

Session 3-L: Retina: RD, Vitrectomy, Macular Degeneration

Title: Development of a Bovine Eye Angiogenesis Model

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Purpose: To evaluate a new, novel bovine eye angiogenesis model (BEAM) that will produce a three-dimensionally intact ophthalmic tissue model. Based on our experience with the fibrin-thrombin angiogenesis assay, we hypothesized that portions of the bovine eye would develop angiogenesis in a controlled, repeatable fashion.

Methods: Fresh bovine eyes were transported on ice and dissected; tissue disks were created using a 2-mm dermal punch. These disks were embedded in a 0.3% fibrin-thrombin clot, overlaid with a growth-supportive medium, and observed over a 14- to 16-day period. The percent of wells initiating an angiogenic response was calculated. Subsequent growth of angiogenic response was rated using a semi-quantitative angiogenic index (AI) rating scale developed in our laboratory (AI = 0-16 scale).

Results: Choroid/retinal pigment epithelium (RPE) disks developed a robust angiogenic response in this assay system. Light and electron microscopy of selected wells confirmed the endothelial nature of these networks. All choroid/RPE replicates developed an angiogenic response in 89-100% (93% overall) of the wells cultured. Following initiation of the angiogenic response, all wells grew in a progressive fashion, developing dense interconnected networks of neovessels. The mean AI \pm SEM (0-16 scale) of all specimens was 13.86 ± 0.6 , indicating near maximal growth in the 178 wells that initiated an angiogenic response.

Conclusions: BEAM may portray the initiation and proliferation of vascular endothelium arising from ocular tissue inexpensively and more quickly than other *in vivo* models or monolayer human endothelial cell-based angiogenesis models. BEAM appears to be predictable and reproducible. Investigation of a variety of antiangiogenic drugs is underway in our laboratory.