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**Characterization of the Corneal Subbasal Nerve Plexus in Limbal Stem Cell Deficiency.**

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**Public Summary:**

**PURPOSE:** To quantify the changes in the subbasal nerve plexus in patients with limbal stem cell deficiency (LSCD) using in vivo laser scanning confocal microscopy. **METHODS:** In this retrospective cross-sectional comparative study, confocal images of 51 eyes of 37 patients with LSCD collected between 2010 and 2015 by the Heidelberg Retina Tomograph III Rostock Corneal Module Confocal Microscope were analyzed. Two independent observers evaluated the scans of the central cornea. Seventeen normal eyes of 13 subjects served as controls. Total subbasal nerve density (SND), density of long nerves (ie, nerves 200  $\mu\text{m}$  or longer), and the degree of tortuosity were quantified. **RESULTS:** The mean ( $\pm$ -SD) total SND and long nerve density were 48.0  $\pm$  34.2 and 9.7  $\pm$  10.9 nerves/mm, respectively, in all eyes with LSCD and 97.3  $\pm$  29.9 and 35.3  $\pm$  25.3 nerves/mm, respectively, in eyes of the control group ( $P < 0.001$  for both comparisons). Compared with SND in control subjects, SND was reduced by 34.9% in the early stage, 54.0% in the intermediate stage, and 73.5% in the late stage of LSCD. The degrees of nerve tortuosity were significantly greater in patients with LSCD than in control subjects and differed among the early, intermediate, and late stages of LSCD. Reductions in total SND and long nerve density were positively correlated with the severity of LSCD. **CONCLUSIONS:** Reductions in total SND and long nerve density were accompanied by increases in nerve tortuosity in eyes with LSCD. These parameters could be used as quantifiable measures of LSCD severity.

**Scientific Abstract:**

**PURPOSE:** To quantify the changes in the subbasal nerve plexus in patients with limbal stem cell deficiency (LSCD) using in vivo laser scanning confocal microscopy. **METHODS:** In this retrospective cross-sectional comparative study, confocal images of 51 eyes of 37 patients with LSCD collected between 2010 and 2015 by the Heidelberg Retina Tomograph III Rostock Corneal Module Confocal Microscope were analyzed. Two independent observers evaluated the scans of the central cornea. Seventeen normal eyes of 13 subjects served as controls. Total subbasal nerve density (SND), density of long nerves (ie, nerves 200  $\mu\text{m}$  or longer), and the degree of tortuosity were quantified. **RESULTS:** The mean ( $\pm$ -SD) total SND and long nerve density were 48.0  $\pm$  34.2 and 9.7  $\pm$  10.9 nerves/mm, respectively, in all eyes with LSCD and 97.3  $\pm$  29.9 and 35.3  $\pm$  25.3 nerves/mm, respectively, in eyes of the control group ( $P < 0.001$  for both comparisons). Compared with SND in control subjects, SND was reduced by 34.9% in the early stage, 54.0% in the intermediate stage, and 73.5% in the late stage of LSCD. The degrees of nerve tortuosity were significantly greater in patients with LSCD than in control subjects and differed among the early, intermediate, and late stages of LSCD. Reductions in total SND and long nerve density were positively correlated with the severity of LSCD. **CONCLUSIONS:** Reductions in total SND and long nerve density were accompanied by increases in nerve tortuosity in eyes with LSCD. These parameters could be used as quantifiable measures of LSCD severity.

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