

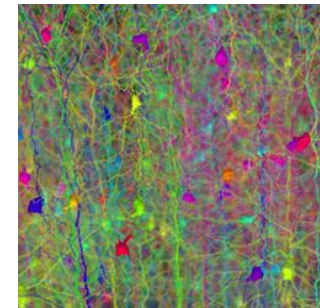
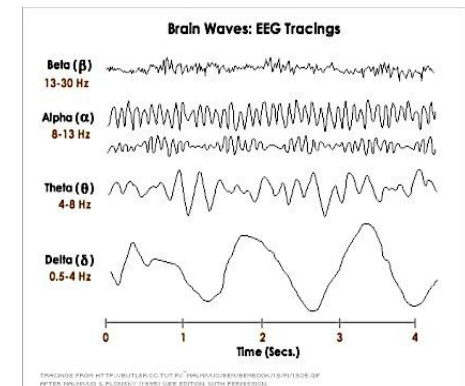
Effets de signaux RF GSM-1800 sur l'activité électrique de réseaux de neurones en culture

D. Moretti, A. Garenne, F. Poullétier de Gannes, E. Haro, I. Lagroye,
P. Levêque, **B. Veyret** & N. Lewis

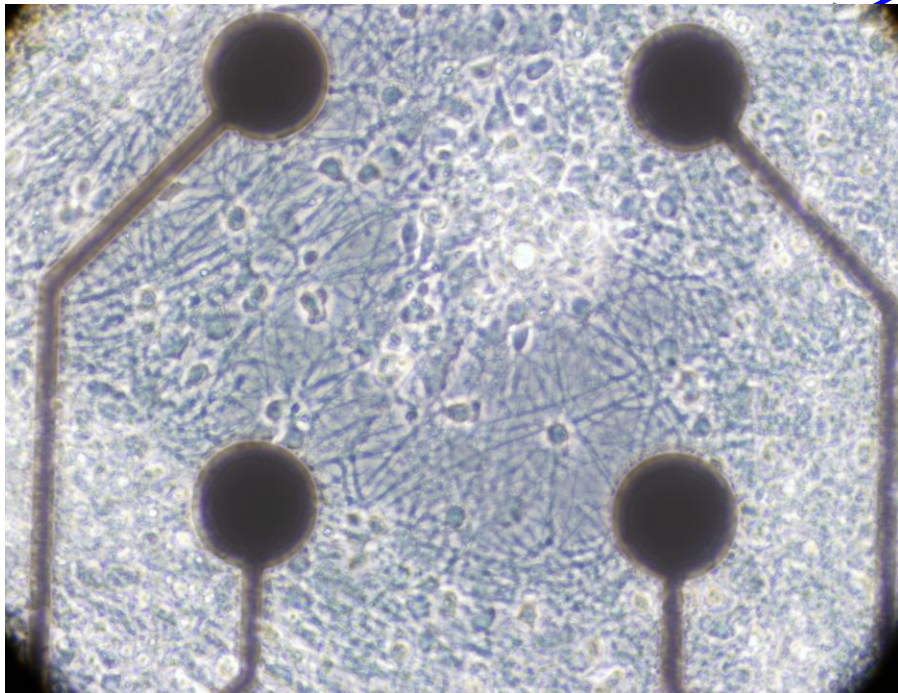
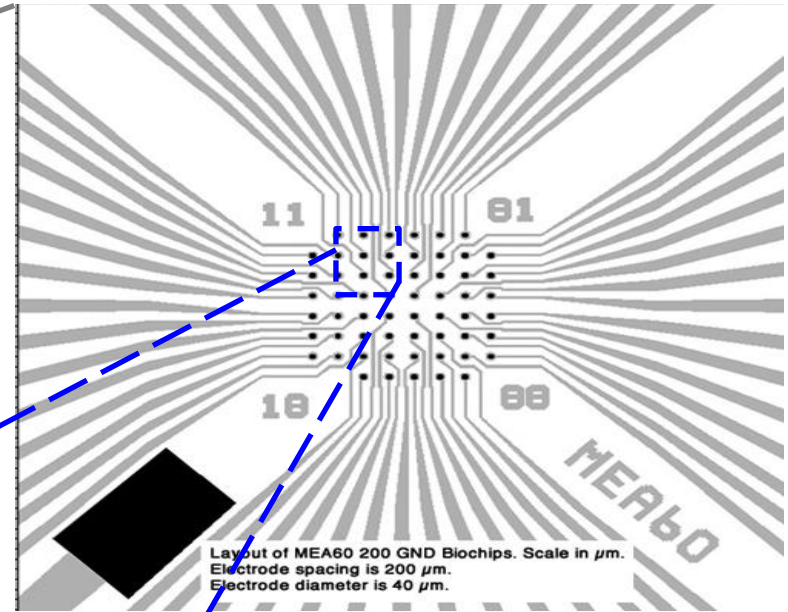
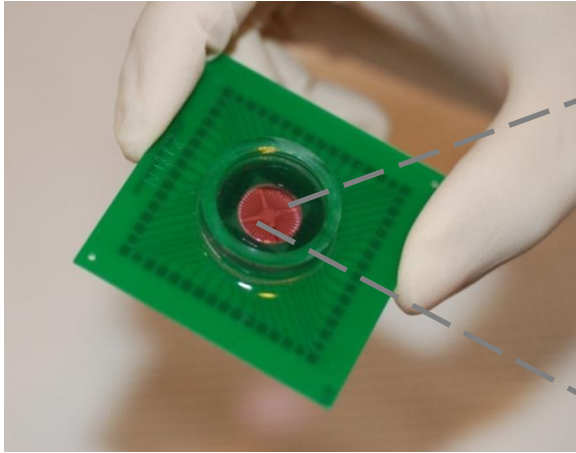


Pourquoi cette étude ?

- SNC : cible des RF
- effets rapportés des RF sur EEG/sommeil chez l'homme
- approche complémentaire *in vitro*



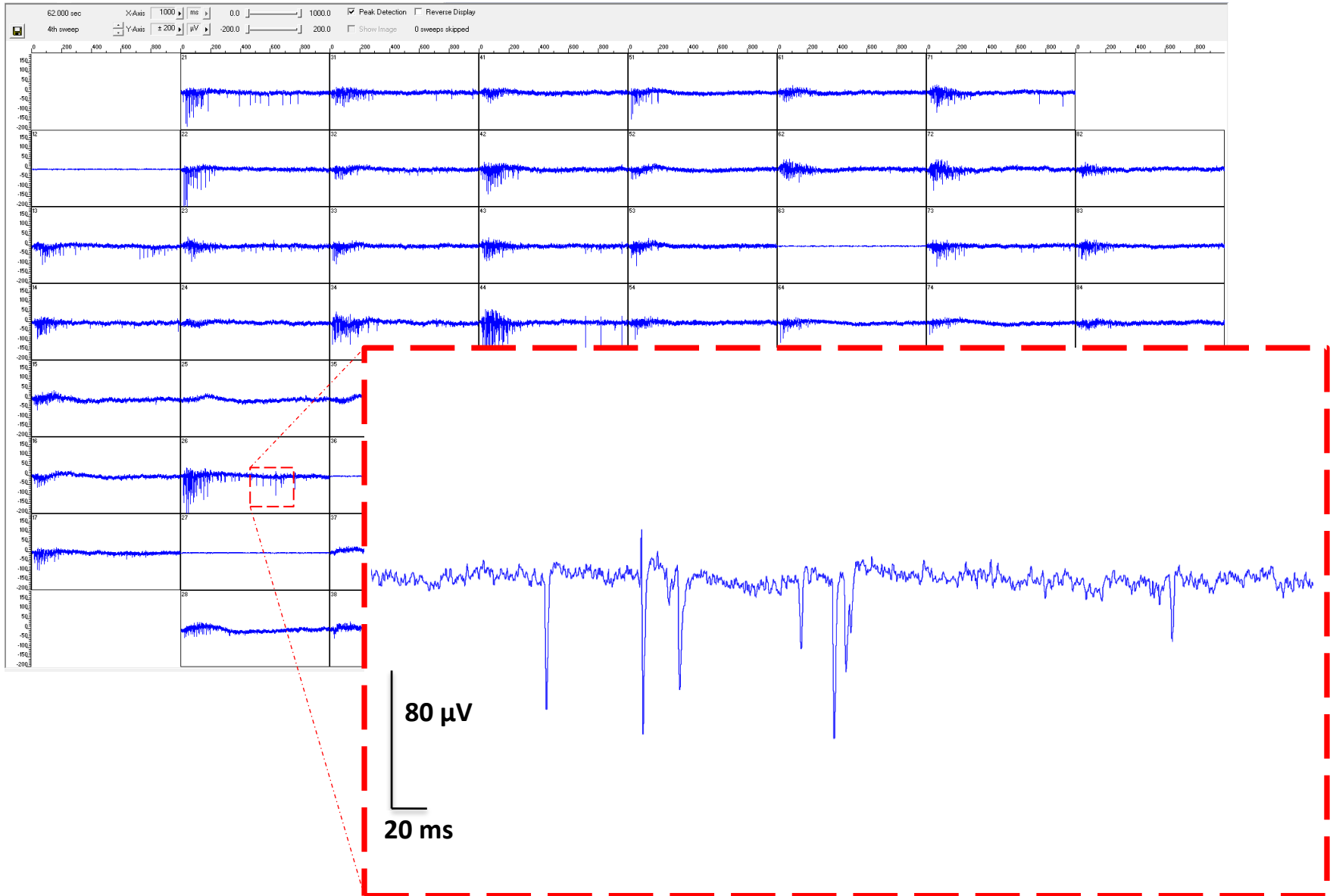
Multi Electrode Array (MEA)



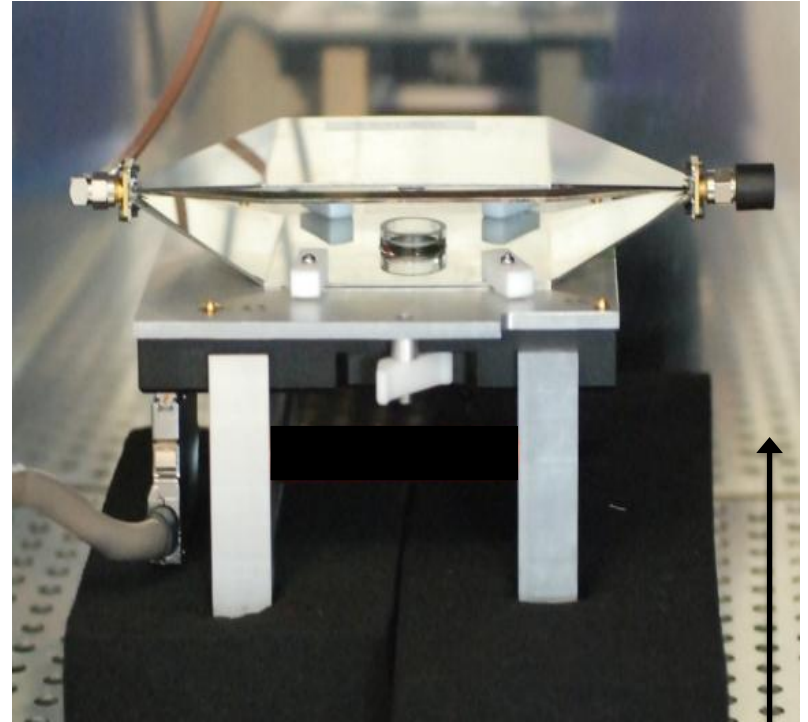
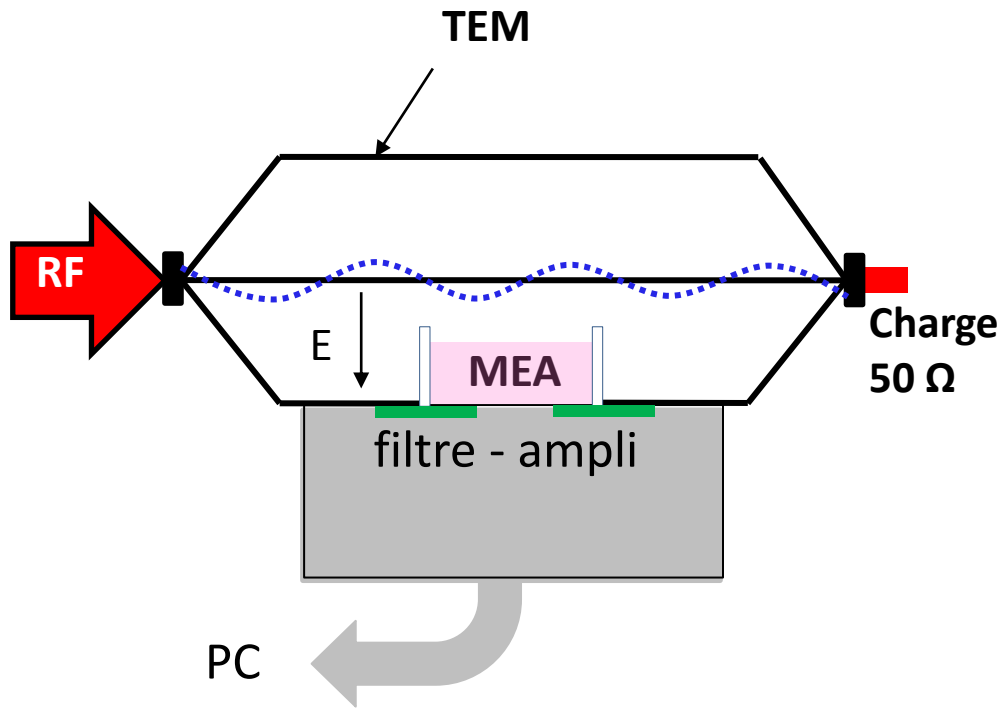
60 électrodes

Neurones corticaux
d'embryons de rat

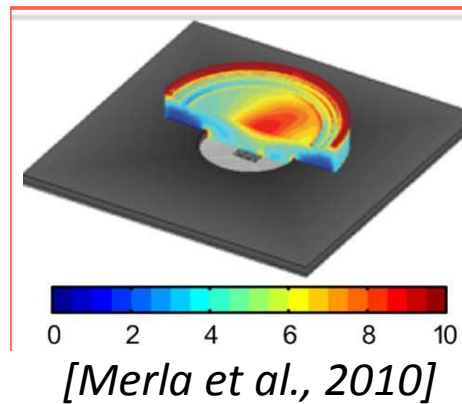
Spikes & bursts



Systeme d'exposition

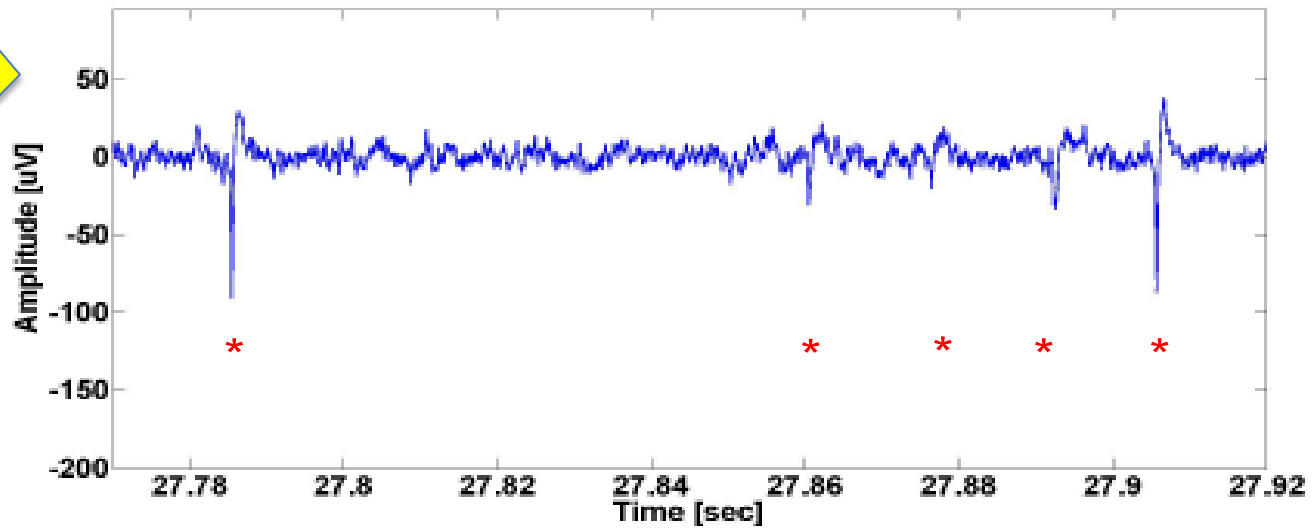
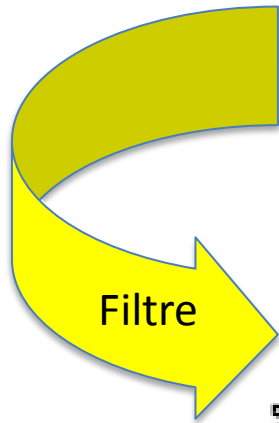
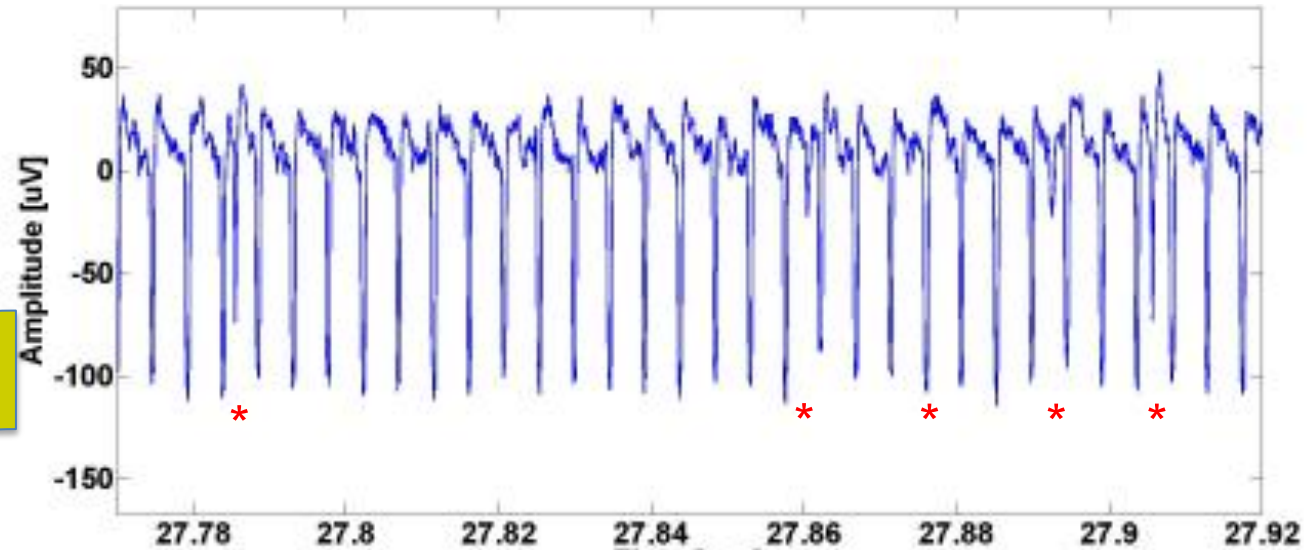
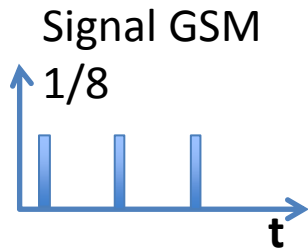


GSM-1800
DAS = 3.2 W/kg



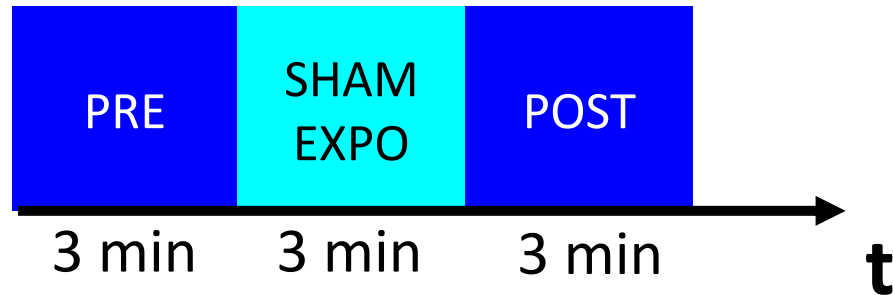
Incubateur sec
37°C , 5% CO₂

Interférence GSM

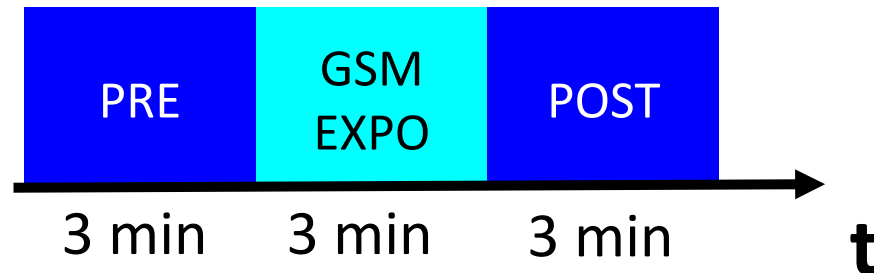


Protocole d'exposition

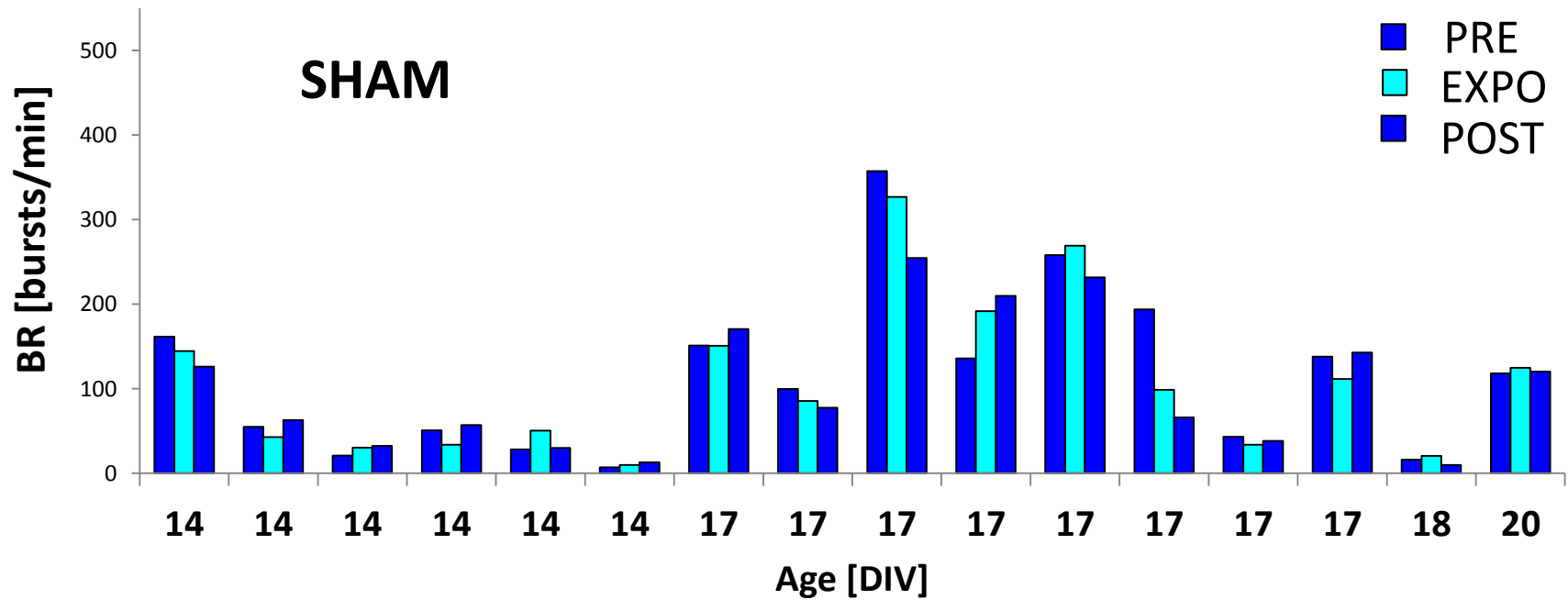
1^{er} jour = sham



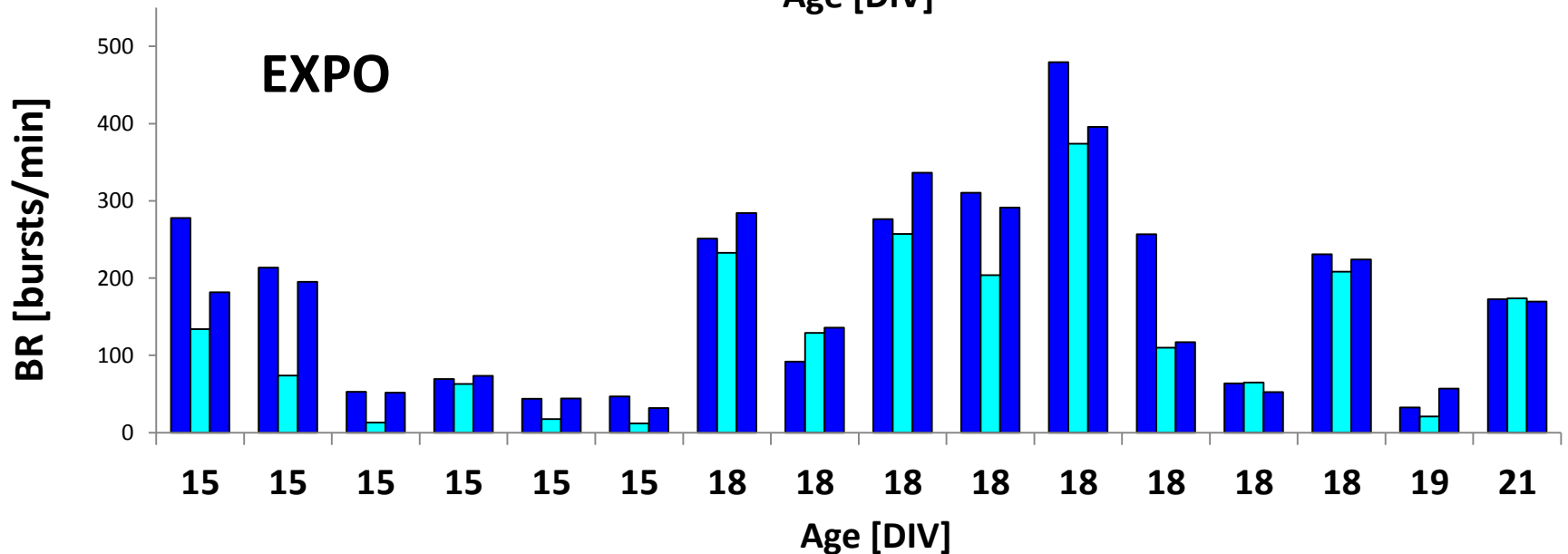
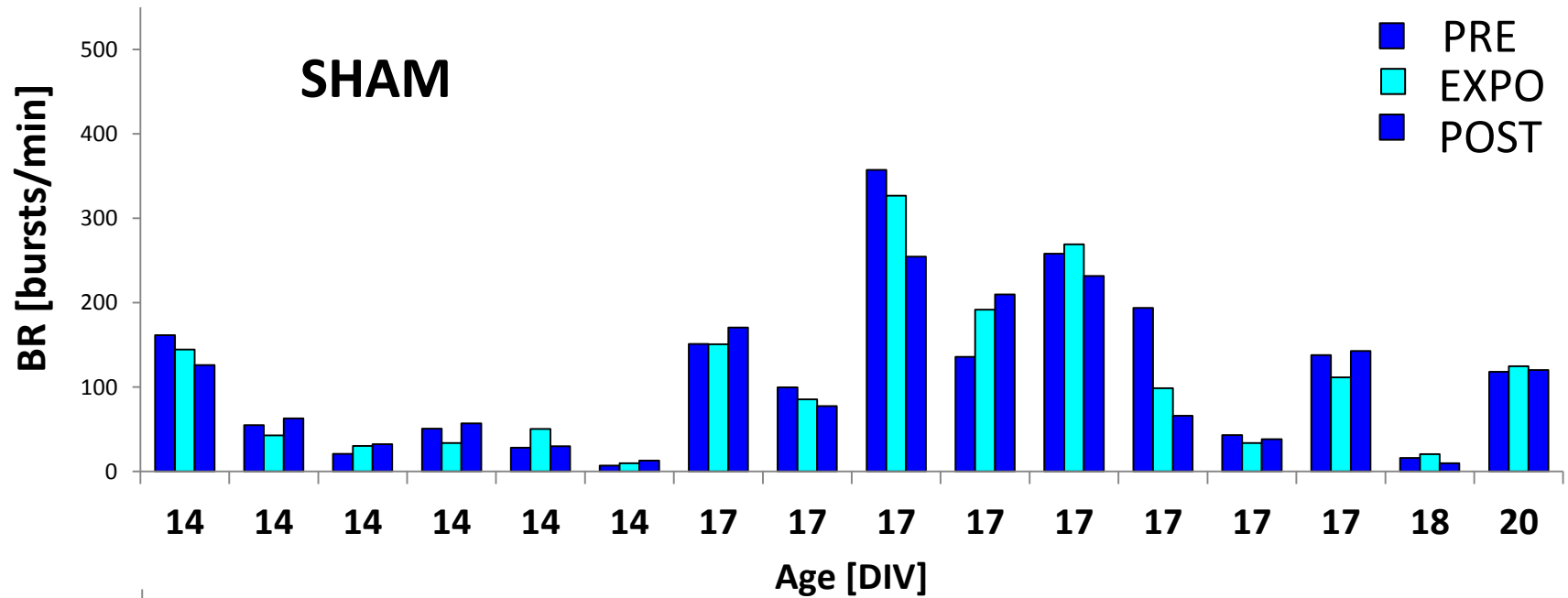
2^{ème} jour = expo



Résultats : Bursting rate [BR]



Résultats : Bursting rate [BR]



Analyse statistique “avant-après”

n=16 cultures

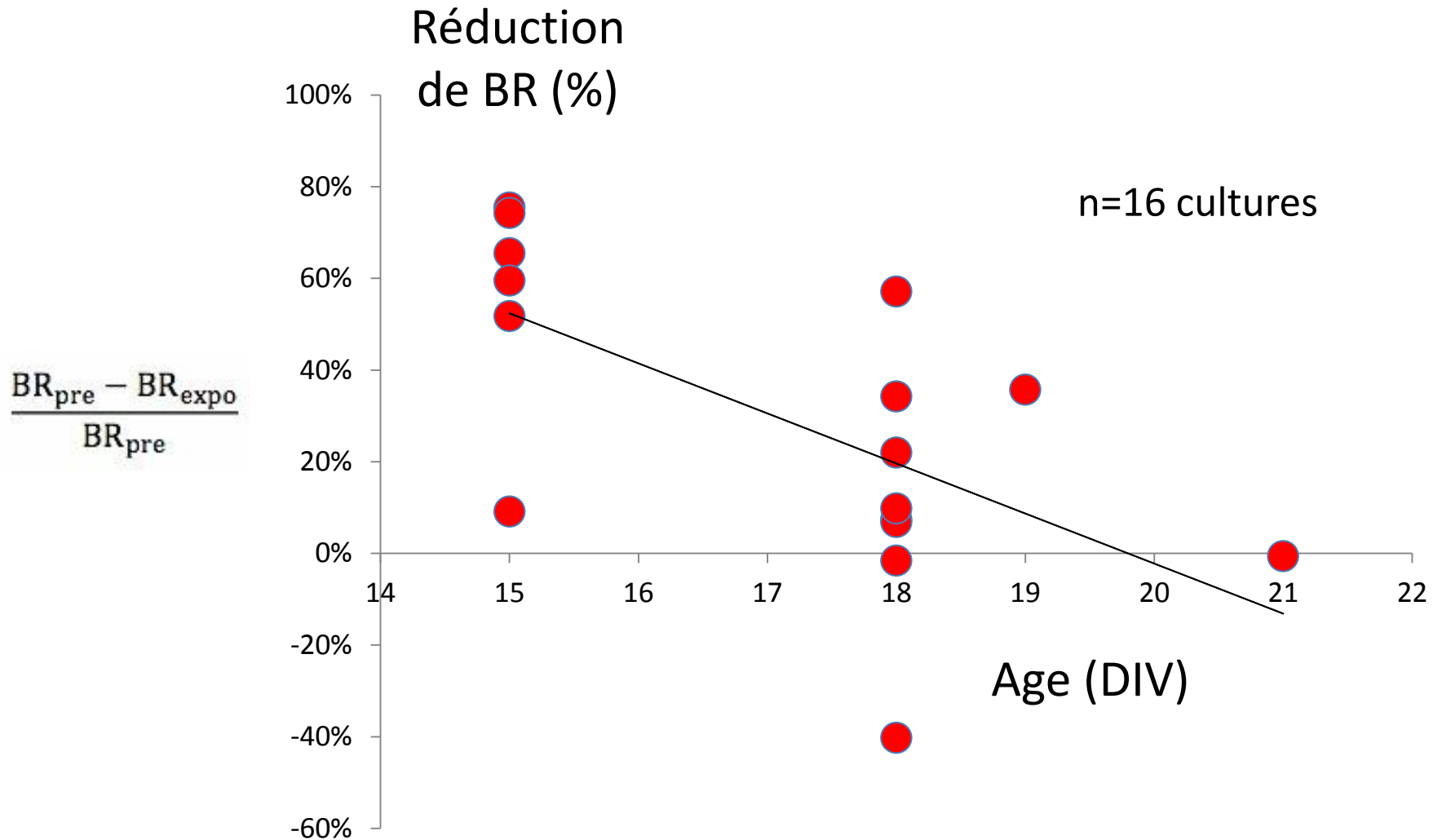
		GSM	Sham
$\frac{\text{BR}_{\text{pre}}}{\text{BR}_{\text{post}}}$	Mean	1.11	1.13
	<i>p value</i>	NS	NS

Analyse statistique “pendant l’exposition”

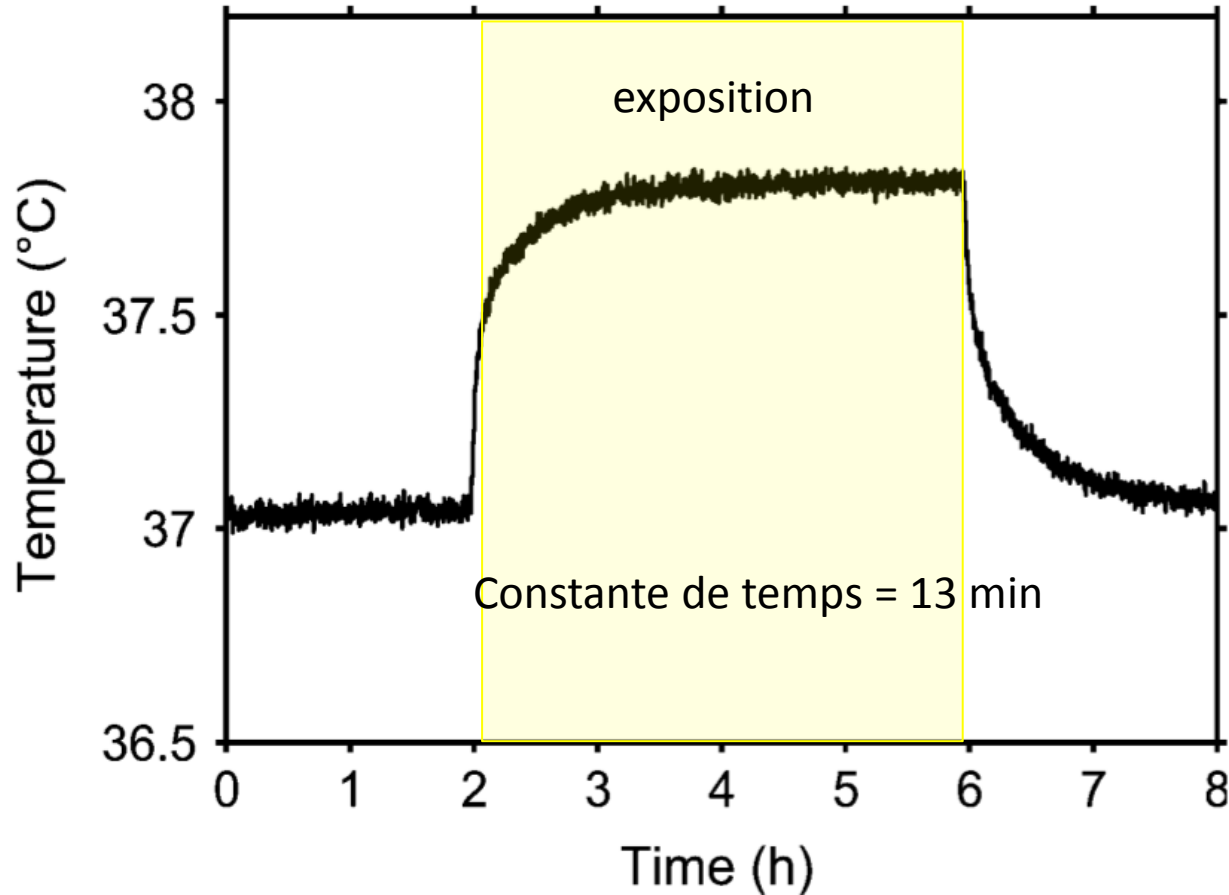
n=16 cultures

		GSM	Sham
$\frac{\mathbf{BR}_{\text{expo}}}{(\mathbf{BR}_{\text{pre}} + \mathbf{BR}_{\text{post}})/2}$	Mean	0.70	1.03
	<i>p value</i>	0.0001	NS

Analyse de sensibilité : effet = f (âge)



Mécanisme de l'effet : échauffement ?

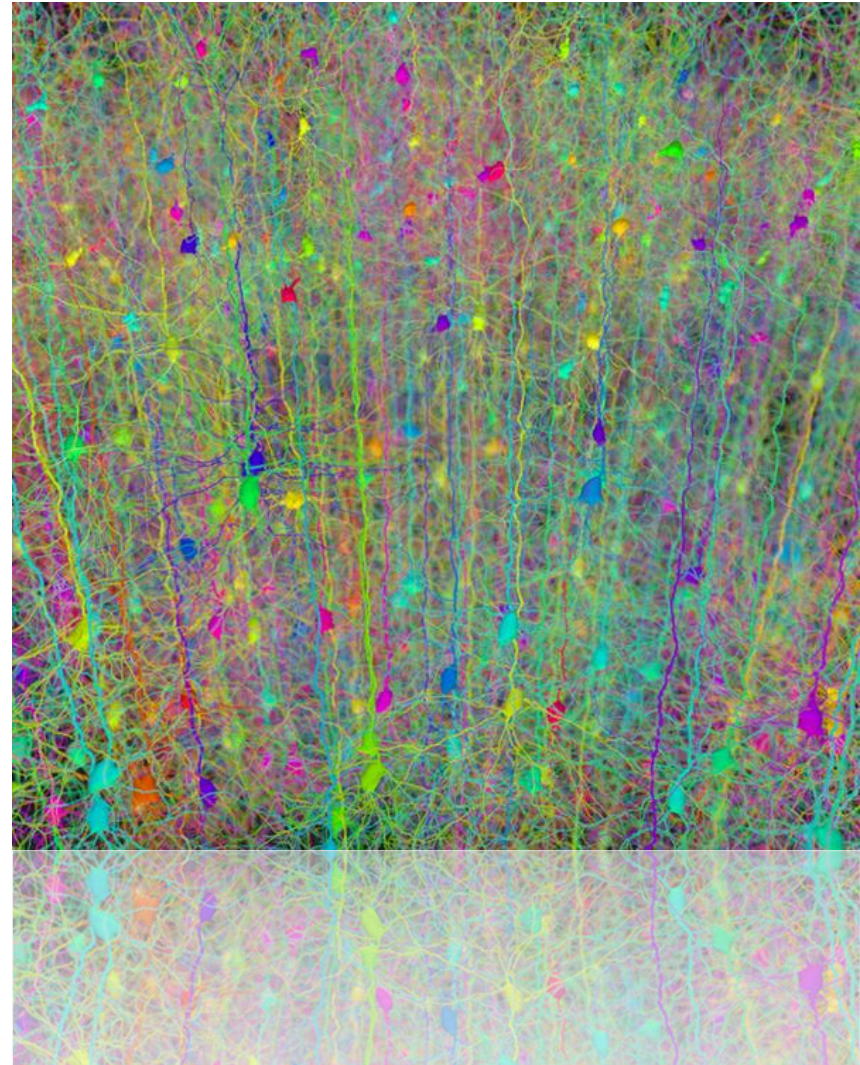


[Merla et al., 2010]

$$\Delta T (3 \text{ min}) = 0,06 \text{ } ^\circ\text{C}$$

Conclusion

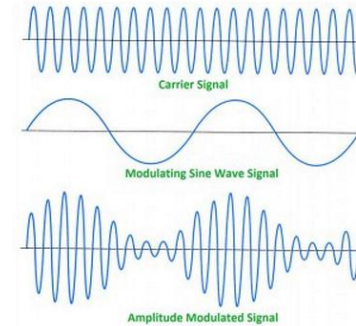
- Étude de faisabilité
Publiée : Moretti et al
Bioelectromagnetics 2013
- Effets du GSM sur
l'activité de neurones
"jeunes"
- Effet réversible



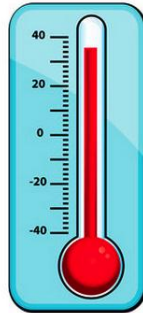
Expérimentation en cours



- effet de la modulation des RF (TDMA vs CW)



- niveau de DAS

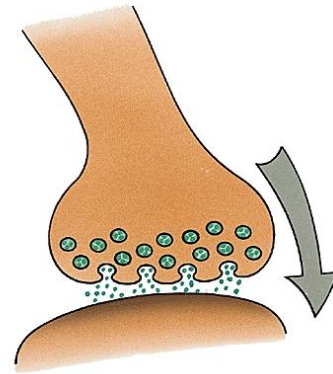


- durée d'exposition



Perspectives

- Effets des RF sur la plasticité neuronale

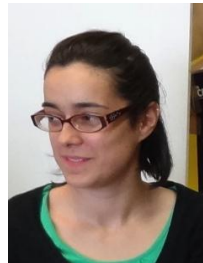


- Approche intégrative sur modèle animal





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Daniela
Moretti



Emmanuelle
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Poulletier de
Gannes



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André Garenne



Philippe Lévêque



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