SURFACE CHARATERIZATION OF SOFT CONTACT LENSES BY ATOMIC FORCE MICROSCOPY

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The aim of this study is to analyze surface properties of different hydrogel and silicone-hydrogel contact lenses (CL) using Atomic Force Microscopy (AFM)

Several commercial CL prepared by the same method of manufacture (cast-moulding), with different monomers composition, water content and surface treatment were used in this study.

Surface roughness analysis was performed using AFM on Tapping® Mode using standard silicone tips. High quality microtopography images and surfaces roughness measurement were recorded randomly on four different CL surface locations, and the mean roughness parameters R_a and R_q being determined.

CL exhibited different surface topography appearance and average roughness (R_a) with values ranging between 0.54 and 13.40nm. The highest and lowest values were observed in silicone-hydrogel CL. On what concerns microrelief maps, Lotrafilcon B exhibits typical structures with a pattern of numerous grooves with different orientations probably related to the surface treatment, Senofilcon A shows an homogeneously and smooth structure corroborating the obtained values for roughness and Comfilcon A presenting a surface with several tracks with different orientations. With respect to the hydrogel CL, Hilafilcon B exhibits a granulated appearance, Etafilcon A and Nefilcon A presenting a kind of tiny bubbles on its surface and Methafilcon A shows a smooth surface with some bumps spread on the top of it.

As the CL surface is in direct contact with the ocular surface, it is critical for bacterial adhesion, so, surface properties are an important factor to be addressed. This study shows that the topography of the CL surface revealed very different characteristics, depending on the type of monomers presenting in the CL and the type of lenses. We could also observe that the same type of lenses may present different roughness values depending on the lot.

Keywords: Contact lenses, Surface topography, Roughness Atomic Force Microscopy