



EDITORIAL

Tribute to Professor Miguel F. Refojo, PhD, DSc (1928–2016)



Tributo al professor Miguel F. Refojo, PhD, DSc (1928–2016)

Antonio Lopez Alemany^a, Vicente Compañ Moreno^b, Jesús Merayo Lloves^c,
José M. González-Méijome^{d,*}

^a Departamento de Óptica y de Optometría y Ciencias de la Visión, Grupo de Investigación en Superficie Ocular, Córnea y Lentes de Contacto "Miguel F. Refojo", Universidad de Valencia, Spain

^b Departamento de Termodinámica Aplicada, Escuela Técnica Superior de Ingenieros Industriales, Universidad Politécnica de Valencia, Spain

^c Universidad De Oviedo, Director del Instituto Universitario Fernández-Vega, Spain

^d Departamento/Centro de Física, Clinical and Experimental Optometry Research Lab, Universidade do Minho, Braga, Portugal



Prof. Miguel Refojo at II Symposium of Biomaterials and Ocular Surface: Contact Lenses, Xàtiva, Spain, 2007

July 21, 2016, Professor Miguel F. Refojo passed away at the age of 88 in Needham (Massachusetts). Saying that Miguel was one of the most renowned Spanish scientists of the second half of the XXth Century does not resembles its

actual scientific size. Indeed, Miguel (or "Migüel" as most of his American friends pronounced his name) was a World Class scientist and inventor that will be forever linked to the advances in polymer science applied to the ophthalmic environment. His contributions in the biomedical field start "officially" in 1967 according to the National Library of Medline database (Pubmed-Medline).

His brilliant mind was soon recognized by companies such as Dupont Canada where he started his "North American excursion" to continue later in industry in the USA and finally at Harvard University from 1963 at the Schepens Eye Research Institute working in close loop with physicians at the Massachusetts Eye and Ear Infirmary Hospital. Probably his entrepreneurial spirit came from his mixed experience in industry and academia and the proximity to the real world of eye care at the hospital resulting in different patents and commercial products.

In spite of the dimension of the achievement, remembering him as the inventor and founder of Corneal Science Incorporated (CSI contact lens material) will be too limiting. In fact, Miguel applied his profound knowledge of

* Corresponding author.

E-mail address: jgmejome@fisica.uminho.pt (J.M. González-Méijome).

membrane, surface and interface chemistry to the ocular surface environment to improve our understanding of oxygen dynamics, tear film formation and tear fluid evaporation and its clinical impact.

The authors of this editorial are in debt with Miguel for his generosity, friendship and welcoming spirit allowing that at least a tiny part of his enormous knowledge passed through us and many others to the next generations of optometrists, ophthalmologists and materials scientists. In spite of the difficulty of picking-up the most relevant contributions of Miguel over the more than 50 years dedicated to science and technology, we have selected to mention here some of them what we consider had been his most relevant contributions listed here. Starting with the synthesis and application of glycerol methacrylate, the second hydrogel material applied for biomedical use¹ for different applications in ophthalmology,² his contributions to explain gas transport through contact lenses³ a topic that motivated some of us to approach him to conduct our own experiments, the development of the evaporimeter to understand the tear dynamics in healthy eyes and in dry eye,⁴ his extensive study of *Pseudomonas* adhesion to contact lens materials,⁵ his contributions to explain the porous structure of silicone hydrogel (Si-Hy) lenses and its differences with respect to conventional hydrogel lenses⁶ and their surface morphology⁷ his help in the study of apparent oxygen permeability and transmissibility of Si-Hy lenses saturated of water using the electrochemical method of Clark, originally developed by Fatt for conventional hydrogel lenses and the same study in dry conditions (xerogel using the gas/lens/gas configuration) with the aim of determining how the water uptake affects the oxygen permeability in the lens, collaboration in studies carried out to characterize the physiological response of the cornea when it is disposed on a contact lens relating the oxygen transmissibility of a contact lens to the equivalent oxygen percentage (EOP) which is the basis of the concept of biological oxygen apparent transmissibility (BOAT) established by Fatt and Ruben,⁸ the water loss dynamics in modern hydrogel and silicone-hydrogel materials,⁹ etc.

Miguel also served as Member of the Editorial Board of Journal of Optometry since its inception in 2008 till 2016 helping us to launch this amazing Open-Access publishing project that nowadays is used by over 150,000 users doing over 80,000 downloads of documents every year.

Miguel's inspiring career will be celebrated next 31 March, 1 and 2 April 2017 in a conference devoted to polymer science applied to contact lenses to be held in Xativa (Spain) and promoted by the University of Valencia.

Rest in peace.

References

1. Dohlman CH, Refojo MF, Rose J. Synthetic polymers in corneal surgery. I. Glyceryl methacrylate. *Arch Ophthalmol*. 1967;77:252–257.
2. Refojo MF. Artificial membranes for corneal surgery. *J Biomed Mater Res*. 1969;3:333–347.
3. Refojo MF. Mechanism of gas transport through contact lenses. *J Am Optom Assoc*. 1979;50:285–287.
4. Rolando M, Refojo MF. Tear evaporimeter for measuring water evaporation rate from the tear film under controlled conditions in humans. *Exp Eye Res*. 1983;36:25–33.
5. Durán JA, Refojo MF, Kenyon KR. Hydrogel contact lens-induced *Pseudomonas* keratitis in a rabbit model. *Cornea*. 1987;6:258–260.
6. López-Alemany A, Compañ V, Refojo MF. Porous structure of Purevision versus Focus Night & Day and conventional hydrogel contact lenses. *J Biomed Mater Res*. 2002;63:319–325.
7. González-Méijome JM, López-Alemany A, Almeida JB, Parafita MA, Refojo MF. Microscopic observation of unworn siloxane-hydrogel soft contact lenses by atomic force microscopy. *J Biomed Mater Res B Appl Biomater*. 2006;76:412–418.
8. Compañ V, López-Alemany A, Riande E, Refojo MF. Biological oxygen apparent transmissibility of hydrogel contact lenses with and without organosilicon moieties. *Biomaterials*. 2004;25:359–365.
9. González-Méijome JM, López-Alemany A, Almeida JB, Parafita MA, Refojo MF. Qualitative and quantitative characterization of the in vitro dehydration process of hydrogel contact lenses. *J Biomed Mater Res B Appl Biomater*. 2007;83:512–526.