

Evaluation of optical properties of different types of contact lenses

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Purpose: The main objective of this work was to attain a deeper knowledge of contact lenses (CL) optical properties and to understand the influence of CL power on other properties which can affect the optical performance and compromise the ocular physiology.

Method: Four daily contact lenses (Soflens[®] Daily, Acuvue[®] One Day Moist[™], Dailies[®] AquaComfort Plus[®] and Acuvue[®] OneDay TruEye[™]) and five silicone-hydrogel CL (Acuvue[®] Oasys[™], Menicon PremiO, Air Optix[®] Aqua[™], Purevision 2[™], and Biofinity[™]) were investigated. Several powers were studied for each CL brand, including the maximum negative degree of each brand (between -9.00D and -12.00D); -6.00D; -3.00D, 0 or -0.25D, +3.00D and +6.00D. In total, 54 CL were evaluated. For each lens power, optical properties (transmittance, reflectance and refractive index) and physical properties (central and peripheral thickness) were measured.

Results: The results indicate that the refractive index does not change with the CL power, but is influenced by the type of polymers and the polymerization process applied. This property depends primarily on the density of the CL material and its water content. We have also shown that the transmittance values on the ultraviolet region change with the type of CL, but no significant changes were observed for the different powers. Significantly different central and peripheral thicknesses were measured for the different powers.

Conclusion: It was possible to conclude that the central and peripheral thicknesses change significantly when considering the power of the lens, and professionals should take this into account when prescribing CL for high ametropias.