

# **Curriculum vitae**

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### EDUCATION

B.S. in Biological Sciences, 1980, Avadh University, India  
M.S. in Chemistry, 1982, Avadh University  
Ph.D. in Biochemistry, 1986, University of Delhi  
*Thesis title:* Hepatic endoplasmic reticulum and dietary protein: a biochemical study in rats.  
Resident in Neurology, 1987, All India Institute of Medical Sciences

### RESEARCH EXPERIENCE

1982-1986 Junior Research Fellow, V. P. Chest institute, University of Delhi, India  
1986-1987 Senior Research Fellow, All India Institute of Medical Sciences, New Delhi, India  
1987-1991 Postdoctoral Fellow, University of Kansas Medical Centre, U.S.A.  
1991-1993 Research Associate, University of Missouri, U.S.A.

### PROFESSIONAL POSITIONS:

1993-1996 Assistant Instructor, University of Missouri, U.S.A.  
1996-2002 Associate Scientist, Yale University School of Medicine, U.S.A.  
2002-2006 Scientist, Universidad de Malaga, Spain  
2006-present Professor of Medicine, Universidad de Málaga

### PUBLICATIONS: (Note: *Highlighted* texts reflect the publication of meeting abstracts)

- Khan ZU, Misra UK (1986) Impaired metabolism of phosphatidylcholine molecular species in rough and smooth endoplasmic reticulum on inadequate protein feeding. **Nutrition Reports International** 34: 769-782. Impact factor: 1.337 (T2)*
- Khan ZU, Tyagi SR, Misra UK (1986) Effect of quality and quantity of dietary protein on phospholipid metabolism. **Nutrition Reports International** 33: 803-810. Impact factor: 1.337 (T2)*
- Khan ZU, Misra UK (1986) Hepatic rough and smooth endoplasmic reticulum membrane lipids and their metabolism in rats fed imbalanced protein diet. **Nutrition Reports International** 34: 541-556. Impact factor: 1.337 (T2)*
- Khan ZU, Khung N, Rastogi G, Grover JK (1986) Anti-inflammatory analgesic activities of *Circuma Longa*. **Indian Journal of Pharmacology** 18 Suppl.: 19 Impact factor: 0.303 (T4)*
- Khan ZU, Narayan S, Misra UK (1987) Mixed function oxidases (MFO) in hepatic rough and smooth endoplasmic reticulum of rats fed dietary proteins. **Nutrition Reports International** 35: 719-723. Impact factor: 1.337 (T2)*
- Khan ZU, Misra UK (1988) Endoplasmic reticulum phospholipid and mixed function oxidase system on proteins feeding. **Nutrition Research** 8: 163-174. Impact factor: 0.627 (T3)*
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- Khan ZU, Fernando LP, Escriba P, Mallet J, Miralles CP, Filla M, De Blas AL (1993) Antibodies to the human  $\gamma_2$  subunit of the  $\gamma$ -aminobutyric acid<sub>A</sub>/benzodiazepine receptor. **Journal of Neurochemistry** 60: 961-971. *Impact factor: 4.651 (T1)*
- De Blas AL, Khan ZU, Fernando LP, Moreno JI, Escriba P, Piva MA, Gutierrez A, Miralles CP (1993) Antibodies to fusion proteins of the GABA<sub>A</sub>/benzodiazepine receptor subunits. **European Journal of Neuroscience** Suppl. 6: 189 *Impact factor: 3.947 (T1)*
- Gutierrez A, Khan ZU, Morris SJ, De Blas AL (1994) Age-related decrease of GABA<sub>A</sub> receptor subunits and glutamic acid decarboxylase in the rat inferior colliculus. **Journal of Neuroscience** 14: 7469-7477. *Impact factor: 8.403 (T1)*
- Gutierrez A, Khan ZU, De Blas AL (1994) Immunocytochemical localization of  $\gamma_2$  short and  $\gamma_2$  long subunits of the GABA<sub>A</sub> receptor in the rat brain. **Journal of Neuroscience** 14: 7168-7179. *Impact factor: 8.403 (T1)*
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- Miralles CP, Gutierrez A, Khan ZU, Vitorica J, De Blas AL (1994) Differential expression of the short and long forms of the  $\gamma_2$  subunit of the GABA<sub>A</sub>/ benzodiazepine receptors. **Molecular Brain Research** 24: 129. *Impact factor: 2.742 (T2)*
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- Ruano D, Khan Z, De Blas AL, Machado A, Vitorica J (1994) Molecular heterogeneity of the type I GABA<sub>A</sub>/benzodiazepine receptor complex. **European Journal of Pharmacology** 267: 123-127. *Impact factor: 1.992 (T1)*
- Fernando, LP, Khan ZU, McKernan RM, De Blas AL (1995) Monoclonal antibodies to the human  $\gamma_2$  subunit of the GABA<sub>A</sub>/benzodiazepine receptors. **Journal of Neurochemistry** 64: 1305-1311. *Impact factor: 4.651 (T1)*
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- Gutierrez A, Khan ZU, Miralles CP, De Blas AL (1995) Alteración de la expresión de las subunidades  $\gamma_2$  corta y  $\gamma_2$  larga del receptor GABA<sub>A</sub> cerebral en el envejecimiento. **Revista de Neurología** 23 (121): 529 *Impact factor: 0.201 (T4)*
- Gutierrez A, Khan ZU, Miralles CP, De Blas AL (1995) Changes in the expression of  $\gamma_{2L}$  and  $\gamma_{2S}$  GABA<sub>A</sub> receptor subunits in the aging rat brain. **European Journal of Neuroscience** 8 Suppl.: 16 *Impact factor: 3.947 (T1)*
- Gutierrez A, Khan ZU, De Blas AL (1996) Immunocytochemical localization of the  $\alpha_6$  subunit of  $\gamma$ -aminobutyric acid<sub>A</sub> receptor in the rat nervous system. **Journal of Comparative Neurology** 365: 504-510. *Impact factor: 3.476 (T1)*
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- receptor maintaining their individual benzodiazepine binding specificities. **Journal of Neurochemistry** 66: 685-691. *Impact factor: 4.651 (T1)*
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- Khan ZU, Peñafiel A, Gutierrez A, Martin R, de la Calle A (1996) Dopamine D<sub>3</sub> and D<sub>4</sub> receptors in rat and human brain. **European Journal of Neuroscience** 9 Suppl.: 77 *Impact factor: 3.947 (T1)*
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- Khan ZU, Koulen P, Rubinstein M, Grandy DK, Goldman-Rakic PS (2001) An astroglia-linked dopamine D<sub>2</sub>-receptor action in prefrontal cortex. **Proceedings of the National Academy of Science USA** 98: 1964-1969. *Impact factor: 10.896 (T1)*
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- Khan ZU, Gutierrez A (2004) Distribution of C-terminal splice variant of G $\alpha_{i2}$  in rat and monkey brain. **Neuroscience** 127: 833-843. *Impact factor: 3.456 (T1)*
- Carballo FJ, Cererzo AD, Rodríguez AE, López-Aranda MF, Acevedo MJ, Castner S, Khan ZU (2005) Rescue of amphetamine-induced cognitive deficits and IP3 levels by dopamine D1 receptor blockade in the prefrontal cortex of nonhuman primate model of schizophrenia. **Revista de Neurología** 41 Suppl. 2: 58 *Impact factor: 0.391 (T4)*
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- Vitorica J, Moreno-González I, Baglietto-Vargas D, del Río JC, Ramos B, Caballero C, Jiménez S, Sanchez-Varo R, Lopez-Telleg JF, Romero-Acebal M, Khan ZU, Ruano D, Gutierrez A (2006) Early neuropathologic degeneration of the entorhinal cortex in a PS1XAPP transgenic model of Alzheimer's disease. **Alzheimer's and Dementia** 2: 98 *Impact factor: 4.553 (T1)*
- López-Aranda MF, Acevedo MJ, Gutierrez A, Koulen P and Khan ZU (2007) Role of G $\alpha_{i2}$  splice variant in the formation of an intracellular dopamine D2 receptor pool. **Journal of Cell Science** 120: 2171-2178. *Impact factor: 6.383 (T1)*
- Lopez-Aranda MF, Acevedo MJ, Gutierrez A, Koulen P, Khan ZU (2007) Splice variant of G $\alpha_{i2}$  protein in the formation of intracellular dopamine D<sub>2</sub> receptor pool. **Journal of Neurochemistry** 101 (1): 51 *Impact factor: 4.451 (T1)*
- Olalla L, Gutiérrez A, Jiménez AJ, López-Téllez JF, Khan ZU, Pérez J, Alonso FJ, de la Rosa V, Campos-Sandoval JA, Segura JA, Carlos Aledo J and Márquez J (2008) Expression of the scaffolding PDZ protein glutaminase-interacting protein in mammalian brain. **Journal of Neuroscience Research** 86: 281-292. *Impact factor: 3.086 (T2)*
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- López-Aranda MF, Navarro-Lobato I, López-Téllez JF, Blanco E, Masmudi-Martín M, Khan ZU (2008) Activation of caspase-3 pathway by expression of sG $\alpha_{i2}$  protein in BHK cells. **Neuroscience Letters**

- López-Aranda MF, López-Téllez JF, Blanco E, Masmudi-Martín M, Navarro-Lobato I, *Khan ZU* (2008) A dynamic expression pattern of sGα<sub>12</sub> protein during early period of postnatal rat brain development. **International Journal of Developmental Neuroscience** 26: 611-624. *Impact factor: 1.869 (T3)*
- López-Téllez JF, López-Aranda MF, Navarro-Lobato MF, Blanco E, Masmudi-Martín M, Martín-Montañez E, Barón-López FJ, Domínguez-Pinos MD, Campos Arillo VM, *Khan ZU* (2008) sGai2 protein-mediated activation of cellular apoptosis. **Methods and Findings in Experimental and Clinical Pharmacology** 30 Suppl. 2: 103 *Impact factor: 1.000 (T4)*
- Martín-Montañez E, López-Téllez JF, Acevedo MJ, López-Aranda MF, Blanco E, Navarro-Lobato E, Masmudi-Martín M, González A, Guatteo E, Koulen P, *Khan ZU* (2008) L-type calcium channel blockage by the proteins 101 and 102. **Methods and Findings in Experimental and Clinical Pharmacology** 30 Suppl. 2: 168 *Impact factor: 1.000 (T4)*
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- Vitorica J, Baglietto-Vargas D, Jiménez S, Moreno-González I, Caballero C, Sánchez-Varo R, Torres M, Trujillo-Estrada L, Romero-Acebal M, *Khan ZU*, Ruano D, Vizúete M, Gutiérrez A (2008) Phenotypic and functional switch in microglial cells correlates with neurodegeneration in the hippocampus of aged PS1xAPP transgenic model of Alzheimer's disease. **Alzheimer's and Dementia** 4 (4): 635 *Impact factor: 4.553 (T1)*
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- Muly EC, Senyuz M, *Khan ZU*, Guo JD, Hazra R, Rainnie DG (2009) Distribution of D1 and D5 dopamine receptors in the primate and rat basolateral amygdala. **Brain Structure and Function** 213(4-5):375-93. *Impact factor: 4.415 (T1)*
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Martín-Montañez E, López-Téllez JF, Acevedo MJ, Pavía J, *Khan ZU* (2010) Efficiency of gene transfection reagents in NG108-15, SH-SY5Y and CHO-K1 cell lines. **Methods and Findings in Experimental and Clinical Pharmacology** 32(5):291-7. *Impact factor: 1.037 (T4)*

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- Moreno-González I, Baglietto-Vargas D, Sánchez-Varo R, Trujillo-Estrada L, Caballero C, Jiménez S, Romero-Acebal M, *Khan ZU*, Ruano D, Vizuete M, Vitorica J, Gutiérrez A (2008) Neuroinflammation is an early event of Alzheimer's disease pathology in the entorhinal cortex of PS1(M146L) xAPP(751SL) transgenic model. **6<sup>th</sup> Forum of Federation of European Neuroscience Society in Geneva, Switzerland**
- Martin Montañez E, López Téllez JF, Acevedo MJ, Lopez Aranda MF, Navarro Lobato I, Masmudi Martin M, Gonzalez A, Guatteo E, Koulen P, *Khan ZU* (2009) Function of RGS 12 and 14 proteins in modulation of membrane calcium activity. **4<sup>th</sup> European Society for Neurochemistry Conference on Advances in Molecular Mechanisms of Neurological Disorders in Leipzig, Germany**
- Lopez Aranda MF, López Téllez JF, Navarro Lobato I, Masmudi Martín M, Martín Montañez E, Blanco Calvo E, Baron López J, Dominguez Pinos MD, Campos Arillo VM, *Khan ZU* (2009) Processing of object recognition memory by layer 6 neurons of v2 visual cortex. **4<sup>th</sup> European Society for Neurochemistry Conference on Advances in Molecular Mechanisms of Neurological Disorders in Leipzig, Germany**
- Lopez Aranda MF, López Téllez JF, Navarro Lobato I, Masmudi Martin M, Gutierrez A, *Khan ZU* (2009) Visual memory in V2 visual cortex: An animal model approach. **12<sup>th</sup> Alzheimer's Association International Conference on Alzheimer's Disease in Vienna, Austria**
- López Aranda MF, López Téllez MF, Navarro Lobato I, Masmudi Martín M, Martín Montañez E, Pavía Molina J, Santos Amaya i, del Barco Collazos JL, Weil Lara B, Cuadros Romero M, *Khan ZU* (2009) Mediation of cellular apoptosis by sGalpha<sub>i2</sub> protein. **4<sup>th</sup> European Society for Neurochemistry Conference on Advances in Molecular Mechanisms of Neurological Disorders in Leipzig, Germany**
- Moreno González I, Baglietto Vargas D, Sánchez Varo R, Jimenez S, Sanchez-Mejias E, Trujillo Estrada L, Torres M, Romero Acebal M, *Khan ZU*, Ruano D, Vizuete M, Vitorica J, Gutierrez A (2009) Extracellular amyloid-beta pathology induces entorhinal neurodegeneration in PS1 (M146L)XAPP(751SL) mouse model of Alzheimer's disease. **12<sup>th</sup> Alzheimer's Association International Conference on Alzheimer's Disease in Vienna, Austria**
- Sánchez Varo R, Baglietto Vargas D, Moreno González I, Sanchez-Mejias E, Trujillo Estrada L, Jiménez S, Torres M, Romero Acebal M, *Khan ZU*, Vizuete M, Vitorica J, Gutierrez A (2009) Early synaptic degenerative changes in the hippocampus of PS1(M146L)ZAPP(751SL) mouse model of Alzheimer's disease. **12<sup>th</sup> Alzheimer's Association International Conference on Alzheimer's Disease in Vienna, Austria**
- Lopez Aranda MF, López Téllez JF, Navarro Lobato I, Masmudi Martin M, *Khan ZU* (2009) V2 visual cortex

in object recognition memory. **XIII congress of Sociedad Española de Neurociencia in Tarragona, Spain**

Navarro Lobato I, Lopez Aranda MF, López Téllez JF, Masmudi Martin M, *Khan ZU* (2009) sGalphal2 protein promotes cellular apoptosis in BHK cells. **XIII congress of Sociedad Española de Neurociencia in Tarragona, Spain**

López Téllez JF, Martin Montañez E, Acevedo MJ, Lopez Aranda MF, Navarro Lobato I, Masmudi Martin M, González A, Guatteo E, Koulen P, *Khan ZU* (2009) RGS proteins in the regulation of membrane calcium channel activity. **XIII congress of Sociedad Española de Neurociencia in Tarragona, Spain**

Sanchez-Mejias E, Moreno-Gonzalez I, Baglietto-Vargas D, Sanchez-Varo R, Trujillo-Estrada L, *Khan ZU*, Vitorica J, Gutierrez A (2009) Afectación patológica temprana de la corteza perrinial en un modelo in vivo PS1xAPP de la enfermedad de Alzheimer. **XIII congress of Sociedad Española de Neurociencia in Tarragona, Spain**

Trujillo-Estrada L, Baglietto-Vargas D, Moreno-Gonzalez I, Sanchez-Varo R, Sanchez-Mejias E, *Khan ZU*, Vitorica J, Gutierrez A (2009) Pérdida neuronal inducida por Abeta en el subículo del modelo PS1M146LxAPP751SL desde edades muy tempranas. **XIII congress of Sociedad Española de Neurociencia in Tarragona, Spain**

Cardona C, Lopez-Tellez JF, Jiménez AJ, *Khan ZU*, Tosina M, Alonso FJ, Gutierrez A, Marquez J (2009) New insights into brain glutaminases: beyond their role on glutamatergic transmission. **XIII congress of Sociedad Española de Neurociencia in Tarragona, Spain**

Masmudi-Martin M, López -Téllez JF, Navarro-Lobato I, López- Aranda MF, Martin-Montañez E, Blanco E, Pavía Molina J, Santos Amaya IM, del Barco Collazos JL, Campos Arillo V, Weil Lara B, *Khan ZU* (2010) Prefrontal inositol tri-phosphate is molecular correlate of working memory in non-human primates. **XXXII Congress of Sociedad Española de Farmacología in León, Spain**

Navarro-Lobato I, Masmudi-Martin M, López Téllez JF, Lopez Aranda MF, Martin Montañez E, Blanco E, Pavía J, Dominguez Pinos MD, Baron López J, Cuadros Romero M, *Khan ZU* (2010) A correlation of haloperidol induced cognitive deficit with dysfunctional dopamine receptor activity in non-human primate. **XXXII Congress of Sociedad Española de Farmacología in León, Spain**

Martin Montañez E, Masmudi-Martin M, Acevedo MJ, López Téllez JF, González A, Koulen P, Irene Navarro Lobato I, Lopez Aranda MF, Pavía Molina, Blanco E, *Khan ZU* (2010) RGS14 protein mediates encoding of long term memory through CaV1 calcium channels. **XXXII Congress of Sociedad Española de Farmacología in León, Spain**

Lopez Aranda MF, López Téllez JF, Navarro Lobato I, Masmudi-Martin M, *Khan ZU* (2010) Treatment with RGS-14 protein not only prevents but also recovers objects memory loss found in ageing rats. **13<sup>th</sup> Alzheimer's Association International Conference on Alzheimer's Disease in Hawaii, USA**

Gutierrez A, Moreno González I, Sánchez Varo R, Sanchez-Mejias E, Trujillo Estrada L, Jiménez S, Torres M, Romero Acebal M, *Khan ZU*, Ruano D, Vizquete M, Vitorica J, Baglietto Vargas D (2010) Degeneration of calretinin interneurons is associated to the early onset of extracellular amyloid pathology in Alzheimer mice hippocampus. **13<sup>th</sup> Alzheimer's Association International Conference on Alzheimer's Disease in Hawaii, USA**

López-Aranda MF, López Téllez JF, Navarro Lobato I, Masmudi Martín M, Gutiérrez A, *Khan ZU* (2010) V2 visual cortex in object recognition memory. **IV European Molecular and Cellular Cognition Society Satellite Meeting in Amsterdam, Netherland**

Rommelfanger KS, Galven A, Kliem MA, *Khan ZU*, Smith Y, Wichmann T (2010). Subcellular localization and functional effects of dopamine receptors in the primate subthalamic nucleus. **10<sup>th</sup> Triennial Meeting of International Basal Ganglia Society in Long Beach, USA**

Navarro-Lobato I, López-Aranda MF, Masmudi-Martín M, López-Téllez JF, Posadas S, Delgado G, Martín-Montañez E, Blanco Calvo E, Pavia, *Khan ZU* (2011) RGS14(414) gene delivery into brain area V2 induces both the recovery and prevention of memory loss in ageing and Alzheimer's disease. **XXXIII Congress of Sociedad Española de Farmacología in Malaga, Spain**

Masmudi-Martín M, Navarro-Lobato I, Castilla-Ortega E, Martín-Montañez E, Domínguez Pinos M, Barón López J, Cuadros Romero M, Santín L, Pavía J, *Khan ZU* (2011) RGS14(414) protein enhances

encoding of both object and spatial memory in perirhinal cortex. **XXXIII Congress of Sociedad Española de Farmacología in Malaga**, Spain

Navarro-Lobato I, Masmudi-Martín M, López-Aranda MF, Luna-Valero S, Barco Collazos J, Campos V, Weil B, Santos I, Luque J, *Khan ZU* (2011) A lack of correlation between sGi2 protein and neuronal apoptosis during rat brain development. **XXXIII Congress of Sociedad Española de Farmacología in Malaga**, Spain

Masmudi-Martín M, Navarro-Lobato I, López-Aranda MF, López Téllez JF, Posadas S, Delgado G, Frechilla D, *Khan ZU* (2011) Recovery as well as prevention of a declarative memory loss in ageing and Alzheimer's disease by targeted expression of RGS14(414) protein into brain area V2. **XIV Congress of Sociedad Española de Neurociencia in Salamanca**, Spain

Navarro-Lobato I, Masmudi-Martín M, Castilla-Ortega E, Martin-Montañez E, López-Aranda MF, López-Téllez JF, Posadas S, Delgado G, Santín LJ, *Khan ZU* (2011).Expression of RGS14(414) protein into perirhinal cortex promotes enhancement in both object and spatial memory. **XIV Congress of Sociedad Española de Neurociencia in Salamanca**, Spain

Masmudi-Martín M, Navarro-Lobato I, López-Aranda MF, López-Tellez JF, Posadas S, Delgado G, *Khan ZU* (2011) A targeted RGS14 gene therapy not only recovers but also prevents a memory loss in ageing and Alzheimer's disease. **XX<sup>TH</sup> World Congress of Neurology in Marrakesh**, Morocco

Navarro-Lobato I, Lopez-Aranda MF, Masmudi-Martin M, Lopez-Tellez JF, Posadas S, Delgado G, *Khan ZU* (2011) RGS14<sub>414</sub> gene delivery into brain area V2 induces both the recovery and prevention of recognition memory loss. **Society for Neuroscience Meeting 2011 in Washington DC**, USA

Navarro-Lobato I, Simon AM, Lopez-Aranda MF, Mediavilla AP, Frechilla D, *Khan ZU* (2011) Recovery as well as prevention of memory loss in aging and Alzheimer's disease by targeted expression of a RGS14 protein. **14<sup>th</sup> Alzheimer's Association International Conference on Alzheimer's Disease in Paris**, France

Navarro-Lobato I, Masmudi-Martín M, Zoidakis I, Antonia Vlahou A, *Khan ZU* (2016) Neuronal arborization-mediated memory enhancement: a regulation through neurotrophic factor and 14-3-3 $\zeta$  protein. **10<sup>th</sup> FENS Forum of Neuroscience in Copenhagen**, Denmark

Masmudi-Martín M, Navarro-Lobato I, Bashir ZI, Khan ZU (2016) Implication of GluR2 subunit of AMPA receptor in RGS14(414)-mediated memory enhancement. **10<sup>th</sup> FENS Forum of Neuroscience in Copenhagen**, Denmark

Masmudi Martín M, Navarro Lobato I, López-Aranda MF, García Martín G, Santos Amaya I, Del Barco Collazos JL, Luque Gálvez JM, Rubia Lamia LO, Cuadros Romero M, Campos Arillo VM, *Khan ZU* (2019) Activation of neuronal arborization induces memory enhancement and rescues episodic memory deficits. **18<sup>th</sup> National Meeting of the Spanish Society of Neuroscience in Santiago de Compostela**, Spain

## PATENTS

*Reference:* P 200930223 | *Inventor:* Zafaruddin Khan  
*Title:* Uso de la proteína RGS-14 para potenciar la memoria  
*Country and date of priority:* Spain, May 28, 2009  
*Grant date:* September 15, 2011 | *Owner:* Universidad de Málaga

*Reference:* P 201001550 | *Inventor:* Zafaruddin Khan  
*Title:* Uso de la proteína RGS-14 para la prevención y/o tratamiento de un desorden cognitivo y/o un desorden de la memoria  
*Country and date of priority:* Spain, December 2, 2010  
*Grant date:* December 20, 2011 | *Owner:* Universidad de Málaga

*Reference:* P 201001048 | *Inventor:* Zafaruddin Khan  
*Title:* Uso de la proteína RGS-14 para fabricar un potenciador de la memoria  
*Country and date of priority:* Spain, August 07, 2010  
*Grant date:* September 13, 2012 | *Owner:* Universidad de Málaga



*Internacional Reference:* PCT/ES2010/000238 | *Inventor:* Zafaruddin Khan  
*Title:* Use of RGS-14 protein in order to produce a drug for the treatment or prevention of cognitive and memory disorders  
*Country and date of priority:* Internacional, May 28, 2010  
*Grant date:* December 2, 2010 | *Owner:* Universidad de Málaga

*Internacional Reference:* PCT/ES2010/000239 | *Inventor:* Zafaruddin Khan  
*Title:* Use of RGS-14 protein in order to produce memory enhancer  
*Country and date of priority:* Internacional, May 28, 2010  
*Grant date:* December 2, 2010 | *Owner:* Universidad de Málaga

*Internacional Reference:* PCT/ES2011/000348 | *Inventor:* Zafaruddin Khan  
*Title:* Use of RGS-14 protein in order to produce memory enhancer  
*Country and date of priority:* Internacional, December 2, 2011  
*Grant date:* June 7, 2012 | *Owner:* Universidad de Málaga

## **CREATION OF SPIN OFF**

I have created a spin off called *MEDMEM* in year 2009 for research and innovation in area of health and medicine. *MEDMEM* project received first prize award of the Universidad de Málaga and the Cámara de Comercio de Málaga.

## **FINANCIAL SUPPORTS FOR RESEARCH ACTIVITY**

Ref. SR 1358 (PI: Uttam K. Misra)  
University Grants Commission  
1982-1986  
*"Lipid Metabolism of Endoplasmic Reticular Membranes"*

Ref. IM 5078 (PI: Bansi L. Jaikhani)  
Indian Council of Medical Research  
1986-1987  
*"Characterization of Diphenylhydantoin (DPH) Receptors in Brain Tissues"*

Ref. GM 24035 (PI: George M. Helmkamp)  
National Institute of Health  
1987-1990  
*"Phospholipid Transfer Proteins in Liver and Brain"*

Ref. NS 17708 (PI: Angel L. de Blas)  
National Institute of Neurological Disorders and Stroke  
1990-1995  
*"Antibodies to GABA<sub>A</sub>/Benzodiazepine Receptors Subunits"*

Ref. BMH1-CT94-1060 (PI: Jean-Pierre Changeux)  
Union Europea BIOMEDI  
1995-1997  
*"Neuronal Acetylcholine Nicotinic Receptors in the Brain: Interactions with Dopaminergic Receptors"*

Ref. MH 44866 (PI: Patricia S. Goldman-Rakic)  
NIH-National Institute of Mental Health  
1997-2002  
*"Cortical Mechanism in Schizophrenia"*

Ref. DA 10160-02 (PI: Zafaruddin Khan)  
NIH-National Institute of Drug Abuse  
1997-2002  
*"Dopamine Receptors and Nicotinic Acetylcholine Receptors in Prefrontal Cortex"*

Ref. HMRI-99-39 (PI: Patricia S. Goldman-Rakic)  
Hoechst Marion Russell  
1998-2000

*"D1 agonist reversal of chronic haloperidol-induced working memory deficits in young and aged female Rhesus monkeys"*

Ref. CTS-159 (PI: Pedro González Santos)

Junta de Andalucía

2002-2004

*"Lípidos y Arteriosclerosis"*

Ref. Infraestructura 2002 (PI: Pedro González Santos)

Junta de Andalucía/FEDER

2002-2003

*"Microscopio motorizado de fluorescencia equipado con sistema de imagen digital"*

Ref. RC2001-1914 (PI: Zafaruddin Khan)

2002-2006

Ministerio de Ciencia y Tecnología

*"Papel de las lipoproteínas y la dopamina en la demencia vascular y demencia tipo Alzheimer"*

Ref. BF12003-03464 (PI: Zafaruddin Khan)

Ministerio de Educación y Ciencia

2003-2006

*"Fisiología Celular de la Proteína sG<sub>12</sub> en el Sistema Nervioso Central: Papel en el Transporte de Receptores de Dopamina y en el Proceso de Apoptosis"*

Ref. 807-02-2087 (PI: Antonia Gutierrez)

Aventis Pharma

2003-2006

*"Immunohistochemical characterization of single (PS1) and double (APPxPS1) transgenic mice models for Alzheimer's disease: effect of age on distinct interneuron subpopulations in hippocampus and cerebral cortex"*

Ref. EXC/2005/CVI -902 (PI: Javier Vitorica Fernández)

Junta de Andalucía -Programa de excelencia

2005-2008

*"Mecanismos moleculares y celulares implicados en los procesos neurodegenerativos durante el envejecimiento y en la enfermedad de Alzheimer"*

Ref. BFU2006-00306 (PI: Zafaruddin Khan)

Ministerio de Educación y Ciencia

2006-2009

*"Fisiología Celular de la Proteína sG<sub>12</sub> en el Sistema Nervioso Central: Papel en funciones nucleares y en la enfermedad de Alzheimer"*

Ref. REG-13M (PI: Nicola Biaggio Mercuri)

Italian Ministry of Health

2006-2009

*"Mechanisms of cellular damage underlying neurodegeneration in the pathologies of the Extrapyramidal System"*

Ref. BFU2009-07641 (PI: Zafaruddin Khan)

Ministerio de Ciencia e Innovación

2009-2010

*"Mecanismos biológicos de la memoria visual: Estudio de los reguladores de la señalización de proteínas G"*

Ref. 5P01AG010485-170009 (PI: Peter Koulen)

NIH-National Institute on Aging

2007-2012

*"Intracellular Ca<sup>2+</sup> concentration in development of Alzheimer's disease"*

Ref. CTS-586 (PI: Zafaruddin Khan)

Junta de Andalucía

2008-2011

*"Estudio de los procesos biológicos asociados a trastornos mentales y enfermedades neurológicas"*

Ref. CB06/05/1116 (PI: Antonia Gutierrez)

CIBERNED, Instituto de Salud Carlos III, Ministerio de Ciencia e Innovación.  
2010-2015

*"Patología molecular en la enfermedad de Alzheimer. Neuroinflamación y factores neurotróficos"*

Ref. BFU2010-16500 (PI: Zafaruddin Khan)

Ministerio de Ciencia e Innovación.

2010-2013

*"Molecular mechanisms of visual memory: study of the regulators of G protein signaling"*

Ref. 1R01EY022774-01 (PI: Peter Koulen)

NIH-National Eye Institute.

2012-2015

*"Novel mechanism of action as therapeutic strategy for optic neuritis"*

Ref. BFU2013-43458-R (PI: Zafaruddin Khan)

Ministerio de Economía y Competitividad

2013-2018

*"Strategy for recovery and prevention of memory loss: a preclinical study"*

Ref. P12-CTS-1694 (PI: Zafaruddin Khan)

Consejería de Innovación, Ciencia y Empresa, Junta de Andalucía

2014-2019

*"Una estrategia para recuperar la pérdida de memoria en el envejecimiento y la enfermedad de Alzheimer"*

Ref. PI-0542-2013 (PI: Zafaruddin Khan)

Consejería de Igualdad, Salud y Políticas sociales, Junta de Andalucía

2014-2015

*"Una estrategia para prevenir y recuperar la pérdida de memoria en el envejecimiento y la enfermedad de Alzheimer"*

Ref. UNMA15-CE-3223 (PI: Zafaruddin Khan)

Ministerio de Ciencia e Innovación.

2016-2018

*"Sistema de microscopio de fluorescencia light-sheet para la adquisición de imágenes en 3 dimensiones de muestras de gran tamaño"*

## **PROFESSIONAL STAY IN RESEARCH CENTERS**

July 1982-June 1986	Junior Research Fellow at Delhi University, India
July 1986-June 1987	Senior Research Fellow at All India Institute of Medical Sciences, India
July 1987-March 1990	Postdoctoral Fellow at The University of Kansas Medical Center, USA
April 1990-June 1995	Research Associate at University of Missouri, USA
May 1997-March 2002	Associate Research Scientist at Yale University School of Medicine, USA
July-Aug. 2006	Visiting Scientist at Astra-Zeneca Pharmaceuticals in Wilmington, USA
July-Aug. 2007	Visiting Scientist at University of North Texas Health Science Center, USA
July-Aug. 2008	Visiting Scientist at Miller School of Medicine, University of Miami, USA
July-Aug. 2009	Visiting Scientist at Emory University, USA
July-Aug. 2010	Visiting Scientist at University of California Santa Barbara, USA

## **TEACHING EXPERIENCE**

July 1, 1982- June 30, 1986	Dept. Biochemistry, V P. Chest Institute, University of Delhi, India <i>6 hours per course in a Graduate program</i> Bachelor in Biological Sciences
July 1, 1986-June 30, 1987	Neuroscience Center, All India Institute of Medical Sciences, India <i>12 hours per course in a Postgraduate program</i>

MD in Neurology and Neurosurgery

- April 1, 1990- June 6, 1995 School of biological Sciences, University of Missouri-Kansas City, USA  
*15 hours per course in a Postgraduate program*  
Master of Science in Cell & Molecular Biology
- May 1, 1997- March 15, 2003 Department of Neurobiology, School of Medicine, Yale University, USA  
*20 hours per course in a Graduate program*  
Graduate in Biological and Biomedical Sciences
- Sept. 1, 2005- July 31, 2014 Dept. Medicina, Universidad de Málaga  
*30 hours per course in a Doctorate program*  
Programa de doctorado en neurociencia y sus aplicaciones clínicas  
*Director of a subject entitled "Bases bioquímicas y fisiológicas de la cognición y la memoria"*
- Sept. 1, 2010- July 31, 2013 Departamento de Medicina, Universidad de Málaga  
*30 hours per course in a Postgraduate program*  
Máster universitario en new advancements in diagnosis, therapy and biomedical research  
*Director of a subject entitled "Biological mechanisms of memory and its relevance to neurological diseases"*

#### **SUPERVISION OF Ph.D. / M.D. THESIS**

Yale University School of Medicine in year 2001

Candidate: *Darren Lish*

Title of thesis: **Agonist-induced up-regulation of dopamine receptors in transfected cell lines**

Yale University School of Medicine in year 2002

Candidate: *Frank Forstreuter*

Title of thesis: **Time course effect of haloperidol treatment on dopamine neurotransmission**

Universidad de Málaga in year 2010

Candidate: *Manuel Francisco López Aranda*

Title of thesis: **Molecular functions of sGai2 and RGS-14 proteins in rat brain**

Universidad de Málaga in year 2015

Candidate: *Irene Navarro Lobato*

Title of thesis: **RGS14<sub>414</sub>-mediated prevention of an episodic memory loss: a study of molecular mechanism**

Universidad de Málaga in year 2015

Candidate: *Mariam Al-Masmudi Martín*

Title of thesis: **A mechanism of RGS14<sub>414</sub>-mediated recovery of an episodic memory loss: implication of GluR2 subunit of AMPA receptor**

#### **MENTORING**

Mentored almost 27 Junior Faculty members, Postdoctoral fellows, Graduate and Undergraduate students.

Participated in mentoring program for very high IQ school kids.

Creation of a research group of Consejería de Innovación, Ciencia y Empresa de la Junta de Andalucía dedicated to study the mechanisms associated with mental disorders and neurological diseases (PAIDI code *CTS 586*) in , with the idea to promote research activity and to mentor new generation of research professionals in the area of neuroscience. Currently, this group is made of 40 members where 9 members are from International Institutions (5 from USA, 1 from Japan, 1 from Italy, 1 from France , 1 from New Zealand) and rest are from various research and medical institutions in Spain. This group has

developed a platform where medical professionals, researchers and students can exchange the ideas, learn from each other, teach and work on a common project.

## **PARTICIPATION IN EDUCATIONAL AND RESEARCH ACTIVITIES**

Graduate students major advisor,  
Graduate students committee member,  
External PhD thesis adjudicator,  
Laboratory rotation student mentor,  
Undergraduate research mentor,  
Graduate School teacher,  
Instructor in team-taught courses, and  
Examination coordinator.

## **REVIEWER OF SCIENTIFIC JOURNALS**

- Cancer Research
- Cell and Tissue Research
- Cerebral Cortex
- Cellular and Molecular Neurobiology
- European Journal of Neuroscience
- International Journal of Biochemistry & Cell biology
- Journal of Biological Chemistry
- Journal of Neuroscience
- Journal of Neuroscience Methods
- Journal of Neuroscience Research
- Journal of Neurochemistry
- Neural Regeneration Research
- Neuroscience
- Open Access Animal Physiology
- Proceedings of National Academy of Science-USA
- Science

## **REVIEWER OF GRANTS**

- Honorary Grant Review Board Member of Research Management Group
- Alzheimer's Association
- Alzheimer Health Assistance Foundation
- Agencia Nacional de Evaluación y Prospectiva (ANEP)
- European Commission-Director General of Research
- Ministerio de Ciencia e Innovación
- National Alliance for Research on Schizophrenia and Depression (NARSAD)
- National Science Foundation
- Philip Morris Research Program (until 2007)
- Progreso y Salud de Conserjería de Salud, Junta de Andalucía

## **MEMBERSHIPS IN PROFESSIONAL SOCIETIES**

- Centre for Biomedical Research Network on Neurodegenerative Diseases (CIBERNED)
- European Society for Neurochemistry (ESN)
- Federation of European Neuroscience Society (FENS)
- International Brain Research Organization (IBRO)
- International Society to Advance Alzheimer Research and Treatment (ISTAART)
- Molecular and Cellular Cognition Society (MCCS)
- Sociedad Española de Farmacología (SEF)
- Sociedad Española de Neurociencia (SENC)
- Society for Neuroscience (SFN)