Fear-Based Aggression – What is Fear?

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Introduction

Fear is a very common cause of truly threatening behaviors seen by veterinarians, trainers, and technicians. Unfortunately, there are many misunderstandings about the intersection of fear and aggression. For the purposes of this lecture only, we will define fear as an emotional and physiological reaction within the body which serves to protect an individual from danger by calling attention to potential safety risks and preparing the body to respond to them through fight or flight. We will define aggression as the body language and actions of threat intended to help a fearful animal survive a trigger situation through "fighting" for survival. A definition of aggressive behavior could be discussed for hours amongst esteemed colleagues, but that is beyond the scope of this lecture.

We will start by exploring some of the brain regions that contribute to fear, then assess the relationship between fear and aggression, and finish with a discussion of the differences between adaptive fear and maladaptive fear.

Important brain regions of fear

The sensory cortexes and sensory thalamus identify threats through two major routes, the fast route and the slow route.

The amygdala plays a role in both routes. This is a group of alarm circuits connected to the hippocampus (memory storage and context), hypothalamus, septum, and reticular formation/brain stem.

In the fast route, stimuli trigger activation from the sensory thalamus to the amygdala and start the life-saving fight, flight, and freeze behaviors that tell us a patient is fearful.

In the slow route stimuli go from the sensory thalamus to the sensory cortex and then to the hippocampus and amygdala creating the emotional response known as fear.

Important brain regions of anxiety

Both the sensory cortex and the sensory thalamus send information to the amygdala. Here the lateral nucleus plays a role in decoding emotions and in fear-conditioning. Lateral nucleus activation activates the central nucleus which in turn sends signals to the hypothalamus and the locus ceruleus. When activated these circuits can be strengthened leading to specific phobias.

The hippocampus has multiple connections to the amygdala and is important in processing sets of triggers and creating context. It is also involved in memory storage and retrieval for explicit memories. It helps the individual identify the environment associated with a fear-memory. This activation can create anxiety as an individual may experience the threat of trigger exposure with only short, low-intensity, or infrequent access to the triggers.

The prefrontal cortex (the thinking brain) plays a role in in extinction through pair of a trigger with non-aversive outcomes. It allows planning and action based on responses to fight or flight, and it also allows the imagination to "run wild" anticipating problems.

Fear and anxiety have some important differences

Fear is due to a specific, observable cue that is currently present. During a fear response, attention becomes focused solely on the potential trigger or unsafe situation. In humans, it's considered to be objective and rational. For instance, in a dog it is objective and rational to avoid a person screaming and moving erratically. Fear is strongly associated with the fight or flight response.

Anxiety tends to lack a specific cue. It is an emotion related to concerns about future events and creates a broadening of attention. For instance, anxious animals are often scanning the environment more than their less anxious counterparts. While fight or flight emotions and activations may contribute to or come along with symptoms of anxiety, it is not necessary to have full triggering of a fight or flight response for a patient to be anxious.

Fear and aggression are connected in flight, flight, and freeze

The so-called fight or flight response is initially not conscious, moving through the fast-route vs the slow-route to the amygdala.

When fearful behavior doesn't increase the patient's distance from the trigger, aggression may result. If the aggressive behaviors function to stop, inhibit, or limit the trigger aggressive behavior may increase in the future as the result of negative reinforcement. When the behaviors are negatively reinforced, latency, intensity, and recovery are also impacted.

Maladaptive fear vs adaptive fear

Adaptive fear is a fear of something truly potentially harmful. It increases evolutionary fitness, increases individual survival, and is dependent on the presence of a specific trigger or context. An adaptive fear response is fast in response, in context for the trigger, and in proportion to the trigger.
Maladaptive fear occurs when triggers are not likely to be physically or psychologically harmful. This decreases evolutionary fitness and can decrease individual survival. This response is also quick and dependent on the presence of the trigger. It is out of context and not proportionate to the risk posed by the trigger.

Constant or frequent triggering of fight or flight can cause chronic stress for patients and have negative physiological outcomes.

Once one can ID whether a fear is maladaptive or adaptive, the clinician can work towards improving safety, teaching the animal new ways to cope with the trigger itself or the context where the trigger has been presented. Remember, just because a fear is adaptive (such as fear during veterinary handling) that doesn't mean one shouldn't treat it.

Conclusion

Multiple brain regions connect to create symptoms of fear and anxiety. There are important differences and brain pathways for both, and they can occur in the same patient. Understanding the differences between adaptive fear and maladaptive fear can help guide treatment.