

QUEST CLUB

LIFELONG CARE AND FEEDING OF THE BRAIN

John R Leal

February 13, 2009

PREAMBLE

THIS WEEK ACKNOWLEDGES ACCOMPLISHMENTS OF PEOPLE WHO HAVE MADE A DIFFERENCE IN OUR LIVES.

WEDNESDAY CELEBRATED THE 200TH ANNIVERSARY OF THE BIRTH OF CHARLES DARWIN, WHOSE BOOK ON THE ORIGIN OF THE SPECIES SUBMITS A PROVOCATIVE THEORY ON OUR EVOLUTION AS A SPECIES TO OUR PRESENT STATE OF EXISTENCE.

THURSDAY CELEBRATED THE 200TH ANNIVERSARY OF THE BIRTH OF ABRAHAM LINCOLN – ACKNOWLEDGED NOT ONLY TO BE ONE OF OUR GREATEST PRESIDENTS – ONE WHO SAVED THE UNION - BUT UNIVERSALLY ACKNOWLEDGED AS A GREAT LEADER OF ALL TIMES.

SATURDAY CELEBRATES THE MARTYRDOM OF ST VALENTINE WHO DEFIED CAESER’S DICTATE TO NOT MARRY LOVERS IN THE CHRISTIAN CHURCH, AT THE TIME DEEMED A RELIGIOUS CULT, AND PAID FOR RECOGNITION OF THAT EMOTION CALLED “LOVE” WITH HIS LIFE.

AND TODAY MY PAPER TREATS THE VALUE OF YOU, A PERSON UNIQUE IN ALL RESPECTS, IN THE FAMILY OF THE ANIMAL KINGDOM. THE FACT THAT THIS IS FRIDAY THE 13TH ONLY LENDS MORE VALUE TO YOUR PLACE IN THE CHAIN OF HUMANITY. THEREFORE, I ASK THAT YOU TAKE EVERYTHING I HAVE TO SAY WITH A GRAIN OF SALT – AND IF YOU MAY ROOTS IN NEW ENGLAND – YOU MIGHT JUST THROW THAT GRAIN OF SALT OVER YOUR LEFT SHOULDER.

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This paper will explore the life long care of the body and its effect on the brain and vice versa. Both interdependent. It is not intended to be considered medical advice – for that you must see a licensed medical doctor.

Lifelong care – the measure of organic endurance preceding death.

Feeding of the brain – nourishment of an assembly of innumerable nerves culminating in a master computer mother-board for the most part automatically operating and reacting on its own.

Advance directives! Whether to provide life prolonging procedures or not! A complex vexing decision when called upon by opposing parties faced with this issue.

At such time we are governed by our concept of “quality of life”, “love”, respect for continuation of life, continued medical care in the face of anticipated, probable failures, economic and emotional factors, and a desire to hold on to that which threatens to leave us.

Because we feel as Hamlet does in one of his lesser quoted soliloquies contemplating the worth of the person:

“What a piece of work is a man! How noble in reason, how infinite in faculty! In form, in moving, how express and admirable! In action like an angel, in apprehension how like a god! the beauty of the world! The paragon of animals.”¹

Thus we, like Hamlet, are faced with the duality of the person: that part which thinks and gives orders- the mind; and that part which carries out the orders and acts- the body; and how to separate the two in our decision making. When does one end and the other begin? When does one supersede or take precedence over the other? Or must we consider both in tandem?

Recent events have called upon us to give thought to the person in its totality and examination of factors that many laymen find very difficult and confusing to comprehend much less to evaluate when called upon to do so. Most notable and recent the Terry Schiavo case, and prior to that the Karen Ann Quinlan (who came home from a party, collapsed and lapsed into a persistent vegetative state) and Nancy Cruzan (an accident victim who lapsed into a persistent vegetative state) cases setting the stage for artificially prolonged end of life issues.

How are we to determine as to life and its continuation through artificially fed nourishment when such appears to be within our discretion to prolong or not. It is necessary to consider how intricate the mind and body are in their totality as a functioning, animate organism, complex in its composition and at times surprisingly unpredictable in its function. This is the mysterious twilight zone of the mind interwoven with the body. At times they appear to be inseparable – yet at other times totally independent of one another.

We should give thought to man's duality and how life long care and nourishment of the brain give man his unique character in the chain of animal existence.

Let us consider:

The Brain The center of thought, the organ that perceives. The original most perfect multi task performer of all times! Organically a mass of nerve tissue containing 10 billion nerve cells (or neurons). In man an enlarged extension of the spinal cord; it is the main part of the nervous system, the center of thought and the organ that perceives

sensory impulses and regulates motor impulses. Through its signals, trillions at birth, called synapses, between nerve cells, it operates at speeds far in excess of measurement by ordinary instruments, makes decisions and selects courses of action which it does in 100 cycles per second. Although much slower than a mechanical computer processing unit (CPU) it can however:

1. have its performance degrade gracefully when damaged as opposed to crashing like a computer.

Take the case of Phineas Gage, a Vermont Railway construction foreman who while working had an accidental explosion propel a 3-1/2 foot metal rod through his head destroying a large part of his frontal lobe. Despite this injury he got up and talked with people trying to help him. Before the accident he was considered highly competent, efficient and shrewd but when he returned 7 months later he had become impatient, indecisive and anti social. This deterioration slowly occurred He died 12 years later a degraded person. It took that long for his brain to erode from the injury.

2. The brain can also learn and reorganize itself from experience. We learn to take shortcuts when performing certain tasks.

3. The brain can sometimes have its damaged parts taken over by a healthy part to assume its previous functions. We can learn to use our left hand in the event our dominant right hand becomes incapacitated. A recent study at Case Western Reserve University with monkeys indicates that by being taught to play a computer game that monkeys were able to overcome wrist paralysis with an experimental electrical device that used a single brain cell that had nothing to do with wrist movement. Studies are now being conducted with paralyzed people and there is hope that by electrical stimulation improvement can be made with paralyzed humans. The studies are encouraging²

4. The brain can process complex visual perceptions within less than 100 milliseconds. We can immediately visualize the difference between a Monet and a Picasso.

5. The brain can support our intelligence and self-awareness but we don't know precisely how it does it. We do know whether we are tinkering with a car or playing chess.

6. The brain continues to develop throughout life. At birth it is only about 25% of its adult weight and its early experiences shape how it grows. Trillions of synapses bloom during the early stages of life and those that are not used are culled and discarded. Early stimulation for certain body functions is necessary in order to develop into useful adulthood tools. For example, visual stimulation in the infant is necessary in order to develop the optic connection to the brain; vocal stimulation is necessary to develop muscles for speech development. This development of the visual and vocal is accomplished by the mechanics of synapses, present at birth and there to be used by the growing child. The brain sees to the cementing of synapses used for these specific purposes. The more we repeat something the more it becomes fixed as a habit³

In developing youth the brain stores a bank of 10 quadrillion chemical synapses which with age declines to 1 to 5 quadrillion chemical synapses. [a quadrillion is the number ten (10) to the 15th power]. There are also electrical as well as immunological synapses which interplay with one another. These signals between nerve cells facilitate messages for the body to function. How does a signal find its way to the ultimate organic activity which involves complicated instantaneous conversions from electrical to chemical signals ending with the desired mechanical activity? This is a feat which man still struggles to duplicate in laboratories. The brain itself consists of various dedicated zones with an extension (spinal cord) descending throughout the back and radiating in millions of receptive nerve endings throughout the body. The human brain can think, imagine, plan, and give us speech all on its own. Although fiction writers have attempted to humanize a computer with man's faculties, such as the HAL 9000 computer in Stanley Kubrick's movie *2001: A Space Odyssey*⁴, no computer developed by man has yet been able to do this. Just imagine if you will that there are approximately 100 billion nerve cells (neurons) in the human body – all working in concert when called upon to do so and

performing conscious physical tasks. Your brain controls body temperature, blood pressure, heart rate and breathing; accepts a flood of information about the world around you, through your various senses (seeing, hearing, smelling, tasting, touching, etc.), handles physical motion when walking, talking, standing or sitting; lets you think, dream, reason and experience emotions. It's questionable how many of us have ever given thought to this and what an extraordinary self preserving, protective organ we carry within ourselves. The brain protects us when we face physical danger, signaling the body to take defensive measures, increasing adrenalin and arms and shields us when facing traumatic emotional and physical events. How many times have you heard a petite senior woman say: "I was not going to let him take my purse so I bopped him many times on the head with my cane and he ran away without my purse." How many times have you heard a traffic accident victim say "I don't remember the accident at all." How many times have you wondered how a person could withstand unspeakable physical and emotional abuse beyond human comprehension and survive over many years of suffering? The brain is there at all times to safeguard us physically and mentally. We in fact carry our own Guardian within us at all times ready to spring into action in order to take proper measures of self preservation.

This leads us to:

The Human Body: Amazing! Incredible! Exceptional!

A symphony of cooperation.

One need not question the synchronous perfection of the human body and its development and specialization of functions all working in concert. By whichever means it came here, the body is here in its present, complex form and in existence. And it is here to do our bidding while at the same time preserving its integrity. It requires nourishment whether the brain is active or inactive, conscious or unconscious. And it requires physical activity if it is to thrive organically and perform at its optimum.

The human body is an engineering marvel of efficient specialization. Through its various organs it extracts that which it can use and discards that which it cannot. It does not demand much for its survival and will care, repair and protect itself. Properly cared for it will survive well onto many human years – a lifetime! A scab following a cut is the

body's band aid. Lately research on amputated fingers shows promise that the body can regrow such amputations although it appears that much more research is needed. The body coordinates its reactions with the brain and depends on it to a great extent for its survival. It does the bidding of the brain and at times accelerates its orders. And with adequate care it can survive many years independent of brain activity.

One hears of comatose patients being artificially nourished, existing years on end, mercifully succumbing only because of innocuous and incurable infections.

How then does one compromise the competing elements of survival of one element, the body, and dormancy of the other, the brain? How then does one make the decision for you the one involved? The decision making is deemed so important that the Supreme Court has declared that only you, the person involved, can make that decision. No one else can unilaterally do it for you. And the expression must be in writing or through uncontroverted verbal expression. For it is held that both parts, the body and the brain, have the right to exist apart from one another until the person himself has declared otherwise.

So what is one to do when faced with the inevitable decline of brain function so as to leave the body inanimate, in a persistent vegetative state devoid of those impulses that register all those physical activities we associate with and call life?

The Connection: As with all things there must be a clasping connection, a signal so to speak, between two elements to give rise to a given result; from conception giving rise to a life form to unclasping resulting in the opposite. With the brain we call this a synapse, a term originating from the Greek synaptein "to clasp together." Think about it! All joint activity gives rise to a result greater than that of each separate part.

Synergism comes into play: the simultaneous action of separate agencies which together, have greater total effect than their individual efforts.

The human synapse involves a complicated set of behavior. In the book

[Welcome to Your Brain: why you lose your car keys but never forget how to Drive⁵
we learn that the brain retains that which it considers important for our survival.

Chapter 1: We use all of our brain at all times (that we use only 10% is not true as brain scans show that the entire brain is in use at all times – even while sleeping.)

Chapter 2: The Brain is versatile:

e.g. Amnesia allows us to escape many problems and start life over again

Evidence supports that we erase and rewrite our memories every time we recall them and by doing so we reinforce them.

Chapter 3: Brain is made of many cells

2 types:

- a. neurons (about 100 billion) which talk to one another and to the rest of the body
- b. glial cells (about 100 billion plus) which provide support to keep the whole show going. We've heard of this lately with Senator Ted Kennedy's malignant glioma brain tumor as well as that of Robert Novak prominent political commentator.

All brains, from that of the tiny shrew to that of the whale work on the same principle:

Signals (spikes) within a neuron are carried by electricity to open and close channels from one neuron to another and send electric signals down through axons which trigger a chemical signal to another neuron and so on down the line from your brain through your spine to your toes. This in speeds fast enough to keep your hand from burning or the dog from biting you.

This communication between neurons is achieved chemically – by synapses – which further on trigger further electrical and chemical signals. All these steps take place in a thousandth of a second. Thus synapses are the method by which communication occurs in the brain. In effect a series of open and shut automatic switches enabling us to perform the simplest as well as complex operations.

Is the brain like a computer? Not really

- 1) A computer is designed to work in logical order, one step at a time
- 2) The brain on the other hand is designed to handle multiple tasks at the same time – sort of like a short order cook who manages to perform multiple

cooking orders and gets them all out at the appropriate time, or playing the piano where each hand has a different task, or humming a tune while walking or chewing gum while reading.

How information is handled by the brain:

1. Information is received by the Thalamus (the center of the brain)
2. The thalamus acts as a clearing house; it filters, sorts and passes the information to designated parts of the cortex (that part that looks like a crumpled-up blanket which wraps the top and sides of the brain)
3. The cortex is divided into 4 parts called lobes:
 - a. Occipital lobe – back of the head responsible for visual perception
 - b. Temporal lobe – just above the ears- involved in hearing and the area that understands speech, plus learning, memory and emotional responses.
 - c. Parietal lobe – top and behind the frontal lobe - receives information from the skin, senses – also puts together information from all senses and figures out where to direct your attention.
 - d. Frontal lobe – generates movement commands, contains the area that produces speech and is responsible for selecting appropriate behavior depending upon your goal and environment. Think of etiquette and manners.

The Brain is unique in that it prepares for the body's Future. It has its own survival mode:

The brain is ever vigilant in providing for reserves for future body needs. Originally man had to forage for food and the brain was vigilant in finding ways to assure the body's survival. There were good times in which food was abundant and other times in which food was scarce. Hence the brain through evolution has continued to use various indicators to keep track of the body's present and future energy needs. For example: the hormone leptin, recently discovered circulates in the body and signals the brain as to how much fat is in the body and how the fat level may have changed. When the leptin level falls below a predetermined level it signals the brain which in turn triggers

feelings of hunger and the need for weight gain. And the converse is true when the leptin level increases the result is that we do not feel hungry. Manipulating the leptin level may provide a method to control morbid and lesser obesity. The brain also regulates various hormones such as insulin, peptide YY, ghrelin to interplay with brain regulation of your metabolic rate.⁶ A recent study in mice of the hormone ghrelin, which is released by the empty stomach into the bloodstream before moving to the brain where it triggers feelings of hunger, has an antidepressant effect on the brain with the side effect, however, of increased food intake and increased body weight.^{7,8} Our dietary sources and needs have changed over time but nonetheless the brain takes no chances and triggers signals to store fat wherever the occasion presents itself just to make sure the fat (read energy) will be there should the need arise.

Recent studies in calorie restrictions conducted in mice indicate that the less weight mice carry the longer their longevity. Because of man's longer life span, comparable studies have yet to be completed to see if this also works for man. In this day of obesity and worldwide famine it might just be a good idea to cut down on one's food intake and slim down!

FEEDING THE BRAIN THINGS MOTHER KNEW ALL ALONG

Elements found in Foods thought to Nourish the Brain

1. Omega-3 fatty acids found in fatty fish like salmon and sardines, research indicates they may even build the brain's gray matter.
2. Choline found in Egg yolks and skim milk. When given prenatally to rats their offspring don't seem to develop senility in old age. When given to humans it seems to improve memory.
3. Folic acid found in leafy vegetables, dried beans, and fruits appears to protect the brain from diseases of aging like Parkinson's and Alzheimer's and is considered essential for fetal development. In adults it improves cognitive function – the ability to think and remember.
4. Chocolate which helps to overall fight disease because of its many antioxidants.

5. Green tea which helps to delay decline in cognitive function
6. Cranberries which help to reduce brain cell damage after a stroke.⁹

The Brain knows how to feed itself.

Hormones: chemical messengers that carry signals from one cell to another via the blood. These signals have a physiological effect that the brain coordinates mechanically within the body. Hormones play an important role as messengers, allowing communication with one part of the body with another.

Elements found in foods thought to nourish the body **

1. Olive oil. 40 years ago research scientists conducted a study in the Greek island of Crete trying to determine why the population there had such a low rate of heart disease and cancer. Their study concluded that the monounsaturated fats in olive oil was largely responsible for this low rate. There are a lot of “ol’ timers” with healthy hearts in the Mediterranean.
2. Yogurt. In the 1970s Soviet Georgia was rumored to have more centenarians per capita than any other country. The overall national diet was examined and although no scientific studies were conducted it was felt that their ubiquitous use of yogurt, which contains calcium and good bacteria that help maintain good health, was a chief contributing factor in the population longevity.
3. Fish. Thirty years ago researchers found that the Inuits of Alaska were remarkably free of heart disease. Scientists now think that their extraordinary consumption of fish provides an abundant source of omega-3 fats which helps prevent the buildup of cholesterol in the arteries and protects against heart arrhythmia.

4. Chocolate. The Kuna people of the San Blas Islands off Panama have a heart disease rate 9 times lower than the mainland people and it is thought that their copious consumption of beverages containing generous portions of cocoa, which is rich in flavanols, preserves the healthy function of blood vessels.

5. Nuts. Research among the Seventh Day Adventists (a religious denomination that emphasizes healthy living and a vegetarian diet and eschews coffee and alcohol) and those who eat nuts as part of their diet gain an extra two and a half years longevity. The unsaturated fats found in nuts such as walnuts offer benefits similar to those associated with olive oil.

6. Wine. Drinking alcohol in moderation protects against heart disease, diabetes and age-related memory loss. Researchers believe that Red wine which contains resveratrol contributes to activate genes and slow cellular aging. But this is open to debate as further studies show that one must consume vast amounts of resveratrol in order to have a beneficial effect and in so doing if one chooses to do so with red wine one might be in an ongoing state of inebriation.

7. Blueberries. In a Tufts University study, researchers fed a controlled group of rats a diet high in blueberry extract over a period of time and found a higher performance level of balance and coordination than that of the uncontrolled group of rats. Nutritionists now encourage consumption of blueberries because of their effective mitigation of inflammation and oxidative damage associated with age-related deficits in memory and motor function.¹⁰

8 Leafy greens like Spinach, Kale, Collard Greens, Mustard greens and turnip greens, all high in folate, also known as folic acid, a nutrient which seems to have a direct effect on memory. Studies at Tufts University in Boston and studies in Austria support the belief that a diet rich in folic acid bolsters faster information processing by the brain and effects better memory recall. Women, better than men, tend to have a faster recall when

including folic acid in their diet and it is highly recommended and now considered a supplement for pregnant women.¹¹

9 Coffee research at the University of Innsbruck, Austria found that drinking 2 cups of caffeinated coffee can sharpen your brain function and memory. Through the use of MRI technology it was shown that after 2 cups of caffeinated coffee there was increased brain activity. Without caffeine there was no increase in brain activity.

10. Outdoor Physical Activity

The body requires physical activity to develop and maintain its muscular integrity and while doing so in the sunlight it develops Vitamin D essential for bone development. And recent studies have shown that Vitamin D has a direct impact on the brain's ability to ward off the onset of Alzheimer's disease. Because older people tend to spend less time outdoors they tend to get less protection from the sunshine and the positive effect on bone repair and strengthening. It is thought that older people are more prone to bone breakage because of lack of Vitamin D. The new theory is that Vitamin D as a supplement should be taken by all especially seniors. Studies have not determined the required dosage but the need is apparent.¹²

CONCLUSION

The brain and the body depend on electrical and chemical connections to maintain their physical and mental integrity. And thus to carry out the orders that the brain and body demand. These orders can be either voluntary or involuntary. How this will be accomplished depends to a large extent on how well you care for and maintain and cultivate their care. They each are marvels of complexity and mechanical perfection yet to be equaled by mans' inventiveness.

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