BIOGRAPHICAL SKETCH

NAME: **Carmina Montoliu**

Position: Director of Laboratory of Neurological impairment of INCLIVA-Health Research Institute, Valencia (Spain).

EDUCATION/TRAINING

INSTITUTION AND LOCATION	DEGREE	Completion Date	FIELD OF STUDY
University of Valencia, Spain	**B.S**	**1989**	**Biology**
University of Valencia, Spain	**Ph.D.**	**1995**	**Biology**

A. Personal Statement

Carmina Montoliu, Head, Laboratory of Neurological impairment of INCLIVA-Health Research Institute
Avda. Menéndez Pelayo 46010 Valencia (Spain) Tel: 343864381; cmontoliu@incliva.es
Carmina Montoliu has authored more 113 manuscripts and more than 10 book chapters, 2 patents, Directed Ph.D. thesis: 6 defended in the last 5 years; 7 in course. Directed Master Theses:11.
Dr. Montoliu has been actively involved in 5 EU projects (ENV4-CT96-0173; RANTIV; PBDE-NOTX; PINCHE, DEVNERTOX) and 1 COST Action (COST D8/0014/97). Principal Investigator of 17 grants for research projects, including 1 from the European Commission; 1 International Cooperation; 4 Spanish National Plan of I+D; 1 Spanish National Plan of I+D (The Spanish Ion Channel Initiative, CONSOLIDER); 4 Grants from Private Sources (National Foundations); 1 Regional Grant for Groups of Excellence; 12 Regional Grants (from Generalitat Valenciana).

B. Positions and Honors

Coordinator of the research program on neurological impairment of INCLIVA (Valencia), with the participation of 6 clinical and 2 basic research
Coordinator of the Euro-Mediterranean Master Program in Neuroscience & Biotechnology ISIS "ISIS TEMPUS" from University of Valencia, with the participation of the 18 Euromediterranean Universities.
Member of the Selection Committee (Comisión de Selección) for Training and Mobility of Instituto de Investigación Sanitaria del Hospital Clínico de Valencia, INCLIVA,-University of Valencia
Associate Professor, University of Valencia (Pathology and Histology Department) since 2008

Honors: Awards to research:
Extraordinary doctorate award (1996)

Participation in international activities
Coordinator of the Euromediterranean Master in Neuroscience and Biotechnology.
Director of Master thesis of Students from Morocco and Egypt in the Euromediterranean Master in Neuroscience and Biotechnology.
Partner of the European Innovation Partnership on Active and Healthy Ageing (EIP on AHA) of European Commission: Action Group A3 on "Prevention and early diagnosis of frailty and functional decline, both physical and cognitive, in older people"
Participation in European Projects: Dr. Montoliu has been actively involved in 5 EU projects (ENV4-CT96-0173; RANTIV; PBDE-NOTX; PINCHE, DEVNERTOX) and 1 COST Action (COST D8/0014/97).
Invited Speaker at International Congresses (only the last 5 years are included)
International Symposium on Ionotropic Glutamate Receptors. Physiology, Pathology and Therapeutics, February 16-17, 2012 in Valencia, Spain.
1. 47th EASL (Annual Meeting of the European Association for the Study of the Liver), Barcelona, April 18th, 2012
2. 15th ISHEN (International Society for Hepatic Encephalopathy and Nitrogen Metabolism) Symposium Grenaa, Denmark May 29 to June 2, 2012.

3. 16th ISHEN (International Society for Hepatic Encephalopathy and Nitrogen Metabolism) Symposium, Londres, September 10-14, 2014

Referee for many International Journals in the last 5 years, including the more relevant in the field**.**

Teacher in the following Masters
Coordinator of the Euromediterranean Master in Neuroscience and Biotechnology
Master en Neurociencias Básicas y Aplicadas (Universidad de Valencia)
Master de Biomedicina (Universidad de Valencia)
Doctoral Courses
Teacher in Doctoral Courses on: Neurotoxicity: Molecular Mechanisms and on Neurological Impairment of the Neuroscience Doctoral Program and the Doctoral Program on Medicine at the University of Valencia

C. Contribution to Science

Our investigation focuses on the identification of the mechanisms by which chronic liver diseases (cirrhosis) lead to cognitive and motor impairment in patients with minimal hepatic encephalopathy (MHE) and on the identification of new treatments and biomarkers for early diagnosis for MHE. We have made very relevant contributions to the knowledge of these mechanisms.
We have investigated the contribution of inflammation and hyperammonemia to the induction of mild cognitive impairment (or MHE) in patients with different grades of hyperammonemia and / or inflammation, and we conclude that in patients with liver diseases (cirrhosis, steatohepatitis) cognitive deterioration may appear before progression to cirrhosis, if the levels of ammonium and inflammation are sufficiently high. We have searched for blood markers that reflect the presence of MHE and/or specific neurological alterations in cirrhotic patients. We found that the MHE correlates with an increase in the activation of soluble guanylate cyclase by nitric oxide in lymphocytes and especially with an increase in the proinflammatory interleukins IL6 and IL18, whose concentration in serum allows discriminating cirrhotic patients without and with MHE. We have identified the first peripheral biomarker for early diagnosis of MHE in cirrhotic patients with high sensibility and specificity. We have obtained the patent of this (the first) diagnostic procedure in blood. We are also analyzing the brain alterations associated with MHE by neurophysiology and neuroimaging techniques. We showed that patients with MHE have reduced the area of mismatch negativity (MMN), an auditory evoked potential related to the attention analyzed by EEG, and that MMN area is useful to diagnose attention deficits in cirrhotic patients. Using brain magnetic resonance (MRI) studies in cirrhotic patients, we showed: a) a loss of cortical thickness in certain regions (eg precuneus) that correlates with cognitive alterations associated with MHE; b) blood flow measured by the arterial spin labeling (ASL) MRI, is increased in cerebellum, and correlates with alterations in the attention and visual motor coordination and allows to detect the MHE. c) a reduction in the microstructural integrity of cerebral white matter in patients with MHE that correlates with attention deficits, mental processing speed and visual motor coordination. d) MHE patients showed significant decrease of gray matter volume and lesser degree of resting-state connectivity in different networks related to attention and executive functions as compared to controls and patients without MHE. We have also shown using posturography analysis that balance patterns and limits of stability are impaired in MHE patients compared to patients without MHE and controls. This contributes to a higher risk of falls. Both attention and motor coordination deficits seem to contribute to balance impairment in patients with MHE

We are studying the role of oxidative stress in neurological disorders (cognitive, motor, attention) in MHE. We have shown that patients with MHE have an increased oxidative damage of proteins, lipids and nucleic acids and the activity of antioxidant enzymes in erythrocytes and mononuclear cells of patients. We have proposed the hypothesis that the synergistic effect of hyperammonemia and inflammation in the induction of neurological deterioration is mediated by oxidative stress and the formation of peroxynitrite.

We have also identified the changes in peripheral inflammation associated with appearance of MHE in cirrhotic patients, including: 1) increased activation of CD4+ T-lymphocytes, with increased CD69; 2) increased amount of CD4+CD28- T lymphocytes, associated with increased levels of CX3CL1 and of IL-15; 3) increased differentiation of CD4+ T lymphocytes to Th follicular and Th22. These findings help to understand the process

by which peripheral inflammation triggers MHE and will provide biomarkers for early detection and targets for treatment of MHE.

PUBLICATIONS (IF = impact factor).
Total citations: 3664; Mean of citation/year: 137**; H index: 34**
Citation/year: 2012: 180; 2013: 231; 2014: 220; 2015: 201; 2016: 236; 2017: 200
Publications in the first decile: 34; first quartile: 39; total: 134.
Forty-one articles published in international peer reviewed journals in the last 5 years: 14 articles in journals with decile 1 (D1) and 26 articles in journals with quartile 1 (Q1). Mean impact factor: 6.8 (since 2012)

Some relevant Publications

Publications (including books):126 articles in international peer reviewed journals, including 1 Gastroenterology (IF 18.4); 1 Annals of Internal Medicine (IF 16.59); 3 in Hepatology (IF 13.2); 1 Gut (IF 16.6); 8 Journal of Hepatology (IF 12.5); 1 Antioxidants Redox Signaling (IF 6.3); 1 Neuroimage (IF 6.2), and more than 10 book chapters.The following articles are those that have contributed to the most relevant advances to knowledge in the field in the last 5 years:

1. Felipo, V, …(7 more authors) ..,Montoliu, C. Patients with minimal hepatic encephalopathy show impaired mismatch negativity correlating with reduced performance in attention tests. Hepatology 2012; 55(2):530-9.
2. Montoliu C, …(11 more authors) .., Cantero JL. Focal cortical damage parallels cognitive impairment in minimal hepatic encephalopathy. Neuroimage 2012; 61(4):1165-75.
3. Felipo V, …(8 more authors) ..,Montoliu C. Serum nitrotyrosine and psychometric tests as indicators of impaired fitness to drive in cirrhotic patients with minimal hepatic encephalopathy. Liver Int. 2013; 33(10):1478-89.
4. Montoliu C, ...(11 more authors)..Felipo V. Reduced white matter microstrutural integrity corre lates with cognitive deficits in minimal hepatic encephalopathy. Gut. 2014; 63:1028-30
5. Ampuero J, Simón M, Montoliu C, Jover R, Serra MA, Córdoba J, Romero-Gómez M. Minimal Hepatic Encephalopathy and Critical Flicker Frequency are Associated with survival of patients with cirrhosis. Gastroenterology. 2015; 149(6):1483-9.
6. Gimenez-Garzó C, …(7 more authors)…, Montoliu C, Felipo V. Is cognitive impairment in cirrhotic patients due to increased peroxynitrite and oxidative stress? Antioxid Redox Signal 2015; 1;22(10):871-7.
7. Urios A, …(8 more authors)… , Montoliu C. Altered postural control and stability in cirrhotic patients with minimal hepatic encephalopathy correlate with cognitive deficits. Liver Int. 2017; 37(7): 1013-1022.
8. Giménez-Garzó C, …(10 more authors)…, Montoliu C. The PHES battery does not detect all cirrhotic patients with early neurological deficits, which are different in different patients. PLoS One. 2017; 12(2):e0171211.
9. García-García R, …(13 more authors)…, Montoliu C. Reduced resting state connectivity and gray matter volume correlate with cognitive impairment in minimal hepatic encephalopathy. PLos One 2017; 12(10):e0186463.
10. Mangas-Losada A, …(7 more authors)…, Montoliu C, Felipo V. Minimal hepatic encephalopathy is associated with expansion and activation of CD4+CD28-, Th22 and Tfh and B lymphocytes. Scientific Reports 2017; 7(1):6683.

Complete List of Published Work in MyBibliography:
https://www.ncbi.nlm.nih.gov/pubmed/?term=montoliu+C

Publications:

1. Guerri, C., **Montoliu, C**., Vallés, S., Fornas, E. and Renau-Piqueras, J. Oxidative Changes Induced by Ethanol in Brain and Adaptative Responses After Chronic Ethanol Consumption. *Alcohol and Alcoholism* 27 (1): 36 (1992).
2. **C. Montoliu.**, I. Azorin., J. Renau-Piqueras and C. Guerri. Mechanism Involved on Ethanol Induced Lipid Peroxidation in Brain Homogenates. *Alcohol and Alcoholism* 28 (2): 220 (1993).
3. **Montoliu, C.,** Vallés, S., Renau-Piqueras, J. and Guerri, C. Ethanol-induced oxygen radical formation an lipid peroxidation in rat brain: Effect of chronic alcohol consumption. *Journal of Neurochemistry.* 63: 1855-1862 (1994).
4. Guerri C**, Montoliu C**, Renau-Piqueras J. Involvement of free radical mechanism in the toxic effects of alcohol: implications for fetal alcohol syndrome. *Review: Adv Exp Med Biol*. 366:291-305 (1994).
5. **Montoliu C.**, Renau-Piqueras J. and Guerri C. Role of free radicals in the ethanol-induced brain and astrocytes damage during its development. *Alcohol Clin Exp Res.* 18 (2): 52 A (1994).
6. Valles, S., Lindo, L., **Montoliu, C.,** Renau-Piqueras, J. and Guerri, C. Prenatal exposure to ethanol induces changes in the nerve growth factor and its receptor in proliferating astrocytes in primary culture. *Brain Research*. 656: 281-286 (1994).
7. Vallés, S., Felipo, V., **Montoliu, C.** and Guerri, C. Alcohol exposure during brain development reduces ^{3}H-MK-801 binding and enhances metabotropic-glutamate receptor-stimulated phosphoinositide hydrolysis in rat hippocampus. *LIFE SCIENCE.* 56 (17): 1373-1383 (1995).
8. Maria Sancho-Tello., Soraya Vallés., **Carmina Montoliu.**, Jaime Renau-Piqueras and Consuelo Guerri. Developmental pattern of GFAP and vimentin gene expression in rat brain and in radial glia cultures. *GLIA*. 15: 157-166 (1995).
9. **C. Montoliu.**, M. Sancho-Tello., I. Azorin., S. Vallés, J. Renau-Piqueras and C. Guerri. Ethanol increase CYP2E1 and induces oxidative stress in astrocytes. *Journal of Neurochemistry.* 65 (6): 2561-2570 (1995).
10. **C. Montoliu**, I. Azorin, M. Burgal, J. Renau-Piqueras and C. Guerri. Ethanol increases CYP2E1 and induces oxidative stress in astrocytes. *Alcohol and Alcoholism.* 30 (4): 505 (1995).
11. E. Grau., G. Marcaida., **C. Montoliu.**, M.D. Miñana., S. Grisolia and V. Felipo. Effects of hiperammonemia on brain protein kinase c substrates. Review: *Metabolic Brain Disease.* 11 (3): 205-216 (1996)
12. Hermenegildo, C., Marcaida, G., **Montoliu, C**., Grisolía, S. and Felipo, V. NMDA receptor antagonists prevent acute ammonia toxicity in mice. *Neurochemistry Research.* 21: 1237-1244 (1996).
13. M.D. Miñana., C. Hermenegildo., M. Llansola., **C. Montoliu.**, S. Grisolia and V. Felipo. Carnitine and choline derivates containing a trimethylamine group prevent ammonia toxicity in mice and glutamate toxicity in primary cultures of neurons. *The Journal of Pharmacology and Experimental Therapeutic.* 279 (1): 194-199 (1996).
14. E. Kosenko., V. Felipo., **C. Montoliu.,** S. Grisolia and Y. Kaminsky. Effects of acute hyperammonemia in vivo on rat brain mitochondria. *Metabolic Brain Disease.* 12 (1): 68-82 (1997).
15. **C. Montoliu.**, M. Llansola., C. Cucarella., S. Grisolia and V. Felipo. Activation of the metabotropic glutamate receptor mGluR5 prevents glutamate toxicity in primary cultures of cerebellar neurons. *Journal of Pharmacology and Experimental Therapeutics.* 281 (2): 643-647 (1997).
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17. M. D. Miñana., E. Kosenko., G. Marcaida., C. Hermenegildo., **C. Montoliu.,** S. Grisolia and V. Felipo. Modulation of glutamate synthesis in cultured in cultured astrocytes by nitric oxide. *Cellular and Molecular Neurobiology.* 17 (4): 433-445 (1997).
18. C. Cucarella., **C. Montoliu**., C. Hermenegildo., R. Saez.., L. Manzo., M.D. Miñana and V. Felipo. Chronic Exposure to aluminium impairs neuronal glutamate-nitric oxide-cyclic GMP pathway. *Journal of Neurochemistry.* 70: 1609-1614 (1997).
19. C. Hermenegildo; **C. Montoliu**; M. Llansola; M.D. Muñoz; J.M. Gaztelu; M.D. Miñana and V. Felipo. Chronic hyperammonemia impairs glutamate-nitric oxide-cyclic GMP pathway in cerebellar neurons in culture and in the rat in vivo. *European Journal of Neurocience.* 10: 3201-3209 (1998).

20. M.D. Miñana., **C. Montoliu**., M. Llansola., S. Grisolía and V. Felipo. Nicotine prevents glutamate-induced proteolysis of the microtubule-associated protein MAP-2 and glutamate neurotoxicity primary cultures of cerebellar neurons. *Neuropharmacology.* 37: 847-857 (1998).

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22. **C. Montoliu**., M. Llansola., C. Hermenegildo., M.D. Muñoz., R. Saez., M.D. Miñana. and V. Felipo. Consequences of hyperammonemia in hepatic encephalopathy. *Alcohol Clin Exp Res.* 22 (3): 138 A (1998).

23. Pinazo-Durán, M.D., Azorin, I., **Montoliu, C**., Guerri, C. and Renau-Piqueras, J. Free radical are involved in the alcoholic optic neuropathy. *Alcohol Clin Exp Res.* 22 (3): 184 A (1998).

24. Miñana, M.D., Hermenegildo, C., **Montoliu, C**., Llansola, M., Saez, R., Muñoz, M.D. and Felipo, V. Excitatory amino acids and NMDA receptors in the molecular mechanisms of ammonia neurotoxicity. *Journal of Neurochemistry.* 71: Suppl. S76 (1998).

25. Hermenegildo, C., **Montoliu, C.**, Miñana, M.D., Llansola, M., Saez, R., Monfort, P., Muñoz, M.D. and Felipo. Hyperammonemia impairs NMDA receptor - mediated signal transduction. Implications in hepatic encephalophaty. *Int J. Mol Med* 2 (Supl 1): S10 (1998).

26. Miñana, M.D., Corbalán, R., **Montoliu, C.**, Teng, C.-M. and Felipo, V. Chronic hyperammonemia in rats impairs activation of soluble guanylate cyclase in neurons and in lymphocytes. A putative peripheral marker for neurological alterations. *Biochemical and Biophysical Research Communications* 257: 405-409 (1999).

27. **C. Montoliu**; M. LLansola; R. Saez; S. Yenes; A. Messeger and V. Felipo. Prevention of glutamate neurotoxicity in cultured neurons by 3,4 -Dihydro-6-Hydroxy-7-Methoxy-2,2-dimethyl-1(2h)-Benzpyran (CR-6), a scavenger of nitric oxide. *Biochemical Pharmacology*. 58: 255-261 (1999).

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33. M. Llansola., **C. Montoliu**., P. Monfort., R. Corbalán., I. Fernández-Marticorena., M.L. Hernández-Viadel., J.J Canales and V. Felipo. Glutamate receptors-associated signal transduction pathways modulating phosphorylation of MAP-2 in neurons. Alterations in hiperammonemia. *Int J Mol Med.* 6 (Supl 1): S18 (2000).

34. **C. Montoliu.**, P. Monfort., J. Carrasco., J. Hidalgo and V. Felipo. Metallothionein-III prevents glutamate and nitric oxide neurotoxicity in primary cultures of cerebellar neurons. *Journal of Neurochemistry.* 75: 266-273 (2000).

35. P. Monfort., **C. Montoliu**., C. Hermenegildo., M.D. Muñoz and V. Felipo. Differential effects of acute and chronic hyperammonemia on signal transduction pathways associated to NMDA receptors. *Review: Neurochemistry International.* 37: 249-253 (2000)

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37. **C. Montoliu**., M. Llansola., P. Monfort., R. Corbalan., I. Fernandez-Marticorena., M.L. Hernandez-Viadel and V.Felipo. Role of nitric oxide and cyclic GMP in Glutamate-Induced Neuronal Death. *Neurotoxicity Research.* 3 (2): 179-188 (2001).

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39. Canales, J.J., Corbalán, R., **Montoliu**, **C**., Llansola, M., Erceg, S., Hernandez-Viadel, M. and Felipo, V. Aluminium impairs the glutamate-nitric oxide cGMP pathway in cultured neurons and in rat brain in vivo: molecular mechanisms and implications for neuropathology. Review: *Journal of Inorganic Biochemistry*. 87: 63-69 (2001) PMID:11709215.

40. **C. Montoliu**., M. Humet., J.J. Canales., J. Burda., R. Planells-Cases., F. Sánchez-Baeza., T. Carbonell., E. Perez-Payá., A. Messeguer., A. Ferrer-Montiel and V. Felipo. Prevention of in vivo excitotoxicity by a family of trialkylglycines, a novel class of neuroprotectants. *Journal Pharmacology and Experimental Therapeutics*. 301: 29-36 (2002).

41. R. Planells-Cases., **C. Montoliu**., M. Humet., A.M. Fernandez., C. Garcia-Martinez., E. Valera., J.M. Merino., E. Pérez-Payá., A. Messeguer., V. Felipo and A. Ferrer-Montiel. A novel N-methyl-D-aspartate receptor open chanel blocker with in vivo neuroprotectant activity. *The Journal of Pharmacology and Experimental Therapeutics*. 302: 163-173 (2002)

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44. R. Corbalan., **C. Montoliu**., M.D. Miñana., J.A. Del Olmo., M.A. Serra., L. Aparisi., J.M. Rodrigo and V. Felipo. Altered modulation of soluble guanylate cyclase by nitric oxide in liver disease. *Review: Metabolic Brain Disease*. 17: 295-301 (2002)

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D. Additional Information: Research Support and/or Scholastic Performance

Principal Investigator (PI) of 17 grants for research projects with the distribution indicated in the section A.3. Projects in the last 5 years are the following:

European Union. 1 Project ,ref: FP7-ENV-2011 Grant agreement no: 282957 Title: Developmental neurotoxicity assessment of mixtures in children, DENAMIC PI: Vicente Felipo; Investigator collaborator: Carmina Montoliu. Financial entity: European Commission. Duration: 01/01/2012-31/12/2015. Funding: 649.000 €.

2 Projects: Plan Nacional I+D: Instituto de Salud Carlos III. (FIS) Ministerio de Sanidad y Consumo (FIS): PI12/00884 (2013-2015) (123.420 €) and PI15/00035 (2016-2018) (159.115 €). PI: Carmina Montoliu Felix. Title: Characterization of the neurological alterations in patients with minimal hepatic encephalopathy and the responsible cerebral alterations. Contribution of oxidative stress and inflammation.

2 Projects: Program VLC-BIOCLINIC. Subprogram B. Grant for the realization of preparatory actions for the formulation of research projects in cooperation between researchers of the University of Valencia and INCLIVA. (01/09/2017-31/12/2017) PI: Carmina Montoliu (INCLIVA) // Jesus Malo (UV) (4000 €)
Project: Strategy of the Valencian Community for early detection and prevention of cognitive and functional impairment. FEDER funds for scientific equipment. Conselleria de Sanitat. Generalitat Valenciana (1,632.290 €).
2 Projects from Conselleria de Educacion. Generalitat Valenciana. ACOMP/2012/056 (2012) (12.000 euros); ACOMP/2014/O26 (2014) (10.200 €)
1 Grant for groups of proven quality, from the Gerónimo Forteza program for the hiring of support staff in research organizations of the Valencian Community of the Consellería de Educación de la Generalitat Valenciana. FPA/2012/080 (2012) (9.300 €).
1 Grant for Research Groups of Excellence –Prometeo Program 2014 Fase II, PROMETEOII/2014/033. PI: Vicente Felipo. 2014-2017. (269.000€)
1 Grants for Research Projects of the ERESA Group Foundation 2013. Expediente BF13 007. (20.000 €) PI: Carmina Montoliu.
Translacionality: **Promoter** of two "Post-authorization studies of prospective follow-up (EPA-SP)". Code: MON-TAD-2014-01 and CMF-NRT-2017-01.

Contracts
1. Descriptive study of eye movements using OSCANN-TM and its value in diagnostic assistance in neurodegenerative diseases. AURA INNOVATIVE ROBOTICS, SL. Carmina Montoliu. (Fundación Investigación Clínico de Valencia Instituto de Investigación Sanitaria. INCLIVA). 12/08/2017-12/08/2018. 10.900 €.

Training contracts obtained and directed in the last 5 years
1 Juan de la Cierva Contract from Ministerio de Economía, Industria y Competitividad (2013-2016)
3 Contracts: PROGRAMA VLC-BIOCLINIC. Universitat de Valencia-INCLIVA. 2 in (2016-2017) and 1 in 2016; 1 FPU Contract (Formación Profesorado Universitario). Ministerio Educación, Cultura y Deporte (2013-2017); 1 Contract: PROMETEO (Grupos de Excelencia) Conselleria de Educación (2017). 1 Contract: Sara Borrell. Instituto de Salud Carlos III. Ministerio de Economia y Competitividad (2018-2020)

Patents. 2 patents, 1 in the last 8 years
1. **Authors:** Carmina Montoliu Felix; Omar Cauli; Vicente Felipo Orts. **Title:** Ex-vivo method for the early diagnostic of minimal hepatic encephalopathy through the determination of 3-nitrotyrosine in serum; application no: P201000899, 12 July 2010; International patent application no: PCT/ES2011/070509 published on 19 january 2012, with number WO2012007624; National patent granted on 1 august 2013. Publication no: 2372842. Int CI: G01N 33/48
2. **Authors:** Vicente Felipo Orts; María del Carmen Montoliu Felix; Rosa Planells Cases; Manuel Humet; Enrique Perez Payá; Antonio Messeguer; Antonio Ferrer Montiel. P200002414. **Title:** N-alkylglycine trimers capable of protecting neurons against excitotoxic insults and compositions containing it. Spain. 06/10/2000. INCLIVA-Health Research Institute. INCLIVA/Centro de Investigación Príncipe Felipe.