Effect of 3 excimer laser ablation frequencies (200 Hz, 500 Hz, 1000 Hz) on the cornea using a 1000 Hz scanning-spot excimer laser.

Abstract:
To evaluate the possible side effects on human and porcine cadaver eyes induced by excimer laser ablation with 3 ablation frequencies. Central epithelial abrasion was performed on porcine and human donor eyes. Next, the porcine eyes were photoablated (-9.00 diopters) at 1 of 3 frequencies (200 Hz, 500 Hz, or 1000 Hz) using a prototype 1000 Hz excimer laser. The human eyes were ablated at 1000 Hz. The surface of the stroma as well as the structure and ultrastructure of the corneal cells and stroma were examined using light microscopy, transmission electron microscopy, and scanning electron microscopy (SEM). Special attention was given to the detection of potential thermal damage and the evaluation of corneal smoothness. Histopathologic examination showed very low to almost no differences between the 3 repetition rates. In all cases, SEM showed an equally smooth surface. The structural and ultrastructural evaluation of corneas treated with ablation frequencies of 200 Hz, 500 Hz, and 1000 Hz showed no specific side effects associated with the high repetition rates. The ablation quality was comparable in the 3 frequency groups. However, the treatment time was significantly less with a high repetition rate, indicating the clinical potential in refractive surgery of excimer lasers with a
repetition rate of 1000 Hz. No author has a financial or proprietary interest in any material or method mentioned. Additional disclosures are found in the footnotes.