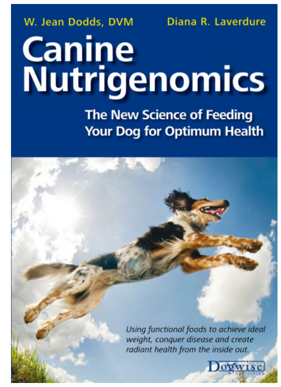
An excerpt from

Canine Nutrigenomics: The New Science of Feeding Your Dog for Optimum Health



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Introduction

Obesity. Gastrointestinal disorders. Skin irritations. Chronic yeast infections. Behavioral issues. Arthritis. Autoimmune diseases. Heart disease. Cancer. These are just a few of the common health conditions plaguing our dogs in skyrocketing—and in some cases epidemic—numbers.

These conditions might not appear to share much in common, but they all result from inflammation that originates at the deepest level in your dog's body—his cells. Where does this inflammation come from? Much of it stems from the lifestyles our dogs share with us, their caretakers—and especially from their modern diet. As you will soon see, many of the foods that are marketed to nourish our dogs actually wreak havoc on them from the inside out, resulting in rampant obesity and chronic disease (Dodds, 2014; Dodds, 2014a). But it doesn't have to be this way.

There is scientific information out there to help your dog live a long life bursting with health and free of chronic illness. You just likely haven't heard much about it until now. This information is what *Canine Nutrigenomics: The New Science of Feeding Your Dog for Optimum Health* is all about.

In the following pages, we will reveal the latest scientific findings showing how nutritional ingredients "speak" to your dog's body at the cellular level. We will disclose how many of the foods you (and likely your veterinary professional) consider healthy are really sending *un*healthy messages to your dog's genes. And, we will offer powerful tools to maximize your dog's health by feeding him to promote optimal gene expression, no matter what his current condition (more on gene expression in a minute).

The concept of eating healthy is not new, but it's only over the past decade that scientists have really begun to understand how diet affects us at the deepest level—the level of our cells. The major breakthrough occurred in 2003 with the completion of the Human Genome Project, a groundbreaking international research program in which scientists sequenced and mapped the location of the known genes in the human body. (Sequencing means determining the exact order of the chemical base units, signified by the letters A, T, G and C that make up a strand of DNA) (NHGRI, 2011). Our DNA contains our genes, which provide the instructions to make proteins that determine everything about us, from our gender and eye color to our ability to fight off disease. An organism's complete set of DNA, including all of its genes, is called its genome. The human genome contains an estimated 20,000 to 25,000 genes, each of which codes for an average of three proteins. We all have trillions of cells, and just about every one of these cells contains a complete copy of our **genome** (NHGRI, 2011; NHGRI, 2012). Understanding the genome is critical to treating, managing and preventing illness, because *virtually every disease has a genetic basis* (NHGRI, 2011).

And humans aren't the only ones to benefit from genomic mapping. Scientists have also sequenced the genomes of many other species, including dogs. (A Boxer named Tasha was the first dog to have her DNA sequenced!) The Dog Genome Project demonstrated that people share an even closer bond with our canine companions than we previously realized—right down to the structure and evolution of our genes (Broad Institute, 2014). There are approximately 21,000 genes in the canine genome (Starr, 2011). In 2013, researchers from the University of Chicago and other international institutions found that *humans and domestic dogs share an extensive parallel genomic evolution, particularly in genes associated with digestion and metabolism, neurological processes and diseases such as cancer*. According to the researchers, these genes have likely evolved in parallel due to the close living environment shared by humans and dogs over many thousands of years, including possibly scavenging for food together (Lee, 2013; Wang et al., 2013). This is really exciting news (but probably not *surprising* to those of us who feel deeply connected to our dogs!) because it means that both species can benefit from much of the same new scientific information regarding the best way to eat for optimum cellular health.

But exactly how does food communicate with our cells and control our genes? Although the body contains trillions of cells that contain complete copies of the genome, not all cells behave the same; rather, they specialize with different identities and functions (The University of Utah, 2014). Some cells become heart cells, while others become bone cells, brain cells, kidney cells, muscle cells, skin cells and so on. What makes cells different? Every gene codes for proteins, but not all genes make proteins in all cells all of the time. Instead, different sets of genes are turned on (active) or off (suppressed) to make proteins in various cells at different times (NHGRI, 2012a; The University of Utah, 2014). The process of turning genes on or off inside a cell is called **gene expression**. The way our genes express determines a great deal about our destiny. But what controls gene expression?

This is where the **epigenome** comes in. The epigenome is a structural layer that surrounds our DNA and the proteins they are attached to. The epigenome initiates chemical reactions within cells that control gene expression, determining which genes are turned on or off and which proteins are produced (NHGRI, 2012a; Sample, 2009; The University of Utah, 2014). By changing a cell's gene expression, the epigenome also changes the cell's destiny, determining whether it will become a brain cell, a heart cell or a skin cell—and whether it will become a healthy cell or a diseased cell (The University of Utah, 2014).

And *this* is where food comes in. We now know that the epigenome is highly responsive to environmental signals—including diet. This brings us to the exciting new scientific field—and the topic of this book—called **nutrigenomics** (nutri-gen-om-ics). Nutrigenomics, a combination of the words *nutrition* and *genomics*, is the science of how diet affects the epigenome and thus gene expression, which in turn alters our genetic predisposition toward health or disease (Dodds, 2014; Dodds, 2014a; Elliot and Ong, 2002; Fekete and Brown, 2007; Swanson, Schook and Fahey, 2003).

Just as we inherited our genes from our parents, our epigenome also has a cellular memory that can be passed from one generation to the next (The University of Utah, 2014). This means that a mother and father's lifestyle decisions—including the quality of their diet—will influence the epigenome of their offspring! Unlike the genome, however, we *can* alter our epigenome over time with new environmental signals, such as optimum nutrition. And that is exactly what you will learn to do with your dog's diet!

W. Jean Dodds, DVM, a veterinarian for 50 years, has a worldwide reputation for being at the forefront of veterinary science, clinical research and animal welfare; she has 25 patents, and has authored numerous scientific papers, book chapters and two books. She moved from upstate NY to southern California in 1986 to start Hemopet, the first non-profit national animal blood bank. Today, Hemopet's range of nonprofit services also include specialized diagnostic testing; consulting in clinical pathology; and teaching for animal health care professionals, kennel clubs, and pet owners on a variety of subjects including nutrition and holistic medicine (www.hemopet.org).
Diana Laverdure MS (2015) is an award-winning dog health writer, pet nutritionist and animal nutrition activist. She is a dog health columnist, canine nutrition columnist, frequent contributor to many national dog magazines and has authored two books on canine health and nutrition with Dr. W. Jean Dodds. Through her company, Pet Food Diva (www.petfooddiva.com), Diana is leading a global movement to slash pet obesity and chronic illness via optimum nutrition based on the new science of nutrigenomics.