Iron is stored in the body as hemosiderin deposits. Excessive accumulation of hemosiderin can then cause organ damage and dysfunction, a disease we call iron overload disorder. While this disorder normally doesn’t directly cause death, it can cause or increase the severity of other diseases such as infectious diseases and cancers.

One theory involves a potential adaptation to a diet that is naturally low in iron. Browsing rhinoceroses eat mainly twigs, leaves & fruits from trees or bushes, therefore, they only get a small amount of iron. Scientists have speculated that this affinity for a low iron diet in an environment where they are given adequate nutrition such as in zoos, predisposes them to developing excessive iron accumulation. This occurs because they are essentially too good at storing the iron and have no way to expel the excess.

Another theory involves an increased number of cytokines, which are small proteins produced by many types of cells including fat cells. The assumption is that rhinos are fed a more nutritious diet in captivity, therefore they will have more fat tissue. If there’s more fat tissue then there will be more cytokines. These cytokines will tell the body to move iron out of the red blood cells and into the organs to be stored as hemosiderin. The cytokines can also affect the insulin-glucose balance within the body causing more iron to be stored and increasing the severity of the condition.

None of these theories have been proven, making diagnosis and treatment complicated. Signs of iron overload disease are hard to recognize in the rhinoceros, making it hard to know when an animal needs to be treated. Currently the most widely used test to diagnose iron overload is to measure ferritin in the blood but this test has in recent studies been shown to be somewhat unreliable. Consequently, the only dependable means of diagnosis is to look at the organs after the animal has died, which is not helpful for animals currently affected by the condition.

Our research is focused on looking at the liver on a microscopic level using various stains and comparing that with an analysis of the minerals found within the liver. Hopefully through this research we will be able to better understand the etiology of iron overload disorder in the rhinoceros.

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