POSTER 48

RETINAL REDOX STRESS AND ULTRASTRUCTURAL REMODELING IN METABOLIC SYNDROME AND DIABETIC RETINOPATHY

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Abstract

Background/ Aims: Diabetic retinopathy is the major cause of blindness in the United States in the age group from 20-74. There are four traditional metabolic pathways involved in the development of diabetic retinopathy: increased polyol pathway flux, increased advanced glycation end-product formation, activation of protein kinase C (PKC) isoforms, and increased hexosamine pathway flux. These pathways individually and synergistically contribute to redox stress resulting in retinal tissue injury culminating in microvascular retinal remodeling and diabetic retinopathy.

Methods: We investigated the ultrastructural remodeling of the blood retinal barrier (BRB) in the choroid coat layer and plexiform layers in retinas of the young 9 week old Zucker rat model of obesity and insulin resistance and the 20 week old alloxan diabetic porcine model with JEM -1400 transmission electron microscopy. Previous studies indicated that pericyte loss and dysfunction are the earliest hallmarks of diabetic retinopathy.

Results: The pertinent pathological finding in the Zucker obese metabolic model was double encasement of the pericyte between two thickened basement membranes. In the diabetic 20 week model, we observed capillary rarefaction, pericyte degeneration – apoptosis, and novel multilayering of pericyte processes.

Conclusions: *These observations suggest that there are progressive pathological ultrastructural abnormalities with increasing degrees of metabolic disease.* It is important to better understand retinal redox stress and remodeling, as this may enable researchers and clinicians to develop an earlier intervention during the prediabetes phase to prevent diabetic retinopathy.