

## **Brave Horse Blog – Uveitis**

Equine Recurrent Uveitis (ERU) affects 2-25% of horses globally, with approximately half of the affected horses eventually going blind.<sup>1,2</sup> In general, the disease is characterized by episodes of blindness in the middle layer of the eye (uveal tract).<sup>1</sup> Some horses experience only a single episode, while others have consistent low-grade (insidious) inflammation or episodic occurrences; horses with insidious inflammation often have cumulative damage that can lead to cataracts, glaucoma, and blindness.<sup>1</sup>

Different types of infections as well as physical trauma to the eye can initiate ERU, and physiologic factors that cause the symptoms of the disease are complex and multifaceted.<sup>2</sup> However, inflammation is a main factor that leads to the resulting pain and damage exhibited by horses with ERU.

Current treatments of ERU focus on reduction or elimination of inflammation, preservation of vision, alleviation of pain, and minimization of recurrence. Topical corticosteroids, non-steroidal anti-inflammatory drugs (NSAIDs), and mydriatic drugs aid in management of pain and inflammation but do not prevent recurrence. In severe cases, corticosteroid injections, cyclosporine implantation, core vitrectomy (removal of debris and replacement with saline), or enucleation (eye removal) may be necessary.<sup>1,2</sup> The current treatment options, while satisfactory for symptom management, do not treat the underlying causes of the disease.

Inflammation and degeneration occur as a result of oxidative stress, which is a disruption of the balance of reactive oxygen species (ROS) and antioxidants in the body.<sup>3</sup> ROS are naturally produced during normal cellular processes such as respiration in which fuel is converted into a usable energy form for cells (ATP). But when the amount of antioxidants present in the body is insufficient to scavenge and neutralize these species, ROS accumulate in the body and cause receptors to signal physiological responses that can cause damage over time.

Oxidative stress is known to activate p38 mitogen-activated protein kinase (MAPK), an enzyme involved in cell signaling, particularly in response to changes in cellular environment and conditions.<sup>4</sup> In addition to other physiological factors, persistent oxidative stress in cases of ERU contributes to inflammation and progressive degeneration in the eye.

Cannabidiol (CBD), a potent antioxidant, has been shown to reduce inflammation and degeneration in cases of ERU. While it may function through other mechanisms that have yet to be discovered, CBD appears to reduce oxidative stress and inhibit p38 MAPK.<sup>5</sup> CBD's antioxidant, anti-inflammatory, and neuroprotective properties make it a promising potential treatment for ERU as it treats not only the symptoms of the disease but also treats some of the underlying causes as well.

## References:

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- (4) Anerillas, C.; Abdelmohsen, K.; Gorospe, M. Regulation of Senescence Traits by MAPKs. *GeroScience* 2020, *42* (2), 397–408.
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