

Unightly war zones of aging

Imagine you were trying to hammer a nail, but instead you accidentally hit your thumb. Aside from pain, you may notice redness, swelling, and warmth of your thumb. These are symptoms of *inflammation*. When an area of the body has been compromised either by injury or infection, the body recruits cells to repair the damage and fight off invaders. Inflammation is a war zone full of dead tissue, invaders like bacteria, and soldiers like white blood cells.

Once all is well, a “clean up” starts, reducing inflammation and returning your thumb to normal. We call this *acute* inflammation. Unfortunately, sometimes inflammation continues even when there is no need for war. This is called *chronic* inflammation (e.g. arthritis, inflammation of the joints).

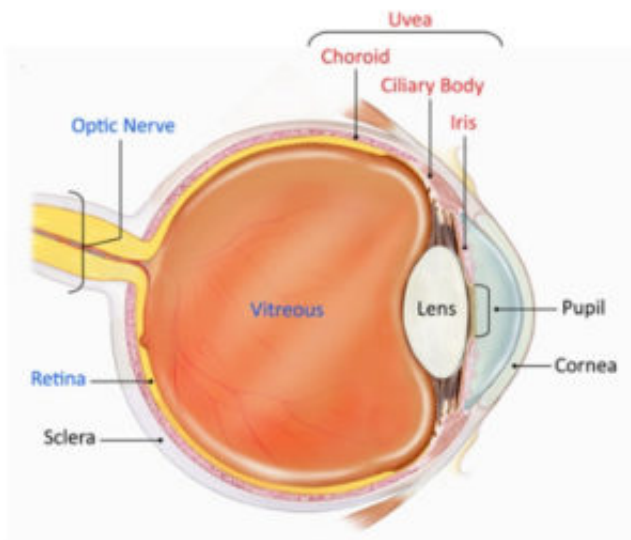


Fig. 1. Diagram of the eye. Source: nei.nih.gov

As we age, we tend to see more of these war zones. There are two major explanations: *immunosenescence* and *inflamm-aging*.

In immunosenescence, the “soldiers,” the white blood cells of our immune system, become reduced over time. They begin malfunctioning. They have trouble releasing *cytokines* (signals to help recruit or prevent other cells in battle). More inflammation-causing infections occur because we have decreased protection from invaders. A build up of damaging chemicals (*reactive oxygen species*) prevents malfunctioning cells from programming their death (*apoptosis*), promoting cancer.

Inflamm-aging involves cytokines. Some white blood cells use *pro-inflammatory* cytokines to recruit

other cells for battle. Others use *anti*-inflammatory cytokines to stop or clean up war zones. As we get older, there are more pro-inflammatory signals than anti-inflammatory signals, leading to chronic inflammation. Also, more malfunctioning antibodies (proteins that aid in destruction of invaders) are produced than normal, which confuse the body for an invader.

We will now focus on inflammation that involves the eye and that can affect any age, including the elderly: *uveitis*. Uveitis is defined as inflammation of the uvea, structures that make up the “insides” of the eye. The iris gives our eyes color (e.g. brown, blue, green, etc.). The ciliary body produces *aqueous humor*, the fluid that keeps the front part of our eye inflated. The retina houses the cells that process our vision, and the choroid provides the blood supply to parts of the retina (Fig. 1).

We describe the type of uveitis by location: anterior uveitis (iris and/or ciliary body) (Fig. 2), intermediate uveitis (vitreous humor which is the fluid that inflates the back side of the eye), posterior uveitis (retina, choroid, and optic nerve), and pan-uveitis (affects all parts of the eye, front and back). Uveitis can be acute or chronic. Acute anterior uveitis typically presents with sensitivity to light, redness, and pain, while intermediate and posterior uveitis can present with vision loss but can also be asymptomatic.

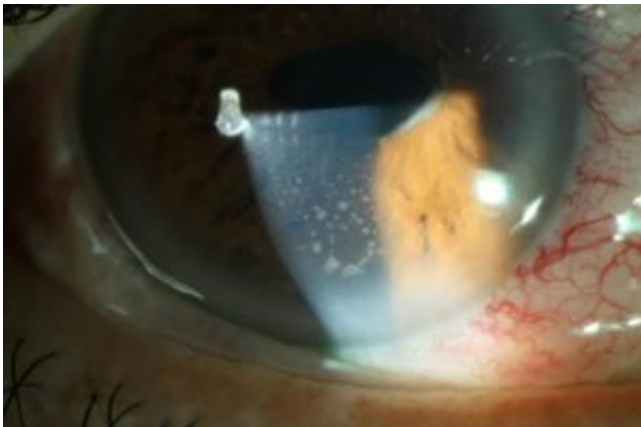


Fig. 2. An example of anterior uveitis.

The most common location for uveitis (in young and old individuals) is anterior uveitis, which can be idiopathic (i.e. cause unknown) or can be caused by a systemic inflammatory condition (e.g. ankylosing spondylitis, a type of arthritis) or an infection (e.g. herpes). Entities common in the elderly, such as ischemia can also masquerade as uveitis, such as seen with *ocular ischemia*, or a lack of blood flow to the eye due to a blockage of a major artery. Among other signs, ocular ischemia can present with a low grade chronic anterior uveitis. The next most common uveitis locations in the elderly are posterior and pan-uveitis. As with anterior uveitis, a systemic inflammatory condition can cause posterior and pan-uveitis, such as sarcoidosis (a condition which

presents “lumps” of white blood cells called *granulomas*) as can an infection (e.g. syphilis, tuberculosis). Lymphoma (cancer of the white blood cells) can masquerade as posterior uveitis in the elderly.

Eye care doctors perform a comprehensive eye exam to diagnose uveitis and may treat the inflammation with corticosteroids (topical, intra-ocular, oral) and/or anti-virals (herpetic uveitis) or antibiotics (syphilitic uveitis), depending on the location of inflammation and underlying cause of disease. Although treatment is oftentimes successful, there are unique challenges that must be considered in the elderly. The elderly are often on multiple medications, which can interact with each other, affecting their success. As we age, our metabolism slows down and we less efficiently clear drugs from our bodies. Furthermore, some patients may not take their prescription as instructed for varied reasons. Patients are encouraged to voice their concerns regarding medication concerns to their doctors.

Inflammation can have a positive role, such as with a hammered thumb. However, when it is maladaptive and/or chronic, inflammation needs to be managed, as in the case with uveitis.

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