

## Laboratory of Brain Exosomes and Pathology - ExoBrain



# ExoBrain

In the new era of **Precision Medicine**, the diagnosis, prognosis and treatment of complex and multifactorial brain diseases such as Alzheimer's disease (AD) and depression are increasingly based on the evaluation of the individual's lifestyle, risk factors and multilevel biological analyses that aim to clarify the degree of brain pathology as well as the effectiveness of new therapeutic schemes in each, individual/patient.

The **Laboratory of Brain Exosomes and Pathology – ExoBrain** led by **Dr Ioannis Sotiropoulos**

focuses on

**the understanding of different cellular mechanisms of AD**

(e.g. A $\beta$ , Tau, neuroinflammation) and

**their relationship to**

**brain exosomes**

; the latter are small

**extracellular vesicles (EVs)**

secreted by cells and carry different biological material (e.g. proteins, RNA and DNA) from the cell of origin. Based on their multiple cargo, small EVs such as exosomes are suggested to transfer biological information about the health status of the cell/brain exhibiting a great biomarker potential (

**Figure 1**

). Emerging evidence suggest two roles of brain exosomes: a) brain exosomes are involved in

the

***spreading of AD brain pathology***

between cells & brain regions and, b) brain exosomes collected at the peripheral blood may represent great

***biomarkers of brain pathology***

(

**Figure 1 -**

*Gomes et al., Exper Neurol 2022*

). Our laboratory uses novel techniques for the collection, isolation and multiscale analysis of brain exosomes as well as brain-derived exosomes collected in the peripheral blood while we have developed a novel method for isolation of brain tissue exosomes from animals and humans (

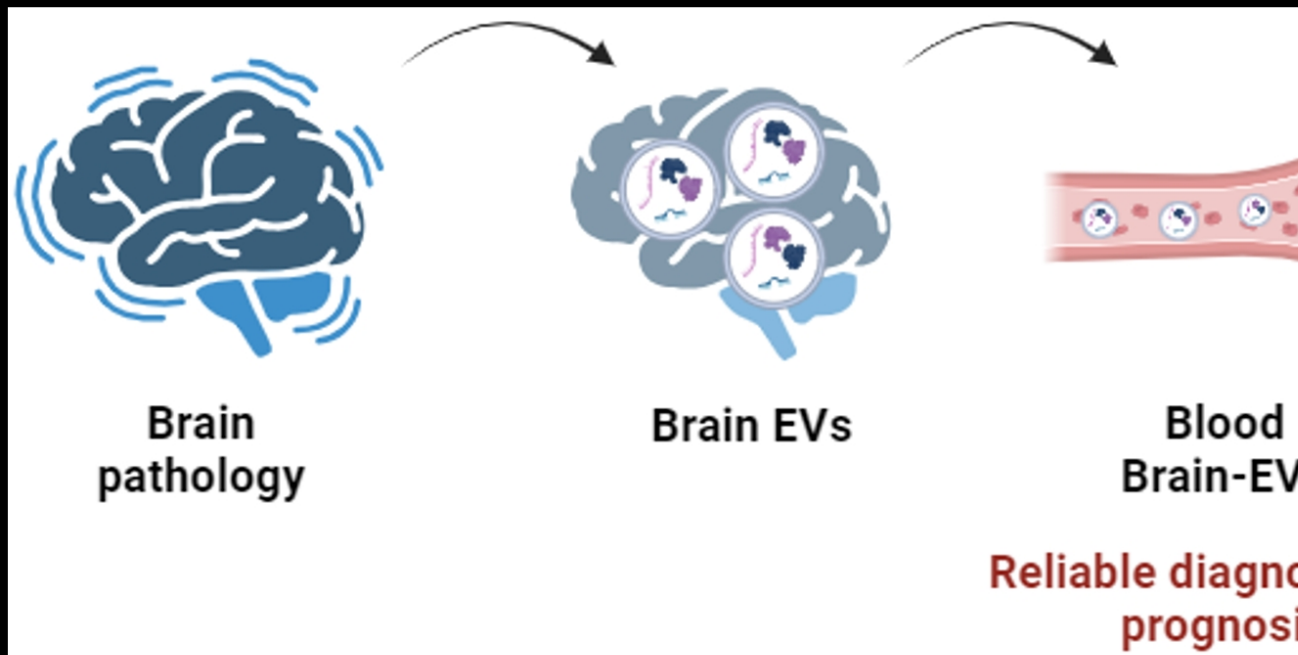
***release method***

)(

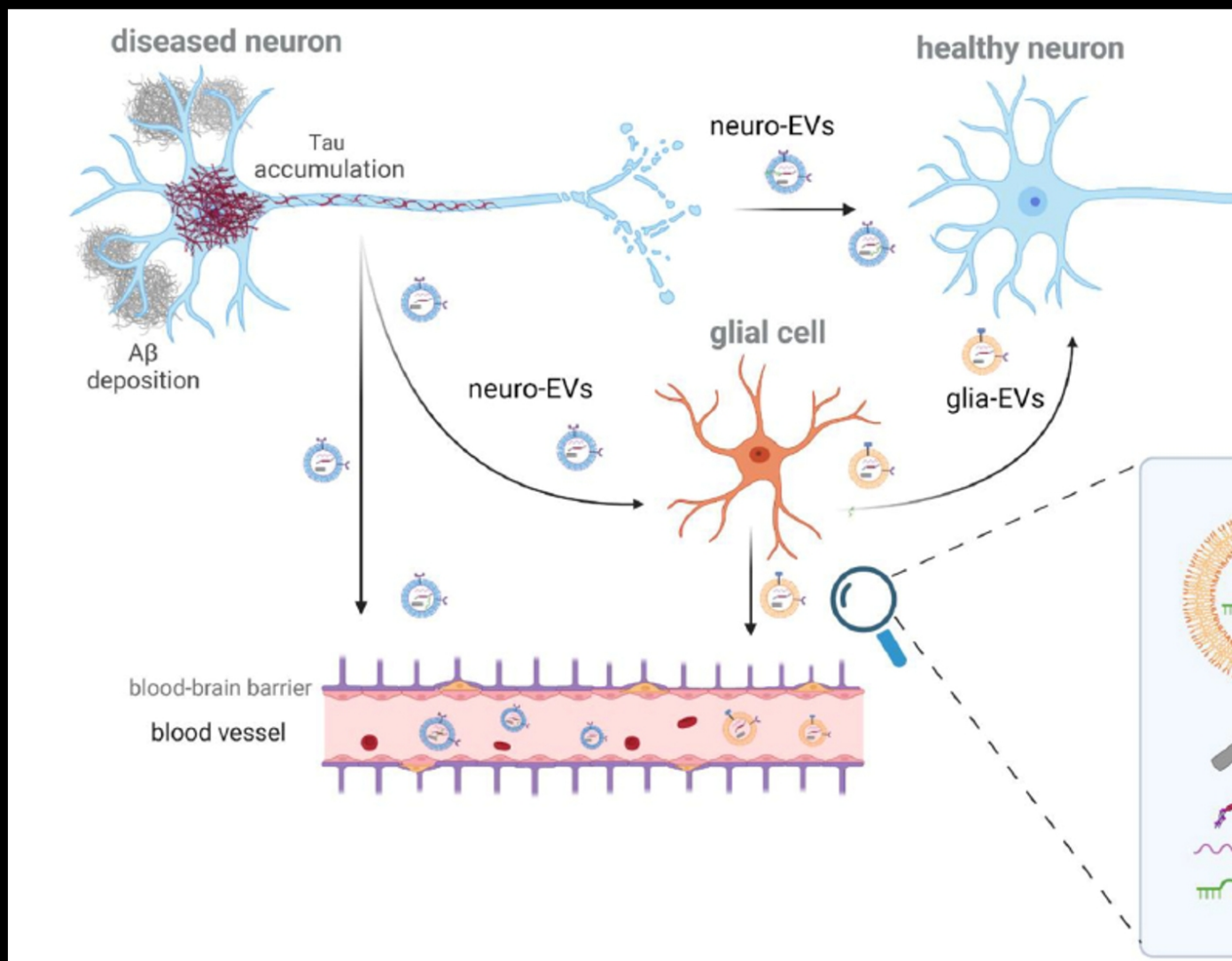
*Gomes et al., Cell Com 2023*

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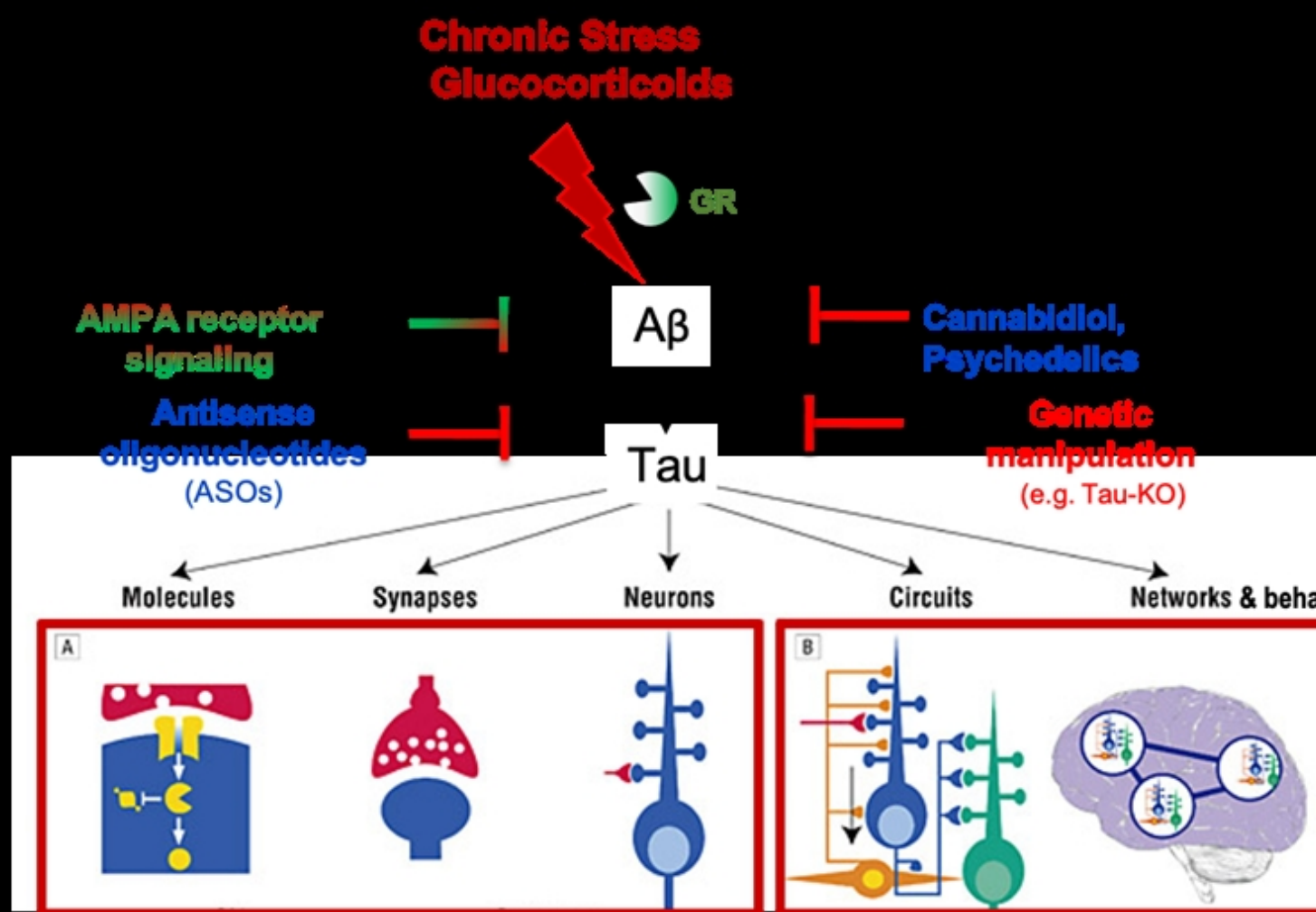
A



B

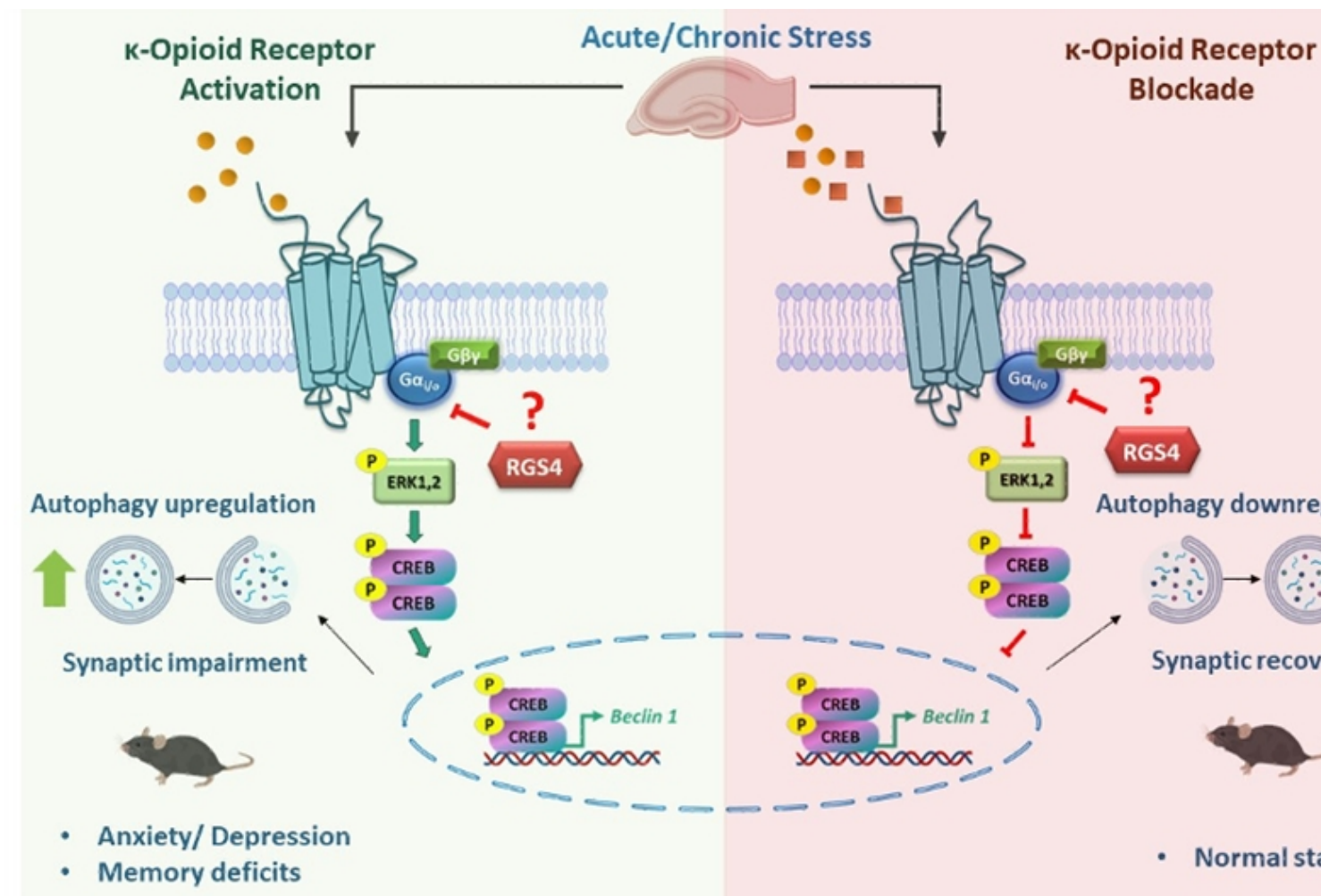


Dr. Solimene's current research lines include: (i) role of stress in AD and depression (SO); (ii) role of

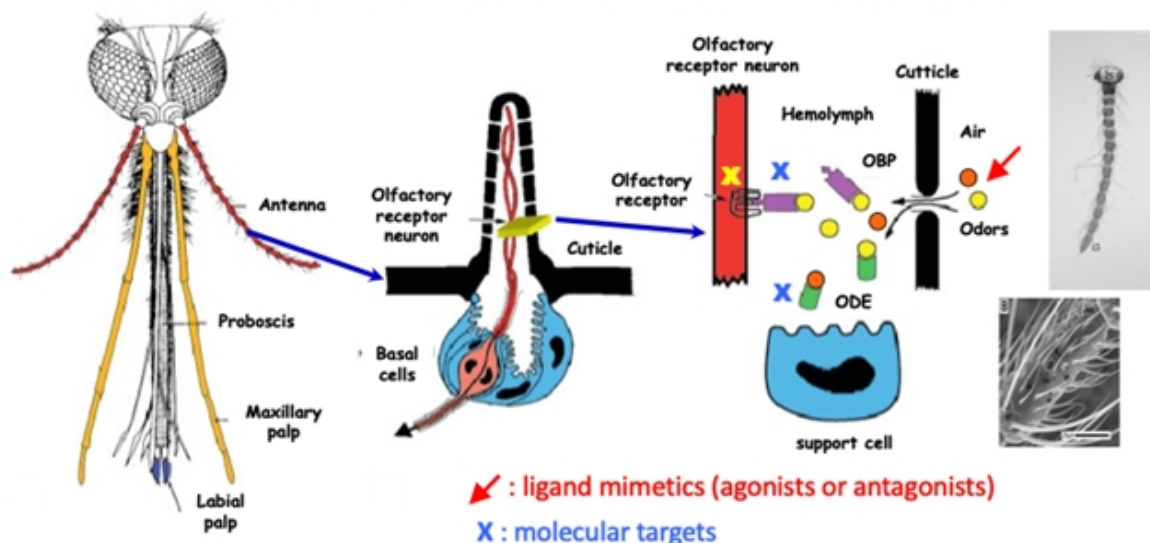
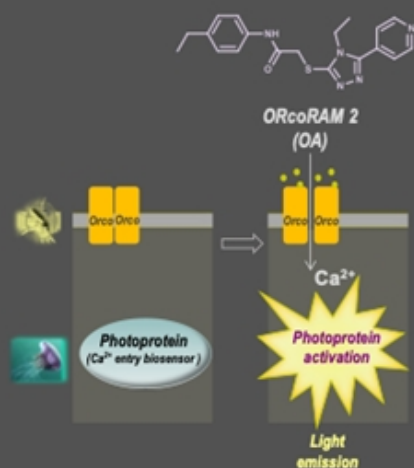


**Our multiscale analytical approaches**

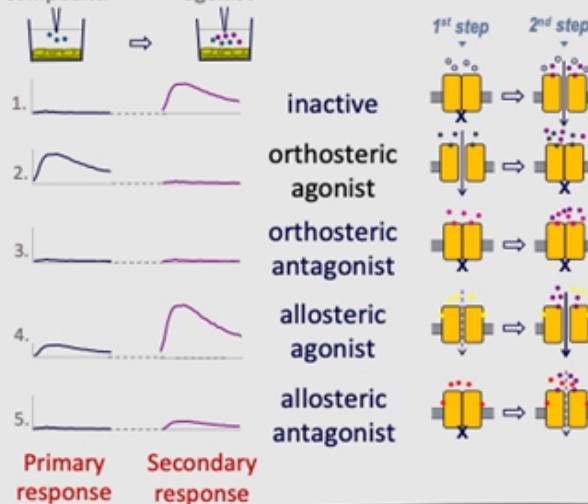
**Figure**



Figure

**A****The elements of odor detection in the insect antenna****B****Insect cell-based screening platform for ORco ligands****ORco agonist/antagonist detection**

Sequential additions of  
Examined compound      Specific ORco  
agonist

**Figure 4**