**Effects of Taurine in dry eye models**

1)Fidilio A. 2)Bucolo C. 3)Platania CB. 4)Lazzara F. 5)Geraci F. 6)Drago F.

*University of Catania, Dept of Biometec, Italy*

Hallmarks of dry eye disease (DED), a complex multifactorial disease, are corneal epithelium lesion, inflammation, increased osmolarity of the tear film and ocular discomfort. Osmoprotectants are classified as amino acids (e.g., glycine, betaine, proline, taurine), polyols (e.g., glycerol, inositols, sorbitol), small carbohydrates (e.g., trehalose), methylamines/methylsulfonium solutes (e.g., L-carnitine). Recently, some osmoprotectants showed anti-inflammatory activity by inhibition of hyperosmotic-induced release of proinflammatory cytokines (TNF-α, IL-1β, IL-6, and IL-17) and chemokines (IL-8, CCL2, and CCL20) in vitro and in vivo models of dry-eye. In this perspective, the aim of this study was to evaluate, in in-vitro and in-vivo models of dry eye, the efficacy of ophthalmic formulations composed of taurine (TAU) and sodium hyaluronate (SH) to manage ocular surface diseases.

Rabbit corneal epithelial cells (SIRCs) were treated with the following formulations: 0.2% SH, 0.4% SH, 0.4% SH + 0.5% TAU and were exposed to oxidative stress with 1mM H2O2 to evaluate Reactive oxygen species (ROS) by commercial kit and with 100μM H2O2 to analyze single cell DNA damage by COMET assay.

Dry eye was induced in albino rabbits by topical application (4 times per day) of 1% atropine eye drops and fifteen minutes after atropine instillation the eyes were treated with formulations. Animals were divided into one untreated control group and into 4 treated groups with atropine, atropine + 0.2% SH, atropine + 0.4% SH and atropine + 0.4% SH + 0.5% TAU. The following endpoints were evaluated: Schirmer's test, tear breakup time (TBUT), tear osmolarity and MMP-9 expression in tear by Western Blotting.

Taurine significantly ($p<0.01$) decreased ROS production in SIRC after oxidative stress and DNA damage induced by H2O2 treatment. Formulation 0.4% SH + 0.5% TAU led to significant decreased ROS and single cell DNA damage.

Topical administration of atropine in the rabbit eye significantly ($p<0.01$) reduced tear volume and TBUT. Tear osmolarity were also significantly ($p<0.01$) modified by atropine treatment. Additionally, MMP-9 expression in tear of taurine-treated eyes was significantly ($p<0.01$) lower compared to positive control (atropine treatment). All the altered parameters were significantly ($p<0.01$) reversed by 0.4% SH + 0.5% TAU treatment and this formulation was more effective compared to SH formulations.

Therefore, our findings validate the hypothesis that taurine may be useful in clinical treatment of ocular surface diseases.