Stratification of Tear Components During Tear Microdesiccation on Vertical Glass Surfaces: A Novel Approach in Tear Fluid Assessment

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Resumen

Purpose: Tear desiccation on a horizontal glass surface followed by low-resolution light microscopy has been used as an expeditious diagnostic aid to evaluate patients suspected of dry eye. The presence of fern-like crystalloids in the dry specimen is the only feature taken into consideration. We demonstrate that different morphological domains of tear microdesiccates can be separated based on distinctive physicochemical properties. Methods: Healthy subjects (Ocular Surface Disease Index questionnaire, laboratory tests, and slit-lamp examination) and 74 young adults from a random student population were recruited as volunteer tear donors. Single tear samples were taken from individual eyes (n = 154) using absorbing polyurethane minisponges. From each sample, aliquots were allowed to desiccate simultaneously on microscope slides positioned either horizontally or vertically followed by comparative dark-field microscopy. Results: Vertical desiccation of each tear sample resulted in highly reproducible top-to-bottom stratification. Particular layers in any vertical microdesiccate represented morphological domains of the corresponding horizontal microdesiccate. Major fern-like crystalloids located at the center of Rolando type I horizontal microdesiccates became concentrated in a prominent layer at the bottom of vertical microdesiccates. Often, these fern-like crystalloids were more vigorous than those of the horizontal counterpart. A number of tear samples from the random population showed no ability to form fern-like crystalloids either by vertical or horizontal microdesiccation. Other prominent layers in vertical microdesiccates represented less noticeable circularly distributed morphological domains of the corresponding horizontal specimens. Conclusions: Microdesiccation of tear fluid on a vertical glass surface causes top-to-bottom stratification of diverse tear components. A more comprehensive expeditious tear assessment is feasible.

Palabras clave

Palabras clave de autor: tear; ferning test; dry eye; dark-field microscopy; tear collection; microfluidics

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