

Tiny pump means pain relief for big cats

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Osmotic pumps now help veterinarians to provide pain killers to big cats such as the leopard after surgical procedures. Credit: Julie Larsen Maher (c) WCS

Veterinarians from the Wildlife Conservation Society's Bronx Zoo and the University of Tennessee have found a solution to the challenge of providing effective pain relief to some of their most difficult patients: big cats.

The answer: A surgically implanted, capsule-sized pump that provides continuous [pain relief](#) while the animal recovers from surgery, according to a new study appearing in the August edition of the *American Journal of Veterinary Research*.

The paper features the results of evaluations carried out with domestic

cats at the University of Tennessee for the purpose of evaluating the potential usage of osmotic pumps for big cats. As a result of this work, the units have already been used successfully on two leopards that both underwent spay procedures at [Tiger Haven](#), a big cat sanctuary in Tennessee.

"Osmotic pumps are a reliable, largely non-invasive means of providing pain relief to big cats such as leopards, tigers and other species after surgery," said Dr. John Sykes of the Wildlife Conservation Society's Global Health Program and lead author on the paper. "They can be placed within the cat at the end of an operation and then removed after a period of weeks with no other handling required."

The co-authors of the study are Drs. Sherry Cox and Edward C. Ramsay of the University of Tennessee. The study was funded by the Morris Animal Foundation.

Delivering pain relief to pet animals such as dogs, cats, or rabbits after surgery is relatively easy as opposed to wild animals in zoos. Some have tried using transdermal patches in domestic cats, but wild cats tend to remove them shortly after waking up from surgery. And while small cats can be held to give pills or injections to relieve pain, larger cats—leopards, tigers, cougars, and lions—are too powerful to restrain easily. In addition, big cats will typically stop eating when in pain, eliminating the possibility of administering oral medication in tasty treats.

Osmotic pumps, on the other hand, provide veterinarians with a delivery device that cannot be removed by the animal patient and limits the required handling of the animal for a minor procedure to implant and remove the pump weeks later (as opposed to daily injections delivered via drug darts for weeks).

The pump itself is a small capsule shaped unit (ranging between 1.5 and 5.1 centimeters in size) that is placed just beneath the surface of the skin of the animal's shoulder during surgery and is easy to implant and remove. The pump contains the pain medication (in this case fentanyl), which resides inside a bag within the pump. The outer casing of the pump is permeable, and plasma from the animal is drawn into the casing through the process of osmosis, and the medication diffuses out through a small opening at the top of the pump. Since the flow of liquid out of the pump is constant, veterinarians control the rate of dosing through the concentration of the drug in the pump.

"This is a great example of how existing methodologies can be adapted for usage in wild cats in captive breeding programs," said Dr. William Karesh, Vice President and Director of WCS's Global Health Program. "It's a win-win in that it reduces the effort by veterinarians to treat big cats while helping to reduce stress and thus speed healing in the cats themselves."

To assess the potential of osmotic pumps for usage in larger cats, Sykes and other authors conducted clinical trials on house cats at the University of Tennessee, comparing the effectiveness of the osmotic pumps versus transdermal patches. After implanting pumps, the veterinarians tested each of the cats for the presence of the pain medication fentanyl in the blood stream at six-hour intervals for a full period of 96 hours, after which the pumps were surgically removed. Later, the cats were given post-operative fentanyl doses via transdermal patches and the blood was similarly tested.

According to the results, the osmotic pumps delivered pain medications more quickly into the blood stream of the cats than the transdermal patches. The medications also disappeared from the bloodstream more quickly upon removal of the pumps than the patches. All of the house cats are doing well.

Osmotic pumps also provide veterinarians with a means of delivering other medications. Wildlife Conservation Society veterinarians have successfully used osmotic pumps to administer antibiotics to snakes and other species at the [Bronx Zoo](#).

Source: Wildlife Conservation Society ([news](#) : [web](#))

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