ABSTRACT:
The only source of the neurotransmitter dopamine in the mammalian retina is from dopaminergic amacrine neurons. Released locally at synapse-like varicosities to target neurons and also in a paracrine fashion to diffusely affect the retina, dopamine is critical in adjusting the retina from nighttime to daytime vision. Our data indicate that dopamine release, expression of the enzyme responsible for dopamine production (tyrosine hydroxylase), and dopaminergic neuron number are all reduced in the retina of the Ins2Akita mouse model of diabetes. We find deficits in retinal circuit function, visual behavior, and blood flow in the eye that are all remarkably consistent with reduced dopamine as a unifying mechanism. We hypothesize that dopamine regulates both neuronal and vascular function of the retina and that dysregulation of dopamine action at neurons and microvessel endothelial cells contributes significantly to the visual impairments of diabetic retinopathy.
We propose that an important, previously unappreciated link between the neuronal and vascular damage is through a dopamine-VEGF (vascular endothelial growth factor) retinal axis, and this will be the subject of my talk.