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Implications of Plant Genome Research to Alternative Therapies:

A Case for Radiogenic Metabolism in Humans

M. Sue Benford MSBENFORD@aol.com

Abstract: Recent research revealed a stunning percentage of a plant's genome is nearly identical to a human being's. A relatively high proportion of genetic matches occurred in the categories 'metabolism' and 'energy', thus fueling speculation of a light-based photo-metabolism in animals similar to plant photosynthesis. This paper examines these newly discovered genetic overlaps in relationship to human energy and metabolic processes furthering previously published work incorporating "radiogenic metabolism" into a revised energy-balance equation. Also examined is groundbreaking Russian research on bio-photon emissions, including the historical work of A.G. Gurwitsch. This work is further compared with recent gamma radiation detection experiments during bio-energy therapies and revolutionary new evidence demonstrating cellular "consumption" of infrared light sources. Positing a 'cross-kingdom heritage' with that of a species intimately dependent on light, introduces a new perspective for interpreting mysterious psycho-spiritual enigmas, such as halos and uncorrupted bodies. "Eating light" may also help explain why one study demonstrated that bio-energy healers are nearly twice as likely to be significantly overweight as comparable population-based cohorts.
Keywords: genome, radiogenic metabolism, bioenergy, radiogenic metabolism.

Introduction

A major milestone in plant genome research was recently published in the journal *Nature.*[1] Scientists reported the decoding and placement of more than 100 million letters of genetic code that comprise the plant *Arabidopsis* (a common weed). Many long-held beliefs were systematically uprooted when the researchers discovered that thirty percent of the plant's genes have notable similarities to human genes. The researchers found that between 48 to 60% of genes involved in protein synthesis have counterparts in the other eukaryotic genomes, reflecting highly-conserved gene functions. "The relatively high proportion of matches between *Arabidopsis* and bacterial proteins in the categories 'metabolism' and 'energy' reflects both the acquisition of bacterial genes from the ancestor of the plastid and high conservation of sequences across all species."[2]

Photosynthesis is responsible for energy and metabolism in plants. Of specific relevance is that this process evolved from an ancient species of photosynthetic bacteria that learned how to make energy from sunlight about 3.5 billion years ago. Thus, since plants inherited their photosynthetic genes from the common ancestor some 3.5 billion years ago, and the separation between plant and animals did not occur until 1.6 billion years ago, part of the 30% genetic overlap between plants and humans may represent a genetically-based "photometabolic" capability within humans. The scientists concluded from their five-year study, . . ." many genes of the

endosymbiotic ancestor of the plastid have been transferred to the nucleus, and the products of this rich prokaryotic heritage contribute to diverse functions such as photoautotrophic growth and signalling."[3] But do these genetic overlaps extend to human energy and metabolic processes such that there might be a component of "radiogenic metabolism" within the human energy-balance equation? The team responsible for the photomorphogenesis and photosynthesis section of the *Arabidopsis* genome paper**,** Drs. Joanne Chory and Meng Chen, responded to this question by stating that, ". . . there might be some similarities between genes involved in electron transfer chain and subunits of ATPase in photosynthesis and human genes. Because these chloroplast genes share significant similarities with their mitochondria homologs, which are conserved among different organisms."[4]

Radiogenic Metabolism: An Alternative Cellular Energy Source

Renowned cell biologist and radiation hormesis expert Dr. T.D. Luckey coined the term for the cellular usage of ionizing radiation within living cells as "radiogenic metabolism."[5] By Luckey's description, radiogenic metabolism is concerned with "the promotion of metabolic reactions by ionizing radiation and its products. It is hypothesized that radiogenic metabolism was involved in prephotosynthetic transformation of radiant energy into chemical energy. Metabolic adaptation to the utilization of free radicals from the radiolysis of water could be the evolutionary precursor to the use of active oxygen radicals in photosynthesis and respiration".[6] Evidence that radiation is essential for life was obtained by shielding microbes, plants and invertebrates from natural sources of radiation.[7] The results indicated that radiogenic metabolism is important for the growth and survival of a variety of living organisms. But does the comparison extend to human cells and energy metabolism?

In human cells, only 40 percent of the total potential energy in glucose is transferred to ATP. The remaining 60 percent of the energy is generated in the form of heat.[8] Given this inefficient energy cycle, it is not hard to imagine the cellular need for an alternative fuel supply such as light. Some physiologists speculate that up to thirty percent of the energy fueling daily metabolic processes must come from energy sources other than foodstuffs.[9]

A recently published theory, proposes a new paradigm for understanding the human energy-balance equation.[10] The laws of thermodynamics dictate that in the steady state, the total caloric expenditure of the body equals total body caloric-fuel input.[11] The energy-balance equation, subsequently, can be thought of as:

Food energy intake = internal heat produced + external work (observed bodily functions) + internal work (unobserved intracellular functions) + energy storage. As predicted by this energy-balance equation, three states are possible:

1) Food intake = internal heat production + external work + internal work (body weight constant)
2) Food intake > internal heat production + external work + internal work (body weight increase)
3) Food intake < internal heat production + external work + internal work (body weight decrease)

Using this model, an individual's degree of energy usage, i.e., heat production plus external and internal work, is one of the essential determinants of total energy balance. When exposure to cold or physical exercise (external work) causes increased energy usage, the individual, to maintain equilibrium, increases his food intake by an amount sufficient to match the additional energy required.

Similarly, individuals battling a disease or illness experience an elevated energy requirement (internal work) such that enhanced energy intake is required to maintain balance and

restore health. The question then becomes, what happens if the individual does not take in the added energy required via foodstuffs? Is disequilibrium always the answer or is there an alternative fuel source capable of meeting the intracellular energy needs?

According to bioenergy healing theories, when the body's energy field is "blocked," energy treatments serve to release the blockages and encourage the flow of energy into the body. Also observed by trained healers is the "pulling effect of universal energy" by subjects in a disease or disequilibrium state. This pulling subsides as the subject's condition improves. Thus, for subjects needing additional energy beyond what their body can capture and utilize via foodstuffs, theoretically, gamma radiation, which are high-energy photons, surrounding the subject's body during a healing energy session should decrease representing utilization and/or conservation of this energy source. In the reverse scenario, whereby a person is absorbing too much/not emitting enough ionizing radiation, the healing therapy session should result in increased external gamma counts during healing energy sessions. Thus, according to this new paradigm, the previous energy-balance equation can be expanded to include radiogenic energy sources:

> Food energy + **ionizing radiation** = internal heat produced + external work (observed bodily functions) + internal work (unobserved intracellular functions) + energy storage.

If this revised energy-balance equation is an appropriate model, then it stands to reason that when food energy (calories) decreases, cellular ionizing radiation energy intake may increase to maintain the energy-balance equilibrium. The reverse phenomenon may also occur such that, in radiation-rich environments, food energy intake automatically decreases due to total energetic satiation.

Supporting Research in Bioluminescence

If the theory of radiogenic metabolism as an alternative cellular energy source is plausible, then evidence should exist documenting both photon uptake and light emission from cellular sources. The existence of such phenomena was first postulated and tested by Russian research A.G. Gurwitsch in the early years of the 20th Century.[12] He demonstrated that dividing cells emit ultraviolet radiation, that he dubbed "mitogenic radiation," capable of stimulating mitotic division in other cells. Among the plethora of his significant findings, Gurwitsch was able to discern specific caloric requirements necessary to perform certain cellular functions. He wrote, "To initiate the process in an amino acid solution, the photon energy should exceed 105 kcal/mol. This energy may be supplied either by a single photon with a wavelength not exceeding 270 nm, or by two photons. The energy of the first should be not less than 87.4 kcal/mol (326 nm), while the second can belong to the visible or infrared range with an energy limit of 18 kcal/mol, that is, around 1,500 nm. . . We established that from 326 nm, up to the short wavelength limit of a quartz spectrograph, effectiveness of the UV radiation depends exclusively upon the degree of UV absorption by the peptone or amino acids, rather than upon the photon wavelength."[13]

An interesting finding by Gurwitsch related to the previously suggested revised energy-balance equation, is an experiment in which the rapid and intense cooling of animal tissues initiated the cells to irradiate themselves thus creating a mitogenic effect.[14] One can surmise that the cells were attempting to reestablish a heat equilibrium. This is a relevant finding when one notes that not only is light produced by the process of "organic scintillation," which converts higher-energy photons into lower-energy light, but heat is a byproduct as well (see FIGURE 1). In fact, the efficiency of a scintillator is determined by the ratio of light versus heat produced by the substance.

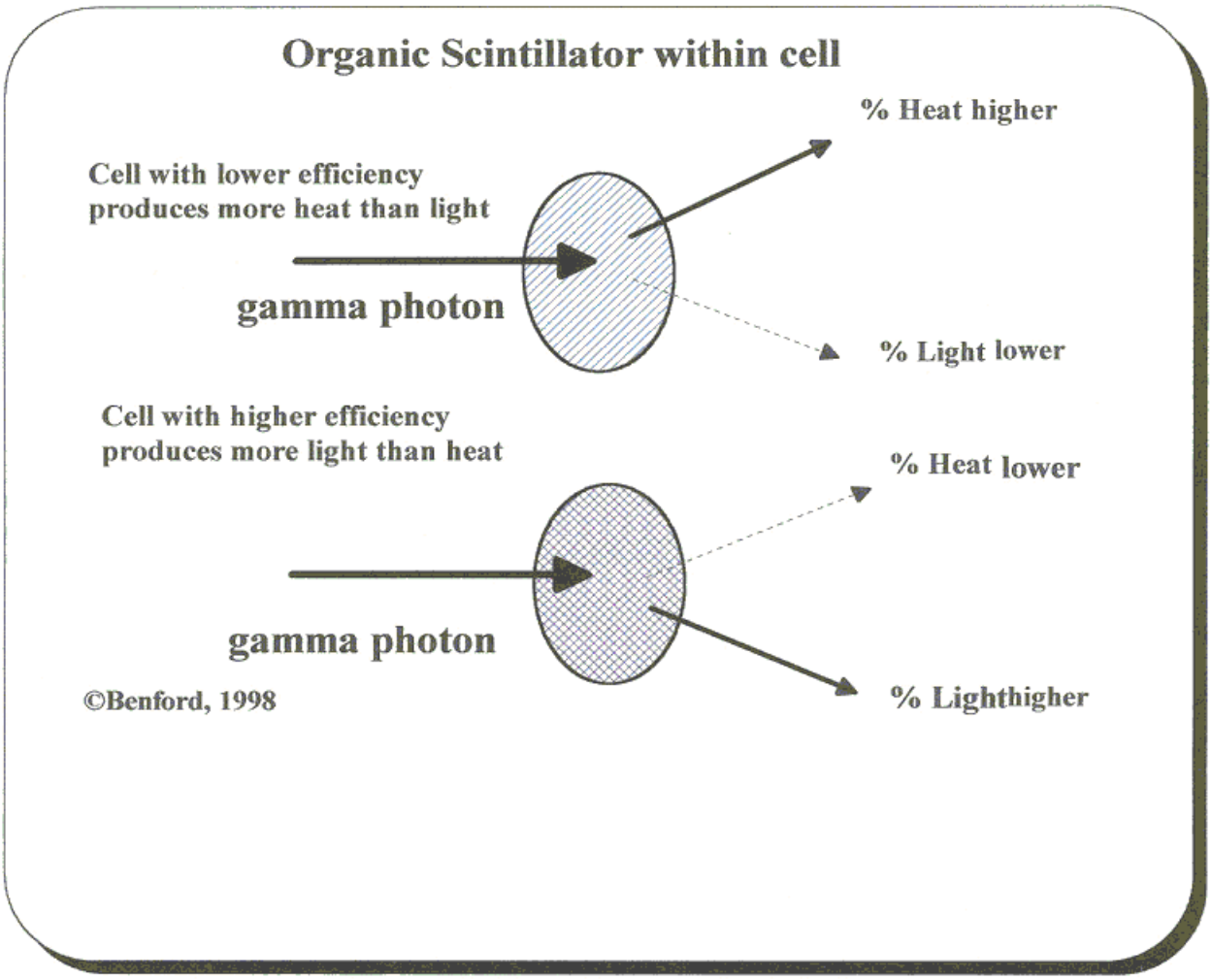


FIGURE 1. More efficient cellular scintillators create a higher percentage of light versus heat

Recent experimental studies conducted by Russian scientists demonstrated that living organisms exposed to low doses of gamma irradiation emitted a secondary radiation of very low intensity for several hours after the initial gamma radiation exposure stopped. This secondary radiation could be detected because of its ability to stimulate development of a biological detector. It was called "secondary biogenic radiation" (SBR) and has been linked to numerous biopositive effects that are similar to those occurring following bioenergy therapies such as improved cellular functioning.[15,16] SBRs have been demonstrated to occur in all the living organisms investigated (microorganisms, insects, and animals). The main property of SBR is to supply the living organism with the information required to remove the cells from the resting state, to enter a cell cycle and, as a result, to stimulate cell division, accelerating growth and development. This has been proven experimentally when SBR was directed towards germinating seeds. Of special interest were the experiments where SBR could reanimate old organisms already incapable of further development.

Another important finding by the Russians is that fresh human blood, exposed to low doses of gamma radiation, responded with SBRs. This is noteworthy in that the heme molecule in blood is nearly identical to the chlorophyll molecule, which is responsible for photosynthesis in plants. As it turns out, the main divergence between the molecules is the heavier metal (iron vs. magnesium) in the human cell (see FIGURE 2). This, as hypothesized, evolved to assist with stopping the higher-energy radiation so that the energy could be converted into SBRs. The logic behind this theory is clear: plants, with their surface structures, do not need to stop the highly-penetrating and energetic photons; whereas, it requires much more energetic (gamma) radiation to penetrate deep into animal blood cells. Thus, iron vs. magnesium and heme vs. chlorophyll evolved to make use of radiation, at various intensities, as alternative cellular energy sources. However, the basic premise behind the scintillating effect, converting higher-energy into lower-energy photons, stayed unchanged between plants and animals. The diversity of biological objects investigated by the Russians suggests that secondary radiation induced by gamma irradiation is a general biological phenomenon common to all living organisms.

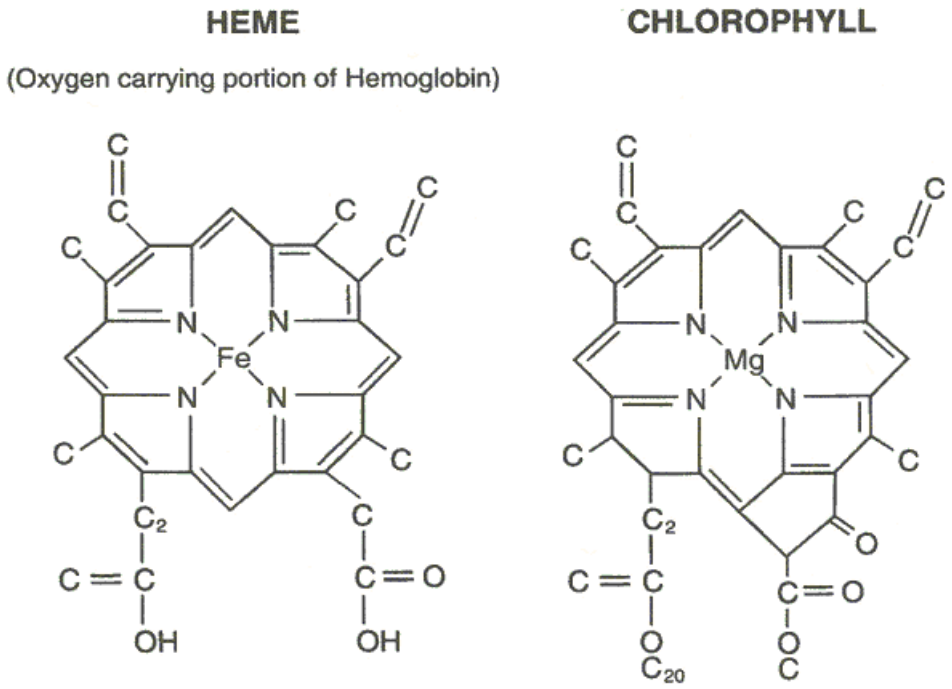


FIGURE 2. The Heme and Chlorophyll molecules are practically identical with the main exception of the heavier metal (Fe vs. Mg) in Heme. The heavier metal in the animal-based Heme molecules may play a role in stopping higher-energy photons, such as gamma rays, for the purpose of radiogenic metabolism.

"A.G. Gurwitsch has hypothesized that the cellular biofield, formed in the cell chromatin and spread out of the cell boundaries, interacts with the biofields of other cells creating thus a synthetic biofield of an entire organism. This idea agrees with our data on exciting the chromatin by a natural atomic irradiation and on the formation of polaritons which emit SBR and interact with the SBRs of other cell proteins. SBR, spread out of the cell boundaries and being interacted with the SBRs of other cells, creates a biofield of an entire organism. Previously unknown SBRs are crucial for the normal functioning of any organism."[17]

Seeing the light

Northwestern University cell biologist, Dr. Guenter Albrecht-Buehler, observed that, "During my study of the motile behavior of cells I came across several observations that raised the startling possibility that cells may be able to detect objects at a distance as if they could see them."[18] This theory is tandem to Gurwitsch's "extending cellular biofields." Buehler eliminated the traditional explanations of chemical responses and posited a more revolutionary explanation that proposed some type of "vision," or remote sensing, related to cellular reactions around pulsating infrared light sources. For several reasons, he chose the near-infrared (IR) light in the range of 750 - 1500 nm to explore as the most viable candidate for light that cells might see; however, as the Russian research indicates, the phenomena is not limited to just this portion of the electromagnetic spectrum. Buehler's numerous experiments showed that cells were able to detect microscopic near-IR light sources at a distance (see FIGURES 3-6).

FIGURE 3

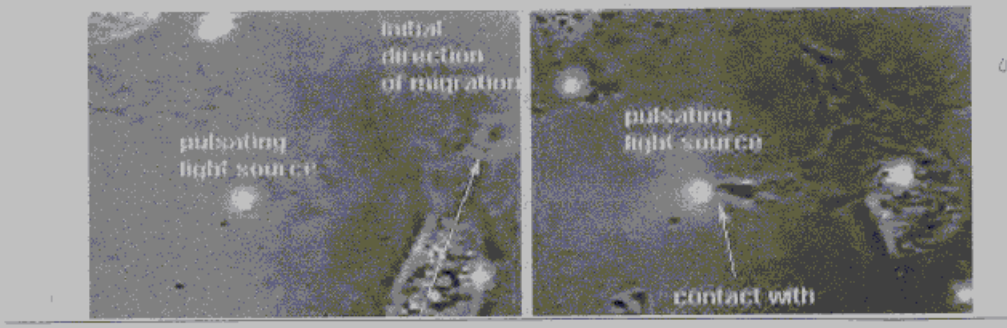


FIGURE 4

FIGURE 5

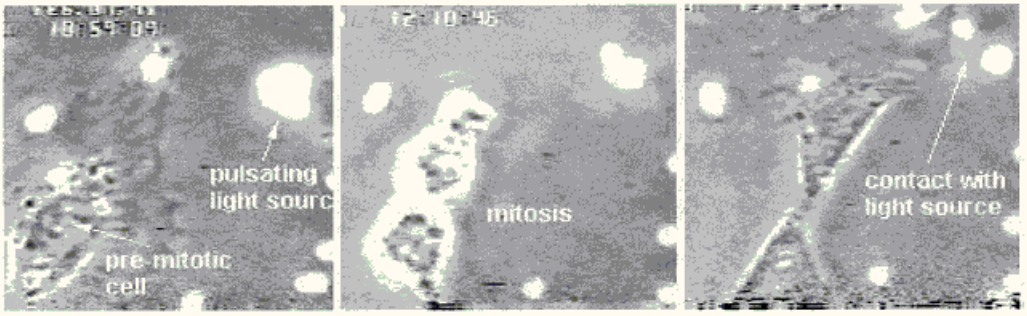
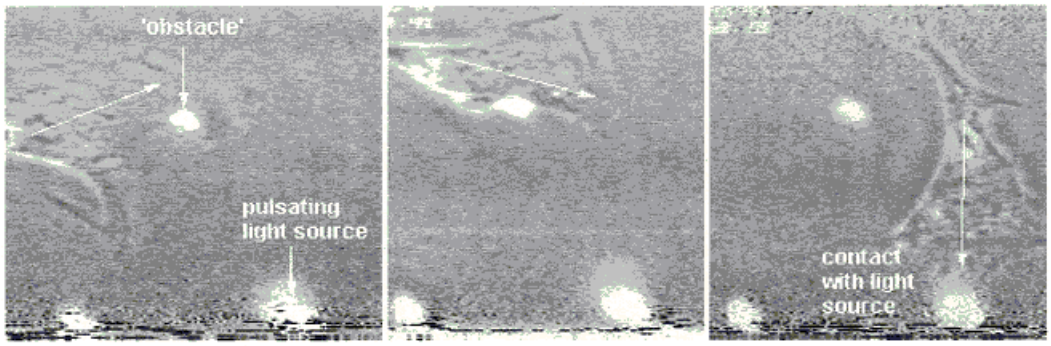


FIGURE 6



Beyond mere detection, the cells were observed to elicit numerous "atypical" behaviors in the presence of light. Among these were cells aggressively pursuing and engaging the light sources, turning completely around to make contact with a photon, dodging obstacles to get to the light source, and moving backwards to pursue the light source. All these behaviors can be applied to an organism seeking a food source for consumption.

Relevant to the Gurwitsch's mitogenic radiation findings, Buehler also observed a light-dependent mitotic sequence of events. As the still photos demonstrate (FIGURE 5), the final completion of mitosis did not occur until at least one of the daughter cells successfully engaged a light source; thus, supporting Gurwitsch hypothesis of the key role of radiation in basic cell division.

Of further significance is that Buehler pinpointed the most likely candidate involved in the pulsating IR light as the cell's mitochondria. The mitochondria, or cellular "power houses," contain the vast majority of porphyrin (heme-) containing proteins in tissue cells, namely the cytochromes. The process of organic scintillation, within the heme molecule is aptly described by

Buehler, "The center of the heme group and other related molecules contains a metal ion. Such a system of many conjugated bonds may generate energy states, which have properties somewhere in between the discrete energy levels of single atoms and the continuous energy band structure of (infinite) solid state crystals. The charge of the metal ion is able to fine-tune the energy levels. These energy states may lie very close to each other and yet not allow transitions between them for reasons of the conservation of momentum and spin. Thus they may accumulate and store small packages of energy such as infrared photons well protected from the ubiquitous thermal chaos of the cellular world until a very specific trigger discharges them. The discharge may release photons of higher energy than the single photons that build up the charge and it may also generate sudden electrical conductivity of the molecule because electrons moved into the higher energy levels that are comparable to the conduction bands of crystals. In other words the porphyrin molecule may serve as a powerful accumulation and amplification mechanism for the small energy of the individually absorbed photons."[19] As already mentioned, the connections between chlorophyll and hemoglobin may stem from a mutual plastid ancestor and contribute to radiogenic metabolism.

Deviations in radiogenic metabolic efficiency: experiences with cancer

A profound finding by Gurwitsch was that mitogenic radiation varied among tissues with cancer cells, exhibiting a cessation of emission. Gurwitsch discovered a "cancer extinguisher" within the cancer cells that halted normal cell function and thwarted the normal emission of mitogenic radiation. In a study on yeast cultures, a complete, temporary arrest of cell proliferation was achieved by the addition of a negligible amount of this so-called “cancer extinguisher” derived from the blood of a cancer patient. However, after irradiation of the culture from the outside, proliferation was renewed and brought to its initial level. Gurwitsch also demonstrated that the addition of the extinguisher, besides suppressing proliferation, inhibits mitogenic emission from the culture itself. The extinguisher did not disturb any other conditions necessary for cell division, except for self-irradiation of the culture. Thus, it was found that external irradiation completely substitutes for self-irradiation of the culture in the process of initiating mitogenesis.[20]

A series of long-term studies recently reported by Russian researcher, Valeri Orel demonstrated that there is something in common among subjects with malignancies in terms of the mechano-luminescence of the blood.[21] This work was further supported by the recent research of biophoton expert, Dr. Fritz-Albert Popp, who demonstrated the differences in light emission spectra of cancerous versus non-cancerous cells. Popp showed that carcinogencic substances were very stable emitters of mitogenic radiation resulting in the stimulation of continuous cell division. This signal overrides the organism’s own natural mitogenic signal thus creating cellular breakdown, deficiencies, and death.[22]

In addition, related research is receiving wide acclaim as a potential cancer diagnostic tool. In a blinded study conducted over a 12-day period in a hospital in Tbilisi, Georgia (Russia), 275 subjects were evaluated for cancer using an enhanced Kirlian device augmented with computerized video cameras. To the amazement of the skeptical hospital staff, the Kirlian researchers were correct in 85% of the cases (up to 95% for some specific types of diagnoses).[23] As indicated in FIGURE 7, the biophoton emissions from patients' fingertips vary considerable among cancer versus non-cancer patients.

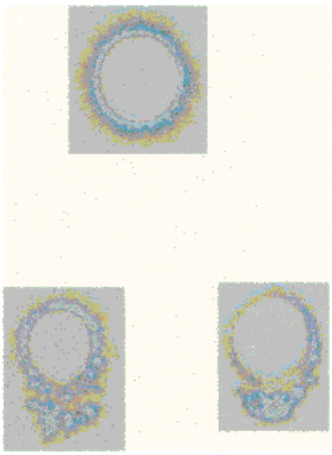


FIGURE 7. Kirlian photography, enhanced with new Russian produced BEO GDV technology, successfully detected cancer in hospitalized patients (up to 95% accuracy). The top fingertip image is from a patient without cancer while the bottom two were taken from patients with cancer. These differences have been linked to other aberrant biophoton emissions in cancer patients (Images courtesy Korotkov KG).

Radiation Hormesis and Bioenergy Therapies

The late Alexander Kuzin, a prominent Russian biophoton researcher, fervently believed that the mechanism of action for Gurwitsch's mitogenic radiation, and secondary biophoton emissions, was "radiation hormesis." In this process, it is thought that just enough ionizing radiation is absorbed to induce the expression of repair genes without actually causing serious biological damage.[24] Multiple studies have produced unambiguous, statistically-significant, laboratory and field research results that demonstrate stimulatory, beneficial, and biopositive effects from low-dose ionizing radiation.[25-27] The observed effects have been reported at the molecular, cellular, organ and organism levels. Positive effects have also been demonstrated in growth and development, reproduction, numerous physiological functions and immune response, including successful treatment of diseases including remission of cancer.[28-32]

Preliminary studies by Benford *et al.* with various bioenergy-healing techniques have posited a theory linking bioenergy therapies with radiation hormesis by demonstrating statistically significant decreases in external gamma radiation measurements during the course of therapy sessions. These studies demonstrated that human beings, skilled in the art of bioenergy techniques, induce the fluctuation of high-energy light waves (gamma photons) more dramatically than those who are not trained in bioenergy techniques regardless of purposeful intentions to heal. During these initial preliminary tests involving Polarity therapists and volunteer subjects, total counts were recorded in 100-second trials separately over the subject's crown, heart, abdomen and pelvic regions using a NaI(Tl) crystal scintillator, which detected gamma radiation from approximately 100 KeV to 3 MeV. Later tests involved 300-second counts over the heart and pelvic regions only.

The results demonstrated that gamma radiation levels markedly decreased during therapy sessions of 100% of subjects and at every body site tested regardless of which therapist performed the treatment. In many instances, the gamma counts fluctuated by thousands within the short time periods analyzed. T-tests were used to determine statistical significance with p-values ranging from $p = .035$ to $p < .0001$, in the 100-second trials, and $p < .00001$ in the 300-second trials.[33,34]

During the gamma radiation experiment of 11/27/98, one subject was tested who had been receiving treatment for breast cancer (Subject ES).[35] ES presented to the study as a 62-year old female, 5' 5" tall, and weighing 240 lbs. She reported being 11 years post-ovarian cancer and having begun chemotherapy for breast carcinoma five-weeks prior to the test date. ES received the identical intervention protocol as the other nine, healthy subjects.

FIGURES 8 -10 represent the comparisons of all subjects (n=10) when specified energy Regions Of Interest (ROI) were evaluated. FIGURE 8, ROI 569.31 KeV to 662.21 KeV, depicts a significant compacting of all gamma counts for ES, e.g., Background Heart, Background Pelvis, Standing Control Heart, etc. This represents little fluctuation of that energy spectrum among the six conditions during the trial. FIGURE 9, ROI 1409.67 to 1671.88 KeV, demonstrates no significant difference between ES's gamma counts and the rest of the group. FIGURE 10, ROI 54.94 KeV to 140.4 KeV, once again, represents a noted variation between ES's gamma counts compared to the nine other healthy subjects. In this instance, her Background Heart reading, taken 2 inches above her chest, is the lowest count observed. This inversely compares with all the others whose Background Heart readings are consistently higher than most other counts. In addition, ES's other five measures are lower than all but one of the other nine subjects' measures. This possibly represents a higher rate of overall gamma radiation absorption and/or diminished emission, compared to the rest of the group. This finding supports the above hypothesis of differentiation in mitogenic radiation between subjects with and without cancer and further supports the revised energy-balance equation utilizing radiogenic metabolism as an alternative fuel source.

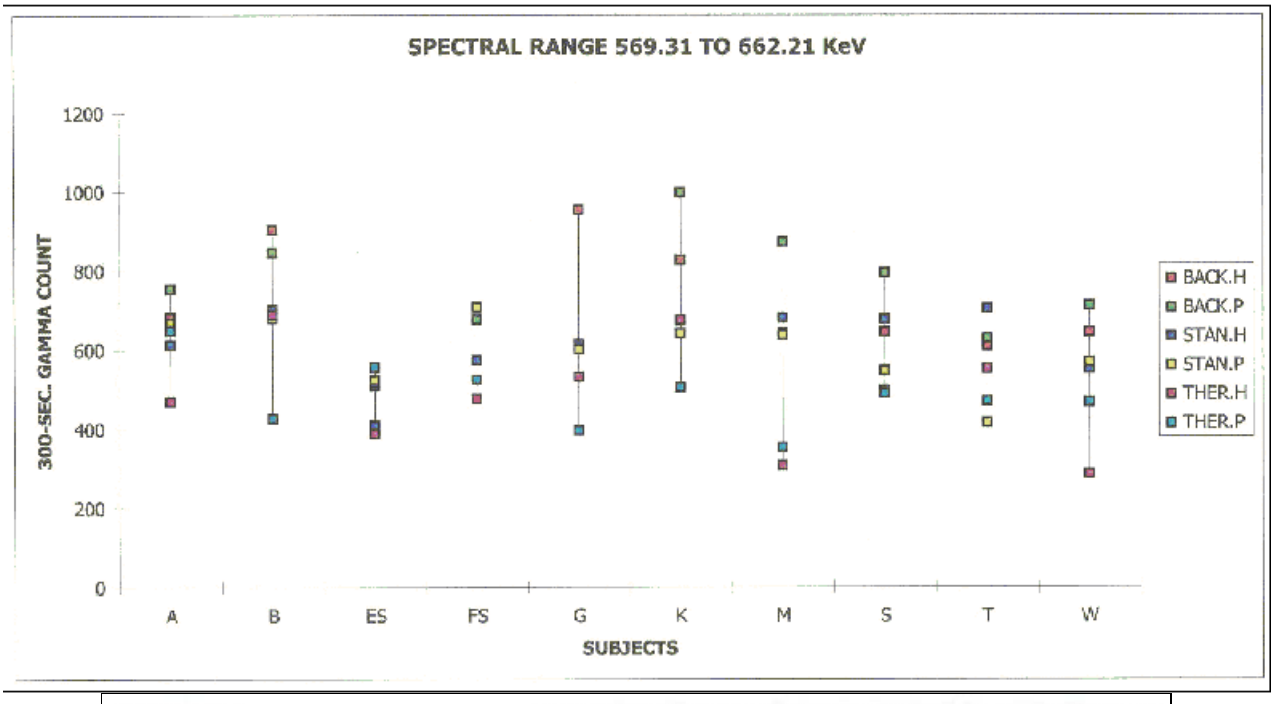


FIGURE 8 Compacting of gamma photon counts for Subject ES with cancer

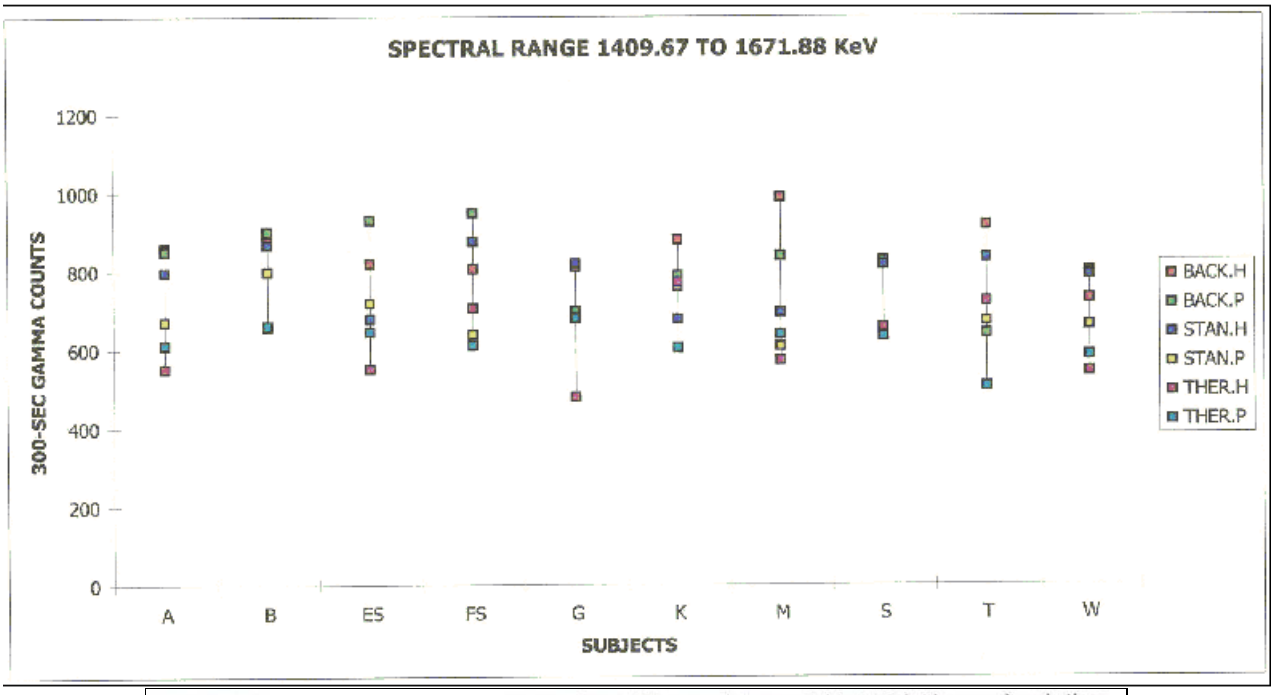


FIGURE 9 No significant differences between Subject ES (with cancer) and others

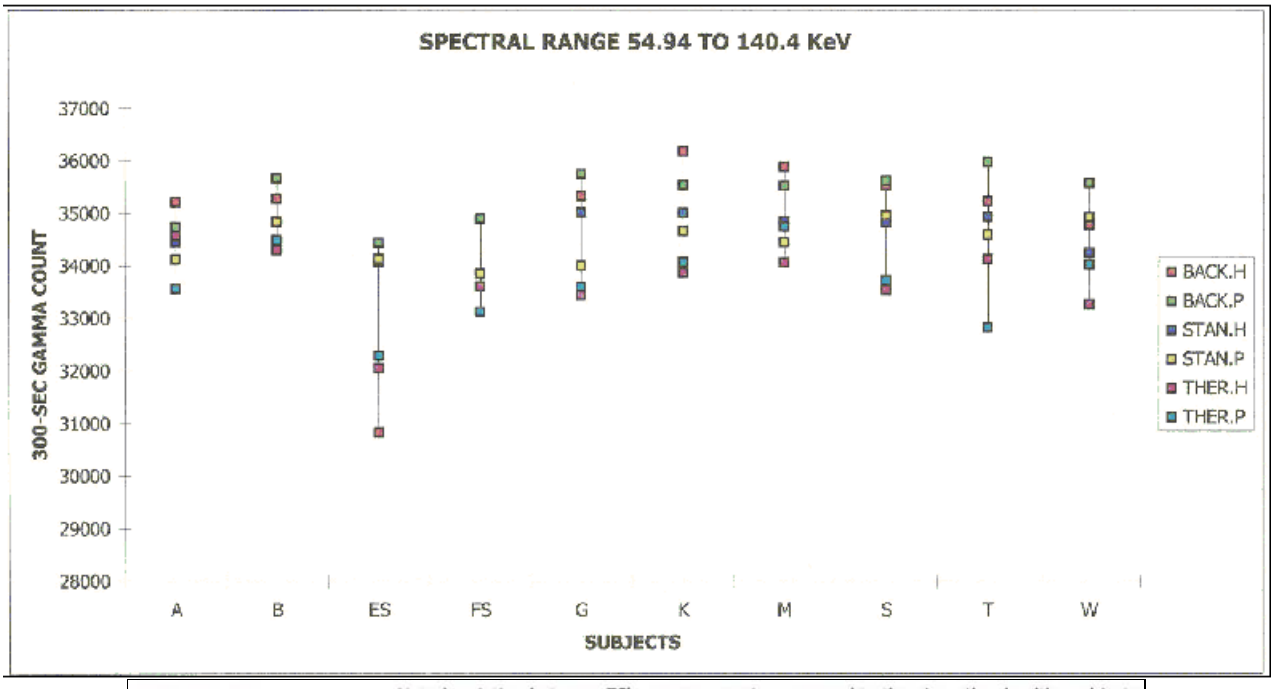


FIGURE 10 Noted variation between ES's gamma counts compared to the nine other healthy subjects

Summary

It is not hard to imagine the difficulty inherent in accepting our genetic similarities to organisms from the plant kingdom. After all, fervor still rages regarding human origins, evolution, and even human beings' overwhelming genetic connections to other primates.

However, for those willing to contemplate the new horizons presented from the plant genome study, and the other revolutionary research reported in this paper, the profound opportunity arises to view our existence, not from a pigeonhole of singularity but, rather, from the broad abyss of interconnectivity. If, in fact, we are, at the essential core, a part of the larger lifecycle of all living organisms inhabiting this earth then it becomes not as far of a leap to begin to see how quantum effects, unknown forms of sensing, and light interdependencies may occur.

Considering a "cross-kingdom heritage" with that of a species intimately dependent on light, permits a more enlightened appreciation of mysterious psychospiritual enigmas, such as halos, that have baffled even the most astute for centuries. For instance, could the halo represent the light emission resulting from the organic scintillation process that produces both heat (top of head is predominant) and light? It is of particular interest that both high elevations, e.g., mountaintops, and diminished caloric intake, e.g., fasting, play a significant role in spiritual and religious lore. Does the body adjust and adapt to fewer calories and/or more abundant ionizing radiation by intaking, or reabsorbing, larger doses of light? This would explain the parallel hormesis effects found among mountainous-region populations with those who arbitrarily restrict foodstuffs. The author has proposed that not only is there an energy potential during radiogenic metabolism but an *informational* potential as well that may explain many psi-phenomena including precognition.[36]

Further assessment might reveal that the sudden output of stored cellular light, if it occurred in a “light shout” at the time of death as described in research by Janusz Slawinski, could be responsible for delayed decomposition of bodies.[37] This phenomenon, known as *incorruption* by the Catholic Church, may be explained by the disruption of the decay process, which, in turn, preserves the flesh. Similar procedures are currently employed today with the gamma irradiation of meat products, which kills bacteria thus extending shelf life of the products. The full appreciation of radiogenic sources as supplemental cellular energy invites a better vantage point for ascertaining many, if not all, these phenomena.

Several medically related enigmas may also be explained by understanding the role of ionizing radiation in our bodies. Idiopathic thermogenesis, burning that occurs in the body of an unknown origin, has perplexed physicians for centuries. These conditions include a continuum of presentations from minor cases of localized erythema multiforme to the more serious and deadly Steven-Johnson’s syndrome and Toxic Epidermal Necrolysis (TEN).[38]

At the end of the idiopathic thermogenic severity continuum may be another unexplained phenomenon called Spontaneous Human Combustion or SHC. Recent research involving a survivor of a presumed SHC event[39] and scientific analysis of an artifact from a purported SHC scene[40] provides plausible evidence of the role of gamma radiation in potentiating a biological nuclear reaction.

Furthermore, accepting that bioenergy healers are interacting with and possibly absorbing additional calories via the "universal energy source," may explain the results of recent research indicating that bioenergy healers are nearly twice as likely to be significantly overweight as a comparable population-based cohort.[41]

Positing a suitable and testable theory of human involvement in radiogenic metabolism may be crucial to understanding not only the basic energy-balance equation but, as described, clarifying and responding to unexplained conditions of the human experience.

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