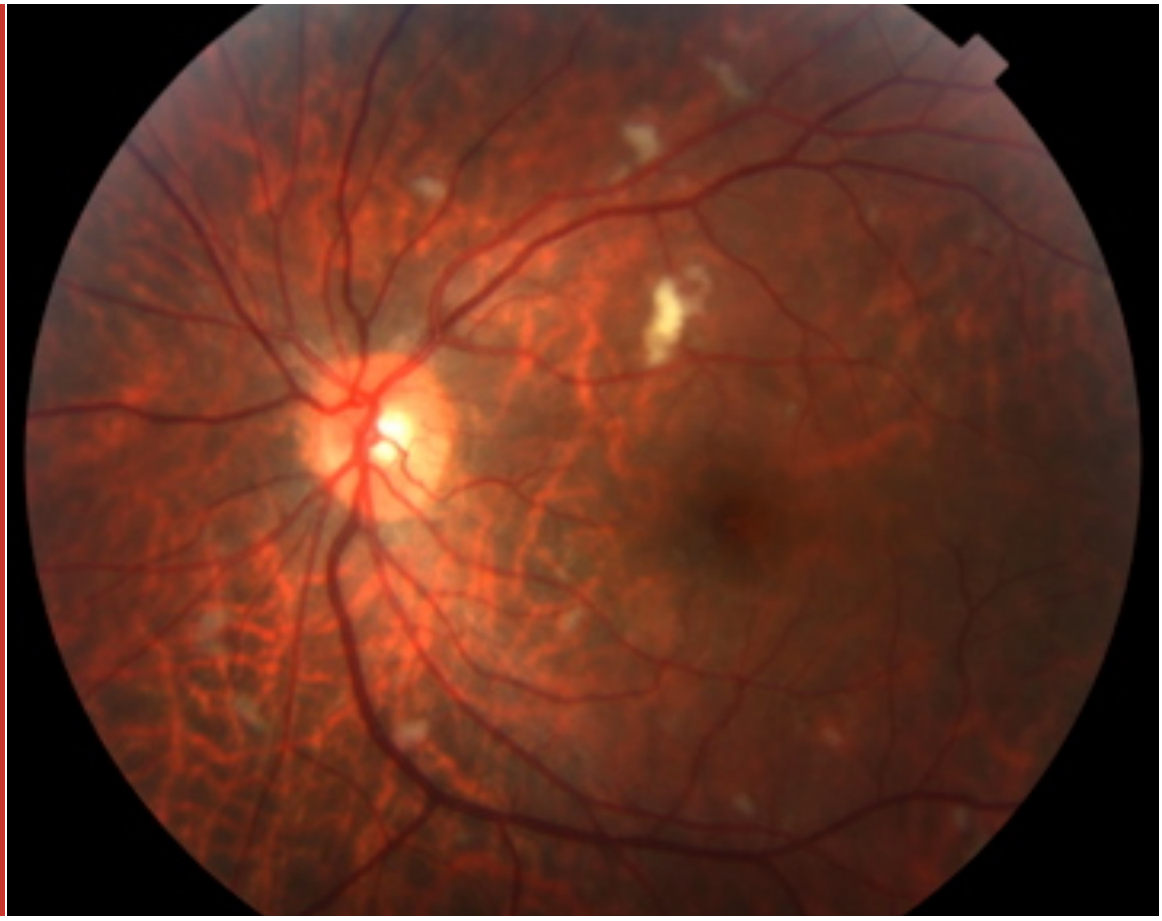
RADIATIONRETINOPATHY

Excellence Through Innovation - 2016



Radiation therapy provides life and vision sparing treatment for eye lid, conjunctival, intraocular and orbital tumors.

Radiation Dose to Normal Ocular Tissues Predicts Side Effects

Careful Planning Can Save Vision!

Radiation therapy continues to save both vision and lives for eye cancer patients. It is widely used to treat tumors and inflammatory diseases in and around the eye.

Through his research, Dr. Finger has shown that not all radiation techniques are equal. Though they can be used to kill cancer, there are significant dose-related differences in the severity and distribution of side effects

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For example, as early as 1990, Dr. Finger realized that compared to iodine-125 plaques, the lower energy photon radiation from palladium-103 seeds were less able to reach most normal ocular structures beyond the intraocular melanoma. Dr. Finger says, "this shows the importance of comparing radiation sources prior to each plaque surgery."

Patients should ask their eye cancer specialists if they are comparing radiation techniques and choosing the best plaque or beam source for their specific tumor and their eye.

At The New York Eye Cancer Center, careful comparative source selection has translated to improved local control and better long-term visual acuity results. This is a recurring finding in Dr. Finger's publications. ***The American Brachytherapy Society also recommends these comparisons.***

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VEGF vs. Anti-VEGF
An Unfolding Eye Cancer Story

Malignant tumors manufacture **V**ascular **E**ndothelial **G**rowth **F**actor (VEGF) to promote the growth of their blood vessels. Further, radiation damaged "ischemic" tissue also makes VEGF. Therefore, after ocular radiation therapy many eyes develop new and leaking blood vessels called radiation retinopathy and optic neuropathy.

Dr. Finger discovered that anti-VEGF agents can be used to slow the progress of radiation induced vascular damage in the eye. Currently used around the world, anti-VEGF treatment has saved the vision of thousands of patients that would otherwise be blind.

Research at The New York Eye Cancer Center also discovered that almost all patients treated with iodine-125 and palladium-103 plaque therapy for choroidal melanoma be helped.

"In the 1980s, more than 50% of patients were legally blind within 5 years after plaque therapy for choroidal melanoma due to radiation side-effects."

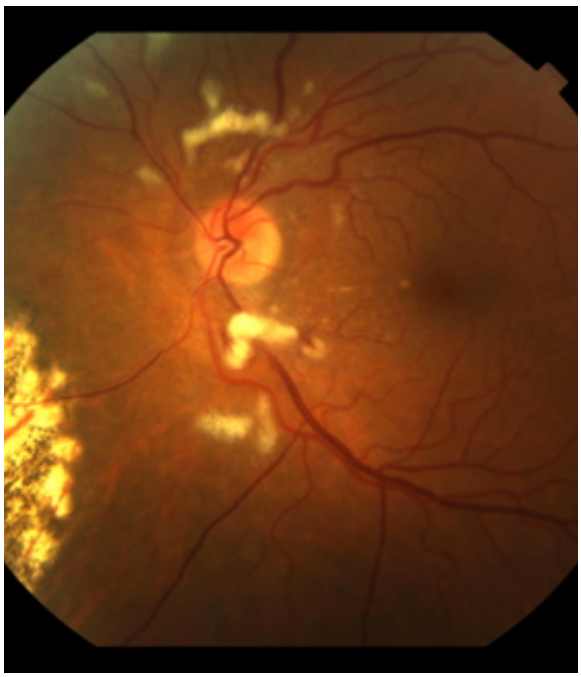
Now with 10-years experience, Dr. Finger notes that intraocular injections of anti-VEGF agents can preserve vision for years after the onset of radiation retinopathy and optic neuropathy. It is crucially important that every patient be monitored for radiation damage after their cancer treatment.

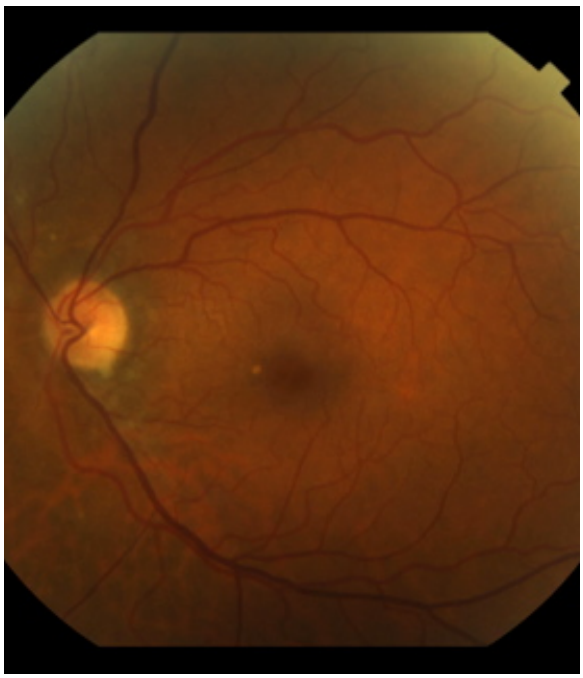
THINGS TO KNOW:

- **The lower the initial radiation dose and dose rate to the macula and optic nerve, the better the chance patients will avoid developing radiation retinopathy, optic neuropathy and neovascular glaucoma.**
- **Periodic intraocular anti-VEGF therapy will suppress radiation-associated intraocular edema, cotton-wool spots and hemorrhage.**
- **Like insulin for diabetes, almost all patients will be unable to stop receiving anti-VEGF treatment without recurrence of their disease (and vision loss).**
- **As radiation vascular damage progresses, higher-dose anti-VEGF medications and combinations with steroids are often needed.**
- **Anti-VEGF therapy preserves vision.**

Dr. Finger notes that, "since we started in 2005, almost all patients treated with periodic intravitreal anti-VEGF have retained useful vision in their irradiated eye."

Clinical Example: Color photographs show hemorrhages, exudates and cotton wool spots resolving after periodic anti-VEGF therapy.





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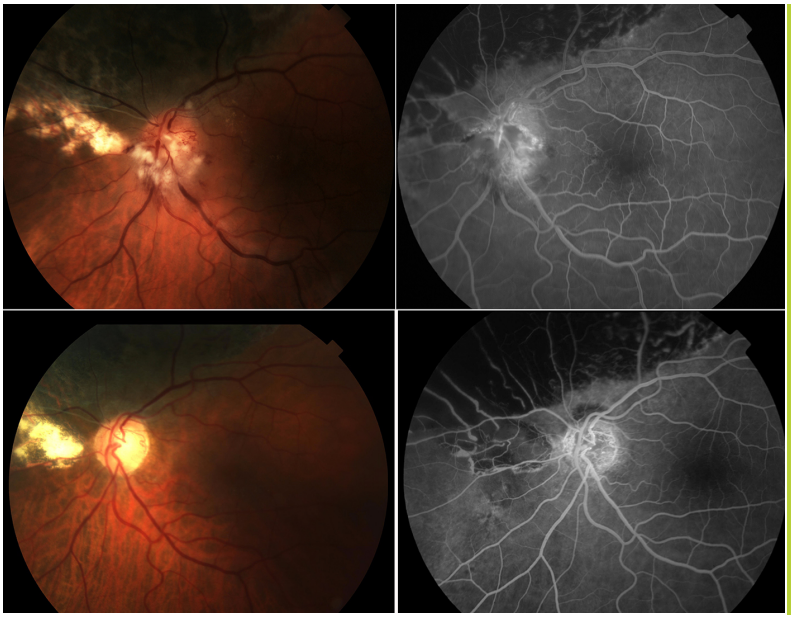

Top, before periodic, perpetual anti-VEGF therapy there is optic disc edema, hemorrhage and leakage.

Bottom, marked resolution of disc edema with restoration of the optic disc margins and a visual acuity of 20/20 until her last examination 8 years later.

Anterior Radiation Optic Neuropathy is Treatable with Anti-VEGF Therapy

By Paul T. Finger, MD

In 2007, Dr. Finger pioneered the use of intraocular Avastin as treatment for radiation optic neuropathy (RON) (See top left images). From this work, he went on to perform the first clinical case series as published in The International Journal of Radiation Oncology Biology Physics.

In 2012, Drs. Finger and Yousef reported that optical coherence tomography of the optic nerve head can be used to detect early signs of RON. This work was reported in the journal, Ophthalmic Surgery, Lasers and Imaging.

These findings suggest that periodic, intravitreal anti-VEGF therapy reduces and prevents swelling (edema) of the optic nerve within the scleral canal and optic nerve sheath. Like a compartment syndrome, swelling of the optic nerve can cause compression of intrinsic blood vessels, depriving this critical structure of blood and nutrients. This leads to atrophy and loss of vision.

Many doctors will tell patients that radiation retina and optic nerve damage is "self-limited and will burn itself out over 6-12 months."

Dr. Finger says, " this is true, but that is only because it has exerted all its damage at once leaving the patient will poor vision or legally blind.

THINGS TO KNOW:

- **The lower the initial radiation dose and dose rate to optic nerve, the better the chance patients will avoid developing optic neuropathy.**
- **Periodic intraocular anti-VEGF therapy will suppress radiation-associated optic nerve edema, cotton-wool spots, hemorrhage and neovascularization.**
- **Like insulin for diabetes, all patients have been unable to stop receiving anti-VEGF treatment without recurrence of their disease (and vision loss).**
- **As radiation vascular damage progresses, higher-dose anti-VEGF medications and combinations with steroids are often needed.**
- ***Anti-VEGF therapy preserves vision.***

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About Paul T. Finger, MD

Clinical Professor of Ophthalmology, Dr. Finger is a specialist in ocular tumors, orbital diseases and ophthalmic radiation therapy. He has developed new methods for the diagnosis and treatment of many ocular tumors, holds many patents and has written hundreds of scientific publications.

Dr. Finger is invited to lecture frequently at local, national and international meetings. He is founding Director of The New York Eye Cancer Center and The Ocular Tumor Services of The New York Eye and Ear Infirmary and NYU School of Medicine.

Dr. Finger is the Chair of the (AJCC) American Joint Committee on Cancer's Ophthalmic Oncology Task Force and a member of the Committee on Cancer (COC) of the American College of Surgeons. Further, he consults for The American Brachytherapy Society (ABS) and the Association for Physicists in Medicine (AAPM).

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