



THE OCULAR IMMUNOLOGY  
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## **Acquired Immunodeficiency Syndrome and the Eye**

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The ocular manifestations of acquired immunodeficiency syndrome (AIDS) revolve primarily around infectious and malignant diseases. Prior to the advent of multi-drug “cocktail” therapy for human immunodeficiency virus (HIV) infection, opportunistic infectious diseases of the eye were very common and, in fact, were sentinel markers of a marked reduction in CD4 T-cell lymphocyte count and progression into the final stages of AIDS.

Following the emergence of multi-drug antiretroviral therapy, the prevalence of opportunistic AIDS-related ocular infections and malignancies has declined dramatically. However, patients are still occasionally seen in whom an ocular infectious disease is the first clinical manifestation of previously undiagnosed HIV infection. For example, we saw a young man who had an outbreak of shingles (herpes zoster infection) affecting one eye (herpes zoster ophthalmicus).

Although herpes zoster ophthalmicus responds rapidly to appropriate viral therapy for immunocompetent individuals, this patient’s problem persisted, resisted all efforts, both medical and surgical, to bring an end to the problem. This ultimately prompted an evaluation for an underlying cause of disease resistance. The patient was found to have a markedly reduced CD4 T-cell lymphocyte count, so HIV antigen and antibody testing was done. Both tests returned positive, confirming the diagnosis and allowing referral to appropriate specialists for initiation of combination antiretroviral therapy.

There are many microorganisms that can serve as notable sentinel markers of HIV infection. These include toxoplasmosis (parasitic infection), Candida (fungal infection), herpes simplex virus, varicella zoster virus, Pneumocystis carinii, syphilis, tuberculosis, cryptococcus, cryptosporidium, microsporidium and cytomegalovirus.

Cytomegalovirus is considered the most invasive infection of the eye and is associated with significant comorbidities in patients with AIDS. It may cause bilateral necrotizing retinitis, which

can ultimately lead to advanced retinal detachment, proliferative vitreoretinopathy, and blindness in both eyes.

The most common malignancy associated with HIV involving the eye is Kaposi's sarcoma, which typically affects the conjunctiva. Other common malignancies include systemic lymphoma with secondary ocular involvement and primary intraocular lymphoma.

There are two other ophthalmic presentations associated with HIV infection. HIV retinopathy refers to a common, usually mild retinal condition seen in patients with HIV infection, especially in the early course of the disease. It is characterized by cotton-wool spots and retinal hemorrhages. It is thought to result from microvascular damage and immune dysregulation rather than direct viral infection of retinal tissue. HIV retinopathy is generally benign and self-limited.

The other condition is immune recovery uveitis (IRU). Immune recovery uveitis is a form of intraocular inflammation associated with immune reconstitution inflammatory syndrome (IRIS), typically occurring in HIV-infected patients with a history of cytomegalovirus retinitis following the initiation of highly active antiretroviral therapy. It reflects a dysregulated immune response to residual cytomegalovirus antigens in the setting of rapid immune recovery and is a significant cause of vision loss in this population due to complications such as cystoid macular edema, epiretinal membranes, and optic disc edema.

Major advances have occurred over the past three decades in the diagnosis and treatment of patients with HIV infection. The HIV is still with us and will likely remain so for the foreseeable future. The most effective strategy for avoiding HIV infection remains celibacy and avoidance of high-risk behaviors such as drug use for individuals who are not sexually active, and monogamy with a known, uninfected partner for those who are sexually active.

It is hoped that the ongoing quest to develop a highly protective and effective vaccine will be successful.