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Abstract Title: Tear Film Osmolarity in Dry-Eye Disease

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Abstract Body:

Purpose: Dry eye is a multifactorial disease of the tears and ocular surface that results in symptoms of discomfort, visual disturbance, and tear film instability with potential damage to the ocular surface. It is accompanied by increased osmolarity of the tear film and inflammation of the ocular surface. Tear hyperosmolarity causes damage to the surface epithelium by activating a cascade of inflammatory events at the ocular surface and a release of inflammatory mediators into the tears (MAP kinases, NFkB signalling pathways) which leads to the generation of inflammatory cytokines (IL-1 α , IL-1 β , TNF- α) and Matrix Metalloproteinases (MMP 9). Epithelial damage involves cell death by apoptosis, a loss of goblet cells, the disturbance of mucin expression and an increased tear film instability which causes the exacerbation of ocular surface hyperosmolarity. Because of these pathogenetic mechanisms, tear film osmolarity could be an important diagnostic tool as indicator of ocular surface health in keratokonjunctivitis sicca and other ocular surface diseases. The aim of this prospective, non-randomized, clinical, single-centre study was to assess the changes in the osmolarity in tear samples of patients with keratokonjunctivitis sicca compared to healthy controls.

Methods: 28 patients (age 36 \pm 12, 10 males and 18 females) with severe keratokonjunctivitis sicca and 25 controls (age 42 \pm 18, 11 males and 14 females) were enrolled in the trial. Tear samples were collected from the inferior-temporal conjunctival sac. Inclusion criteria were a break up time (BUT) <5sec and a Jones-Test <5mm. Tear film osmolarity was analyzed by the OcuSense TearLab osmometer. A small nanoliter tear sample is sufficient (50 nl) for measurements. Statistical analyses were performed using StatisticaTM software, p-values < 0.05 *, < 0.001** were considered significant.

Results: There was a significantly higher tear film osmolarity in patients with keratokonjunctivitis sicca (342 \pm 29.5 mOsmol/l) compared to the control group (302 \pm 18.2 mOsmol/l).

Conclusions: Tear film osmolarity can be determined using the OcuSense TearLab osmometer. Testing tear film osmolarity, applied alone or in combination, can be a very effective objective diagnostic tool in the diagnosis of dry eye disease (cutoff value for dry eye: 315.6 mOsmol/l).

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