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View Abstract

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Study Group: (none)
ABSTRACT
TITLE: Establishing an <i>in-vivo</i> retinal edema model in the chick
ABSTRACT BODY: Purpose: The chick (<i>Gallus gallus</i>) is very useful for ocular research due to its low cost, cone-rich retina. Similar features to the human macula make it promising for the development of an <i>in vivo</i> retinal edema model. The N-methyl-D-aspartate (NMDA) excitotoxic damage model has similarities to retinal vein occlusion and causes significant retinal edema and subsequent death of inner retinal neurons one day post-injury. Vascular endothelial growth factor (VEGF) has been shown to be critical in the development of retinal edema in human and other animal models. Aquaporin-4 (AQP4) is a water channel protein thought to play a role in retinal edema. We aim to develop a VEGF-induced chick edema model and compare it to the NMDA model. Methods: Following an IACUC-approved protocol, chicks (n=12) were injected intravitreally with a dose of VEGF equivalent to that used in other animal models of blood retinal barrier disruption (0.2µg/20µl) compared to saline (vehicle) (n=16). Spectral domain optical coherence tomography (SD-OCT) retinal layer thickness measurements were performed on chicks at Day 1 (D1) and Day 7 (D7). The VEGF model data were compared with database measurements of NDMA (500nmol/20µl in one eye and saline vehicle in the fellow eye, n=10). AQP4 was assessed using immunohistochemistry on D1 and D7 through measuring the mean intensity in the inner retina and

quantitation using NIS-Elements. TUNEL cell death staining was performed on D1 eyes. Data were analyzed using one-way ANOVA with Tukey and Sidak HSD post-hoc testing with GraphPad PRISM software.

Results: NMDA caused significant retinal edema at D1 as measured by total retinal thickness (NMDA: $344.7 \pm 5.676 \mu\text{m}$ vs Saline: $279.6 \pm 5.459 \mu\text{m}$, $p < 0.0001$). There was no significant difference with VEGF on D1 and D7. TUNEL levels in NMDA-treated eyes had significantly higher number of cell death (3624.94 ± 449.51 vs 0.00 ± 0.00 TUNEL positive cells/ mm^2 , $p = 0.0211$ vs untreated). VEGF did not lead to cell death as indicated by negative TUNEL staining. NMDA AQP4 expression on D1 was increased in the inner nuclear layer in comparison to VEGF and control (NMDA: $54.03 \pm 15.638 \mu\text{m}$ vs Saline: $25.54 \pm 1.468 \mu\text{m}$, $p < 0.0036$; vs VEGF: 24.90 $p < 0.0030$).

Conclusions: NMDA injection induces significant retinal edema in the chick, while VEGF injection does not. The avascularity of the chick retina may play a role in the absence of VEGF-induced retinal edema.

(No Image Selected)

DETAILS

PRESENTATION TYPE - PLEASE NOTE, IF YOU CHANGE YOUR PRESENTATION TYPE AFTER APPLYING FOR AN AWARD (BELOW), YOU MUST GO BACK AND RESELECT THE APPLY BUTTON.: #1 Poster, #2 Paper

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