

# **Feline Surgery and Medicine**

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**2016**

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## Preface

Cats have either a mutualistic or commensal relationship with humans. Two main theories are given about how cats were domesticated. In one, people deliberately tamed cats in a process of artificial selection as they were useful predators of vermin. This has been criticized as implausible, because the reward for such an effort may have been too little; cats generally do not carry out commands and although they do eat rodents, other species such as ferrets or terriers may be better at controlling these pests. The alternative idea is that cats were simply tolerated by people and gradually diverged from their wild relatives through natural selection, as they adapted to hunting the vermin found around humans in towns and villages

Cats are common pets in Europe and North America, and their worldwide population exceeds 500 million.

From time to time, cats may require a surgical procedure. Usually the first time a cat undergoes surgery is when it is desexed (spayed/neutered) as a kitten. Most surgeries are pre-planned, but as accidents happen, there may be an unfortunate time the cat will undergo emergency surgery.

The goal of veterinary medicine in cats is a bit like in human beings, and more and more complex operations are performed, with sophisticated anesthesia techniques. In cats, the cost of the operation must not exceed the economic benefit in surgically treating the illness. There is a possibility that during a pet's lifetime, surgery may be recommended to treat a medical condition. So, it does not hurt to know what the most common medical conditions requiring surgery are, and how much you might pay for treatment.

This text is concerned with medicine and surgical considerations of the feline species. The book includes a chapter on general surgical considerations that provide up-to-date information for practitioners and veterinarians.

Each of the operations mentioned in the book is described widely starting from the anatomical structure of the targeted tissue or organ followed by the techniques used to perform the surgery. Also the type of the anesthesia used is mentioned.

The specific surgical content is covered on the basis of body systems, with diagrams or photographs and illustrations. The reproduction of some photographs could be improved.

The main purpose of the book is to point out the interest of feline medicine and surgery and the progress in the field of veterinary surgery and to clear its importance in the field of veterinary medicine. The book is concisely and clearly written and intended for veterinarians and clinicians and for people directly involved in cat health, management and breeding. It would also be of value to post and undergraduate veterinary students.

Prof. Hussein A. Kaoud

## Introduction

The **domestic cat** (*Felis catus* or *Felis silvestris catus*) is a small, usually furry, domesticated, and carnivorous mammal. They are often called a **housecat** when kept as an indoor pet or simply a **cat** when there is no need to distinguish them from other felids and felines. Cats are often valued by humans for companionship and their ability to hunt pests.

Cats are similar in anatomy to the other felids, with strong, flexible bodies, quick reflexes, sharp retractable claws, and teeth adapted to killing small prey. Cat senses fit a crepuscular and predatory ecological niche. Cats can hear sounds too faint or too high in frequency for human ears, such as those made by mice and other small animals. They can see in near darkness. Like most other mammals, cats have poorer color vision and a better sense of smell than humans.

Despite being solitary hunters, cats are a social species and cat communication includes the use of a variety of vocalizations (mewing, purring, trilling, hissing, growling and grunting), as well as cat pheromones and types of cat-specific body language.

All the cats in this genus share a common ancestor that probably lived around 6–7 million years ago in Asia. The exact relationships within the Felidae are close but still uncertain, e.g. the Chinese mountain cat is sometimes classified (under the name *Felis silvestris bieti*) as a subspecies of the wildcat, like the North African variety *F. s. lybica*.

In comparison to dogs cats have not undergone major changes during the domestication process, as the form and behavior of the domestic cat is not radically different from those of wildcats and domestic cats are perfectly capable of surviving in the wild. Fully domesticated house cats often interbreed with feral *F. catus* populations. This limited evolution during domestication, means that hybridisation can occur with many other felids notably the Asian leopard cat. Several natural behaviors and characteristics of wildcats may have preadapted them for domestication as pets. These traits include their small size, social nature, obvious body language, love of play and relatively high intelligence; they may also have an inborn tendency towards tameness.

Cats have either a mutualistic or commensal relationship with humans. Two main theories are given about how cats were domesticated. In one, people deliberately tamed cats in a process of artificial selection, as they were useful predators of vermin. This has been criticized as implausible, because the reward for such an effort may have been too little; cats generally do not carry out commands and although they do eat rodents, other species such as ferrets or terriers may be better at controlling these pests. The alternative idea is that cats were simply tolerated by people and gradually diverged from their wild relatives through natural selection, as they adapted to hunting the vermin found around humans in towns and villages.

## Cat genetics

The domesticated cat and its closest wild ancestor are both diploid organisms that possess 38 chromosomes and roughly 20,000 genes. About 250 heritable genetic disorders have been identified in cats, many similar to human inborn errors. The high level of similarity among the metabolism of mammals allows many of these feline diseases to be diagnosed using genetic tests that were originally developed for use in humans, as well as the use of cats as animal models in the study of the human diseases.

Cats, like dogs, are digitigrades. They walk directly on their toes, with the bones of their feet making up the lower part of the visible leg. Cats are capable of walking very precisely, because like all felines, they

directly register; that is, they place each hind paw (almost) directly in the print of the corresponding fore paw, minimizing noise and visible tracks. This also provides sure footing for their hind paws when they navigate rough terrain. Unlike most mammals, when cats walk, they use a "pacing" gait; that is, they move the two legs on one side of the body before the legs on the other side. This trait is shared with camels and giraffes. As a walk speeds up into a trot, a cat's gait changes to be a "diagonal" gait, similar to that of most other mammals (and many other land animals, such as lizards): the diagonally opposite hind and fore legs move simultaneously.

## Physiology

Table 1: Normal physiological value

Body temperature	38.6 °C (101.5 °F)
Heart rate	120–140 beats per minute
Breathing rate	16–40 breaths per minute

## Cat senses

Cats have excellent night vision and can see at only one-sixth the light level required for human vision. This is partly the result of cat eyes having a tapetum lucidum, which reflects any light that passes through the retina back into the eye, thereby increasing the eye's sensitivity to dim light. Another adaptation to dim light is the large pupils of cats' eyes. Unlike some big cats, such as tigers, domestic cats have slit pupils. These slit pupils can focus bright light without chromatic aberration, and are needed since the domestic cat's pupils are much larger, relative to their eyes, than the pupils of the big cats. Indeed, at low light levels a cat's pupils will expand to cover most of the exposed surface of its eyes. However, domestic cats have rather poor color vision and (like most nonprimate mammals) have only two types of cones, optimized for sensitivity to blue and yellowish green; they have limited ability to distinguish between red and green. A 1993 paper reported a response to middle wavelengths from a system other than the rods which might be due to a third type of cone. However, this appears to be an adaptation to low light levels rather than representing true trichromatic vision.

Cats have excellent hearing and can detect an extremely broad range of frequencies. They can hear higher-pitched sounds than either dogs or humans, detecting frequencies from 55 Hz to 79,000 Hz, a range of 10.5 octaves, while humans and dogs both have ranges of about 9 octaves. Cats can hear ultrasound, which is important in hunting because many species of rodents make ultrasonic calls. However, they do not communicate using ultrasound like rodents do. Cats' hearing is also sensitive and among the best of any mammal, being most acute in the range of 500 Hz to 32 kHz. This sensitivity is further enhanced by the cat's large movable outer ears (their pinnae), which both amplify sounds and help detect the direction of a noise.