

THE AUTONOMIC NERVOUS SYSTEM
In Relation to Kelley's Dietary program and Cancer
A Compilation from Various Sources, Including Kelley and Gonzales
by Douglas Saint

In conventional neurophysiology, there are a collection of nerves which regulate metabolic processes perceived as beyond conscious or voluntary control such as circulation of blood, digestion, respiration, the secretion of enzymes and hormones, sexual reflexes and the overall rate of body metabolism.

Each division of the autonomic nervous system stimulates certain tissues, organs and glands and inhibits others. Furthermore, the two divisions tend to function in a contrary, or antagonistic way. For example, the sympathetic system, when firing, raises the heart rate but blocks the production and release of pancreatic digestive enzymes. When active, the parasympathetic nerves slow the heart rate but stimulate the manufacture and secretion of pancreatic juices.

The nerves controlling this "automatic" nervous system emerge from both the cranium and the spinal cord along with what are termed somatic nerves.

The following is a reprint that describes the scientific basis of the autonomic nervous system.

THE AUTONOMIC NERVOUS SYSTEM
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The nervous system is divided into the somatic nervous system which controls organs under voluntary control (mainly muscles) and the Autonomic Nervous System (ANS) which regulates individual organ function and homeostasis, and for the most part is not subject to voluntary control. It is also known as the visceral or automatic system. The ANS is predominantly an efferent system transmitting impulses from the Central Nervous System (CNS) to peripheral organ systems. Its effects include control of heart rate and force of contraction, constriction and dilatation of blood vessels, contraction and relaxation of smooth muscle in various organs, visual accommodation, pupillary size and secretions from exocrine and endocrine glands. Autonomic nerves constitute all of the efferent fibres which leave the CNS, except for those which innervate skeletal muscle. There are some afferent autonomic fibres (i.e. transmit information from the periphery to the CNS) which are concerned with the mediation of visceral sensation and the regulation of vasomotor and respiratory reflexes, for example the baroreceptors and chemoreceptors in the carotid sinus and aortic arch which are important in the control of heart rate, blood pressure and respiratory activity. These afferent fibres are usually carried to the CNS by major autonomic nerves such as the vagus, splanchnic or pelvic nerves, although afferent pain fibres from blood vessels may be carried by somatic nerves. The ANS is primarily involved in reflex arcs, involving an autonomic or somatic afferent limb, and then autonomic and somatic efferent limbs. For instance, afferent fibres may convey stimuli from pain receptors, or mechanoreceptors and chemoreceptors in the heart, lungs, gastrointestinal tract etc.

There may then be a reflex response to this involving autonomic efferent fibres causing contraction of smooth muscle in certain organs (e.g. blood vessels, eyes, lungs, bladder, gastrointestinal tract) and influencing the function of the heart and glands. The efferent limbs of these reflexes may also involve the somatic nervous system (e.g. coughing and vomiting). Simple reflexes are completed entirely within the organ concerned, whereas more complex reflexes are controlled by the higher autonomic centres in the CNS, principally the hypothalamus. The ANS is divided into two separate divisions called the Parasympathetic and Sympathetic Systems, on the basis of anatomical and functional differences. Both of these systems consist of myelinated preganglionic fibres which make synaptic connections with unmyelinated postganglionic fibres, and it is these which then innervate the effector organ. These synapses usually occur in clusters called ganglia. Most organs are innervated by fibres from both divisions of the ANS, and the influence is usually opposing (e.g. the vagus slows the heart, whilst the sympathetic nerves increase its rate and contractility), although it may be parallel (e.g. the salivary glands).

Parasympathetic Nervous System The preganglionic outflow of the parasympathetic nervous system arises from the cell bodies of the motor nuclei of the cranial nerves III, VII, IX and X in the brain stem and from the second, third and fourth sacral segments of the spinal cord. It is therefore also known as the cranio-sacral outflow. Preganglionic fibres run almost to the organ which is innervated, and synapse in ganglia close to or within that organ, giving rise to postganglionic fibres which then innervate the relevant tissue. The ganglion cells may be either well organised (e.g. myenteric plexus of the intestine) or diffuse (e.g. bladder, blood vessels). The cranial nerves III, VII and IX affect the pupil and salivary gland secretion, whilst the vagus nerve (X) carries fibres to the heart, lungs, stomach, upper intestine and ureter. The sacral fibres form pelvic plexuses which innervate the distal colon, rectum, bladder and reproductive organs. In physiological terms, the

parasympathetic system is concerned with conservation and restoration of energy, as it causes a reduction in heart rate and blood pressure, and facilitates digestion and absorption of nutrients, and consequently the excretion of waste products. The chemical transmitter at both pre and postganglionic synapses in the parasympathetic system is Acetylcholine (ACh). ACh is also the neurotransmitter at sympathetic preganglionic synapses, some sympathetic postganglionic synapses, the neuromuscular junction (somatic nervous system), and at some sites in the CNS. Nerve fibres that release ACh from their endings are described as cholinergic fibres. The synthesis of ACh occurs in the cytoplasm of nerve endings and is stored in vesicles in the presynaptic terminal. The arrival of a presynaptic action potential causes an influx of calcium ions and the release of the contents of several hundred vesicles into the synaptic cleft. The ACh then binds to specific receptors on the postsynaptic membrane and increases the membrane permeability to sodium, potassium and calcium ions, which results in an excitatory post-synaptic potential. The action of ACh is terminated by hydrolysis with the enzyme Acetyl Cholinesterase. The specific ACh receptors have been subdivided pharmacologically by the actions of the alkaloids muscarine and nicotine. The actions of ACh at the preganglionic synapses in both the parasympathetic and sympathetic systems is mimicked by nicotine, and all autonomic ganglia are therefore termed nicotinic. Nicotinic transmission also occurs at the neuromuscular junction, in the CNS, the adrenal medulla and at some sympathetic postganglionic sites (see later). However, the actions of ACh at the parasympathetic postganglionic nerve ending is mimicked by muscarine. Muscarinic transmission also occurs at certain sites in the CNS.

Sympathetic Nervous System The cell bodies of the sympathetic preganglionic fibres are in the lateral horns of the spinal segments T1-L2, the so called thoraco-lumbar outflow. The preganglionic fibres travel a short distance in the mixed spinal nerve, and then branch off as white rami (myelinated) to enter the sympathetic ganglia. These are mainly arranged in two paravertebral chains which lie anterolateral to the vertebral bodies and extend from the cervical to the sacral region. They are called the sympathetic ganglionic chains. The short preganglionic fibres which enter the chain make a synapse with a postsynaptic fibre either at the same dermatomal level, or at a higher or lower level, and then the longer postganglionic fibres usually return to the adjacent spinal nerve via grey rami (unmyelinated) and are conveyed to the effector organ. Some preganglionic fibres do not synapse in the sympathetic chains but terminate in separate cervical or abdominal ganglia, or travel in the greater splanchnic nerve and directly synapse with chromaffin cells in the adrenal medulla. As discussed above, ACh is the neurotransmitter via a nicotinic receptor at the preganglionic synapse. The adrenal medulla is innervated by preganglionic fibres and therefore adrenaline is released from the gland by stimulation of nicotinic ACh receptors. At most postganglionic sympathetic endings, the chemical transmitter is noradrenaline, which is present in the presynaptic terminal as well as in the adrenal medulla. In sweat glands, however, postganglionic sympathetic fibres release ACh and this transmission is nicotinic.

In contrast to the parasympathetic system, the sympathetic system enables the body to be prepared for fear, flight or fight. Sympathetic responses include an increase in heart rate, blood pressure and cardiac output, a diversion of blood flow from the skin and splanchnic vessels to those supplying skeletal muscle, increased pupil size, bronchiolar dilation, contraction of sphincters and metabolic changes such as the mobilisation of fat and glycogen. Adrenaline and noradrenaline are both catecholamines, and are both synthesized from the essential amino acid phenylalanine by a series of steps, which includes the production of dopamine. The terminal branches of the sympathetic postganglionic fibres have varicosities or swellings, giving them the appearance of a string of beads. These swellings form the synaptic contact with the effector organ, and are also the site of synthesis and storage of noradrenaline. On the arrival of a nerve impulse, noradrenaline is released from granules in the presynaptic terminal into the synaptic cleft. The action of noradrenaline is terminated by diffusion from the site of action, re-uptake back into the presynaptic nerve ending where it is inactivated by the enzyme Monoamine Oxidase in mitochondria or metabolism locally by the enzyme Catechol-O-Methyl-Transferase. The synthesis and storage of catecholamines in the adrenal medulla is similar to that of sympathetic postganglionic nerve endings, but due to the presence of an additional enzyme the majority of noradrenaline is converted to adrenaline. The adrenal medulla responds to nervous impulses in the sympathetic cholinergic preganglionic fibres by transforming the neural impulses into hormonal secretion. In situations involving physical or psychological stress, much larger quantities are released. The actions of catecholamines are mediated by specific postsynaptic cell surface receptors. Pharmacological subdivision of these receptors into two groups (alpha and beta) was first suggested by Ahlquist in 1948, based upon the effects of adrenaline at peripheral sympathetic sites. These have since been further subdivided on functional and anatomical grounds. Thus beta₁-adrenoceptor mediated effects in the heart (increased force and rate of contraction) have been differentiated from those producing smooth muscle relaxation in the bronchi and blood vessels (beta₂ effects). Similarly, alpha-adrenoceptor mediated effects such as vasoconstriction have been termed, alpha₁- effects, to differentiate them from the feedback inhibition by noradrenaline on its own release from presynaptic terminals, which is mediated by alpha₂-adrenoceptors on the presynaptic membrane. However, further research now shows that the classification is not as simple as this. For instance, many organs have both beta₁ and beta₂ adrenoceptors. (e.g. in the heart, there is one beta₂-adrenoceptor to every three beta₁-adrenoceptors). The receptors also show differing responses to adrenaline and noradrenaline. At beta₁ adrenoceptors in the heart, adrenaline and noradrenaline appear to have an equal effect, whereas at beta₂ adrenoceptors in smooth muscle are more sensitive to circulating adrenaline than noradrenaline.

Organ	Sympathetic Stimulation	Parasympathetic Stimulation
Heart	Increased heart rate β_1 (& β_2) Increased force of contraction β_1 (& β_2) Increased conduction velocity	Decreased heart rate Decreased force of contraction Decreased conduction velocity
Arteries	Constriction (α_1) Dilation (β_2)	Dilation
Veins	Constriction (α_1) Dilation (β_2)	
Lungs	Bronchial muscle relaxation (β_2)	Bronchial muscle contraction Increased bronchial gland secretions
Gastro-intestinal tract	Decreased motility (β_2) Contraction of sphincters (α)	Increased motility Relaxation of sphincters
Liver	Glycogenolysis (β_2 & α) Gluconeogenesis (β_2 & α) Lipolysis (β_2 & α)	Glycogen synthesis
Kidney	Renin secretion (β_2)	
Bladder	Detrusor relaxation (β_2) Contraction of sphincter (α)	Detrusor contraction Relaxation of sphincter
Uterus	Contraction of pregnant uterus (α) Relaxation of pregnant and non-pregnant uterus (β_2)	
Eye	Dilates pupil (α)	Constricts pupil Increased lacrimal gland secretions
Sub-Mandibular & parotid glands	Viscous salivary secretions (α)	Watery salivary secretions

Many approaches to regulating the autonomic nervous system have been used by different cultures and researchers to categorize the same phenomena.

The Chinese, it is speculated, first quantified the autonomic nervous system calling the process generally Yin or Yang (sympathetic or parasympathetic) and divided the effects according to nature, being fire, earth, metal, wood and water. The Chinese believed that the body could not be investigated internally, so their treatment came from visual observations involving the cause and effect of nerve stimulation through what is termed acupuncture points. They followed the nerves and discovered patterns of radiation from the spine and called them "meridians." Known in America as "Eastern Medicine" it is viewed as many things that it is not. Below is a comparison between Western Medicine and Traditional Chinese Medicine.

Western Medicine	Traditional Chinese Medicine
The body is composed of parts, like those of a machine. Parts are treated in isolation.	The body works together as a whole, and is treated as a whole.
Body, mind and spirit are separate and require separate practitioners.	Body, mind and spirit are interconnected and are addressed together.
Disease happens.	Disease is a failure on the part of the doctor.
Disease is caused by germs and outside forces.	Disease is caused by imbalance within.
The collection of symptoms is considered very important and is named (diagnosis or disease), and this is what is treated.	The symptoms or disease manifestations are relatively unimportant, and the underlying imbalance is treated.
The illness is treated.	The patient is treated.
Doctor gives care and advice, of which the patient is a passive recipient. The patient's only responsibility is compliance/obedience.	Doctor and patient work together in partnership toward their mutual goal, the patient's health.
The body malfunctions and needs to be fixed.	The body is designed to work correctly once barriers are removed.
The doctor's treatment is what fixes the body.	The doctor identifies problems and imbalances and corrects them, and the body should then heal itself.
The focus is on what one should do.	The focus is on what one should be.
Medicine as a science.	Medicine as an art.

Centuries ago, the Chinese brought religion into their practice of medicine. As there are religious connotations with this form of medicine, as the ancient practitioners, the psychological problem with so called Eastern medicine, in the eyes of many is the religious aspect of the practice. Nevertheless it is founded in physiological facts, as real as gravity.

In 1965, George Watson. Ph.D., wrote a book, "Nutrition and Your Mind" in which he explains how nutrition influences the operation of the mind through vitamins and minerals. This little recognized book is a wealth of information for those who are searching for information regarding autonomic modulation by foods. In that book, the world was first introduced to the concept of a psychological "type" of personality based solely upon the preference and consumption of foods.

Dr. David Watts, of Trace Elements International, has contributed a great deal to our understanding of the effects of specific nutrients on the function of the autonomic nervous system through his book, "Trace Elements and Other Essential Nutrients". His system uses the terms "fast" and "slow" metabolizers, to indicate the sympathetic and parasympathetic dominate types respectively. He divides these types into eight categories: Fast 1 through Fast 4 and Slow 1 through Slow 4.

Dr. Cary Reams divided those two groups into cationic (+) and anionic (-) categories to relate to sympathetic and parasympathetic systems respectively. He created a complicated formula to determine the individuals state of health. Many alternative practitioners ignore this and concentrate on the pH measurements of urine and saliva. While not according to Reams' original teaching, pH of urine and saliva do represent different states of physiological balance and may be used in the home environment with good results without expensive equipment and dangerous chemicals used to derive various values to satisfy his original equation.

The accepted pH scale runs from a pH of 0 - very acidic, to a pH of 14 - very alkaline. Although a pH of 7 is neutral (neither acid nor alkaline) Reams based his "zero" on 6.4 because it was his opinion that electrons needed a slightly acid medium to become functional. This truth is born out in agriculture and biochemistry. effective. as "normal" in the urine and saliva. Reams' believed that proper types of calcium and to a lesser extent, foods, whether cationic or anionic; acid or alkaline, so to speak, would result in a balanced metabolic system. The reams system is still taught today and is very effective in autonomic balancing.

Interestingly. the Periodic Table of the Elements is even arranged in rows that begin with the most anionic (alkaline, to most cationic minerals.

Variations in the Autonomic Nervous System

In 2000, William Wolcott wrote a book titled, "The Metabolic Typing Diet." In that book, he claims to be the foremost authority and originator of metabolic typing.

But it was William Donald Kelley, MS, DDS, who first quantified variations in individuals' parasympathetic and sympathetic nervous systems calling them metabolic types. These variations revealed a body dominance over either sympathetic or parasympathetic system. Kelley classified these variations into 12 metabolic types.

The Metabolic Types

Dr. Kelley believed that the human species can be divided into three genetically determined groups: "sympathetic dominants," "parasympathetic dominants" and "balanced types.

Dr. Kelley observed that the sympathetic dominant types have a more highly efficient sympathetic nervous system. In addition, the tissues, organs and glands normally stimulated by the sympathetic nerves - the heart, for example will be well developed. In this metabolic group the parasympathetic nervous system will be relatively inefficient, and all the tissues and organs normally activated by this system will be physiologically subordinate.

He also observed that the parasympathetic dominant types have a more highly efficient parasympathetic nervous system. Similarly, the tissues normally stimulated by these nerves, such as the pancreas, stomach and intestine will be more active and efficient, but the sympathetic nervous system, along with the tissues it activates, will be less active and physiologically subordinate.

Kelly also recognized that in the balanced types, both branches of the autonomic nervous system, with all the respective tissues, organs and glands will be more equally developed, active and efficient. In a sense, this group has a more "balanced" physiology than do the other two.

As Kelley centered his efforts on the study on cancer, he observed that those affected tended to be sympathetic dominant and would treat their disease using pancreatic enzymes and other parasympathetic stimulating nutrients to help the body swing back towards normal, under the belief that the body would heal. His success with this approach is well known.

The central nervous system tries as best it can to balance the autonomic nervous system when the body "swings" more towards one than the other.

Dr. Kelley claims the three types - the sympathetic dominants, parasympathetic dominants and balanced types - are the end product of evolutionary selection pressures. Each developed, he says, in a very distinctive environment, with a physiological makeup ideally suited to, and determined primarily by, the available food supply.

Specifically, the sympathetic dominants evolved in the jungles and grassland savannas of South America, Africa, Asia and Australia. These are the classical tropical and subtropical ecosystems, notable for a year round summer and at times, as in the Amazon, lush vegetation. Groups in these regions survived and thrived on a largely plant based diet of roots, nuts, seeds, fruits, and leaves. Even today, as anthropologists report, the diet of certain tribes in the Amazon and Australian bush consists of 80% plant food.

The parasympathetic dominants were more Northern people of the Arctic and Sub-arctic. They also inhabited the colder regions of Europe, Asia, and the Americas, in ecosystems of extreme cold, long winters and only a brief growing season. These people survived and thrived on a meat based diet and only occasionally consumed plant foods. Some "parasympathetic" groups, such as the Eskimos, flourished for generations on a virtually all meat diet providing no plant products whatsoever.

The balanced types evolved in the middle latitude regions of the continents, in ecosystems distinguished by four seasons and a diversity of both fauna and flora. People of these latitudes, Dr. Kelley says, had access to a great variety of foods including meat products, fish, nuts, seeds, primitive grains, roots, and fruits. In a sense, their diet fell somewhere between the sympathetic and parasympathetic extremes.

Dr. Kelley believes for generations the various types lived largely in isolation, separated by natural boundaries and great distances. In today's world, of course, this ecological seclusion no longer holds true. In a country such as the United States, particularly, Dr. Kelley identifies all three groups and the various subtypes living together side by side. Because of such mingling and inevitable interbreeding, a certain mixing of genes has occurred. But for the most part, Dr. Kelley claims the types tend to breed true and have the same physiological makeup as their prehistoric ancestors.

Nutrition and the Metabolic Types

Sympathetic dominants, Dr. Kelley says, as they exist today, remain adapted to a largely vegetarian diet. In actual practice, Dr. Kelley recommends his sympathetic patients obtain 80% of all calories from raw plant products such as unprocessed fresh fruits, vegetables, nuts, sprouts, and seeds such as pumpkin and sunflower seeds. However, certain vegetables with a high fat content - avocados, for example - are to be avoided.

The remaining 20% of the diet provides lightly cooked vegetables, cooked whole grains, whole grain breads and animal products. Dr. Kelley recommends lean fish and poultry three to four times a week, but no more frequently than this. A daily egg and limited quantities of dairy products are also allowed, but red meat should be consumed only occasionally.

For parasympathetic dominants, Dr. Kelley suggests a diet providing at least 50% of total calories derived from fatty meat. Parasympathetic dominants can eat large servings of beef, lamb or pork at least once a day, and oftentimes more frequently. In contrast, the leaner cuts, as well as lean fish and fowl, are to be avoided.

This diet also allows frequent servings of dairy products, including cheeses, cream, and even butter despite the general perception of these foods as "unhealthy."

Acceptable vegetables include cooked beans and other legumes, avocados, cooked root vegetables such as potatoes, sweet potatoes and carrots. Dr. Kelley recommends one serving from this group each day, but leafy green vegetables and most fruits should be eaten only sparingly.

The balanced types thrive on a wide variety of foods — both lean and fatty meats, nearly all vegetables and fruits, grains, nuts, seeds, etc. Dr. Kelley does suggest plant products be fresh and unprocessed, and at least 50% of the balanced diet is best consumed raw. Furthermore, each meat meal should alternate with a more vegetarian course, to provide variety.

In his research papers, Dr. Kelley emphasizes each of the three diets contains different levels of nearly all nutrients — the proteins, fats, carbohydrates, vitamins, minerals and trace elements. For example, the meat based parasympathetic diet clearly provides the most protein and fat of the three, while the plant based sympathetic diet supplies the most sugar (from fruit) and complex carbohydrate.

In terms of other nutrients, vitamin B12, necessary for normal DNA replication, occurs only in animal products. However, fruits and certain vegetables contain the most vitamin C, needed to form collagen, the basic intercellular cement. Consequently, the parasympathetic diet provides the largest quantities of vitamin B12, but the least vitamin C. The sympathetic foods yield the most vitamin C but the least B12.

Overall, the sympathetic vegetarian diet contains, in addition to carbohydrate, the most abundant amounts of the vitamins thiamin, riboflavin, pyridoxine, biotin, folate, ascorbic acid (vitamin C), D and K; the mineral magnesium; the trace elements chromium and manganese, and the electrolyte potassium. All these nutrients, conversely, will be scarcest in parasympathetic foods.

The parasympathetic diet supplies the largest quantities, in addition to protein and fat, of the vitamins pantothenic acid, B12, A and E; the minerals calcium and phosphorus; the trace element iron, and sodium. These nutrients will be least abundant in sympathetic foods.

In the diet of the balanced types, the vitamins, minerals, trace elements, etc. occur in intermediate amounts: these levels are approximately, an average of the sympathetic and parasympathetic extremes.

Finally, two important nutrients, the B vitamin niacin (or niacinamide) and the trace element zinc, are round about equally in all three diets.

Dr. Kelley says each of the types is precisely adjusted, biologically, to the nutrient levels present in their respective diets. For example, he claims that certain nutrients abundant in vegetarian, "sympathetic" foods, particularly magnesium, suppress the sympathetic nervous system. Other nutrients, such as potassium — also well supplied in these foods — build up and stimulate the parasympathetic system. In essence, the sympathetic diet provides large quantities of those nutrients which support the inefficient nervous system and inhibit the strong. The recommended diet, therefore, pushes the autonomic nervous system toward a physiological balance.

Certain nutrients plentiful in the parasympathetic diet, such as sodium, suppress the parasympathetic nerves while other amply supplied nutrients — calcium, for example — stimulate the sympathetic system. The parasympathetic diet, therefore, provides in abundance those nutrients which support the weak system but subdue the strong. In effect, this diet, according to Dr. Kelley, pushes parasympathetic dominants toward metabolic equilibrium.

In the balanced types, the two divisions of the autonomic nervous system are equally efficient and equally active. Since their diet contains moderate amounts of all nutrients, both the sympathetic and parasympathetic systems will be similarly stimulated and suppressed. This diet, therefore, helps maintain an already balanced metabolism.

In summary, the appropriate diet for each type helps support a state of neurophysiological equilibrium. In the Kelley model, this translates into superb physical and emotional health, with protection against most degenerative, most psychiatric, and even most infectious disease.

Dr. Kelley quotes evidence from the orthodox scientific literature to substantiate at least some of his claims. In experimental models, for example, calcium ions do appear to stimulate - and magnesium does suppress — the sympathetic nervous system. But for the most part, Dr. Kelley's beliefs are far removed from what most medical researchers would accept as true.

Metabolic Decline

The ideal balance proposed by Dr. Kelley can be disrupted in several predictable ways. We can follow the "right" diet for our type but use refined, synthetic or otherwise nutrient depleted foods. A sympathetic dominant might rely on vigorously cooked canned fruits and vegetables, instead of raw, fresh produce. A parasympathetic might consume processed, chemically treated meat.

In this case, the proportions and amounts of many nutrients will differ considerably from the proportions and amounts in the recommended diets. In turn, Dr. Kelley says, metabolic equilibrium cannot be maintained: over time both the strong and weak branches of the autonomic nervous system will deteriorate. This decline may be gradual, but according to Dr. Kelley, it will inevitably occur.

We might also follow a diet suitable for another type. A sympathetic dominant might eat red meat two or three times a day; a parasympathetic might become a vegetarian. In this situation, we provide our bodies with excess amounts of those nutrients that support the strong system and further suppress the weak. Eventually, Dr. Kelley maintains, the dominant system can be driven to the point of collapse like an overloaded fuse, and the inefficient system may simply shut off.

Dr. Kelley recognizes gradations of "wrong" diet. Many people follow the right diet for their type some of the time, and alternate "wholesome" with nutrient depleted foods. Overall, Dr. Kelley insists the more we stray from the ideal diet, the further we move from metabolic equilibrium- If the imbalance is not corrected with proper nutrition, overt disease can develop.

Dr. Kelley associates very specific syndromes and illnesses with each of the three types, as they move through autonomic imbalance. For example, a sympathetic might at first experience anxiety, increasing moodiness, or insomnia. His or her powers of concentration might decline.

As the deterioration continues, sympathetics can develop colitis, ulcers, or diabetes. They may suffer serious bacterial infections and high blood pressure. In extreme imbalance, sympathetic dominants are prone to severe, even life threatening illness, such as congestive heart failure, strokes and schizophrenia.

In the early stages of decline, a parasympathetic might require more sleep; despite extra sleep, he or she may feel fatigued, perhaps depressed. Allergies and hay fever may become a chronic problem.

As the process continues, parasympathetics are susceptible to skin disorders such as psoriasis. They frequently suffer asthma, arthritis, angina, and viral infections.

As they deteriorate still further, parasympathetics fall victim to suicidal depression, severe cardiac arrhythmia, massive heart attacks, lupus, and other autoimmune diseases.

The balanced types can experience syndromes associated with either of the other two types. In a sense, they can decline along a sympathetic or parasympathetic route.

In his model, Dr. Kelley describes the pathophysiology of cancer in particular detail. In general he associates the "hard tumors," the malignancies of the internal organs such as lung or colon cancer, with severely imbalanced sympathetic dominants. This type develops such tumors, Dr. Kelley says, for several specific reasons.

In the tissues of most internal organs, defects in the stroma often occur spontaneously as part of the normal aging process. In some cases, these defects, or mutations, can lead to cancerous change. Dr. Kelley believes, as do more orthodox researchers, that most of us produce small numbers of cancer cells in this way each day, but only rarely do these mutants take hold and produce clinical disease.

Conventional scientists argue that the immune system, especially the natural killer cells, protect us from such cancers. But Dr. Kelley disagrees: he claims certain pancreatic enzymes, particularly the proteolytic or protein digesting enzymes — and not the immune system — represent the first line of defense against malignancy.

Dr. Kelley acknowledges that the pancreas releases most of its enzymes directly into the small intestine, for the purposes of digestion. However, he claims the pancreas also secretes a significant amount of its protease into the bloodstream, where they circulate and eventually reach all body tissues.

In the blood and in the various tissues and organs, the proteolytic enzymes, Dr. Kelley says, can effectively recognize, and digest, aged, mutated and defective cells including those of cancer. Normal cells, according to Dr. Kelley, manufacture certain membrane proteins (such as analogues of alpha 1 antitrypsin) that protect against the circulating pancreatic enzymes. But cancer cells lack these protective molecules and are therefore susceptible to enzymatic destruction.

In the Kelley model, the sympathetic dominant pancreas, of the three types, is the least efficient, and synthesizes the least amount of the various enzymes. However, a vegetarian diet can be digested quite effectively with only minimal quantities of most enzymes. As long as a sympathetic dominant follows such a diet, Dr. Kelley says the pancreas should produce sufficient protease for both digestion and protection against cancer.

A sympathetic who strays from the recommended diet and consumes fatty meat and other rich foods frequently stresses pancreatic production to the limit. In this situation, most of the enzymes will be shunted into the gastrointestinal tract for digestion while the amount secreted into the blood for scavenging declines. The cancer cells, normally kept in check by the enzymes, can grow with impunity.

Parasympathetic dominants, according to Dr. Kelley, have a durable, efficient pancreas capable of producing copious amounts of all the digestive enzymes. Consequently, this type tends to be protected against the classic hard "sympathetic" malignancies. But parasympathetics, despite an abundance of circulating enzymes, are susceptible to the soft tumors; these are the cancers of the white blood cells and lymph system, including the leukemias, lymphomas and Hodgkin's disease.

Dr. Kelley claims most parasympathetic cells, even healthy cells, have loose, permeable outer membranes. With optimal nutrition, this is a normal rather than a pathological condition, but if the cells are inappropriately nourished, the membranes loosen still further. As this happens, viruses, proteins, free radicals and other active molecules move with increasing ease in and out of the cells and in and out of the cell, nuclei. These particles can damage the nuclear DNA, although this usually happens only when a cell and its genetic material are dividing.

In many organs, such as muscle or nerve, cells rarely if ever replicate beyond childhood. However, the cell lines in the bone marrow that form the white blood cells and lymphocytes are among the most rapidly dividing in the body, and are, therefore, the most sensitive to DNA disruption by wayward viruses and other particles. With enough such damage, Dr. Kelley says, the marrow cells can turn cancerous, forming the leukemias and lymphomas.

In the bone marrow, and in the lymphatic organs, phagocytic cells lining the smaller blood vessels tend to filter out circulating pancreatic enzymes even in parasympathetic dominants. As a result, nests of leukemia or lymphoma can thrive in the marrow and in certain lymph tissues, where they are largely protected from enzymatic digestion.

Sympathetic dominants develop leukemia and the lymphomas much less frequently than do parasympathetics. In the Kelley model, sympathetic cells have very tight, impermeable membranes which prevent entry of the viruses and other active molecules Dr. Kelley associates with DNA damage. In this type, therefore, the cell membrane itself — and not the pancreatic enzymes — is the main protection against the soft tumors.

For Dr. Kelley, most disease is clearly a problem of nutrition. Of course, he acknowledges that other factors, such as cigarette smoking or exposure to toxic chemicals, can cause serious illness. But he says we tolerate, and often survive, such exposures far more effectively if we are optimally nourished.

We also resist infectious agents — the viruses, bacteria, fungi, even parasites — more efficiently if we follow the appropriate diet. According to Dr. Kelley, nutritional status can make the difference between a mild infection and serious, life threatening illness.

Finally, as I've said to Dr. Kelley, all of us know friends, relatives and acquaintances who have very poor eating habits by any standards, but seem to thrive. I know one physician who has coffee and donuts for breakfast, soda and sweet rolls for lunch, and pizza or other fast food for dinner. Yet he works a full day with great energy, and appears to be in excellent health.

Dr. Kelley claims such lucky people inherited exceptional genes. Even so, he says my friend is a rare case, and he'll become an even rarer breed as our nutritional habits continue to deteriorate.

According to Dr. Kelley, many Americans, in fact, the great majority, are just not particularly healthy. Few of us, he insists, really know what good health is.

Even an exception such as my physician friend can't function optimally, or live up to his potential on his diet. He's only playing Russian roulette, Dr. Kelley tells me, and for the moment he just happens to be winning.