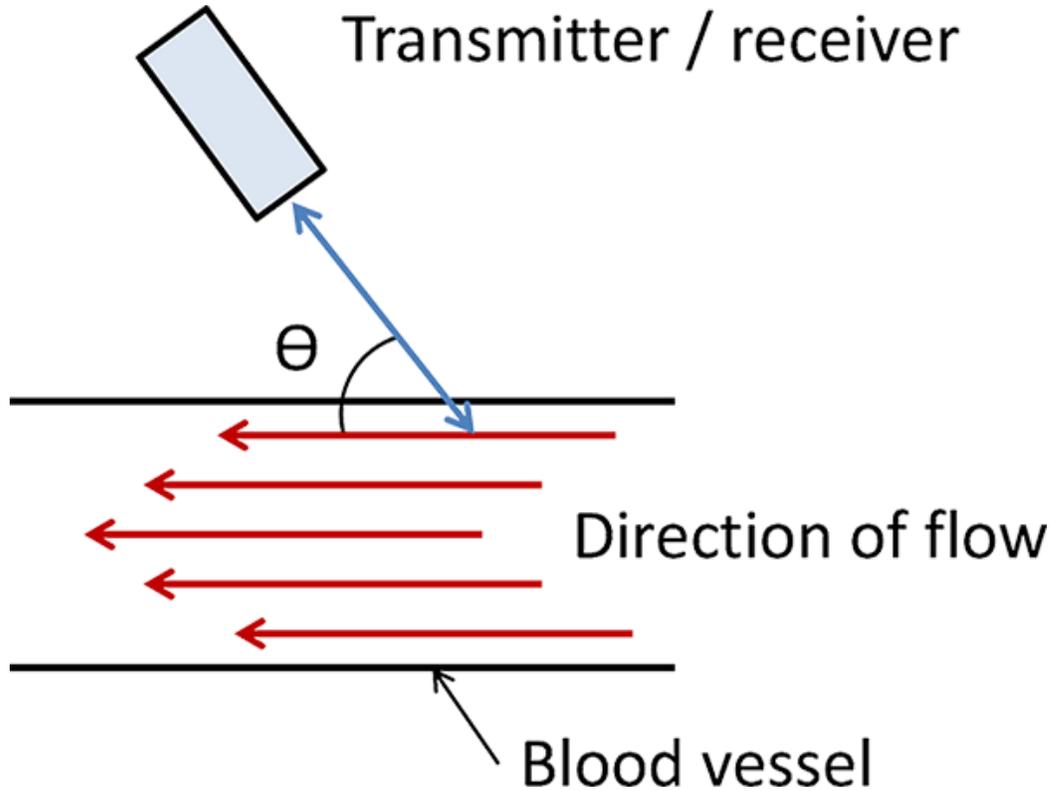


# Estudio de la conectividad cerebral mediante ultrasonido funcional

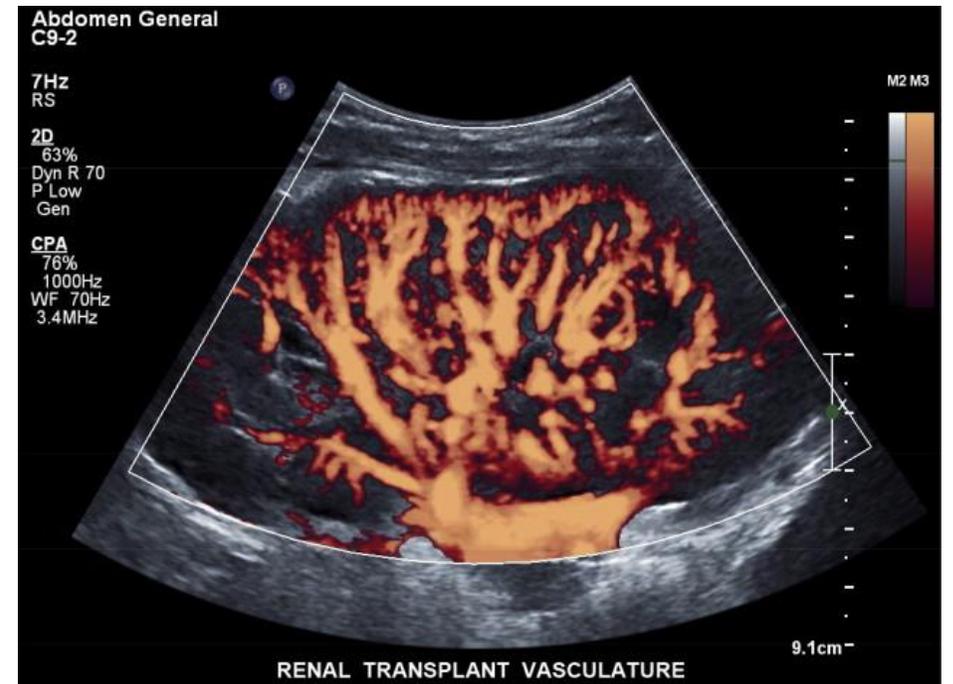
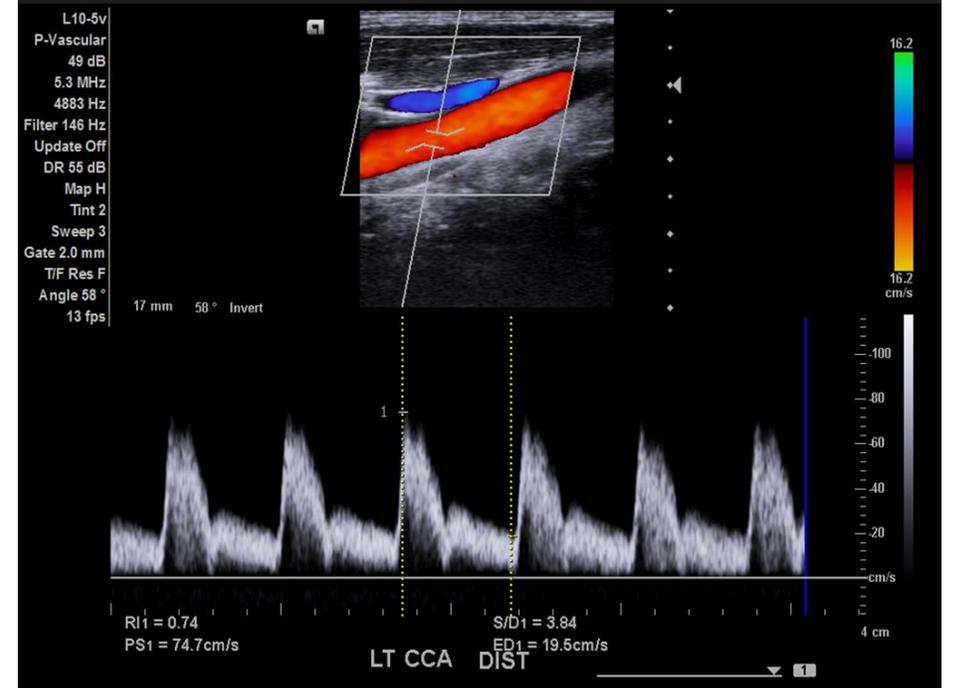
Maximiliano Anzibar Fialho – Grupo Física No Lineal

# ¿Qué es una imagen Doppler?

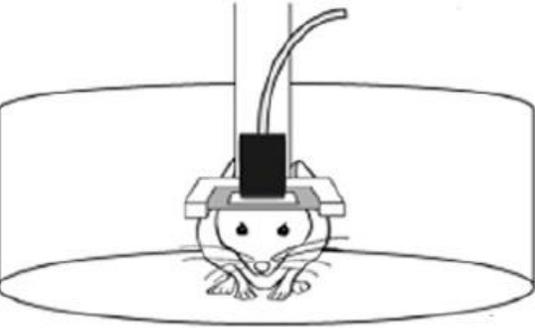


Velocidad a partir del cambio de frecuencia

$$f_D = \Delta f = f_R - f_T = [2(v/c_0) \cos \theta] f_0$$



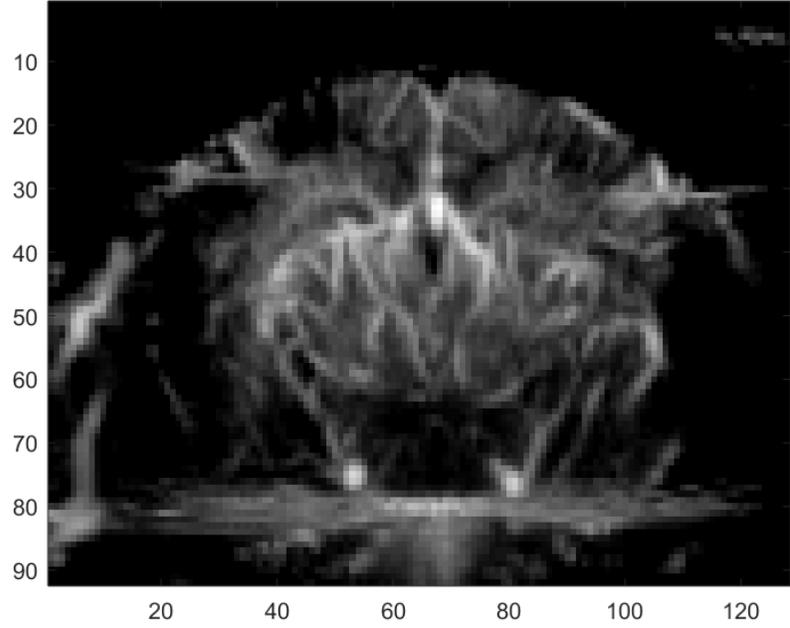
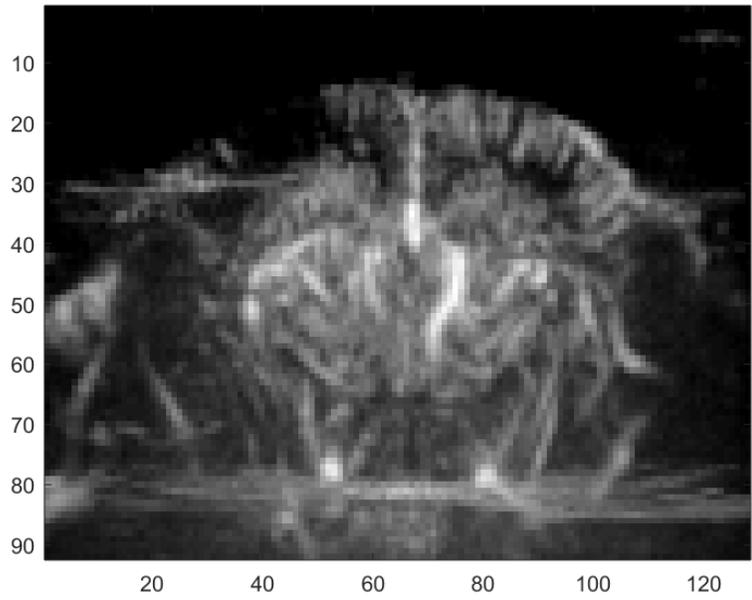
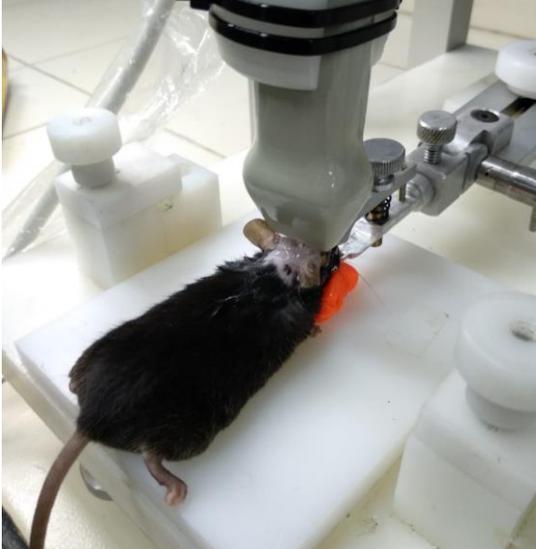
# Imágenes del cerebro en ratones



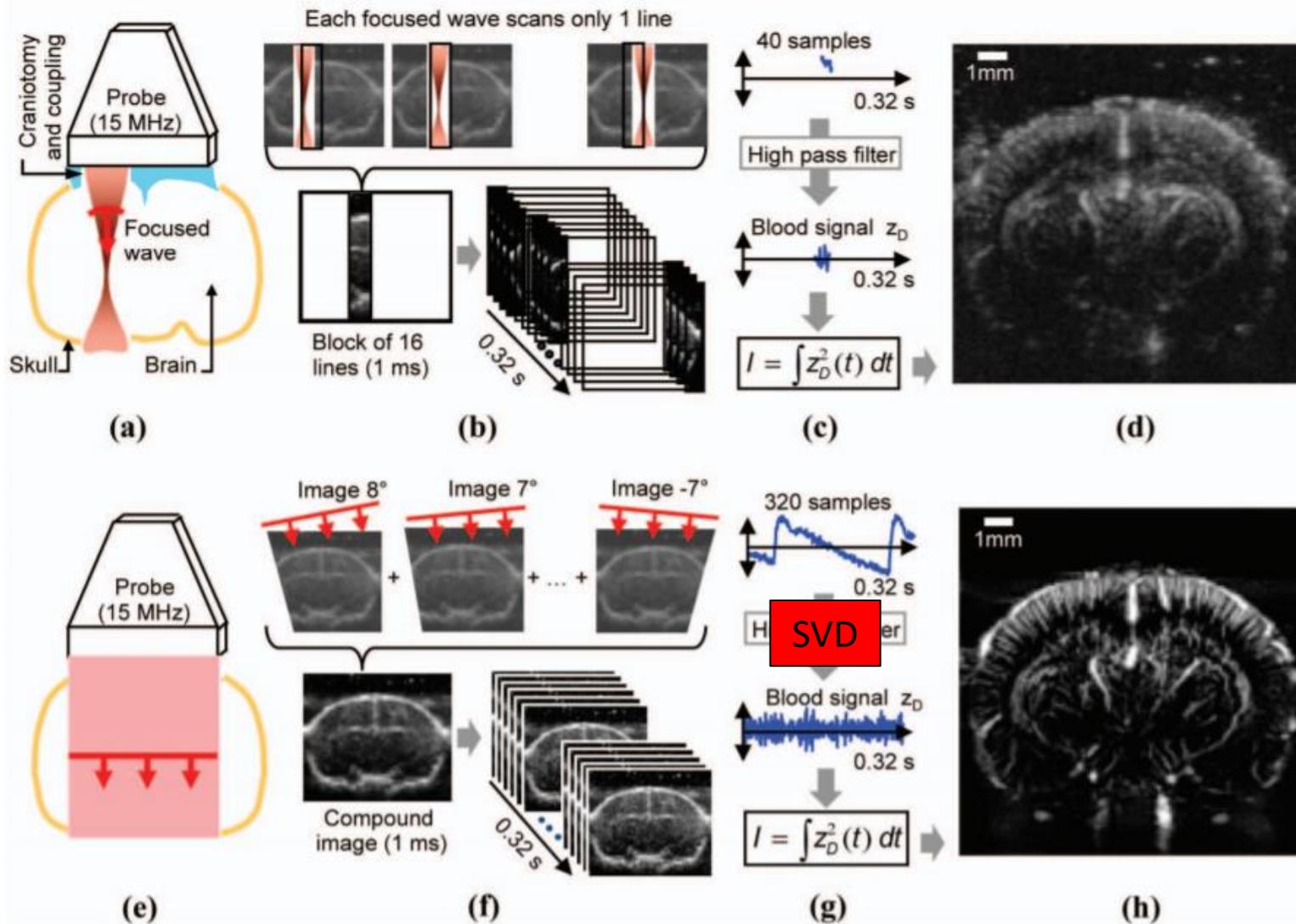
+



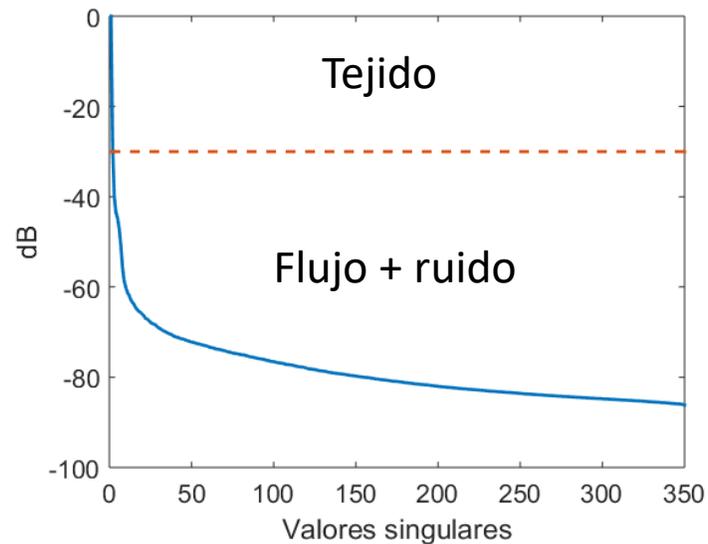
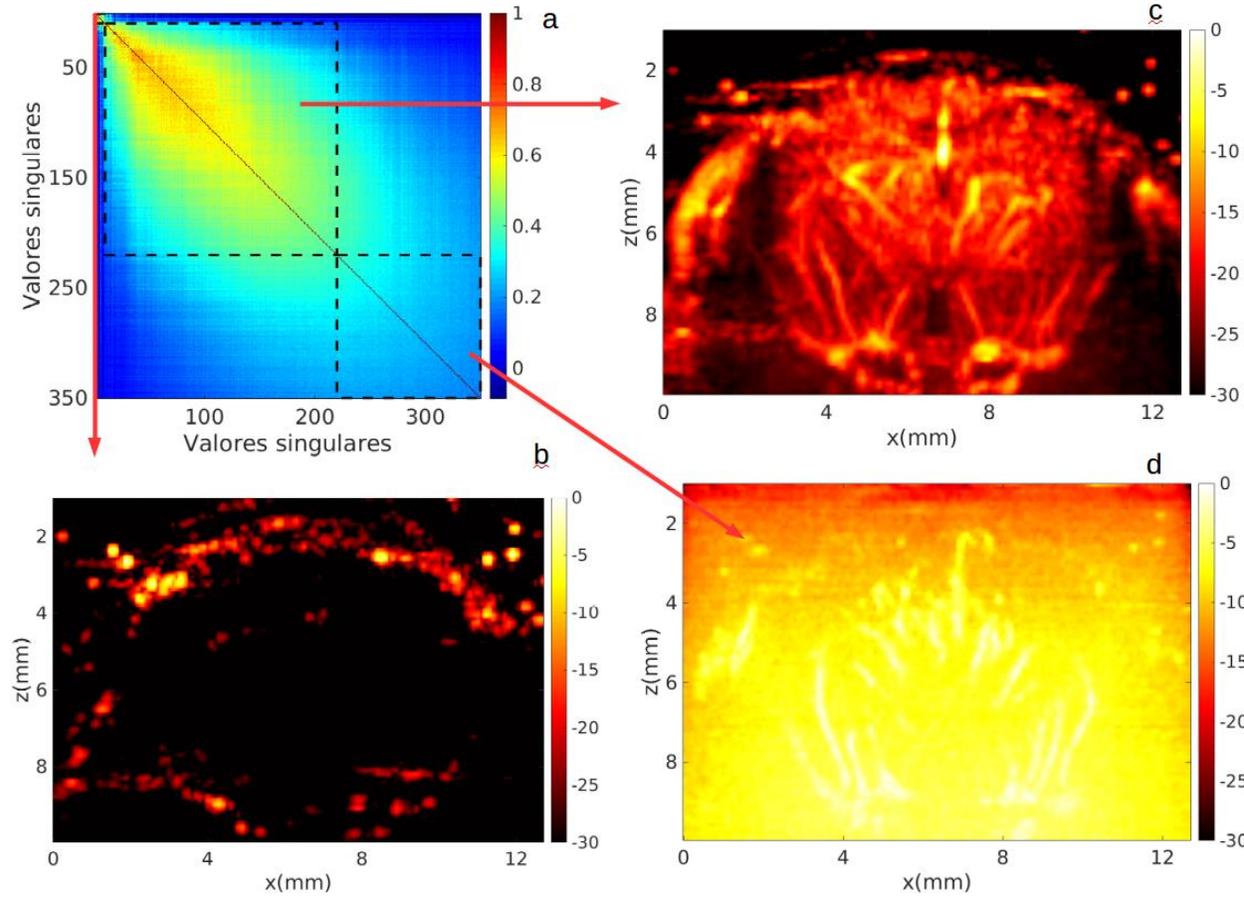
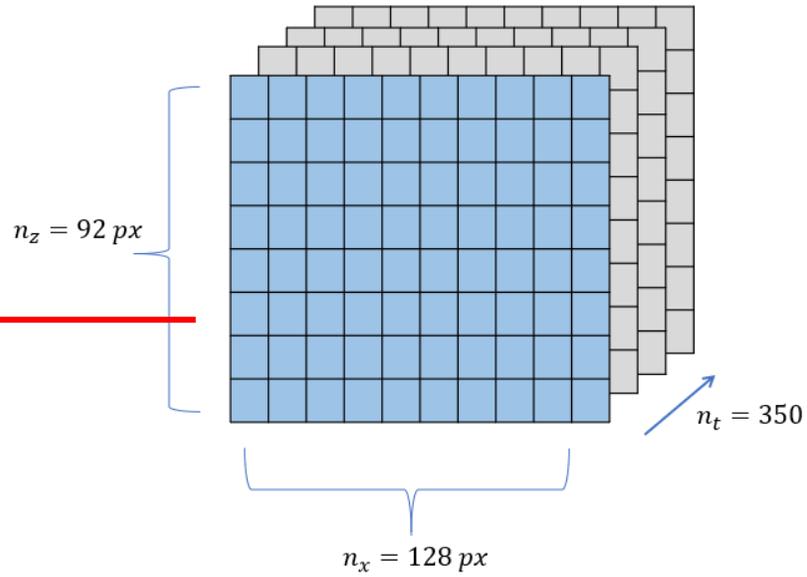
=



# Focalización vs compound imaging

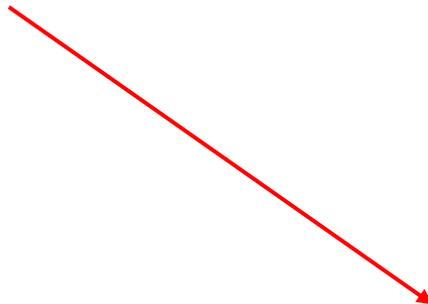
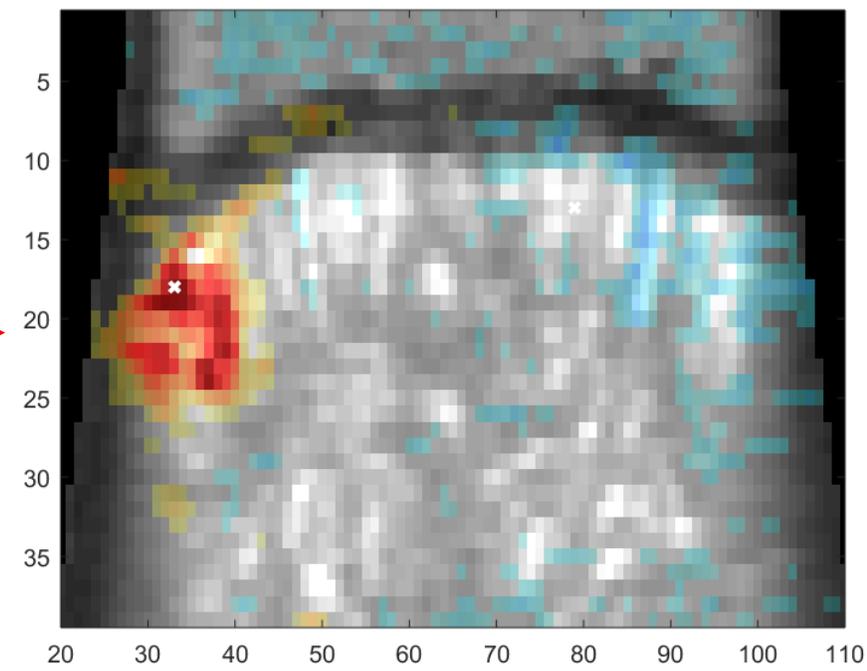
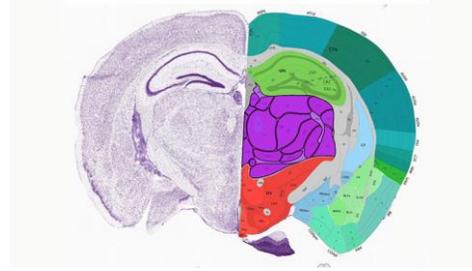


# Descomposición SVD aplicada a datos de ultrasonido

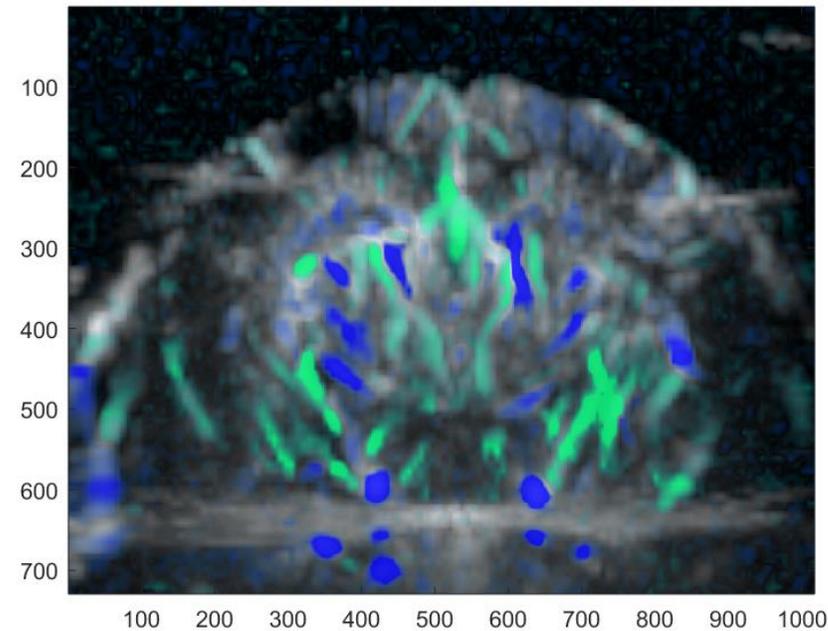
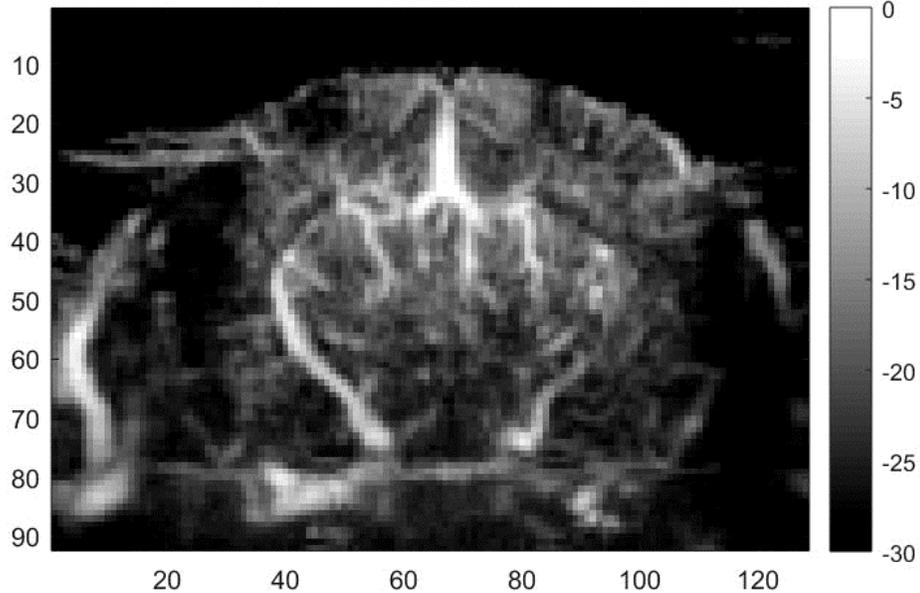


$$\begin{matrix}
 \begin{matrix} \square & \square & \square \\ \square & \square & \square \\ \square & \square & \square \end{matrix} & = & \begin{matrix} \square & \square & \square \\ \square & \square & \square \\ \square & \square & \square \end{matrix} & \Sigma & \begin{matrix} \square & \square & \square \\ \square & \square & \square \\ \square & \square & \square \end{matrix} & \begin{matrix} \square & \square & \square \\ \square & \square & \square \\ \square & \square & \square \end{matrix} \\
 \mathbf{M} & = & \mathbf{U} & \Sigma & \mathbf{V}^* \\
 m \times n & & m \times m & m \times n & n \times n \\
 \\
 \begin{matrix} \square & \square & \square \\ \square & \square & \square \\ \square & \square & \square \end{matrix} & & \begin{matrix} \square & \square & \square \\ \square & \square & \square \\ \square & \square & \square \end{matrix} & = & \begin{matrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{matrix} \\
 \mathbf{U} & & \mathbf{U}^* & = & \mathbf{I}_m \\
 \\
 \begin{matrix} \square & \square & \square \\ \square & \square & \square \\ \square & \square & \square \end{matrix} & & \begin{matrix} \square & \square & \square \\ \square & \square & \square \\ \square & \square & \square \end{matrix} & = & \begin{matrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{matrix} \\
 \mathbf{V} & & \mathbf{V}^* & = & \mathbf{I}_n
 \end{matrix}$$

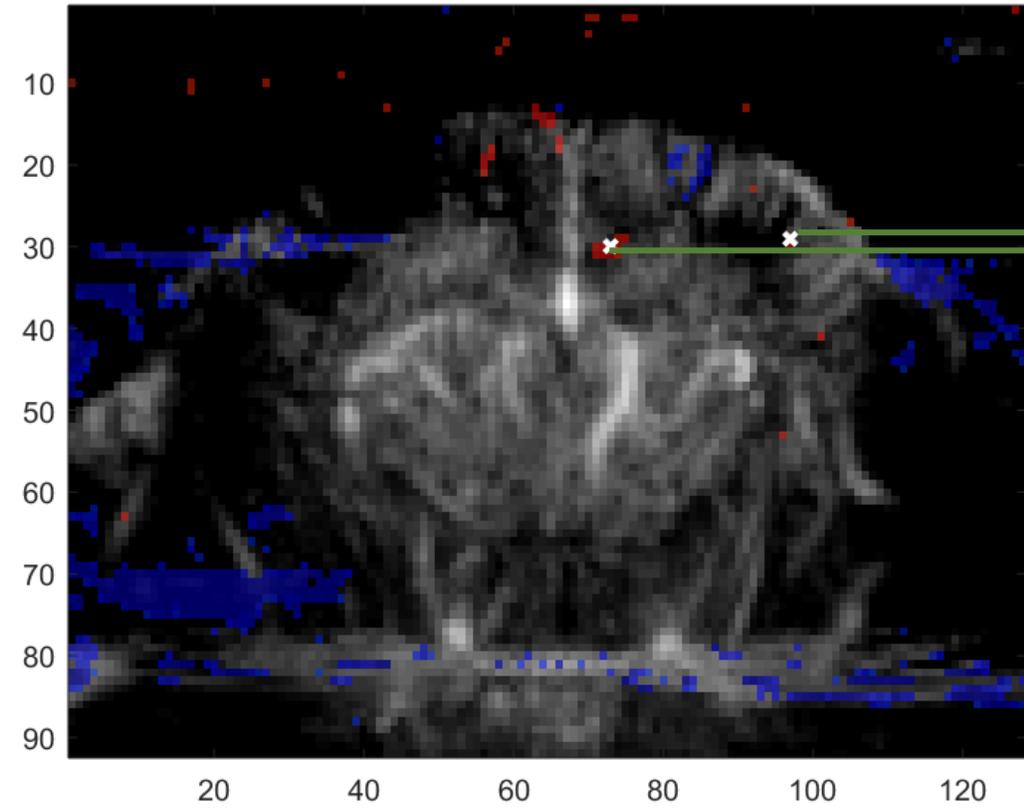
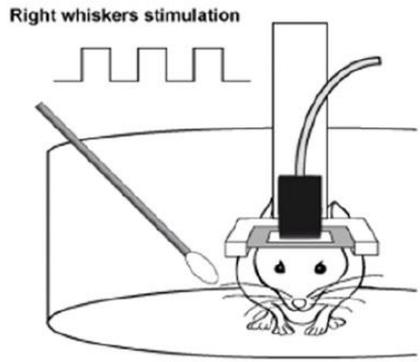
# ¿Qué información se puede obtener con ultrasonido?



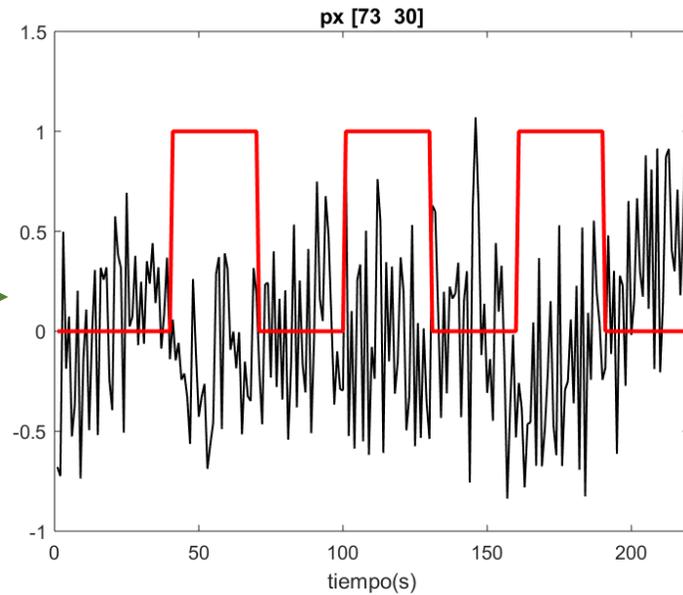
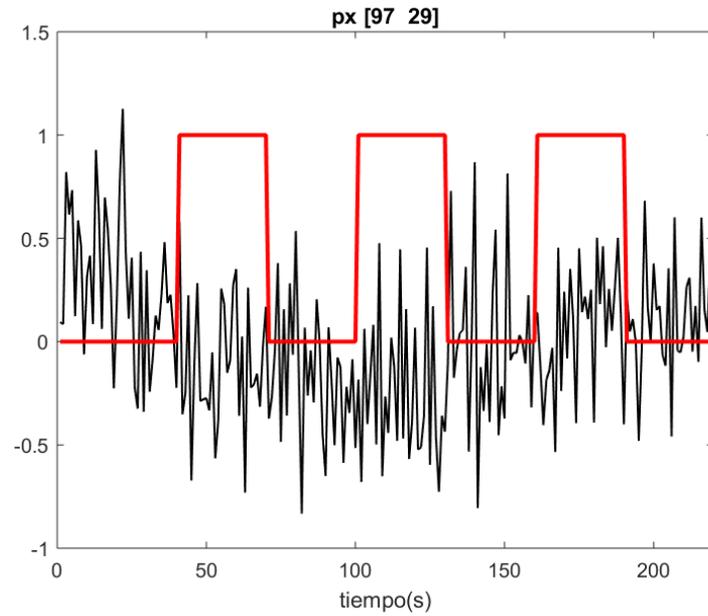
Plano4



# Resultados: respuesta funcional a estímulo

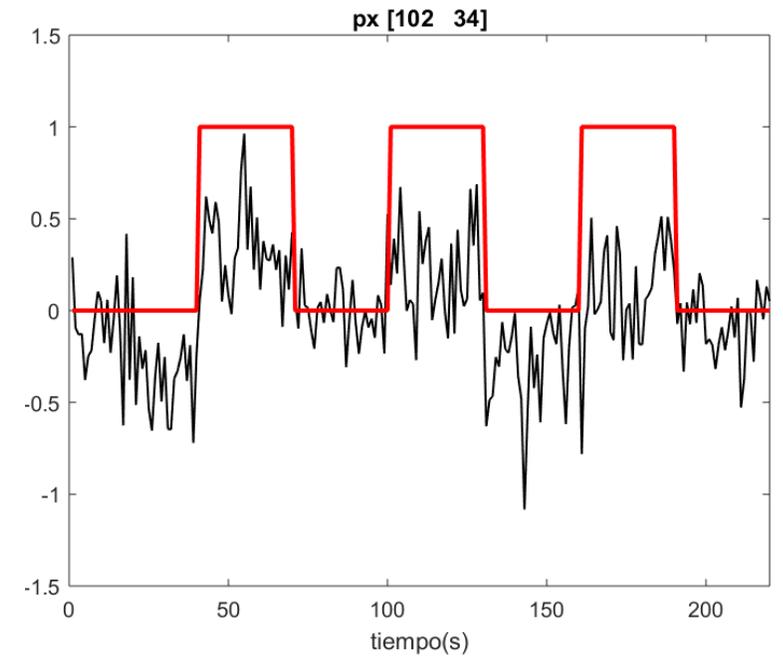
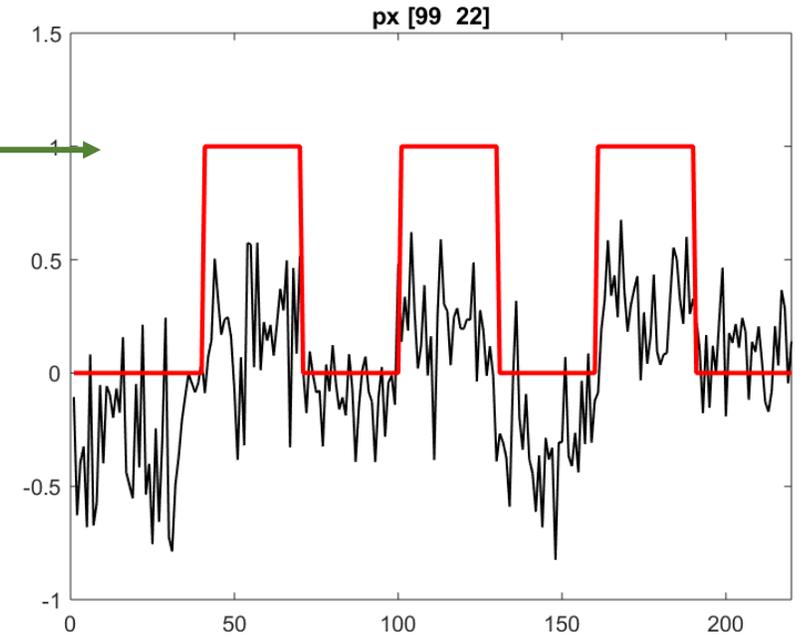
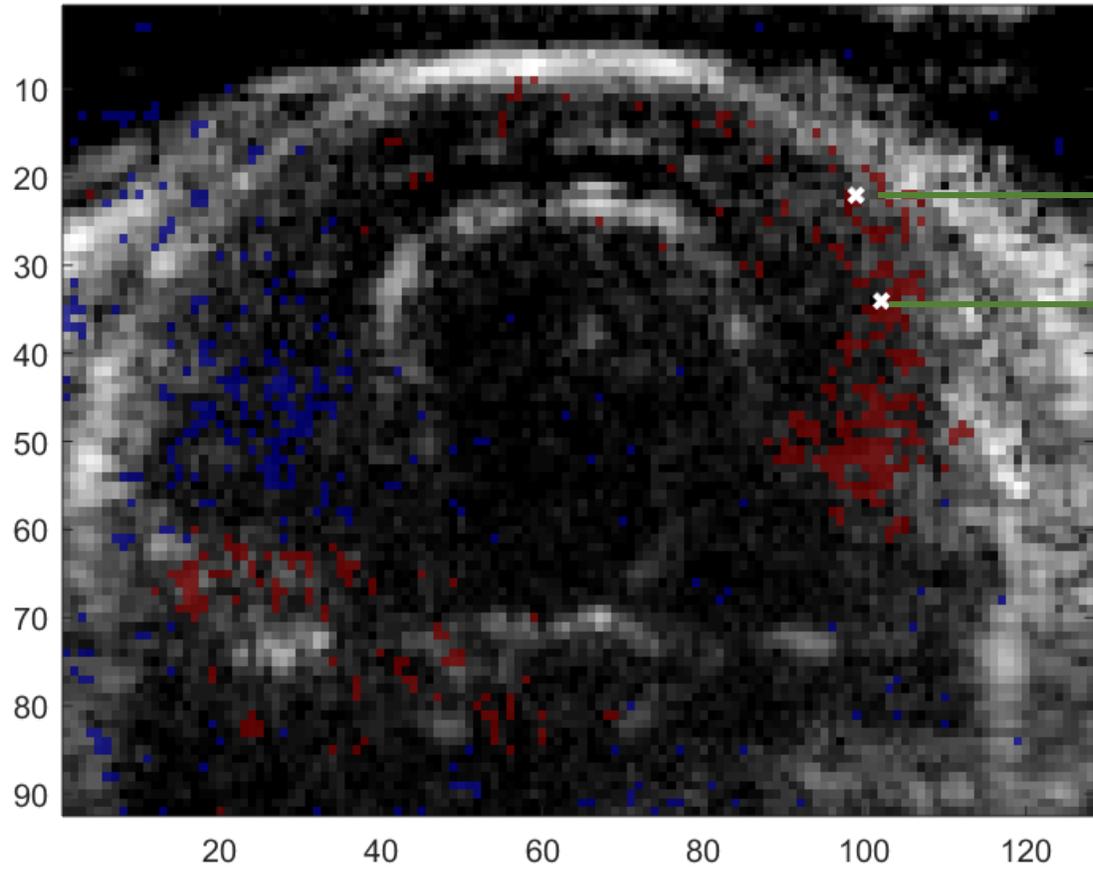
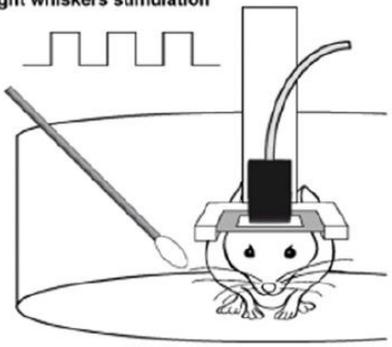


P-value = 0.01, Threshold = 0.2



# Resultados: respuesta funcional a estímulo (cráneo)

Right whiskers stimulation

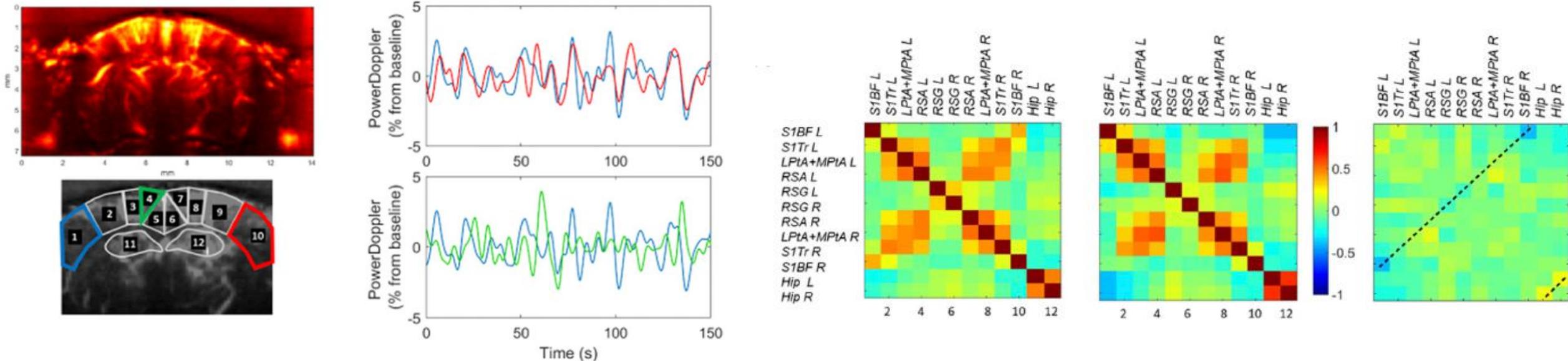


# Functional imaging evidence for task-induced deactivation and disconnection of a major default mode network hub in the mouse brain

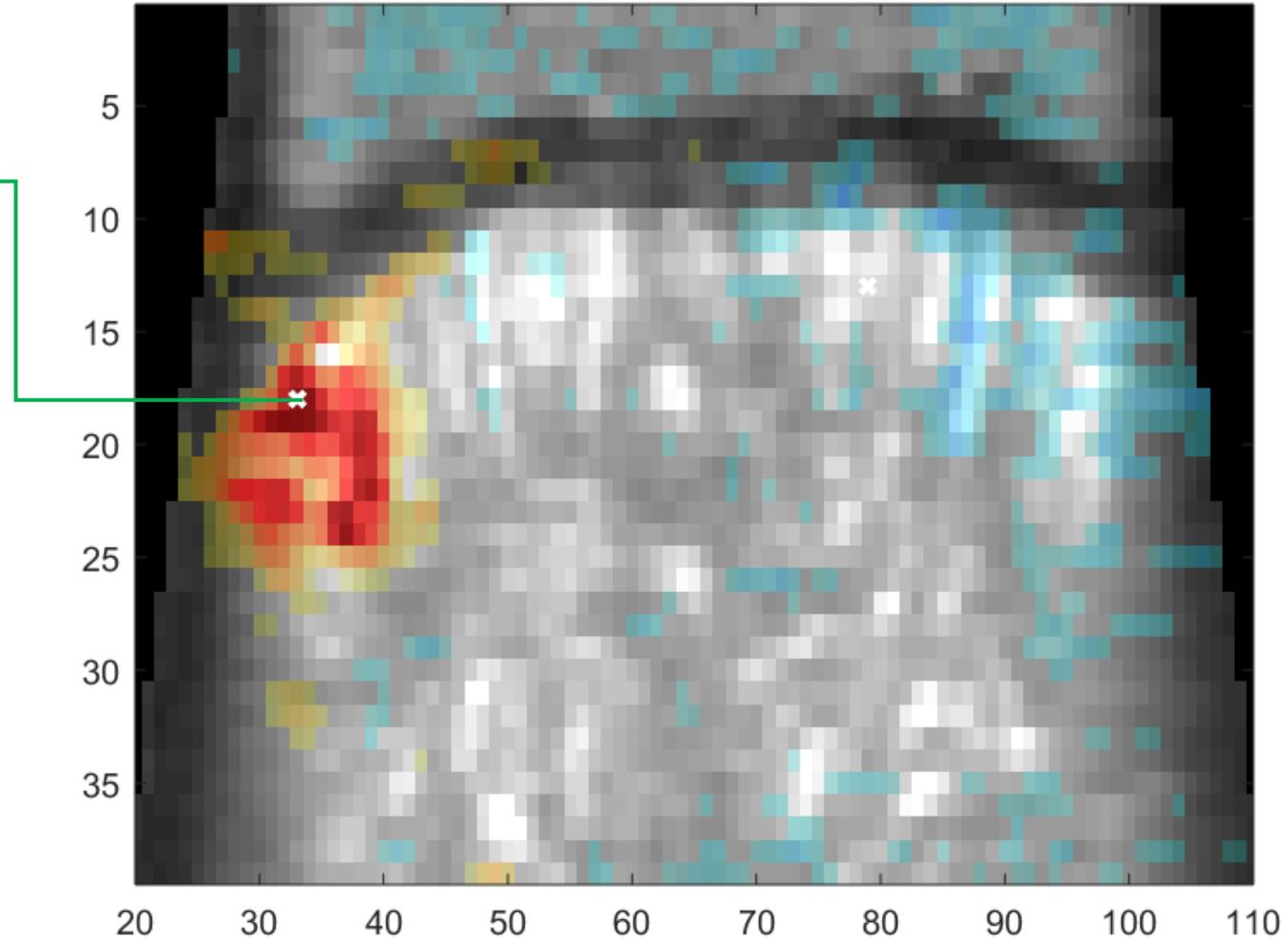
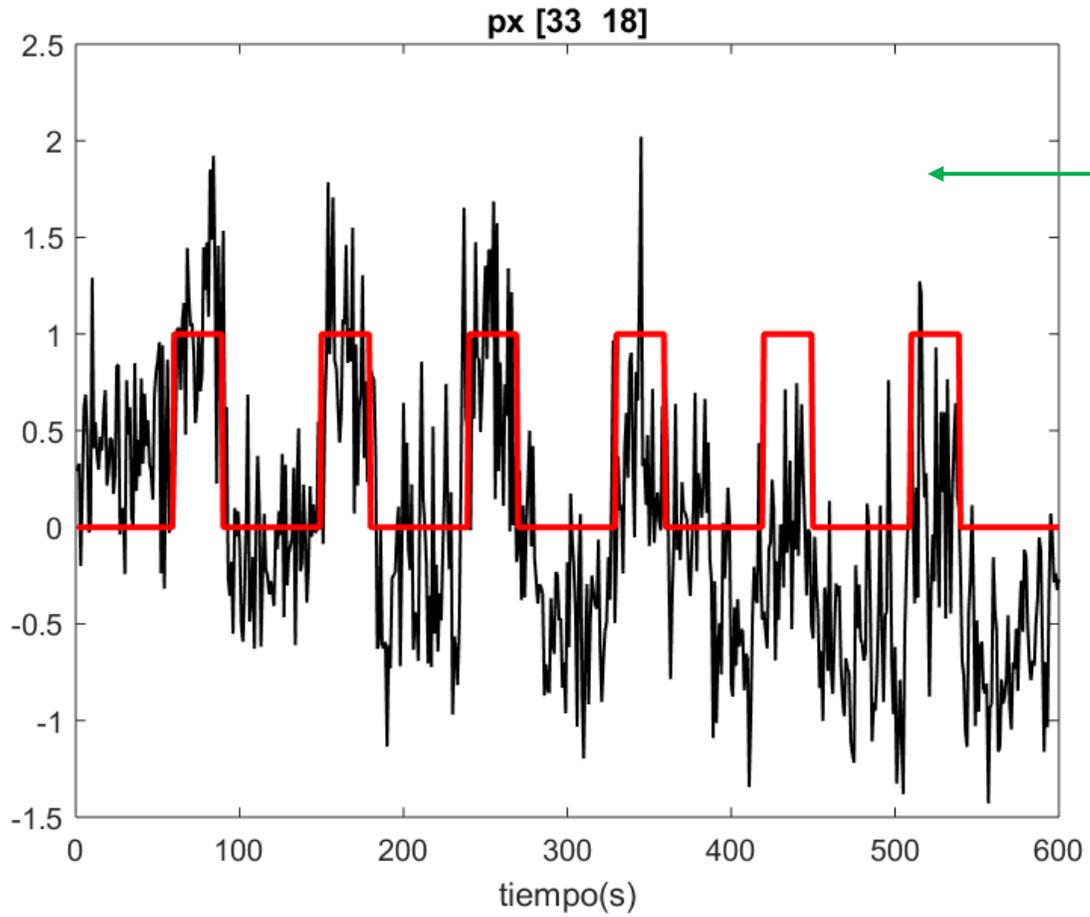
Jeremy Ferrier<sup>a,b,1</sup> , Elodie Tiran<sup>c,1</sup>, Thomas Deffieux<sup>c</sup>, Mickael Tanter<sup>c,2,3</sup>, and Zsolt Lenkei<sup>a,b,2,3</sup> 

<sup>a</sup>Institute of Psychiatry and Neurosciences of Paris, INSERM U1266, Université de Paris, 75014 Paris, France; <sup>b</sup>Brain Plasticity Unit, ESPCI Paris, CNRS, PSL Research University, 75005 Paris, France; and <sup>c</sup>Physics for Medicine Paris, ESPCI Paris, INSERM, CNRS, PSL Research University, 75012 Paris, France

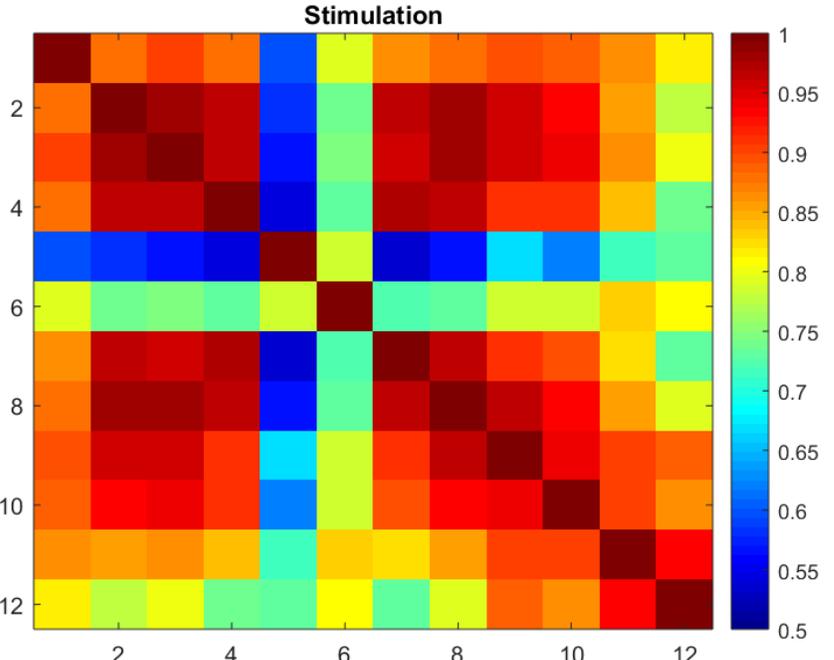
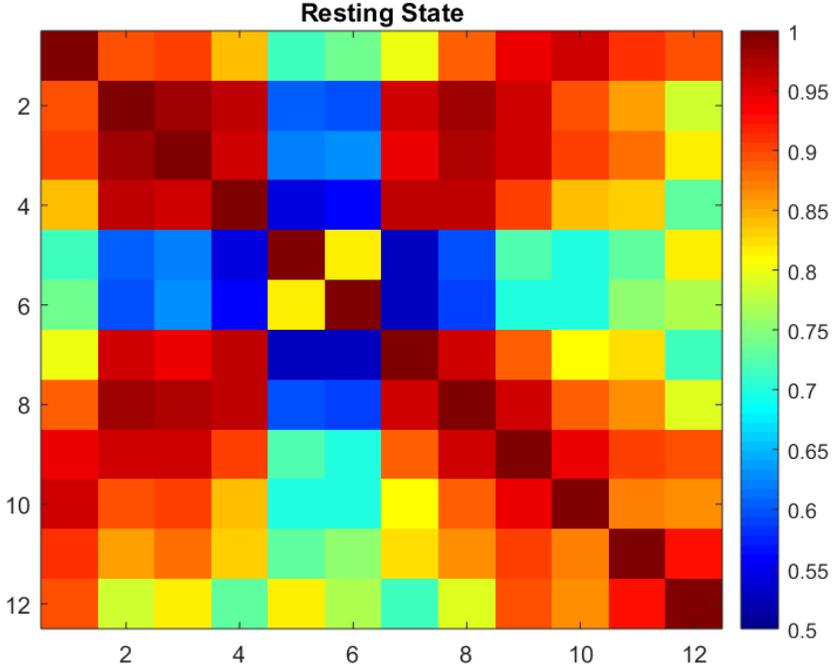
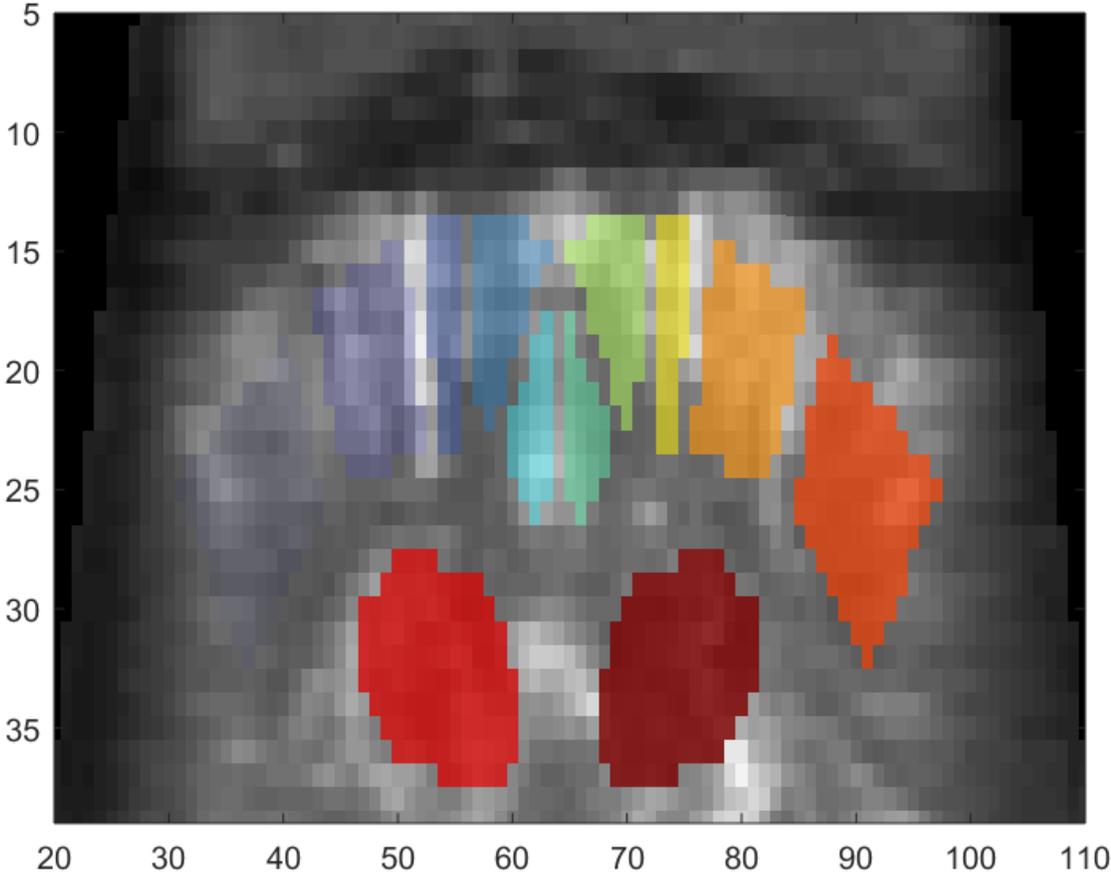
Edited by David C. Van Essen, Washington University in St. Louis School of Medicine, St. Louis, MO, and approved May 20, 2020 (received for review November 21, 2019)



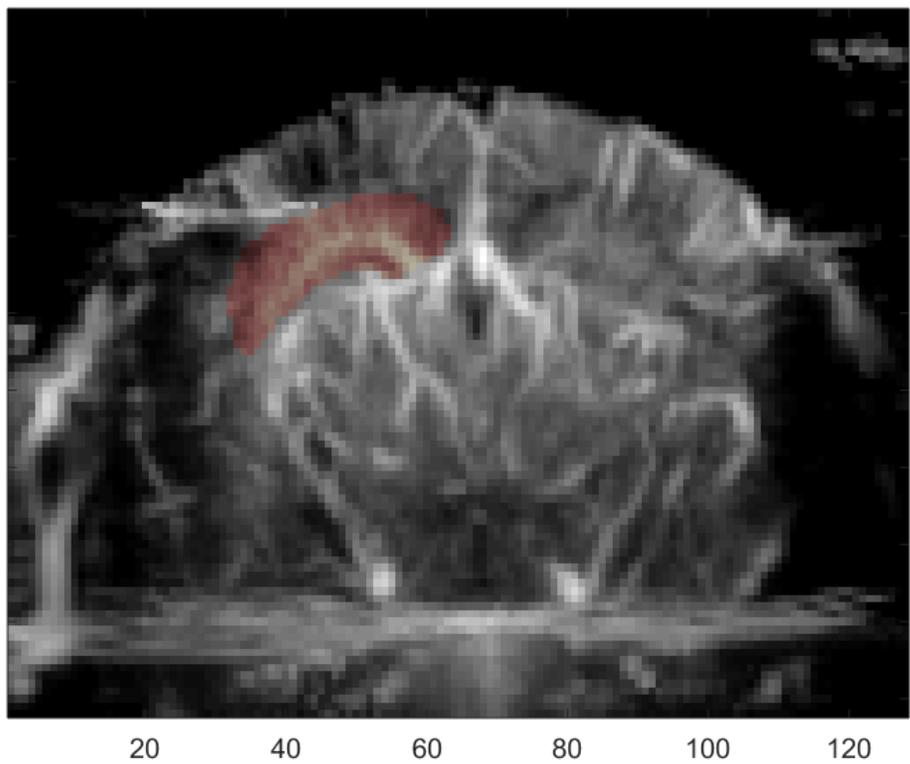
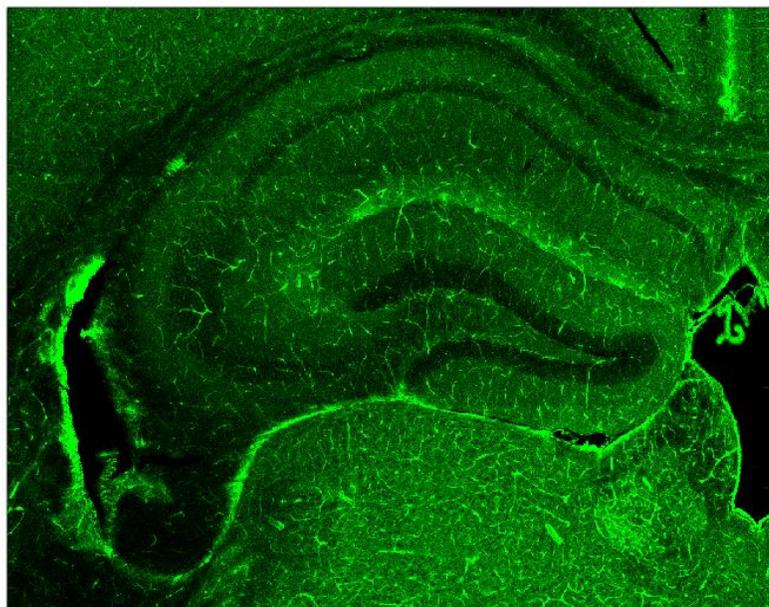
# Correlación con el estímulo



# Conectividad entre regiones



# Comparar con microscopía confocal



500

1000

1500

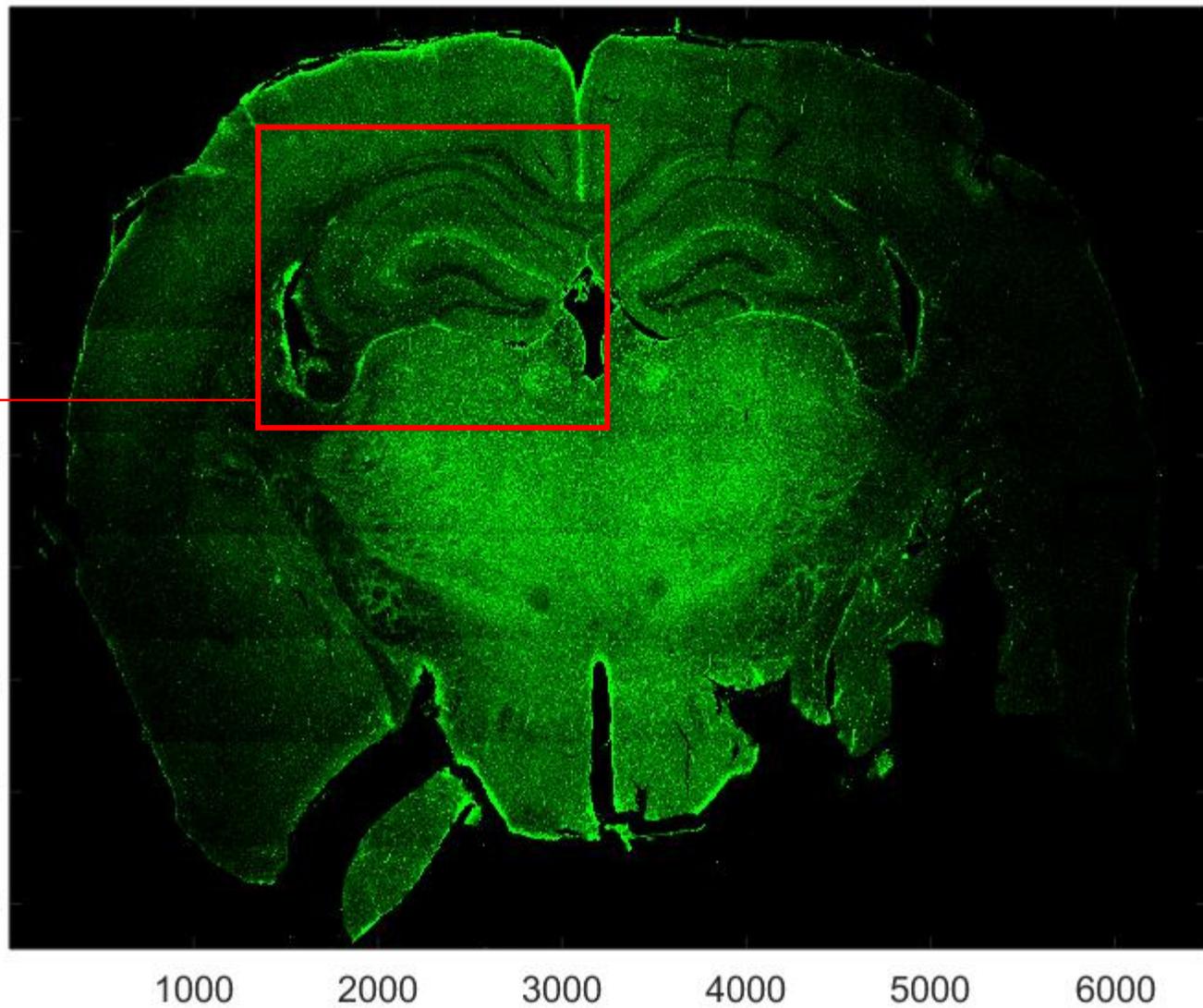
2000

2500

3000

3500

4000



1000

2000

3000

4000

5000

6000

# Gracias

