Unveiling the Proangiogenic Role of Telomerase Components in Experimental Choroidal Neovascularization

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AuthorBlock: *EILEEN SANZ[1], Vinodhini Jayananthan[1], Aman Kumar[1], Nagaraj Kerur[1]*
[1]Opthalmology, The Ohio State University, Columbus, Ohio, United States;

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Purpose
Aberrant ocular angiogenesis contributes to profound vision loss in conditions such as neovascular age-related macular degeneration (nvAMD), proliferative diabetic retinopathy (DR), retinopathy of prematurity (ROP), and ischemic retinal vein occlusion. Telomerase, a pivotal enzyme associated with telomere maintenance, has been extensively linked to endothelial cell proliferation, survival, migration, and invasion within the realm of tumor angiogenesis. Despite these known roles, its potential involvement in pathological ocular angiogenesis is still a relatively unexplored area. This study aims to unravel the proangiogenic impact of telomerase by employing a mouse model of laser-induced choroidal neovascularization (CNV).

Methods
CNV was induced by laser injury in 10-12 week old C57BL/6J wild-type (WT), *Tert*$^{-/-}$,and *Terc*$^{-/-}$ mice. Seven days after the laser injury, eyes were dissected and confocal microscopic imaging of CNV lesions stained with FITC-labeled *Griffonia Simplicifolia* Lectin I (GSL1) Isolectin B4 was performed. CNV lesion area and volumes were measured using Nikon NIS-Elements NIS.ai image analysis suite.

Results
We observed significantly reduced CNV lesion area and volume in both *Tert*$^{-/-}$ the *Terc*$^{-/-}$ mice compared to WT mice. Since *Tert*$^{-/-}$ and *Terc*$^{-/-}$ mice were derived from heterozygous breeders (*Tert*$^{+/-}$ and *Terc*$^{+/-}$), these knockout mice are not expected to have shortened telomeres. These results suggest that proangiogenic activity of *Tert* and *Terc* are independent of their canonical telomerase maintenance function.

Conclusions

Telomerase has a proangiogenic activity in this laser-induced CNV mouse model. These findings highlight the new roles of telomerase components in ocular angiogenesis and suggest potential avenues for therapeutic interventions.