

The Tragic, Seemingly Unlikely Victims of Wildfires

Wildlife, ranch and farm animals aren't the only creatures that end up in harm's way during fire season. Sadly, both shelter and privately owned pets are also too often victims. And now, this new study reveals the unfortunate after-effects of wildfires on pets.

Analysis by Dr. Karen Shaw Becker

STORY AT-A-GLANCE

- A new study by veterinary researchers at the University of California, Davis reveals that wildfire-injured domestic cats have increased overactive platelets compared to healthy cats or cats with hypertrophic cardiomyopathy (heart disease), which puts them at risk of forming deadly blood clots
- The researchers found that cats exposed to wildfire smoke and injuries are at significantly increased risk of throwing clots, pointing to a direct association between wildfire injuries, platelet response and clot formation
- An earlier 2020 study of cats who suffered burns during California's wildfires showed a high incidence of heart effects; heart muscle thickening was present in over half the cats (51%) while nearly 30% had blood clots or were at high risk of them
- Both the 2020 study and the current study highlight the need for veterinarians to screen cats for heart changes and blood clots if they've been exposed to wildfires
- Understanding more about the injuries cats sustain from wildfires will translate to better treatment and injury prevention in both cats and humans

As many of you are probably aware, wildfires in California are an ongoing problem, year-in and year-out. When it comes to creatures in harm's way during fire season, it's not just wildlife, ranch, or farm animals. Sadly, both shelter pets and privately owned pets are also too often victims of wildfires.

And now, a new study by researchers at the Veterinary Medical Teaching Hospital (VMTH) at the University of California, Davis, confirms that the poor cats who suffer burns and smoke inhalation in urban California wildfires are also at risk of forming deadly blood clots.¹ The study follows up on an earlier discovery that cats injured in urban wildfires had a high rate of heart problems.²

"Prior to these two papers, we didn't realize that cats impacted by urban wildfires were prone to forming clots, which can lead to sudden death," lead co-author Ronald Li, associate professor of small animal emergency and critical care at UC Davis said in a university news release. "This study will change the standard of care for rescued cats from these wildfires and hopefully save more lives."³

Earlier Study Revealed Severe Heart Changes

As noted above, in the earlier 2020 study, also conducted by UC Davis veterinary researchers, we learned that cats exposed to wildfires have a high risk of heart problems. Fifty-one domestic cats who received thermal burns during California wildfires in 2017 and 2018 underwent ultrasounds of their hearts (echocardiograms), which revealed that

many had heart effects, including heart muscle thickening and blood clots.

"Many of these cats had moderate burns but had really severe heart changes," lead author Catherine Gunther-Harrington, assistant professor of clinical cardiology at UC Davis VMTH, said in a news release.⁴

Heart muscle thickening was present in over half the cats (51%) while nearly 30% had blood clots or were at high risk of them.

"What was most surprising to us was the vast number of cats that were affected and the severity of their condition," said Gunther-Harrington.

According to the research team, significant cardiovascular effects are known to occur secondary to thermal burns and smoke inhalation in both humans and animals. In humans, cardiovascular dysfunction, caused by pathologic changes and an inflammatory response, may persist for up to three years following the initial burn injury or smoke inhalation.

Smoke inhalation exposes the respiratory system to many toxic substances, including carbon monoxide and cyanide, while leading to "the coagulation cascade."

"Systemic inflammation secondary to the initial thermal injury results in activation of the coagulation cascade and, subsequently, a hypercoagulable state," or an abnormally increased tendency toward blood clotting, according to the study.

Current Diagnostics and Treatments May Not Be Sufficient

Currently, recommended therapy for wildfire-injured cats may include oxygen support, fluids, wound management, pain management and treatment for any complications. However, the 2020 study highlights the need for veterinarians to screen cats for heart changes if they've been exposed to wildfires. Gunther-Harrington added:

"Most of these cats were able to survive and recover, despite the severity of their condition. That gives us hope because we know there will likely be more cats in the future injured in wildfires. The more we learn, the better care we can provide for them."⁵

In California, for instance, veterinarians are using the sterilized skin of tilapia fish to heal burn wounds in animal victims of recent wildfires. It's also likely that understanding more about the injuries cats sustain from wildfires will translate to better treatment and prevention in humans, with researchers noting:

"This study highlights the clinical and pathophysiologic similarities between feline smoke inhalation and burn injury patients to humans with similar exposures suggesting a truly translational opportunity for each species to inform future mechanistic and therapeutic research."

Wildfire-Injured Cats Also Have Increased Overactive Platelets

For the current study, the UC Davis researchers examined the platelets (cells that circulate in blood and help stop bleeding or form blood clots) in blood samples from cats treated for wildfire injuries received during the 2018 Camp Fire in Paradise, CA.

They discovered the cats had “increased overactive platelets compared to healthy cats or cats with heart disease, in this case subclinical hypertrophic cardiomyopathy, or HCM.” HCM is the most common heart condition in felines and accounts for 80% of heart problems in cats.⁶

“Cats with HCM are hypercoagulable, meaning they are more likely to form clots,” explained lead study co-author Ava Tan. “That’s why we used them as a control group to compare with cats in the wildfire group.”⁷

The platelets of the wildfire-injured cats also released high amounts of microvesicles — “microscopic membranous bubble-like structures filled with proteins” that are linked to heart disease and increased risk of clotting.

“We found cats exposed to wildfire smoke and injuries are even more prone to throwing clots, showing a direct association between wildfire injuries, platelet response and clot formation,” Tan said.

In addition to clot formation, platelets play a significant role in overall cardiovascular health and disease. The study also revealed a novel receptor on cat platelets, Toll-Like-Receptor-4, that may play a role in clotting and could be the target for future treatments.

“These results could lead to bigger health implications for our feline patients and highlight the important role that platelets play in linking inflammation with the coagulation system,” Li said.

Study Could Shed Light on Wildfires and Human Heart Health

Interestingly, after wildfire exposure, human emergency room visits increase due to heart attacks and strokes, and while the dots have yet to be connected, the study in cats could shed light on systemic platelet activation and the crucial role it plays in mediating the risk of developing clots as a result of wildfire injuries.

“This study opens a new door to looking at how wildfires impact cardiovascular health in humans,” Li said.

This second study of wildfire-injured cats has led to a third study, now underway, to discover new cellular process that can hopefully shed light on why the platelets of cats are so sensitive and prone to clotting, especially in cats with heart conditions or wildfire injuries.

Keeping Pets Safe During Wildfires

The California wildfires have claimed the lives of countless animals while injuring many more. Evacuation orders can come quickly, and pet owners may find themselves having to flee even faster. Keeping your cat indoors if a wildfire is near or an air quality alert is in effect is important.

You should also have a pet evacuation plan ready, so you and your pets can get out safely if necessary. Seek out animal-friendly public shelters or speak with friends or family outside of your immediate area who you and your pets could stay with if necessary.

Pets with an underlying cardiovascular or respiratory disease are at increased risk of health problems from exposure to smoke. However, all pets should be kept indoors if air quality is poor. If your pet has been exposed to wildfire smoke, keep a close watch for any of the following symptoms, and see your veterinarian if they occur:⁸

- Coughing or gagging
- Eye irritation and excessive watering
- Nasal discharge
- Increased breathing rate
- Disorientation or stumbling
- Difficulty breathing, including open mouth breathing and increased noise when breathing
- Inflammation of throat or mouth
- Asthma-like symptoms
- Fatigue or weakness
- Reduced appetite and/or thirst

Sources and References

¹ [Tan, A.W. et al. Front. Vet. Sci., 14 July 2022, Sec. Veterinary Emergency and Critical Care Medicine](#)

² [Sharpe, A.N. et al. Scientific Reports, Volume 10, Article number: 2648 \(2020\).](#)

^{3, 7} [UC Davis Health News, July 14, 2022](#)

⁴ [UC Davis Health News, February 26, 2020](#)

⁵ [Science Daily February 26, 2020](#)

⁶ [The News-Gazette, December 20, 2018](#)

⁸ [AVMA, Wildfire smoke and animals](#)
