

The Role of Amino Acids in Corneal Stromal Healing: A Method for Evaluating Cellular Density and Extracellular Matrix Distribution

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ABSTRACT

PURPOSE: To evaluate how amino acid supplementation influences the response of corneal stromal keratocytes and other components of the corneal stroma.

METHODS: We compared two groups of patients undergoing cataract surgery. Each group included 20 eyes of 20 patients. Patients in Group 1 were treated with amino acids for 15 days before surgery, and patients in Group 2 did not receive amino acids (control). To evaluate differences and change in corneal stroma, we analyzed all of the operated corneas with confocal microscopy. The confocal images were then analyzed with a new method for measurement of corneal structure based on fractal dimension calculation. This led to a numerical value, D index (fractal surface dimension), an objective measurement of corneal stromal characteristics. This index is related to three factors: keratocyte density, stromal distribution pattern, and intercellular matrix structure.

RESULTS: Patients in the preoperative amino acid group showed higher keratocyte density values than those in the control group. We observed differences in cell distribution patterns and intercellular matrix structures between groups. Amino acid-treated patients had a corneal stroma with a D index value 10% higher than control group patients.

CONCLUSIONS: We hypothesized that preoperative oral supplements with amino acids may change the corneal stroma structure by increasing keratocyte density and modifying the intercellular matrix. A new method for the measurement of these changes was applied, which provides quantification of the stromal structure complexity with a single numerical value.

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