

First French bulldog with sex reversal identified in Spain

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To prevent Tana from suffering any medical complications, the best option was felt to be surgical sterilization. Credit: Marcos Campos.

Tana, a female French bulldog, was brought to a veterinary centre for her first vaccination. Specialists there were alerted by the size of her clitoris, which was "larger than normal", and they started to carry out tests. These revealed the first ever genetic alteration ever detected in the reproductive system of this breed – the female puppy had cryptorchid testicles (outside the scrotum).

Genetic alteration of the reproductive system or sexual reversal "has been described in many species, such as goats, pigs, horses and even human beings", Marcos Campos, lead author of the study and also a researcher at the CEU-Cardenal Herrera University and director of the Reprovalcan assisted reproduction centre for small animals, tells SINC.

The puppy Tana, which was three months old when brought for her first consultation, presented symptoms compatible with having a [genetic alteration](#) of the [reproductive system](#) – she had a large clitoris. "She was a chromosomally XX female but with masculine gonads (cryptorchid testicles) due to the presence of other genes that determined the formation of testicles in the absence of the genes present on the Y chromosome", explains Campos.

This alteration, which has also been described in another 18 breeds of dog around the world, is "uncommon but it can occur". Sex reversal causes sterility and, over the long term, may predispose the animal to pathologies such as infections or tumours of the gonads, "since this is not a normal genital", the veterinarian explains.

The study, which has been published in *Reproduction in Domestic Animals*, showed that the urethra ended in the bladder, and the clitoris, which was 0.8 centimetres long, contained a penis bone, which predisposed it to urinary infections that would likely cause the dog to be infertile.

Canine hermaphroditism with a happy ending

The puppy, which is the first documented case anywhere in the world of a French bulldog with this alteration, had a low level of masculinisation, since despite the size of the clitoris, the vulva was normal.

To prevent Tana from suffering any medical complications, the best option was felt to be surgical sterilisation, during which her genitals were completely removed and later sent to a histopathology laboratory. "The puppy is now in perfect health", says Campos.

The veterinarians suggest that the parents of hermaphrodite puppies should be withdrawn from breeding programmes, because "it is likely

that at least half of their litters will be carriers". The siblings of affected puppies should not be allowed to breed either until the mutant genes have been identified, which would make it possible to eliminate the carriers.

However, there are still no data available about the affected dogs belonging to this particular breed, which would enable the heredity model to be identified. Genetic modelling from other breeds shows that this is a autosomal recessive alteration (the animal only needs to receive the abnormal gene from one of its parents in order to inherit the sex reversal).

More information: Campos, M.; Moreno-Manzano, V.; García-Roselló, M.; García-Roselló, E. "SRY-Negative XX Sex Reversal in a French Bulldog" *Reproduction in Domestic Animals* 46(1): 185-188, February 2011.

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