

**Part A. PERSONAL INFORMATION**

**CV date**

5/10/2019

|                                      |   |                     |    |
|--------------------------------------|---|---------------------|----|
| First and Family name                | Angel Nuñez Molina                            |                     |    |
| Social Security, Passport, ID number | 01095707X                                     | Age                 | 62 |
| Researcher codes                     | WoS Researcher ID (*)                         | Y-9137-2019         |    |
|                                      | SCOPUS Author ID(*)                           |                     |    |
|                                      | Open Researcher and Contributor ID (ORCID) ** | 0000-0002-8013-4812 |    |

(\*) At least one of these is mandatory

(\*\*) Mandatory

**A.1. Current position**

|                                |   |        |                    |
|--------------------------------|---|--------|--------------------|
| Name of University/Institution | Universidad Autónoma de Madrid                                |        |                    |
| Department                     | Anatomía, Histología y Neurociencia                           |        |                    |
| Address and Country            | Arzobispo Morcillo 4  |        |                    |
| Phone number                   | 914973755   | E-mail | angel.nunez@uam.es |
| Current position               | Catedrático Universidad                                       | From   | 19/05/2010         |
| Key words                      | Neurophysiology, thalamo-cortical network, sensory processing |        |                    |

**A.2. Education**

| PhD                       | University         | Year |
|---------------------------|--------------------|------|
| Licenciatura C Biológicas | Autónoma de Madrid | 1979 |
| Doctorado C Biológicas    | Autónoma de Madrid | 1988 |

**A.3. JCR articles, h Index, thesis supervised...**

- Nº de sexenios: 5. Last time: 2016.

96 published papers (69% in el Q1), more than 8.909 citations (Scholar (2019-08-08)).

H Index: 35; Google Scholar (2019-08-08).

Supervised of 5 Doctoral Thesis in the last 10 years. A new Thesis will be finish in 2020.

**Part B. CV SUMMARY (max. 3500 characters, including spaces)**

From my beginnings with Drs. Elio García Austt and Washington Buño (1980) I have learned the techniques of electrophysiology both in anesthetized animals and in vitro preparations.

I have studied the importance of biological rhythms as a fundamental activity in the processes of neuronal synchronization that participate in the generation of synaptic plasticity.

During my post-doctoral stay (1990-1992) with Prof. Steriade (Laval University, Canada) I studied the cellular mechanisms that participate in the generation of electroencephalographic patterns that characterize slow sleep.

When I returned to the Faculty of Medicine, I joined two research groups: one of them led by Drs. Reinoso Suarez and de Andrés for the study of the mechanisms for generating paradoxical sleep and with Dr. Avendaño for the study of the somatosensory pathway.

From 2001 (first project that I have led), I am focused on the study of the plasticity of the somatosensory system and its modulation by acetylcholine and orexin, as well as by the growth factor IGF-I. I am P.I. continuously since 2008. For the past 20 years, I am collaborating with Prof. Ignacio Torres-Alemán, from Institute Cajal (CSIC) to study of the influence of IGF-I in the brain activity. The modulation of the synaptic plasticity by IGF-I can be key in many neurodegenerative processes such as Alzheimer's disease.



## Part C. RELEVANT MERITS

### C.1. Publications (including books)

- 1) Piriz J., Torres-Alemán I., and **Núñez A.** (2009). Independent alterations in the central and peripheral somatosensory pathway in rat diabetic neuropathy. *Neuroscience* 160: 402-411.
- 2) **Núñez, A.**, Rodrigo-Angulo, M., de Andrés I., and Garzon M. (2009). Hypocretin/Orexin Neuropeptides: Participation in the Control of Sleep-Wakefulness Cycle and Energy Homeostasis. *Current Neuropharmacology* 7: 50-59.
- 3) Malmierca, E., Castellanos, N.P., Núñez-Medina, A., Makarov V., and **Núñez A.** (2009). Neuron synchronization in the rat gracilis nucleus facilitates sensory transmission in the somatosensory pathway. *European Journal Neuroscience* 30: 593-601.
- 4) Ma, S.E., Olucha-Bordonau, F.E., Akhter Hossain, M., Lin, F., Kuei, C., Liu, C., Wade, J.D., Sutton, S.W., **Núñez A.** and Gundlach A.L. (2009). Modulation of hippocampal theta oscillations and spatial memory by relaxin-3 neurons of the nucleus incertus. *Learning and Memory* 16: 730-742.
- 5) Martín, Y., Malmierca, E., Avendaño C., and **Núñez A.** (2010). Neuronal disinhibition in the trigeminal nucleus caudalis in a model of chronic neuropathic pain. *European Journal Neuroscience* 32: 399-408.
- 6) Nishijima, T., Piriz, J., Duflot, S., Fernández, A.M., Gaitán, G., Gomez-Pinedo, U., García-Verdugo, J.M., Leroy, F., Soya, H., **Núñez A.**, and Torres-Alemán I. (2010). Neuronal Activity Drives Localized Blood-Brain-Barrier Transport of Serum Insulin-like Growth Factor-I into the CNS. *Neuron* 67: 834-846.
- 7) Olucha-Bordonau, F.E., Otero-García, M., Sánchez-Pérez A. M., **Núñez A.**, Ma S., and Gundlach A. L. (2011). Distribution and targets of the Relaxin-3 Innervation of the septal Area in the Rat. *Journal Comparative Neurology* 520:1903-1939.
- 8) Egea, J., Malmierca E., Rosa A., del Barrio L., Negredo P., **Núñez A.**, López M. (2012). Participation of calbindin-D28K in nociception: results from calbindin-D28K knockout mice. *Pflugers Archiv-European Journal of Physiology* 463:449-58.
- 9) Navarrete, M., Perea G., Fernández de Sevilla D., Gómez-Gonzalo M., **Núñez, A.**, , E. Martín, A. Araque (2012). Astrocytes mediate in vivo cholinergic-induced synaptic plasticity. *Plos Biology* 10: 1-12.
- 10) **Núñez, A.** Domínguez S., Buño W., Fernández de Sevilla D. (2012). Cholinergic-mediated enhancement in barrel cortex layer V pyramidal neurons. *Journal Neurophysiology* 108: 1656–1668.
- 11) Malmierca, E., Martín Y.B., **Núñez A.** (2012). Inhibitory control of nociceptive responses of trigeminal spinal nucleus cells by somatosensory corticofugal projection in rat. *Neuroscience* 221:115-24.
- 12) Trueba-Sáiz A, Cavada C., Fernández A.M., León T., González D.A., Fortea- Ormaechea J., Lleó A., Del Ser T., **Núñez A.**, Torres-Alemán I. (2013). Loss of serum IGF-I input to the brain as an early biomarker of disease onset in Alzheimer mice. *Translational Psychiatry* 3, e330; doi:10.1038/tp.2013.102.
- 13) Tortorella, S., Rodrigo-Angulo M., **Núñez A.**, Garzon M. (2013). Synaptic interactions between perifornical lateral hypothalamic area, locus coeruleus nucleus and the oral pontine reticular nucleus are implicated in the stage succession during sleep- wakefulness cycle. *Frontiers in Neuropharmacology* doi: 10.3389/fnins.2013.00216.
- 14) Malmierca, E., Chaves-Coira I., Rodrigo-Angulo M., **Núñez A.** (2014). Corticofugal projections induce long-lasting effects on somatosensory responses in the trigeminal complex of the rat. *Frontiers in Systems Neuroscience* doi:10.3389/fnsys.2014.00100.
- 15) Martín-Cortecero, J., **Núñez A.** (2014) Cholinergic modulation of tactile response adaptation in the barrel cortex of rats. *Brain Research* 1591: 27-37 doi:10.1016/j.brainres.2014.10.002.
- 16) Barros-Zulaica, N., Castejon C., and **Núñez A.** (2014). Frequency-specific response facilitation of supra and infragranular barrel cortical neurons depends on NMDA-receptor activation in rats. *Neuroscience* 281: 178-194. doi: 10.1016/j.neuroscience.2014.09.057.
- 17) Barros-Zulaica, N., and **Núñez A.** (2015). Synaptic Plasticity in the Somatosensory Cortex. *Neurotransmitter* 2: e588. doi: 10.14800/nt.588.



- 18) Castejón, C., Barros-Zulaica N., and **Núñez A.** (2016). Control of Somatosensory Cortical Processing by Thalamic Posterior Medial Nucleus: a New Role of Thalamus in Cortical Function. *PlosOne* 11(1):e0148169. doi: 10.1371/journal.pone.0148169.
- 19) Chaves-Coira, I., Barros-Zulaica N., Rodrigo-Angulo M. and **Núñez A.** (2016). Modulation of specific sensory cortical areas by segregated basal forebrain cholinergic neurons demonstrated by neuronal tracing and optogenetic stimulation in mice. *Frontiers Neural Circuits* 10:28. doi: 10.3389/fncir.2016.00028.
- 20) Martín-Cortcero, J. and **Núñez A.** (2016). Sensory responses in the medial prefrontal cortex of anesthetized rats. Implications for sensory processing. *Neuroscience* 339:109-123. doi: 10.1016/j.neuroscience.2016.09.045.
- 21) Castejón, C. and **Núñez A.** (2016). Cortical Neural Computation by Discrete Results Hypothesis. *Frontiers Neural Circuits* 10:81. doi: 10.3389/fncir.2016.00081.
- 22) Díez-García, A., Barros-Zulaica N., **Núñez A.**, Buño W. and Fernández de Sevilla D. (2017). Bidirectional Hebbian plasticity induced by low-frequency stimulation in basal dendrites of rat barrel cortex layer 5 pyramidal neurons. *Frontiers Cellular Neuroscience*. 11:8. doi.org/10.3389/fncel.2017.00008.
- 23) Stein, A.M., Munive, V., Fernández, A. M., **Núñez A.** and Torres-Aleman I. (2017). Acute exercise does not modify brain activity and memory performance in APP/PS1 mice. *PLoS ONE* 12(5): e0178247. doi.org/10.1371/journal.pone.0178247.
- 24) Casas-Torremocha, D., Clasca, F. and, **Núñez A.** (2017). Plasticity of tactile responses mediated by the posterior medial thalamic nucleus in rat motor and somatosensory cortices. *Frontiers Neural Circuits* 11:69. doi: 10.3389/fncir.2017.00069.
- 25) Reyes-Marín, K.E and **Núñez, A.** (2017). Seizure susceptibility in a transgenic animal model of Alzheimer's disease and relationship with amyloid  $\beta$  plaques. *Brain Research* 1677: 93-100. doi: 10.1016/j.brainres.2017.09.026.
- 26) Chaves-Coira, I., Rodrigo-Angulo, M.L. and **Núñez, A.** (2018). Bilateral pathways from the basal forebrain to sensory cortices may contribute to synchronous sensory processing. *Frontiers in Neuroanatomy* 12:5. doi: 10.3389/fnana.2018.00005.
- 27) Chaves-Coira, I., Martín-Cortcero, J., **Núñez, A.** and Rodrigo-Angulo, M.L. (2018). Different basal forebrain nuclei display distinct projecting pathways and functional circuits to sensory primary and prefrontal cortices in the rat. *Frontiers in Neuroanatomy* 12:69. doi: 10.3389/fnana.2018.00069
- 28) Escudero, G. and **Núñez, A.** (2019). Medial prefrontal cortical modulation of whisker thalamic responses in anesthetized rats. *Neuroscience* 4522:30086-7. doi.org/10.1016/j.neuroscience.2019.01.059
- 29) Pereda-Pérez, I., Valencia, A., Baliyan, S., **Núñez, A.**, Sanz-García, A., Zamora-Crespo, B., Rodríguez-Fernández, R., Esteban, J.A. and Venero, C. (2019). Systemic administration of a fibroblast growth factor receptor 1 agonist rescues the cognitive deficit in aged socially isolated rats. *Neurobiology of Aging* 78: 155-165. doi.org/10.1016/j.neurobiolaging.2019.02.011
- 30) Casas-Torremocha, D., Prorrero, C., Rodríguez-Moreno, J., García-Amado, M., Lübke, J.H.R., **Núñez, A.** and Clasca, F. (2019). Posterior thalamic nucleus axons have different terminal structures and functional impact in the vibrissal motor and somatosensory cortices. *Brain Structure and Function* doi.org/10.1007/s00429-019-01862-4.
- 31) Barros-Zulaica, N., Villa, A., and **Núñez A.** (2019). Response adaptation in barrel cortical neurons facilitates stimulus detection during rhythmic whisker stimulation in anesthetized mice. *eNeuro* 6(2) e0471-18.2019 1–15. doi.org/10.1523/ENEURO.0471-18.2019.
- 32) Zegarra-Valdivia, J.A., Santi, A., Fernández de Sevilla, M.E., **Núñez A.** and Torres-Aleman I. (2019). Serum Insulin-Like Growth Factor I Deficiency Associates to Alzheimer's Disease Co-Morbidities. *Journal of Alzheimer's Disease* 69:979-987. doi: 10.3233/JAD-190241.

## C.2. Research projects and grants

- Control cortical de las respuestas nociceptivas en el núcleo espinal del trigémino. Fundación Médica Mutua Madrileña (2008-2010). **Investigador Principal.**

- Modulación colinérgica del procesamiento de la información somatosensorial en la corteza



cerebral de la rata. Ministerio de Científica y Tecnología (SAF2009-10339). (2010-2012). **Investigador Principal.**

- Estimulación epidural del área somatosensorial secundaria en el tratamiento del dolor intratable post-traumático y oncológico. Fundación Médica Mutua Madrileña (2012-2014). Participante (Investigador principal: Francisco López Timoneda).

- Importancia del circuito cortico-prosencéfalo basal en el procesamiento de la información somatosensorial en la rata. Participación en los procesos de atención. Ministerio de Economía y Competitividad (BFU2012-36107). (2013-2015). **Investigador Principal.**

- El sistema IGF-I/orexina/acetilcolina como nexo de unión entre co-morbilidad psiquiátrica y deterioro cognitivo en la enfermedad de Alzheimer. Ministerio de Economía y Competitividad (SAF2016-76462 AEI/FEDER). (2016-2019). **Investigador Principal.** Proyecto Coordinado con Prof. Ignacio Torres-Alemán (CSIC). CEI72 1286-A156; Proex: 189/16.

### **C.3. Contracts**

### **C.4. Patents**

- Sistema electrónico de monitorización de la tensión de un ligamento (número: 200400546).

-Uso del IGF-I como reactivo de diagnóstico y/o pronóstico precoz de la Enfermedad de Alzheimer (solicitud patente internacional nº: PCT1641.872).

### **C.5, Institutional responsibilities**

**Secretario de la Comisión de Doctorado del Departamento de Morfología** de la Facultad de Medicina de la Universidad Autónoma de Madrid (from 1989 to July, 1990).

**Claustal de la Universidad Autónoma de Madrid** (from December, 2000 to December, 2007).

**Vicedecano de Alumnos e Infraestructura** de la Facultad de Medicina de la Universidad Autónoma de Madrid (from May, 1999 to November, 2000).

**Secretario** de la Facultad de Medicina de la Universidad Autónoma de Madrid (from December, 2000 to December, 2007).

**Coordinador de Relaciones Internacionales** de la Facultad de Medicina de la Universidad Autónoma de Madrid (from January 2006 to January, 2007).

**Subdirector del Departamento de Anatomía, Histología y Neurociencia** de la Facultad de Medicina de la Universidad Autónoma de Madrid (from January, 2008 to December, 2010).

**Director del Departamento de Anatomía, Histología y Neurociencia** de la Facultad de Medicina de la Universidad Autónoma de Madrid (from December 2010 to January, 2017).