THE BRAIN AND SPINAL CORD
Modified from Ron Kennedy, MD by PBMD

Consult your encyclopedia and locate a diagram of the brain and spinal cord.

The structure and function of the brain and spinal cord are so complex, we cannot cover what is known in these pages, even in general terms. The purpose of this section of the book is to place the presence of the brain and spinal cord in your awareness, so that you appreciate having them.

The brain and spinal cord together are known as the "central nervous system" (CNS). They are derived, embryologically, from the same layer of cells that gives rise to the skin: the ectoderm. This seems appropriate, since the skin and CNS, together with the various sense organs, are derived from these two structures and deal with the task of sensing and interpreting the external world.

The brain is a biological computer of remarkable capacity to which the human spirit is fused in a poorly understood way. The brain is divided into three parts: the forebrain, the midbrain and the hindbrain. The forebrain is the thinking part of the brain: the cortex, with gray matter containing ten billion neurons — individual brain cells. This is the "hardware" of the system, the neural space in which information can reside. As knowledge is gained, neurons develop more connections between each other and evidently exchange information through these new "hard wires."

The midbrain is a relay station between the body and the cortex with its ten billion neurons. The hindbrain is made up of the pons and cerebellum, which are responsible for coordination of the musculoskeletal system and the medulla where breathing and heartbeat is regulated. The midbrain and hindbrain are common to lower animals. The forebrain, of higher functions, is much developed in mammals, and most pronouncedly in humans.

The CNS is also divided into the motor system and the sensory system. These systems exist side by side. The motor system is designed to carry out movement of the body. The sensory system is designed to sense the reality around the body. Somewhere in between the motor and sensory systems cognition (thinking) occurs.

The CNS is again divided into 2 sections of automatic functions of the body, such as digestion, heartbeat, breathing, etc.. The functions are handled by the Autonomic Nervous System, the ANS. The ANS is divided into the sympathetic and the parasympathetic systems. The Sympathetic Nervous System is designed to survive the body in emergency and is responsible for the fight or flight response in all its variations. The Parasympathetic Nervous System is designed to survive the body in non emergency situations. It handles the so-called "vegetative functions," such as eating, digesting, pumping blood, sexing, etc..

Part of what you are conscious of, in any given moment, is a dynamic interplay between these various systems. Because survival of the species is dependent on the overall survival of consciousness, nature considers the safety of the CNS to be of paramount importance. Accordingly, nature has evolved a strong housing for the CNS, the skull and vertebral column. The brain and spinal cord are suspended in a liquid medium and surrounded by three layers of protective coating, the pia mater, the arachnoid and the dura mater. The latter is a tough, tear-resistant covering.

The brain requires a lot of energy and therefore receives fully 25% of the blood volume pumped by the heart at rest. It also requires constant cleansing and has its own unique system of cleansing itself, called the "ventricular system." Cerebrospinal fluid (CSF) is created by filtration of the blood in the lateral ventricles, which are cave like spaces in the left and right hemispheres of the forebrain. The CSF flows through these ventricles and into the third ventricle, bathing and cleansing the midbrain, then to the fourth ventricle, bathing and cleansing the hindbrain and finally into the space surrounding the spinal cord, bathing and cleansing the spinal cord, where it is then reabsorbed into the blood.

The fuel used for energy by the brain is limited to only two: glucose and oxygen. Although there are many nutrients necessary for proper brain function, only glucose and oxygen are use for energy. For many substances, especially those made up of large molecular size and weight, there is a barrier to admission, a kind of wrapping, around the blood vessels which supply the brain, called the "blood brain barrier." In a healthy condition, the blood brain barrier admits only those substances to the brain tissue, including glucose and oxygen, which the brain can utilize for its nutritional or energy needs. The blood-brain-barrier (BBB) blocks many pharmaceuticals, thus drugs are made to breach this biochemical protective shield, often with poor results.

The neurons of the brain are surrounded by helper cells, responsible for keeping them clean and well nourished. These are called "glial" cells. The brain of Einstein, although unremarkable in terms of numbers of neurons, was found to contain twice the usual number of glial cells, so they are apparently very important to clear thinking. (Yet it is said he often failed to recognize his own front door) These cells are, in turn, supported by the capillary bed through which the brain is perfused with blood.

The health of the arteriolar system supplying this capillary bed is the weak point in brain health. Along with the arteriolar system supplying the capillary bed, which supports the heart, this system in the brain is the most critically important capillary bed in the body. With age, poor diet and lack of regular exercise, this arteriolar system becomes blocked and susceptible to "infarction" (loss of blood supply). When this happens, it is called a "stroke" and, depending on the area or areas of the brain infarction one loses this or that mental or motor function.

For example, there is an area on the left parietal lobe of the cortex called "Broca's Speech Area." If the vessel to this area is blocked, one losses one's ability to speak. Prevention of this kind of event lies in proper diet over a lifetime, a balanced diet of carbohydrates, protein and fat, along with the liberal intake of antioxidants. Take care of it, or lose it. A condition of atherosclerosis of the brain (or heart) also can be helped by a course of chelation therapy. See pages 14-24 for a more thorough discussion of chelation therapy.

The brain loses ten percent of its neurons every ten years, due to age. This can be more than made up for by increased inter connectivity between the remaining neurons. Mental capacity does not have to decrease with age, but it will unless these new interconnections are made. These connections are created by using the mind through learning. If you stop learning, you lose your mind with age, little by little. I recently read a study which followed a group of 100 very bright and inquisitive men from age seventy to age eighty. In this group of men, intelligence at eighty was measurably greater than it had been at seventy, evidently because these men pursued knowledge even in those advanced years. Use it, or lose it.

A final word about how the brain relates to illness. The brain is in charge of the body more than any other organ. It also houses at least part of the psyche. It is not surprising, therefore, that the brain can produce effects in the body which mimic physical illness for purposes known only to the unconscious reaches of the psyche — often to distract your attention away from emotions it wishes to repress and keep away from your awareness.

It is said that making the distinction between a physically based illness and a psychosomatic illness is never complete until this possibility is carefully considered. Purportedly many backaches, stomachaches, headaches, etc., are, in part, psychosomatic illnesses and treating them only physically misses the real opportunity. That said, I came to realized many years ago, that most people are sick with real physical illness because they are toxic. That is my focus.