

The Ferret Nervous System

Learn all about what the ferret nervous system is and what it does.

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Posted: January 12, 2009, 5 a.m. EST

Ferret Brain Facts

1. The volume of a ferret's brain is less than a tablespoon.
2. There are over 100 billion cells in a ferret's nervous system.
3. Ferrets are blind and deaf until 4 weeks of age.
4. Ferret brains imprint on the odor of prey (food) between 8 and 13 weeks of age.
5. The brain controls reproductive activity by "analyzing" light cycles (length of day and night).
6. Ferrets can leap tall buildings in a single bound. (Just kidding, although every ferret thinks it can.)

Nervous System Energy Production And Use

Each neuron has the special property of being able to pump ions (charged atoms of sodium and potassium) into and out of the cell to create an electrical potential of stored energy, much like a battery. When properly stimulated, the neuron's cell membrane lets these ions flow to create an electric current. Called an action potential, this becomes the signal the nerve uses to pass along information.

In order to move the ions that allow nerves to function, the cell uses molecular pumps located in the cell membrane to push potassium into the cell, and pump sodium out. Since the normal situation for all cells starts this way, high potassium inside and high sodium outside, pushing more of one in and more of the other out is an uphill effort, much like pumping water up a hill into a reservoir. Once done, you can later let things flow through the turbines to make electricity.

It takes a tremendous amount of energy to do this, and the brain needs a constant supply of fuel to be able to keep functioning. The fuel for all neuronal cellular metabolisms is glucose, a simple sugar derived from carbohydrates in the diet or synthesized by the liver from other sugars or protein. The circulatory system delivers the glucose to the nerve cells along with the oxygen needed to burn the fuel. While all the other cells in the body can also use fats and protein for fuel, brain cells are picky, they only burn glucose.

Ferret Medical Conditions Relating To The Nervous System

Understanding the nervous system's complexity and some of its functioning helps us understand some of the medical conditions seen in ferrets that relate to it. Fortunately, some can be prevented. Some others are managed with medication or surgery. Unfortunately, not every one is treatable.

We vaccinate ferrets to protect against two deadly viral diseases, rabies and distemper. Both are believed to be 100 percent fatal, and neither has an effective treatment. Though distemper is not a risk to humans and research has shown that it is highly unlikely that a ferret with rabies could transmit it to a human, both diseases are serious.

Rabies is acquired through a bite from another rabid animal. The virus enters the break in the skin and begins to infect the local nerves. From there, it propagates and travels up the nerve fibers to the spinal cord, ultimately traveling up to infect the brain. Clinical cases of rabies in ferrets are exceedingly rare, and transmission of rabies from a ferret to a human has never been documented.

Distemper is highly contagious both to ferrets and to dogs. The virus usually enters through the nose or mouth from contact with contaminated items or small, airborne droplets sneezed or coughed by an infected animal. Most signs of distemper relate to the respiratory system or the skin, but neurologic signs like convulsions, muscle tremors and coma can result.

Unfortunately, we do not have a vaccine to protect against a third viral infection that affects the ferret nervous system, Aleutian disease. This is usually a chronic disease with many different possible signs, including posterior weakness or paralysis, tremors and convulsions.

Bacterial, fungal, and parasitic infections of the nervous system are relatively rare. Cryptococcus, a fairly common soil

fungal organism, can cause infection, usually entering the body by inhaling spores through the nasal cavity. From there, infection can spread directly up into the brain along the olfactory nerves.

Possibly the most common cause of neurologic signs in a ferret is hypoglycemia, low blood sugar. Remember, the brain's absolute requirement for glucose at all times. The effects of insulin-secreting tumors of the pancreas, insulinomas, usually show as weakness, paralysis or tremors. If the blood sugar level gets too low, the brain begins to shut down, leading to convulsions or coma.

An Amazing Result

The nervous system is truly a marvelous thing. Ferrets leap and roll and chatter and war dance. They steal your pen, knock over every wastepaper basket, and open every cabinet and door. They crawl into the smallest holes and reach the weirdest places. It is pretty amazing that a quarter of an ounce of interconnected nerve cells wrapped up in a pound of fur, bone and muscle can get into all that trouble.

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