A Theoretical Biochemical Basis of Cancer: Confirmation by Electromagnetic Radiation

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Abstract

Animate chemistry is based upon exponential growth, irreversibility of reproduction and the inheritance of such characteristics. Any chemical system which complies with these three features changes its substrates from inanimate to living. The conversions of two sulfur containing amino acids from reduced to oxidized and back to reduced form fulfil these criteria and must start life. These theoretical concepts are presented. Ionizing radiation uniquely kills life and its target is one or both of these reactions.

Certain frequencies of ultra high frequency electromagnetic radiation increase the exponential kill of ionizing radiation and they act on the same target. Proof of this is the ability to cure HIV infections by the application of these principles. Because an exponential energy system must create life and such a system is automatically intelligent then evolution is driven by pressure from the first reaction. A system is presented to explain the non-chaotic basis of all life in contrast to the chaotic basis of everything inanimate in the universe.

Introduction

1. Inanimate or non-living matter obeys simple chemical and physical laws only. Until proved otherwise the universe is inanimate and only the planet Earth harbours living forms. The universe outside life on Earth is completely chaotic.

2. Life can be defined as a chemical system which complies with the definition above but also obeys three unique features. These are exponential growth, irreversibility of growth (which causes death) together with the ability to inherit these two characteristics.

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3. At the moment on planet Earth when life started the reaction(s) responsible must exhibit these three unique features. Life therefore creates a non-chaotic process unique to the universe. If proven elsewhere, life based on the sulfur atoms would model our evolution but if based on another "exponential" series of reactions, whilst evolving identically would be of utterly different form.

4. Reversing the evolutionary ascent and retracing history by a process "the descent of man" the history of life can be retraced. This process must conclude that life's only original function was exponential growth. In its original form the exponential growth had to perpetuate the survival of itself. The reaction which created exponential growth would have to create a product which included the exponential growth situation but was not necessarily incapable of irreversibility at its start. However, with evolution adding increasing complexity to the basic exponential reaction, the irreversibility of life was created. Therefore, to prevent self-destruction of the life start, the exponential reaction has to have the characteristics of irreversibility.

5. There are no single chemical reactions known which have any of these three characteristics. A sequence of several chemical reactions could produce a system complying with the requirements of the start of life. If more than two chemical forms were used in this sequence it would be impossible to guarantee the perfection of inheritance on each occasion. Therefore the origin of life can only be discovered in a system consisting of two chemicals which are interconvertible. Two chemical systems are known which comply with these requirements. Firstly cystine (a disulfide) converting to cysteine (a monosulfide)

and the reverse are possible but extremely unlikely as cystine is insoluble in water. Secondly when the two forms of cystine are combined as a tripeptide gamma glutamyl-cysteinyl-glycine both forms are extremely soluble and has been demonstrated[1] to have the desired characteristics.

6. A system of the cyclic transformation of reduced glutathione (GSH) oxidizing to oxidized glutathione (GSSG) and then reducing to GSH obeys exponential growth.

GSH—>GSSG + 2 electrons, whilst
GSSG + 1 electron —> GSH.

This peculiarity of the electro-chemistry of glutathione produces electrons in exponential proportions to time. It is effectively irreversible because it only contains two components which can oscillate from one state to the other. Since each cycle produces a spare electron then this electron can provide the energy for an inactive cycle to become active and so on *ad infinitum*. Such a system of transfer of surplus electrons fulfils the criterion of inheritance.

7. The second law of thermodynamics demands that additional energy equivalent to one electron must be introduced to an inactive cycle together with the one surplus electron from another cycle in order to produce two electron outputs. A highly radioactive Earth would produce electrons of suitable energy to provide this.

8. When a relative surplus of GSSG is created in such a system and the supply of external energy (either beta particles available from primordial radioactivity or other source) is sparse there would be insufficient electrons to reform GSH. Thus automatically the GSH/GSSG/GSH cycle is under the control of the local concentration of GSSG. The cycle's activity is thus inversely proportional to the concentration of GSSG around it. This has been known as the Pasteur reaction and was identified 60 or more years ago.[2]

9. The GSH/GSSG/GSH cycle is thus obeying exponential/irreversible/inheritable criteria whilst the Pasteur reaction is governed by conventional chemical and physical laws. The cycle has therefore been labelled Rexp or Re for short, denoting the exponential reaction creating life. The first non exponential reaction (Pasteur's) is labelled RS1 denoting the first simple reaction which controls Re.

10. RS1 can turn Re on or off to meet circumstances. Any change in the physical/chemical surroundings due to the Earth's ageing can thus be met by activating Re, producing electrons which could force the production of alternative energy supplies. In turn these interactions would automatically lead to the system being controlled

Table 1. Proposed Intermediary Stages of control of Re

Re = The exponential reaction creating life
Re + RS1 = The Pasteur reaction
Re + RS1 + RS2 = Anaerobic non-phosphorylating glycolysis
Re + RS1 + RS2 + RS3 = Aerobic non-phosphorylating glycolysis (the energy source of neurons via the glial cells)
Re + RS1 + RS2 + RS3 + RS4 = Aerobic phosphorylating glycolysis
Re + RS1 + RS2 + RS3 + RS4 + RS5 = Citric Acid Cycle
Re + RS1 + RS2 + RS3 + RS4 + RS5 + RS6 = Phosphogluconate cycle
Re + RS1 + RS2 + RS3 + RS4 + RS5 + RS6 + RS7 = Hormones
Re + RS1 + RS2 + RS3 + RS4 + RS5 + RS6 + RS7 + RS8 = Usable genetic information in the extra-nuclear parts of the cell (RNA)

so that it becomes Re + RS1 + RS2 etc.

11. As evolution progresses this chain of reaction is controlled by each addition and becomes of great length. Eg. Re + RS1 + RS2 + RS3....RS1997.

12. Evolution is therefore automatic because the energy of Re pushes all the simple reactions RS1....RS1997 to overcome every obstacle to grow. It cannot be by "Darwinian" chance and is probably of Lamarkian form.

13. As we do not know the millions of intermediary stages of control of Re the following framework is suggested in **Table 1** (p.150).

Warburg[3] has shown that in all cancer anaerobic glycolysis is always active, in variable quantities per cell. He showed that withdrawal of glucose would stop the anaerobic glycolysis but not necessarily kill the cancer cell. Needham et al[4] confirmed this and showed that in developing chicken embryos the first few cell divisions were based on Re and RS1 alone. As the embryo grew with complexity they then proceeded to demonstrate that as fetal growth and cellular differentiation increased so the glucose metabolizing pathways became more and more complex yet of increasing efficiency. As a result the phosphogluconate cycle of aerobic glucose metabolism is the predominant energy source in the normal adult cell. The final control of this cycle is probably via hormones, etc. where relevant and ultimately to the genetic information in the extranuclear part of the cell embodied in the RNA.

Any break in this chain of control from the sophisticated genetic information held in the cellular RNA will cause cancer. If the break is between RS7 and RS8 and hormones are relevant to the cancer site then there will be an hormone dependent, slowly growing, well differentiated cancer. A defect between RS7 and RS6 will be a non hormone dependent cancer. Any break between RS6 and the earlier controlling links will produce a cancer varying from slowly growing, well differentiated when the link is close to a higher number and an aggressive, poorly differentiated, rapidly growing cancer when Re remains in completely uncontrolled autonomy.

This is the situation in a multicellular organism. All the cells are under the permanent control of the whole organism. Cancer is merely a break in the chain of command in one individual cell.

Bacteria have the ability to stop their growth when conditions are unsuitable to propagate and indeed many of them can form inactive highly resistant spores. Viruses appear to be completely autonomous all the time but they require some growth mechanism only provided by the host cells. When situated in a host cell a virus is thus identical in form and concept and organization to a cancer.

Proof of the Above Theories

HIV remains a disease in which there is exponential growth within an exposed population of susceptible individuals. It thus obeys the mathematics of life and cancer and confirms its suitability as a trial to prove these arguments. Other viruses would be suitable but their use would be indefensible on the grounds that vaccines were available to modify the immune response thus aiding treatment. In the case of HIV no known vaccine is of any value, neither is any chemotherapeutic agent. However, of interest is the clinical course of a young man with proven HIV and a lowered T4 cell count who was treated with combinations of glutathione cycle blocking agents and 434 MHz ultra high frequency radiation. The first treatment was combined with Alpha Interferon and as expected there was no synergism between the two and little temporary improvement occurred. The second treatment using cystine produced a rise in the T4 count which was short lived when steroid-induced liver failure became obvious. On recovery from this and a further course of treatment in

March-April 1993 an excellent improvement in his general health occurred and all symptomatology disappeared. Tested with the P24VLP antigen he had a normal response in early 1994. A final treatment using high dose cystine and oxidized glutathione has raised his T4 count to over the 1,000 level. The polymerase chain reaction in August 1995 and on three successive occasions shows a zero level of virus in the blood. He remains clinically well and has normal haematology apart from a permanently raised CD8 cell count (approximately 3,000) and a CD4 count of 1000 ± 100 over the last six months.

Viruses thus consist of Re + RS1 + RS2 + RS3 plus the evolutionary products of these reactions (proteins, etc). HIV is too primitive to generate large stable proteins which can be antigenic and attacked by vaccines, but it cannot withstand withdrawal of its electron source of energy, without which it cannot reproduce. Also viruses must have some defect in their ability to generate these Re electrons to reproduce its other constituents. Perhaps the reason why a virus can only reproduce in a living cell lies in its essential need for GSH, which it cannot store (because it cannot control its autonomous Re cycle).

It is known that the HIV virus is directly attached to the human intracellular (and/or intranuclear) proteins. It is probable that it uses the host GSH-GSSG system to produce its energy for division. If so then blocking agents (GSSG, etc) preventing electron production will have the potential to cure HIV and all other viral agents, autonomous cancer cells and prion or other diseases which grow exponentially. This excludes Legionnaire's disease which does not obey an exponential growth pattern.

Accepting that this is a valid proof of the biochemical energy source of life, cancer and viruses permits speculation as to the nature of carcinogenesis in a multicellular organism. As detailed above this is a break somewhere in the chain of control exercised on Re by evolution and the evolutionary knowledge stored in the genetic apparatus. It is not necessary of course for the genes and chromosomes to be the only repository of the control of Re. There must be some areas of the extranuclear portions of the fertilized ovum which dividing similarly to the chromosomes could equally well be part of the controlling mechanism.

Carcinogenesis

It has been recognized almost since the discovery of radioactivity that there are a few cancers which are induced almost exclusively by ionizing radiation. Radiologists have a higher incidence of leukemic diseases, children radiated *in utero* and at a young age have a similar predisposition and newborn infants who have thymic radiation for respiratory distress have an increased incidence of cancer of the thyroid at puberty and afterwards. Using the World Health Organization estimates from the Chernobyl disaster, which released 200 times as much radioactivity as the Hiroshima and Nagasaki explosions together, one is not surprised therefore to discover that thyroid cancer is the first obvious increase. A 200 fold increase between 1986 and 1994 has been reported. This is much greater then the increase from the Japanese A-bomb survivors. It is presumably directly related to the ingestion of radioactive materials by the children after Chernobyl compared with the teleradiation which occurred in Japan. To relate this to radiotherapist's experiences, gained when thyrotoxicosis was treated with external radiation and then after the war treated with radioiodine it is obvious that teletherapy or radiation from the atomic bombs requires much higher dosages of radiation than does the ingestion of radioiodine, for thyrotoxicosis. The explanation for the lack of a similar rise in leukemias after Chernobyl again can be correlated with clinical experiences. Radiologists and children develop acute leukemias as a result of external tele-

radiation. There is no reported incidence of the rise in acute leukemic diseases from ingesting any known radioactive isotope. In the case of cancer of the thyroid it is thus obvious that there is a weak link in the chain of control of Re by the corporate control of the thyroid gland and that there is also a similar weak link between Re and the haematopoietic control of the body. Since these two links are not related clinically then they must represent separate links in the development from the fetal to the adult thyroid and from the primitive white cells to adult mature white blood cell which are specifically damaged by ionising radiation.Were all the links readily damaged by ionizing radiation then ionizing radiation would be the cause of all spontaneous cancers. This is not so. We may therefore assume that the remaining links in this chain are almost certainly chemical in nature and unrelated to the use of ionized chemical reactions to fulfil their functions.

The majority therefore of "spontaneous" cancers will be created by chemical interference in the control pathways. By "chemical" is meant reactions which take place in the complete absence of ionization of the substrates.

The etiology of urinary cancer has been worked out in great detail over the last century. The correlation between the use of aniline dyes in the dyestuff industry and the development of bladder cancer was so obvious (blood in the urine is a fearsome sign which occurs early in the development of this disease) that this is a useful starting place for an analysis of where such chemical changes might occur.

Tryptophan Metabolism

For nearly a century it has been known that dogs excrete one or two carcinogenic amino acids derived from their metabolism of tryptophan. The indole ring of tryptophan is broken to form kynurenin which in turn is converted to 3-Hydroxy-Kynurenin and that in turn is converted by kynureninase to 3-Hydroxy-anthranilic acid. 3-Hydroxy anthranilic acid can convert into quinolinic acid. The representation in **Figure 1** (p. 154) shows these various steps. Tryptophan is oxidized to kynurenin. Kynurenin is converted to 3-Hydroxy kynurenin with vitamin B_2 or riboflavin plus an oxidation mechanism. The generation of the two carcinogenic compounds 3-Hydroxy anthranilic acid and quinolinic acid occurs if pyridoxine (vitamin B_6) is available in adequate amounts. The quinolinic acid could be further altered to nicotinic acid (which is a non carcinogen) and this could be converted to nicotine adenine dinucleotide.

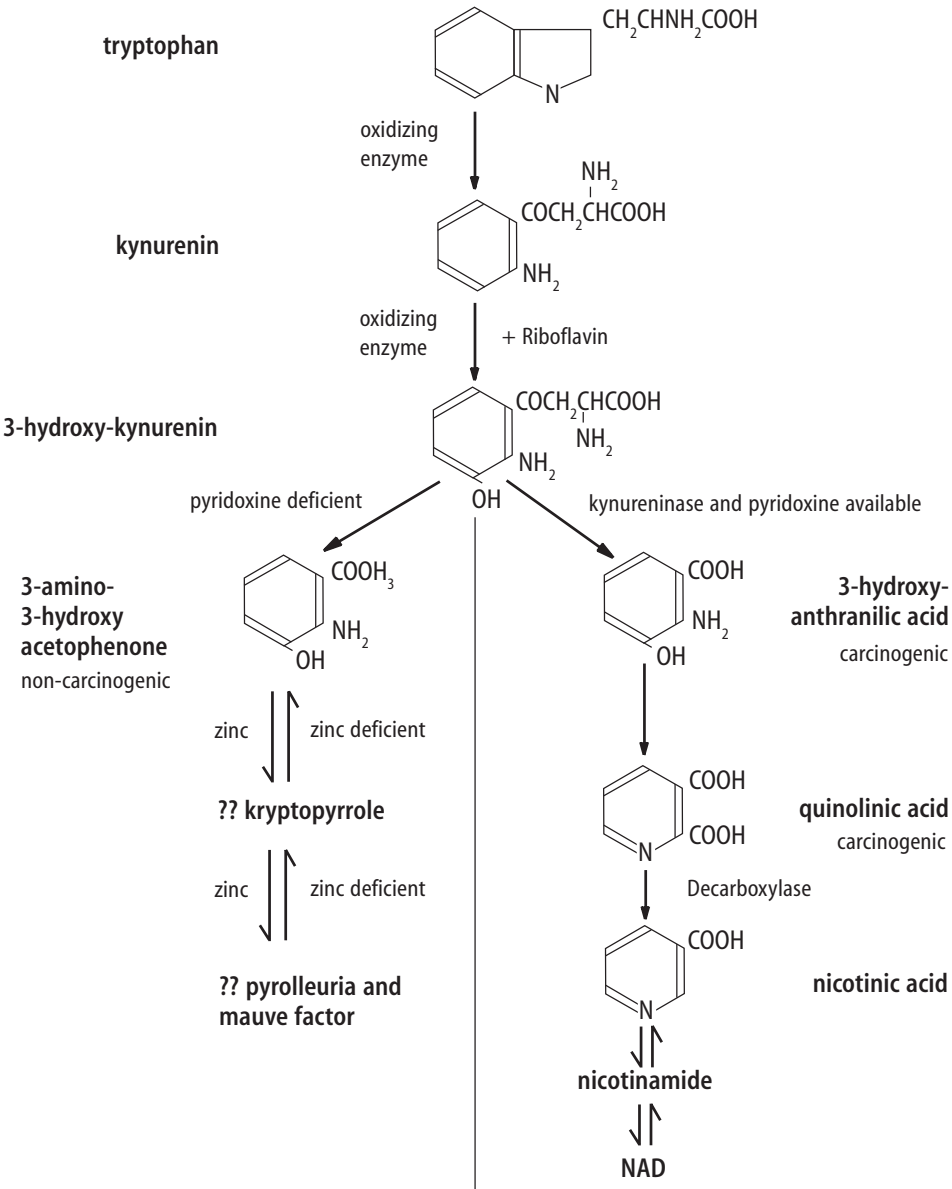
However an alternative pathway exists in the absence of low concentrations of pyridoxine, vitamin B_6 and zinc which produces 2-amino 3-Hydroxy acetophenone. Unlike 3-Hydroxy anthranilic acid and quinolinic acid which are potent carcinogens this is not a carcinogen.

Pyridoxine with or without zinc availability appears to govern which of the two alternative pathways are predominant. Hoffer's[5] work has shown that schizophrenics are deficient in B group vitamins and probably zinc and/or other metallic trace elements. If this is correct then schizophrenics would favour the production of 2-amino 3-Hydroxy acetophenone in place of the carcinogenic compounds produced together with an automatic reduction in the nicotinic acid, nicotinamide, or its products. Dr Hoffer treats schizophrenics very successfully with vitamin B_3 which includes either nicotinamide or niacin.

In a survey of approximately 50,000 patients with cancer treated in Western Australia over a 40 year period the radiotherapists have only treated one patient who was diagnosed with schizophrenia. This is the basis of teaching the students that to avoid cancer one should become a schizophrenic.

Hoffer also published recently[6] details of the mauve factor which occurred in the

Figure 1. Spontaneous Carcinogenesis in Humans: Tryptophan Metabolism.



urine of schizophrenics which disappeared in those whom he had treated and had recovered. The mauve factor is also associated with physical illness and some other mood disorders and alcoholics. The mauve factor is shown by Hoffer to be a kryptopyrolle.

In taking the histories in patients with cancer approximately 90% give the history that after a few childhood illnesses, none having suffered serious or recollectable incidents, patients with proven cancer do not suffer from minor illnesses in the interim. The standard statement of history of a cancer patient is "Doctor, I have been well as long as I can remember and have been absolutely fit and cannot understand why this disease has suddenly hit me. I have never been ill in my life before." Relating this to Hoffer's list of physically ill adults and children with mauve factor we find that the 90% of people who are well do not have the mauve factor. This is the group that develops cancer. This history of chronic ill health completely agrees with the findings in schizophrenics that they do not develop cancer. The conclusions that can be drawn from the clinical findings suggests that chronic illnesses, alcoholism and schizophrenia favour the conversion of tryptophan into a non carcinogenic series of substrates.

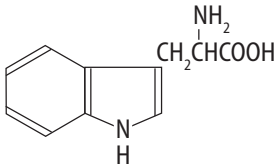
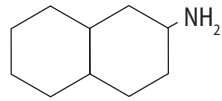
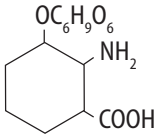
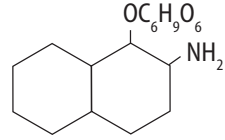
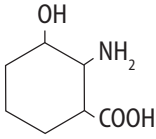
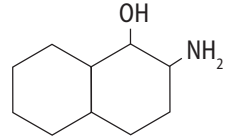
In **Figure 2** (p. 156) one sees the classic metabolic processes which appear to govern the history of urinary cancer in humans. In animals the carcinogenic compounds liberated by these processes undoubtedly cause cancer other than in the urinary tract. The reason for this specificity appears to be the human ability to inactivate the carcinogens by conjugating them with glucuronic acid in the liver which is then excreted by the kidneys. Glucuronides are not carcinogens. The presence of high levels of the enzyme beta-glucuronidase in the urinary mucosa leads to very high levels of the free carcinogen being liberated in the urinary tract. There is no reason why carcinogens either endogenous or exogenous should not be active on any site in the body particularly if there is some fundamental metabolic disorder which prevents complete inactivation of the carcinogen by glucuronic acid.

The Immune System and Cancer

Cancer is an exponential growth process. Similar mathematics govern the growth of infecting organisms such as bacteria and viruses. In most infective processes prior exposure of the intact body to the appropriate antigen will prevent the onset of the disease. However, overwhelmingly large infections still continue to cause death because there is insufficient time for the immune system to respond. If cancer could be controlled by the immune mechanisms of the body then the early stages of cancer would be destroyed and clinically detectable cancer never seen. Since the immune system is triggered by one invading organism then it should respond to one cancer cell. Given time it would respond to millions of them but unfortunately this has not happened. Cancers grow inexorably from one cell in people with normal immune systems and all attempts at creating artificial immunity for cancer have failed. The early phases of cancer development should lead to the ideal sensitization of the immune system which would make it very effective for the control of cancer and least effective for things like bacterial and viral infections. However it is the latter group for which the immune system is superb and the cancer for which it is useless.

There is some immunological response to some cancers in some individuals. This can be demonstrated by culturing various cells from human cancer, creating an antibody to them in another animal and then performing cross testing experiments. These experiments have been performed[7] and demonstrate that there is considerable antigenic antibody response in slow growing cancers of exophytic form.

Figure 2. A summary of the carcinogens derived from tryptophan and industrial or chemically induced cancer. This summarizes the etiology of a human urinary mucosal cancer. The glucuronides, when urinary stasis occurs, and the glucoronidase enzymes are in high concentration. Hence the incidence of bladder cancer directly parallels the incidence of prostate enlargement being displaced 10 years in age presentation.

Spontaneous Urinary Cancer	Steps	Industrial or Chemical Cancer
 Tryptophan	Substance absorbed	 2-Naphthylamine and other 2-Amines
 Tryptophan Glucuronide	Product formed in liver and excreted by kidneys	 Naphthylamine Glucuronide
 3-Hydroxy-Anthranilic Acid	Carcinogens liberated in the urinary tract by enzyme Beta-Glucuronidase and (?) reabsorbed into the bloodstream	 2-Amino-1-Naphtol

That is the clinical type of cancer which grows outwardly from the surface from which it originates. Cauliflower like lesions of the tongue, cheek, floor of the mouth, uterine cervix, bladder and bowel come into this category. Those tumours which are only partly capable of stimulating the immune system do not grow into this cauliflower form but assume the shape and appearance of diffuse infiltration. Such cancers appear like a woody thickening in the tongue, the cervix, the bladder or the bowel. Because of the existence of this partial control on the physical shape of the cancer there is delay in metastasis which is very late in the case of the exophytic type of tumour, moderately delayed in the woody indurated type of tumour and non existent in the infiltrative type of cancer. In this third type it may be difficult to find the primary cancer but secondary cancer is present in the nodes and may have spread via the blood stream to lungs, liver, brain etc. In

this latter group it is often impossible to prepare antibodies in a foreign animal from the cancer cells. Even to a healthy rabbit such cancers do not stimulate the formation of antibodies. It is extremely unlikely therefore that such human cancer will spontaneously create any antibody reaction at all in a host in which its defences are slowly being destroyed.

Over a century ago reports of remission of cancer being associated with infections lead Dr Bradley Coley to develop a method of treating cancers with bacterial extracts. The most effective of these were produced as Coley's Toxins or Vaccine and were extracted from streptococcus pyogenes and serratia marcescens. There is an extensive literature published by Dr Coley Nauts (Dr Bradley Coley's daughter)[8] which demonstrate clearly that two factors are necessary for success with this method. First, increase of body temperature above a minimum temperature for a certain minimum period and second, the presence of these toxins in adequate concentration in and around the tumour. Many other bacteria produce tumouricidal toxins but Coley's results demonstrate 51% (190 out of 373) operable cancers and 46% (238 out of 523 patients) of inoperable cancers were cured for between five and 80 years using his methods. No method today has so far exceeded these results and yet it is utterly neglected by modern cancer therapists. It was eventually established in the 1950s that the active agent was a lipopolysaccharide molecule of approximately 450,000 daltons size. Coley's system must not under any circumstances be confused with or considered as an immune control of cancer. Without a rise in temperature of the body containing cancer the activity of the Re units may be minimal. Increased temperature will tend to perform the same function as the 434 MHz UHF. It activates the Re system or some other part of the closely associated mechanism which creates energy from anaerobic glycolysis. Coley's Toxin selectively kills cancer's energy systems by some process such as occurs in rheumatic fever damage to the heart. The cardiac lesions in acute rheumatic fever are due to the presence of streptococcal toxins which specifically attack parts of the developing heart muscle. The lack of attack on hearts over the age of 12 years indicates that there must be some activity in the Re and its successive control mechanisms which are susceptible to the damage from the streptococcal toxins. Once the heart muscle is adult and Re is kept in complete inactivity then no damage ensues to it from streptococcal toxins. Such must be the explanation of Coley's method of treating cancer. Nauts' material summarizes all the various methods that have been used but draws the conclusion that all the effects on cancer are immunological. This view appears to have prevented logical development of her father's work. The use of specific lethal biological molecules has been replaced by a vain search for immunological processes.

Electrical Properties of Cancer

In 1776 it was reported[9] that lightning had cured a lady of cancer. A lady with a hard cancer of the breast which was slowly growing despite all treatment accidentally got struck with lightning as she stood in a window during a severe thunderstorm. To quote Eason "Set fire to the thatch roof, forced the chimney piece from the wall and raised the carpet from the floor, striking the patient on the left shoulder across the diseased breast and down her back burning her nightgown slightly. She remained paralyzed for hours and recovered. Within two days the breast tumour had softened and diminished in size. Shortly thereafter it disappeared." Eason then commented that lightning and electricity are similar and we should be encouraged to try electric shock against indurated swelling glands. He also said that it may serve to assist other remedies when the case is stubborn. Another similar example of a farmer

in 1880 with a cancer of his lip and chin about to be treated surgically was struck by lightning while plowing a field. Both horses were killed but his lip and chin remained healed for 10 years.[10]

This confirms the theoretical proposition of the nature of Re or the exponential reaction creating life. Mitosis is powered by the energy of the spare electron created when reduced glutathione becomes oxidized to oxidized glutathione. Since an electron is an electric current this energy source must be electrically conductive and it must therefore be housed in an insulating compartment somewhere in the cell. It is certainly not in the nucleus because the nucleus does not contain oxidized glutathione.[11] In 1910 Percy[12] used electric cautery for cervical endometrial cancer and 90% were made operable and/or cured by such therapy. Strauss[13] just before World War I used electric coagulation to treat cancer of the rectum and colon. By 1956 he had treated 250 similar cancers with excellent long term survivors, surpassing the results of surgery alone or surgery with radiotherapy. Madden and Kandalaft[14] produced even more impressive results than Strauss and were able to double the cancer free survival compared with abdominoperineal resection for rectal cancer. The discovery therefore that cancer was more electrically conductive than normal must be attributed to Eason more than 200 years ago. Various nations use various frequencies for medical diathermy. Britain uses 27 MHz, similar to the Scandinavias. Europe is standardized on 434 MHz, Japanese diathermy utilises 8 to 915 MHz in various frequency bands. The United States only officially uses 915 MHz.

The use of heat before X-ray therapy is synergistic whilst the converse of X-ray therapy followed by heat is not. The reason is that ionizing radiation delivers its specific effects in millionths of a second and must be delivered whilst the tissue is either hot or under the influence of non-ionizing electromagnetic radiation. Synergism is not possible when delivered

Figure 3. Spectrum of the reflected radiation from normal (left) and a patient with extensive cancer (right).

The central frequency is approximately 434 MHz. Higher frequencies are to the left of the display and lower frequencies are to the right of the display. the approximate range is 440 mhz (left) to 428 mhz (right). The patient with cancer had approximately one kilogram of metastatic bowel cancer in the liver and the antennae were over the center of the trunk on both occasions. Not only does cancer increase the intensity of the reflections, but resonation and the production of higher frequency reflections indicate that fluorescence occurs.

before such non ionizing radiation or simple heating because its effects have dissipated before the second half of the treatment is delivered.

In whole body non electrical heating (such as by water or wax bath) at 41.8°C which is the limit of tolerance of the human liver the x-ray kill per unit of dose applied can be doubled compared with normothermic radiotherapy. Of 13, 27, 434, 915 and 2450 MHz tried in clinical practice only 434 MHz before X-ray therapy has a better kill rate per unit x-ray dose. The discovery that 434 MHz, without raising the temperature of the target significantly, could increase the cancer cell kill per unit dose of x-rays delivered by a factor of 100 or more indicates a specific non thermal selective effect on cancer. **Figure 3** (p. 158) shows examples of the spectrum reflected from normal persons and cancer subjects respectively. Such changes can only be seen with fairly gross cancers. These spectra and magnetic resonance imaging identify molecules *in vivo* by similar principles.

The Central Nervous System

Intelligence has always been an assumed function of the brain. If intelligence is defined as the ability to adapt to environment then Re is intelligent compared with all other non exponential chemical reactions. It will prosper by controlling its successive reactions to the detriment of non exponential series of chemical reactions. Each cell must therefore have its own individual innate intelligence network which will supervise its pre-programming to cope with trauma, illness or infections. It is therefore reasonable to suggest that the intelligence exhibited by the brain must be mediated by some form of exponential reaction. Activity of the electrical exponential reaction of glutathione would automatically imply that to use this type of exponential reaction to mediate intelligence would result in cells dividing each time the power of intelligence was called upon. Were our cerebral processes involving reasoning and other intelligent facilities to use such a process then our skulls would have to grow rapidly and continuously throughout life or as long as such processes were needed. The skull which is partly composed of "flat" bones and other areas of the skeleton are subjected to a continuous (although rhythmic) influence of growth hormone.

Adult neurons never become malignant. Certainly therefore they do not contain the glutathione cycle Re. The supporting cells of the central nervous system, the glial cells, are the source of all malignancies within the central nervous system. These cells must therefore contain the Re system in its full primitive form. The description ERe for the glutathione cycle is thus seen as an electrical method causing exponential growth of cells. There is no evidence however that our brains solve problems with cellular replications. As neurons don't contain Re they can't reproduce themselves but they also cannot exhibit intelligence unless they function "exponentially." This could be achieved by a non electrical method so that information input results in an exponentially quantity output in proportion to time. Therefore without Re and unable to divide by mitosis this relationship between intelligence and the brain can be symbolized by the equation

$$I_{output} = I_{input}\, e^{AT}$$

It has to be mediated chemically (ie non ionized substrates).

The body does not have receptors for electrical or ionising radiations (x-rays etc) and as we cannot feel, hear, see or in any detect radio, TV, microwave, x-ray or gamma rays by our brain, it must be assumed that neurons are uninfluenced by any of these factors. When non-fatal electrocution has occurred there is often temporary paralysis or lack of function of individual nerves or the whole brain and spi-

nal cord. Recovery which ensues is perfect. Were the brain and the nerves all electrically conductive and if information was transmitted throughout the neuronal systems (including the peripheral nerves) then electrocution would specifically harm the neurons and their axons. However post mortem examination in fatal electrocution shows that the damage does not occur in these regions. It occurs in the glial cells. These are usually coagulated, presumably from electrical heating due to the passage of the electric discharge from the lightning (personal observations of electrocution deaths and injuries in military service). The glial cells which can develop into cancer are therefore the electrically conductive parts of the brain and must produce the EEG patterns and can be electrically shocked. Were the neuron to conduct electricity along its axon then every patient struck with lightning would automatically have the brain and all the peripheral nerves, particularly to the soles of the feet, burnt out. This has never been recorded. One places a live conductor from the highest point of the cathedral to the ground to provide an easy path for the electrical currents generated in the clouds above. The brain should act as a lightning conductor if it were electrically conductive. It is obviously not electrically conductive.

Thus intelligence is based on and created by chemical reactions only, none of which act by ionization of the intermediaries or substrates. If this glutathione cycle Re, by adding an electron to GSSG, powers the first cycle which goes on to produce a spare electron to power the next cycle, then we should consider the brain as the equivalent but based entirely upon chemical transformations. If an input of information by chemical transmitter occurs the glial cells would alter this chemical to a more complex form and transmit this on to the neurone thus increasing its complexity. Since the information input would be to every distinct functioning group of neuronal cells then the specific functions of various areas of the cerebrum would not increase its own complexity if the information was the wrong type for it to process. Since therefore chemical Re (CRe as we can denote cerebral intelligence) is:

$$\text{Information}_{\text{output}} = \text{Information}_{\text{input}} e^{AT}$$

and it automatically follows that the brain neurons will grow internally in complexity as Perves work[15] suggests. The neurons can therefore alter to overcome challenges by increasing complexity which would represent increase of knowledge and intelligence. Thus the brain can mutate just like somatic or body cells. Lamarkian evolution of the brain must be the method by which we learn, thereby adding to our store of genetically acquired information in our neurones. The argument regarding whether intelligence is inherited or acquired is simple: it is both. Twins thus look alike because electrical Re (ERe) has produced identical divisions of their cells but they can learn to think differently depending upon the varying inputs of information and the CRe which is responsible for the brain learning. If Dr Mengele had been able to think logically he would have deduced that you can clone bodies but not minds. It would appear that brainwashing can only succeed by first reducing the mutational complexity derived from learned information. If our neurons were electrically conducting every item of electromagnetic radiation pollution from outer space, x-rays, radiowave pollution, etc, would so influence our brain that it would be in a permanent state of epilepti-form convulsions covering all motor and sensory pathways. It would appear that electric shock treatment does not have a direct effect upon the neurones, only upon the glial cells. Since the glial cells are responsible for the nutrition and the mediation of intelligence in the neurons it would appear that our neurons are merely sensory input, storage and

retrieval, and motor output function leaving the glial cells to mediate our intelligence and analytical functions. Methionine would appear to be the starting point for the brain's development. Methionine is essential to life whereas cystine and/or cysteine is not essential unless methionine is absent in the diet. Methionine is converted in the brain to homocysteine and then to cystathionine. Cystathionine is present in high concentration in the brains of primates, highest in man, less in rodents and least of all in invertebrates.[16] It is thus suggested as the basis of higher neuronal function. Where the methionine is replaced with methionine sulfoximine (the sulfur atom being immobilised by double bonds with oxygen and amino groups) epilepsy can be readily produced together with hysterical syndromes in animals and disorganisation of normal cerebral tranquillity in humans.[17] The metabolism of methionine is therefore vital to the functioning of the cerebral cortex. Similar symptoms do not occur if methyl cysteine sulfoximine replaces methionine sulfoximine. Cysteine is definitely not metabolised for brain function. When mitosis of the glial cells is not required it is suggested that the energy is used to power brain function by converting methionine into cystathionine and passing this on to the neurons. The production of the cystathionine would therefore be powered by an exponential system but is not in itself electrically driven. If the exponential production of electrons forced the conversion of methionine to cystathionine in glial cells so that as soon as there was a need it would be metabolized in exponential quantities then one could explain the exponential increase of complexity of the brain cortex in response to demand. Hence the need to expand the skull and why growth hormone production persists into old age. In normal adult cells when Re is in controlled inactivity until mitosis is permitted, there must be a similar feed back system from the neural cells. Increased neurone complexity demands more cystathionine and so the glial cells are permitted to produce this from methionine. The energy to perform this synthesis must be "electrical" energy produced by Re. It thus would appear that the electroencephalogram must be a product of the activities of Re in the glial cells. The neurons cannot be the source of electroencephalographic electricity unless EEGs merely represent the electrical changes of recovering nerve activity (ie Galvani's activity).

Alzheimer's disease is therefore a failure of the control of cystathionine synthesis or supervision of perfection of its manufacture. The resultant protein tangles, typical of Alzheimer's sufferers, would appear as jumbled amino acids (which they are) of abnormal form and are non-functional.[18,19] Similarly in cancer, the chromosomes become abnormal and non-functional. Uncontrolled CRe is Alzheimer's disease, uncontrolled ERe is cancer.

These protein tangles are of the same nature as amyloid which can be produced by some other cells in response to chronic inflammation.[20] For example amyloid can be produced after prolonged suppuration of abdominal organs and/or soft tissues. The mechanism of production could well be identical to that of Alzheimer's disease. Since some amyloid production can be halted and reversed if suppuration is eliminated (which is why amyloid disease is a rarity in the antibiotic era) perhaps there is a similar factor responsible for Alzheimer's disease which could be eliminated to reverse it.

Summary

Cancer is a disease of defective glucose metabolism. The energy source of cancer is a reaction which produces electrons exponentially which are then used for mitosis. The anaerobic conversion of D-Glucose to L-Lactic Acid is the primary energy source for the cyclic reaction of oxidized and reduced and oxidized glutath-

ione. Each cycle produces one surplus electron. Cancer mitoses is thus electrically driven. The glutathione cycle must be the specific target of X-ray therapy because it is the only exponential reaction producing energy causing exponential growth of cancer whilst X-ray therapy is the only reducer of a cancer cell population by negative exponential quantities. 434 MHz or Ultra High Frequency electromagnetic radiation must also specifically target the glutathione cycle because it will increase the slope of the exponential curve of x-ray response without destroying its exponential nature. Spectrum analysis reveals that this frequency is reflected from the glutathione cycle *in vivo* by fluorescence and/or resonance. There is no evidence that cancer is in any way due to a failure of the immune reaction and obviously cancer cannot be antigenic in the accepted sense of the term whilst its defect is merely a breakdown in the control pathways of its own cell. The immune system is responsible for the gross physical appearance of the cancer which in turn is dependent upon the growth rate of the cancer which is directly due to the position of the breakage in the control linkage series. The biochemical defects noted in patients with chronic illnesses, certain mental illness and schizophrenia alters their incidence of cancers. The endogenous metabolism of tryptophan offers a promising line of investigation. There appears some possibility that a prophylactic biochemical manipulation could reduce the incidence of adult cancer. ERe produces exponential quantities of electricity (electrons) to power mitosis on demand for all cells except neurones. CRe in glial cells produces exponential quantities of cystathione (or a precursor) which increases the complexity of the glial/neuronal association, thereby creating the intellectual basis of neural function. The continuing rise in the incidence and death rate of several cancers (malignant melanoma, breast cancer, prostate cancer etc.) appears inevitable because the energy of radiowave pollutions will be selectively deposited in cancer according to Ohm's law. Radiowave pollution has the potential to increase the growth and/or mutation rate of all viruses because of their electrical characteristics and appears to be the most likely cause of the demise of certain types of animal life and reduction of sperm counts in humans.

References

1. Kosower NS, Kosower EM: The glutathione - disulfide system. In WE Pryer, Ed. *Free Radicals In Biology.* New York. Academic Press. Vol 2. 1976: 67-71.
2. Pasteur L: *Etudes sur la bière.* Paris. Pub Masson, 1876. 240.
3. Warburg O, et al: Uber den stoffwechsel der carcinomzelle. *Biochem Zeitschrift*, 1924: 152; 308.
4. Needham J, Lehmann H: Intermediary carbohydrate metabolism in embryonic life. v. the phosphorylating cycles. vi. glycolysis without phosphorylation. vii experiments on the nature of non-phosphorylating glycolysis. *Biochem J,* 1937:31: 1210-1254.
5. Hoffer A: *Vitamin B3 and schizophrenia: discovery, recovery, controversy.* Kingston, ON. Quarry Press, 1997.
6. Hoffer A: The discovery of kryptopyrrole and its importance in diagnosis of chemical imbalances in schizophrenia and in criminal behaviour. *J Orthomol Med,* 1995; 10: 1: 3-7.
7. Kay HE: In Ed. Wallace DM: *Tumours of the bladder.* London. E&S Livingstone Ltd, 1959: 194-197.
8. Nauts H: *Bibliography of reports concerning the clinical or experimental use of coley toxins (streptococcus pyogenes and serratia marcescens),1893-1984.* Cancer Research Institute, New York, 390 References. 1984.
9. Eason A: A*n account of the effects of lightning in discussing a tumour of the breast.* In eds. T Dolson, Miscellaneous or philosophical extracts from different authors with some originals, Volume 2, Philadelphia. 295-300. 1776.
10. Allison A: Effects of lightning upon cancer. *Lancet,* 1880; 1: 77.
11. Stern H, Mirsky AE: The isolation of wheat germ nuclei and some aspects of their glycolytic metabolism. *J Gen Physiol.* 1952; 36: 181-191. Also *Science* 1955; 121(3135): 144-146.
12. Percy J. Heat in the treatment of carcinoma of the uterus. *Surg, Gynaecol & Obstetr,* 1916: 22; 77-79.
13. Strauss A: *immunological resistance to carcinoma produced by electrocoagulation based on*

57 years' experience and clinical results. Charles A Thomas. 1969.
14. Madden J, Kandalaft S: Electrocoagulation as a primary curative method in the treatment of carcinoma of the rectum. *Surgery, Gynaecol & Obstetr,* 1983: 157; 164-179.
15. Perves D: *Neural activity and the growth of the brain.* London. Cambridge University Press. 1994.
16. White A, Handler P, Smith El: Amino Acid Metabolism. In: *Principles of biochemistry.* 3Rd Edition, New York. Mcgraw Hill, 499-500. 1964.
17. Mellanby E: Diet and canine hysteria. *Br Med J* 1946: 2: 885-887.
18. Yanker Ba, Duffy Lk, Kirschner Da: Neurotrophic and neurotoxic effects of amyloid beta protein: reversal by tachykinin neuro-peptides. *Science* 1990: 250: 279-284.
19. Castano Em Et Al: In vitro formation of amyloid fibrils from two synthetic peptides of different lengths homologous to alzheimer's disease beta protein. *Biophys Biochem Res Comm.* 1986: 141(2): 782-789.
20. Bailey H, Love Rjm: In: *A short practice of surgery.* 9th Edition. London. H K Lewis & Co Ltd. 1952, 5.