

Professor Carlos Belmonte, MD, PhD.



Carlos Belmonte is Emeritus Professor of Human Physiology at the Medical School, University Miguel Hernandez and Senior Researcher of the Instituto de Neurociencias (UMH-CSIC) in Alicante (Spain). Belmonte is a member of the Academia Europaea, the National Academy of Sciences of Spain and The Akademie der Wissenschaft und Literatur, Mainz (Germany). He is *Doctor Honoris Causa* by the University of Castilla la Mancha, Spain and Adjunct Professor, Department of Ophthalmology, University of Utah, USA. He has been Director of the Department of Physiology and Vice-dean at the Medical School, University of Valladolid and served

as Vice President for Academic Affairs and as Dean of the Medical School at the University of Alicante upon its foundation. He directed the Department of Physiology and created in 1987 the Institute of Neurosciences, today a Joint Center of the Spanish National Research Council (CSIC) and the University Miguel Hernandez (UMH) that he directed until his voluntary resignation in 2007. The Institute of Neurosciences is the largest neuroscience research center in Spain, and has been nominated Excellence Research Institution by the Government of Spain.

Professor Belmonte has been Visiting Professor at the Universities of Harvard and Utah and Visiting Scientist at the Eye Research Institute of the Retina Foundation (USA) and at the Prince of Wales Medical Research Institute of New South Wales University in Australia. He has been President of the International Brain Research Organization, the International Society for Eye Research and the Spanish Societies of Neurosciences and of Medical Education. He has been awarded in Spain with the National Research Award "Rey Jaime I", the National Prize for Biology and Biomedicine "Severo Ochoa" and the National Award in Medicine "Gregorio Marañón" among others and internationally with the Endre Balazs Prize of the International Society for Eye Research, the European Vision Award of the European Vision Institute, Honoree of the Association for Research in Vision and Ophthalmology Foundation and the Luis Federico Leloir Award offered by the Government of Argentina. Dr. Belmonte has been member of the boards of many international research institutions (Human Frontiers, European Research Council, Hellen Keller Foundation, ERA-NET Neuron) and belongs to the international scientific board of several research institutes and Foundations in Spain, Mexico, Germany, France, UK, Japan and USA.

The research work of Belmonte and co-workers has been centered in the study of the cellular and molecular mechanisms underlying peripheral somatosensory transduction and pain, and in the neural mechanisms of ocular sensations. Their work on sensory transduction first demonstrated that electrical properties of primary sensory neurons are dependent on the type of peripheral sensory receptor to which they are connected. They also obtained first direct proof that nociceptive nerve terminals subserving pain have separate membrane mechanisms for transduction of mechanical and chemical noxious stimuli, and recorded for the first time the electrical activity of a single mammalian nociceptive nerve terminal. More recently, their work defined the contribution of non-specific ion currents to the transduction and threshold of cold thermoreceptor neurons, the modulation of TRPM8 channels by inflammatory mediators and osmolality, of TRPA1 by bacterial endotoxins and of TRPV1 by sodium hyaluronan.

In eye research, Carlos Belmonte and co-workers defined the functional types of sensory fibers innervating the eye and the correlation between neural activity in corneal sensory nerve fibers and sensations in humans. They developed a new human corneal esthesiometer for the analysis of the various sensation modalities evoked from the cornea and their change under different eye pathologies. Their discovery that activation of TRPM8 in corneal cold thermoreceptors regulate basal tearing and contribute to discomfort sensation in Dry Eye Disease is opening new venues for the treatment of this pathology.

Selected publications (2010-2015)

1. Caires R, Luis E, Taberner FJ, Fernandez-Ballester G, Ferrer-Montiel A, Balazs EA, Gomis A, Belmonte C*, de la Peña E* (2015) **Nat.Comm.** 6:8095. doi: 10.1038/ncomms9095.
2. Quallo T*, Vastani N*, Horridge E*, Gentry C, Parra A, Moss S, Viana F, Belmonte C, Anderson DA, Bevan S (2015) TRPM8 is a neuronal osmosensor that regulates eye blinking. **Nat Comm.** 6:7150 doi: 10.1038/ncomms8150
3. Meseguer V, Alpizar YA, Luis E, Tajada S, Denlinger B, Fajardo O, Manenschijn JA, Fernández-Peña C, Talavera A, Kichko T, Navia B, Sánchez A, Señarís R, Reeh P, Pérez-García MT, López-López JR, Voets T, Belmonte C, Talavera K, Viana F. (2014) TRPA1 channels mediate acute neurogenic inflammation and pain produced by bacterial endotoxins. **Nat Comm.** 5:3125. DOI: 10.1038/ncomms4125.
4. Zhang X, Mak S, Parra A, Denlinger B, Li L, Belmonte C, McNaughton PA. (2012) Direct inhibition of cold-activated ion channel TRPM8 by the $G\alpha_q$ G-protein subunit. **Nat Cell Biol.** 14:851-858
5. Parra A, Madrid R, Echevarria D, delOlmo S, Morenilla-Palao C, Acosta MC, Gallar J, Dhaka A, Viana F, Belmonte C (2010) Ocular surface wetness is regulated by TRPM8-dependent cold thermoreceptors of the cornea. **Nat Med.** 16:1396-1399