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Mutations of one tumor suppressor gene named TP53 have been found in breast, colon, lung, and skin cancers. Normally our immune system finds mutated cells and destroys them before copies can be made. We may permit cancer to develop if we administer immune-suppressive drugs or acquire an immune-suppressive infection.

During cell division, mistakes occur when copying the genetic material or DNA. Repair genes normally correct the errors, but may be hampered by a lack of vitamins, minerals and amino acids that stabilize DNA through a process called *methylation*. Many abnormalities have been identified in cancer cell genes including scrambled sequences, truncated genes, fused base pairs and abnormal histone proteins that the DNA spirals around. We now believe that a number of perturbations of one's genetic material must occur before a normal cell is transformed into a malignant one. Once a cell population has transformed it may undergo more genetic aberrations that further its ability to invade healthy tissue or have a rapid growth rate. A tumor may be comprised of cells with a wide diversity of genetic material rather than simply be clones of one another. This adaptation makes it difficult to find perfect treatments for killing cancer.

The most conspicuous feature of cancer is how the incidence increases steadily with age. Since multiple hits must occur before a cell is transformed into cancer it follows that there might be multiple ways we can prevent cancer over our lifetime. Individuals who inherit a mutation may be a step closer to developing cancer than those without, but the most important determinants of when and how cancer develops are environmental quality and our lifestyle.

How dogs and cats acquire cancer

Given that cancer develops from a series of missteps in life, how might a dog or cat develop this disease? Animal health care changed radically after 1989 when the American Veterinary Medical Association recommended that all cats and dogs be vaccinated annually against distemper and other viral diseases; when persistent heartworm, flea, and tick pesticides hit the market; and when consumers traded home preparation of pet food for the convenience of mass-marketed foods.

A typical series of cancer risks now looks something like this:

1. A normal puppy or kitten receives one-too-many vaccinations and begins to de-compensate for the excess antigenic load with inflammation and allergic reactions. The result of an excessive number or dose of vaccines is childhood allergies (seen as eye, ear, nose, skin, and intestinal disorders). With each annual vaccine booster, the cycle of inflammation and allergic reactions repeats itself.
2. Inflammatory or allergic signs are suppressed with drugs such as antihistamines, steroids and antibiotics. Steroids suppress the immune response and are permissive for cancer to get established. Antibiotics destroy benign and beneficial bacteria, allowing more virulent pathogens to survive, or opportunistic pathogens (such as yeast) to occupy an open niche. Without a deliberate effort to re-establish good bacteria, the young animal is pushed further away from being normal.
3. Monotonous diets of dry pet food are the opposite of a cancer-preventive diet. Largely formulated from grain by-products, animal proteins, animal fats and salt, they lack nearly all the anti-cancer compounds commonly found in fresh foods such as vegetables, fruits, nuts, oils and herbs. Without a deliberate plan to offer a cancer-preventive diet, these animals are at risk of developing cancer and other chronic degenerative diseases, due to eating a poor diet.
4. Persistent pesticides used to prevent heartworm, flea and tick infections can tax the body's ability to detoxify these chemicals. There is a limit to our ability to clear drugs, hormones, pesticides, toxic metals, synthetic preservatives and food additives. When we exceed the body's ability to remove these products, we increase the likelihood of a mutagenic event.
5. When the limitations of modern health care (listed above) push the animal further from self-regulation there is an increased need for nutrients to slow the aging process and promote repair. Unless a deliberate effort is made to fortify the diet with protective antioxidants, essential fatty acids, and immune-supportive foods, the innate immune system cannot keep up with the number of insults we have placed on the body.

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