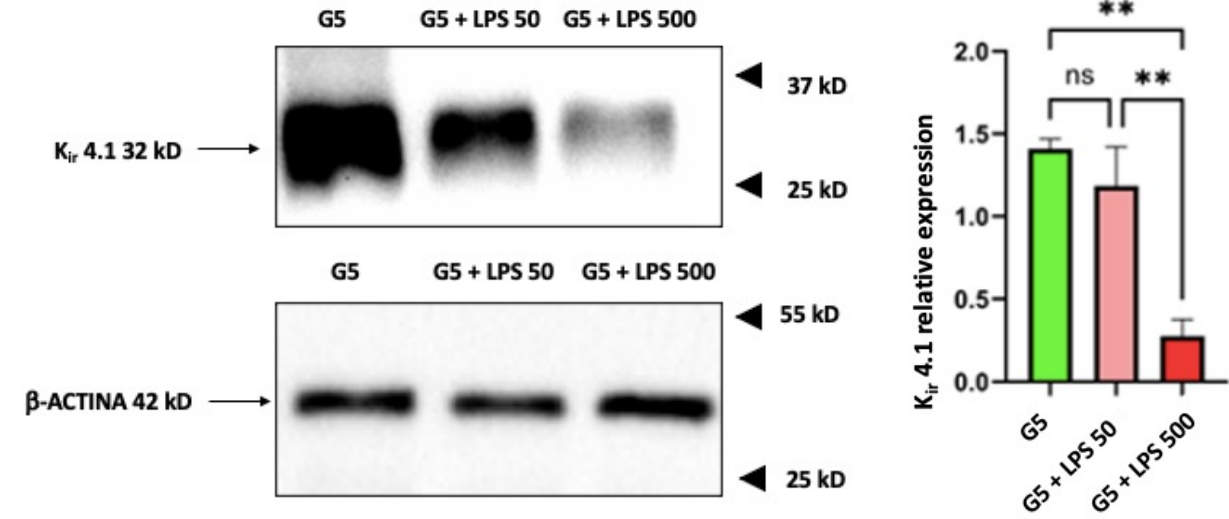
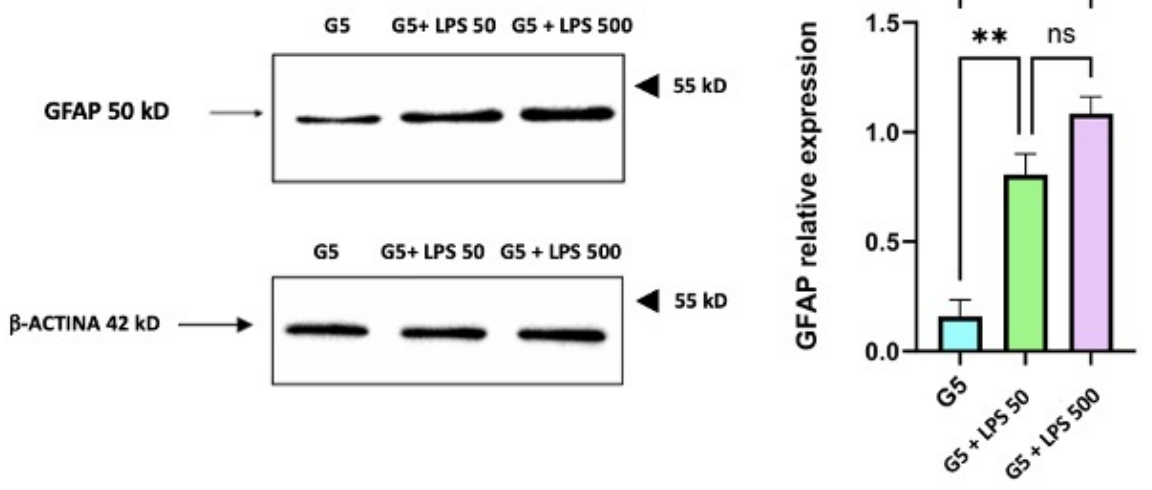
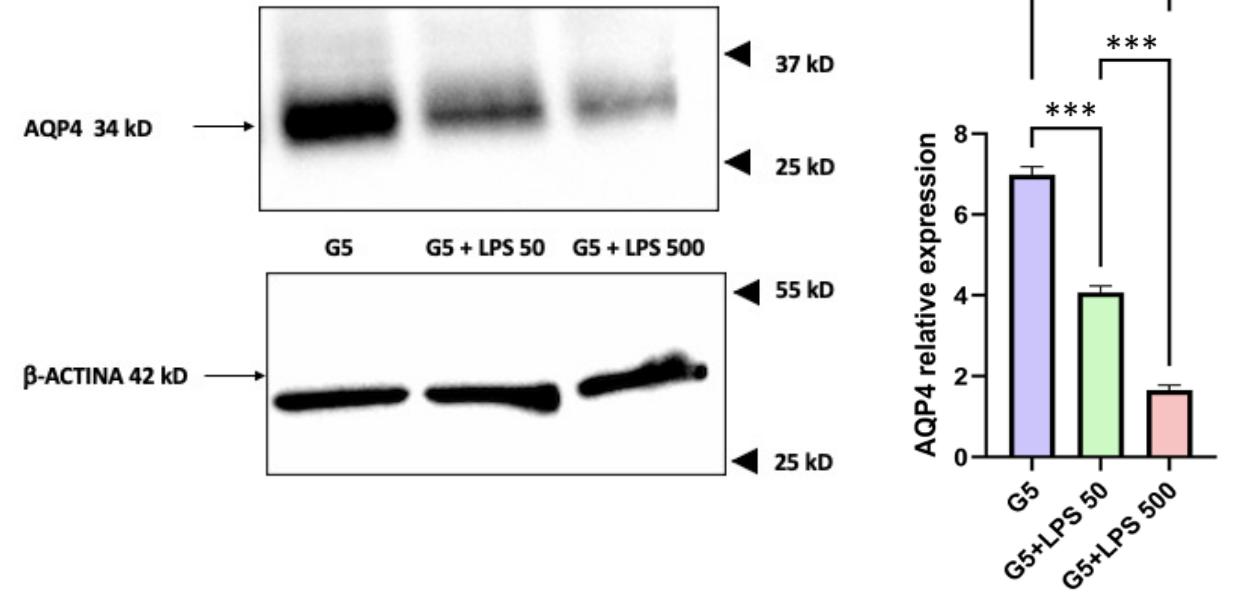
AK-42 CIC-2 selective blocker



CIC-2 mediated currents

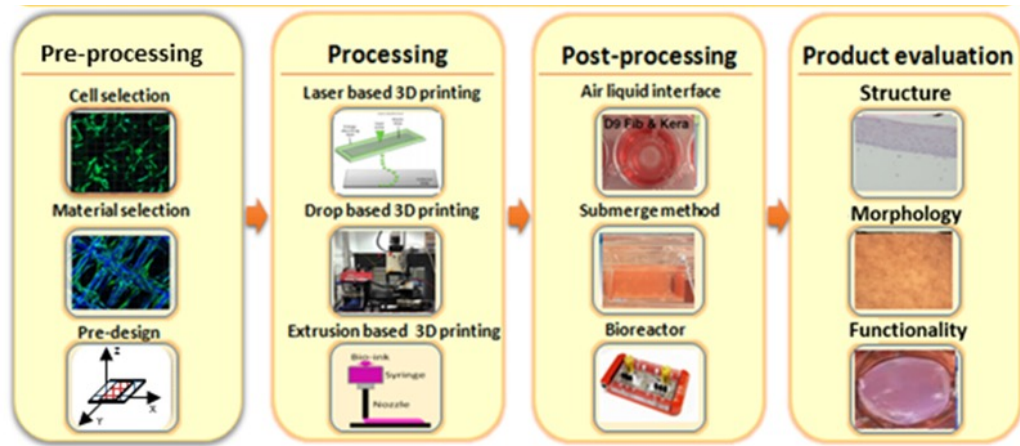
D



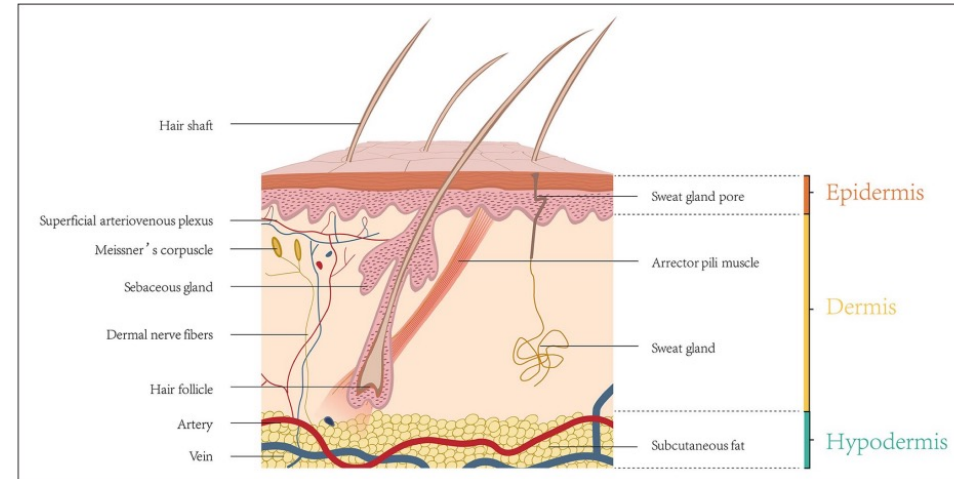
**A****B****C****D***Unpublished observations*

# Modelli “pain in a dish” attraverso biostampa 3D – Dott. Formaggio

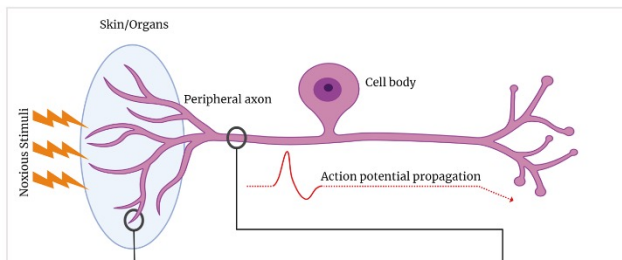
## Bioprinting workflow



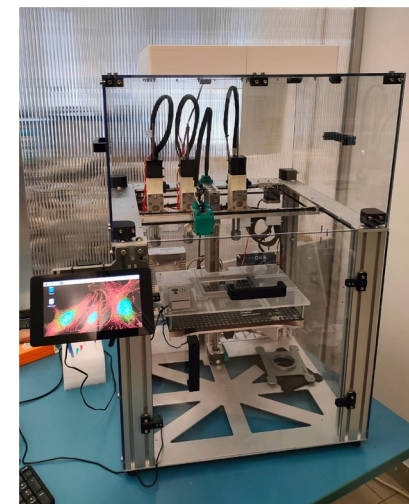
## Struttura pelle



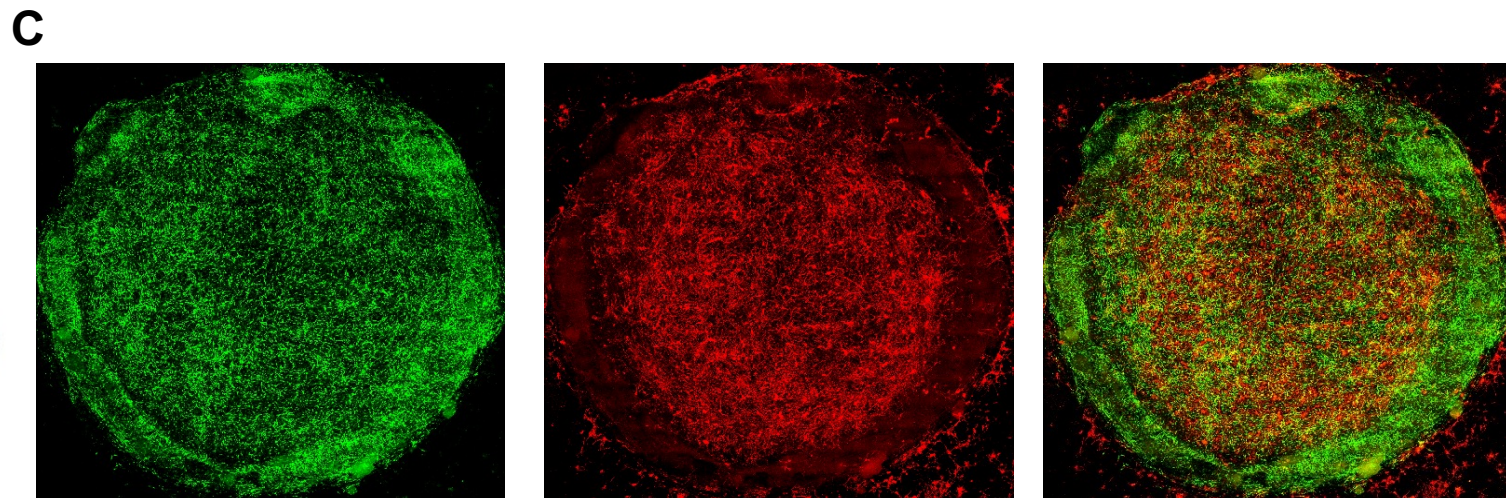
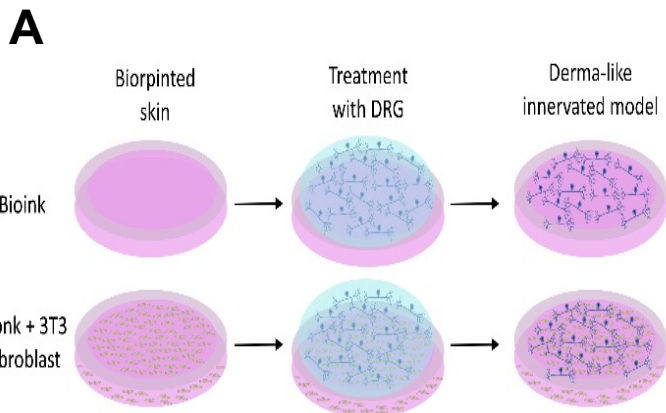
## Neuroni sensoriali



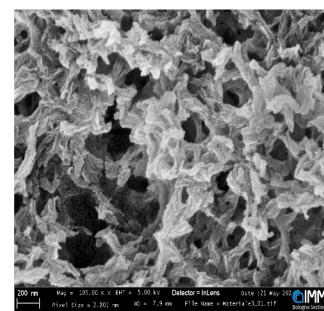
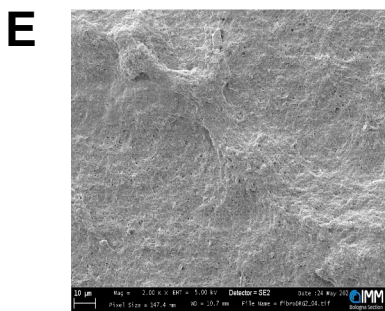
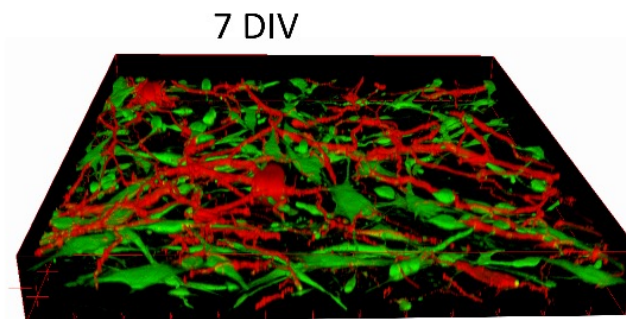
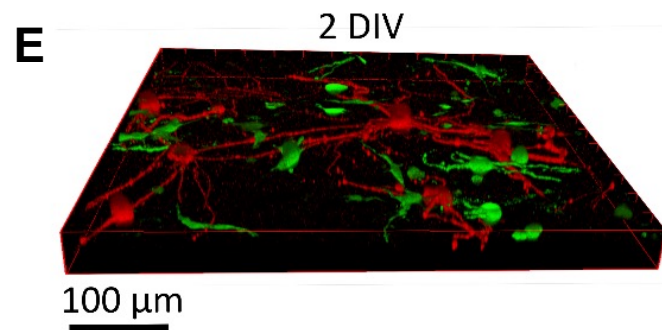
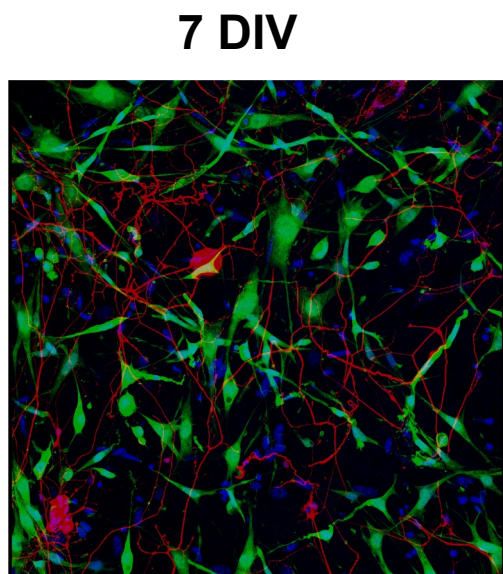
## Bioprinter



Collaborazione con il  
CNR: Simone Bonetti  
ed Emanuela Saracino



NIH-3T3/DRG co-culture



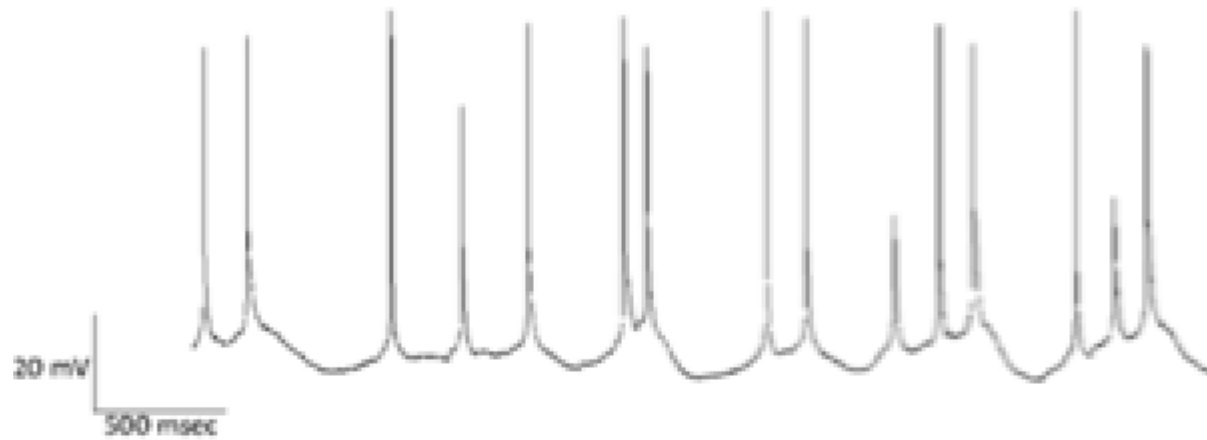


# Chi siamo al FABIT?

Dipartimento di Farmacia e Biotecnologie  
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FRANCESCO CAPPELLETTI  
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LAURA CINTI  
SVEVA GIOVANNINI  
**STEFANO FERRONI**  
**MARCO CAPRINI**



*Ministero della Salute*



FONDAZIONE DEL MONTE  
DI BOLOGNA E RAVENNA  
1473

# COLLABORAZIONI



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SIMONE BONETTI - CNR

EMANUELA SARACINO - CNR



FABIO BENFENATI –IIT GENOVA



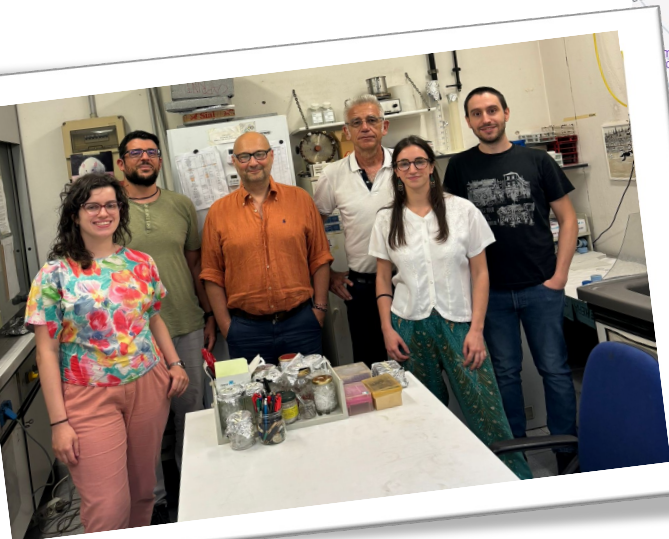
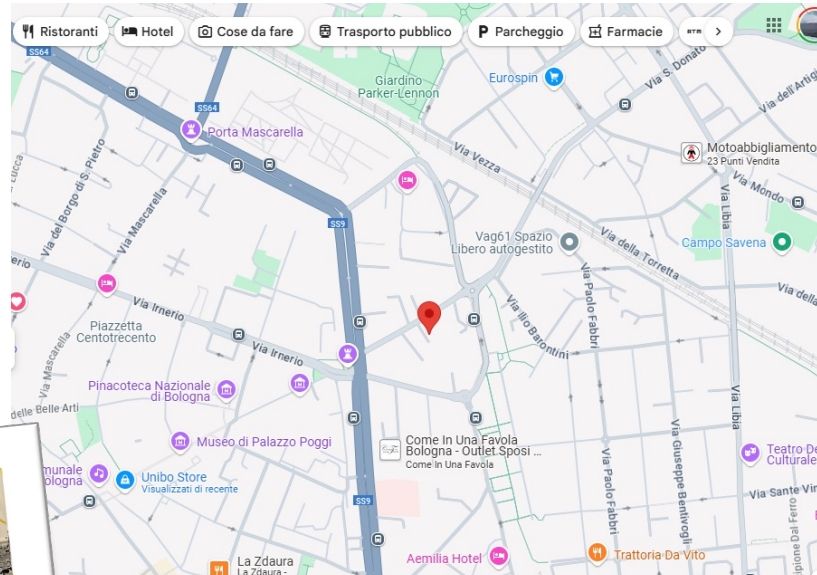


# Tirocinio

# Location

# Contatti

**Durata:** 9-12 mesi



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