Advance Access Publication 11 May 2005

eCAM 2005;2(2)129–137
doi:10.1093/ecam/neh093

Lecture Series

The Systemic Theory of Living Systems and Relevance to CAM: The Theory (Part II)

José A. Olalde Rangel

Venezuelan Association of Systemic Medicine, Caracas, Venezuela

This theory stems from observing the universe's 'omniscient' nature, manifested in flows of energy and information of its life plethora. A notorious example is the living cell's intelligent nature, which guides its basic goal: to maximize survival. This last motivated me to address the living system's intelligence, which constitutes a vital and controversial topic, its relationship with 'incurable' disease in general, including cancer, and to propose golden rules for therapeutics, as well as a definition of ideal medicine. The scientific confirmation of these findings is embedded in discoveries in cybernetics, biological theory of information and modern thermodynamic concepts, concerning energy and information exchange, within a living system. This approach's practical application, denominated Systemic Medicine, has been substantiated by treatment and results obtained in >300 000 patients suffering from chronic degenerative diseases.

Keywords: negentropy – intelligence – synergy – biological intelligence – ideal medicine – adaptogen

Review of Previous Lecture

Life = E, I, O. In the first lecture (1–4), I described a governing dynamic, that survival potential of any living system depended on enhancing the three constituents that structure its common denominator. These essential factors are energy (E), intelligence (I) and organization (O). Energy comprises physiological mechanisms associated with ATP synthesis, such as oxidative phosphorolysis, Krebs cycle, β-oxidation, etc., that serve as organic dynamic fuel. Biological intelligence is the entity responsible for regulating neuroendocrine, biochemical, immune and cellular processes, and organization relates to organ function and structure.

The hypothesis, within this scope, proposes that the survival potential (health) of every human being could be improved by a synergetic increase of any or all of these three factors (5), because they were interdependent. I then went on to compile systemic treatments by combining superior plants—adaptogens and tonics, i.e. non-iatrogenic phytomedicines—that could modulate all three axes of the health or survival triangle (1). According to this hypothesis the triangle's integrity reflects an organisms' entropic status. This can be enhanced by providing survival energy and information to cells. Moreover this furnishes negative entroypy from herbs, to create an endogenous healing tendency within the body called syntropy.

The results obtained using this method by 150 MDs in >300 000 patients reveal an improvement in their clinical condition and quality of life (QoL), without secondary effects. In other words, when all three factors were enhanced, patients' conditions began recovery to normal health. This experience has demonstrated the functionality of the hypothesis. This highly successful healthcare methodology became known as Systemic Medicine (SM) because it provided 'a solid systematic foundation in disease cognition' based on a 'healing philosophy' (6). This methodology differs significantly from orthodox 'systemic medicine concepts', which categorize as 'systemic' a reduced number of pathologies considered to affect the whole body, as well as the synthetics used in their treatment. The divergence between both originates from the fundamental postulate, in this new approach, that all chronic degenerative diseases should be treated as 'systemic' with a whole body therapy based on 'nutraceuticals' that provide negative entropy. Figure 1 depicts an organized system and intelligence.

For reprints and all correspondence: José A. Olalde Rangel, Venezuelan Association of Systemic Medicine, Caracas, Venezuela. Tel: +58-212-9459925; Fax: +58-212-9435911; E-mail: adaptogen@cantv.net

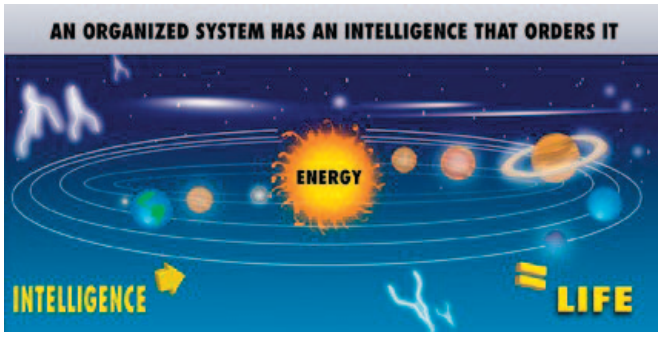

Figure 1. An organized system has an intelligence that orders it. There is life if there is an intelligence which processes energy and information and provides organization.

Introduction: Life and Negentropy

↑Health↔entropy↓. How does life defy entropy? In physics, entropy is defined as the measure of disorder in a system. Disorder, in turn, can be expressed mathematically by probability of random occurrence. All pathologies, by definition, result from a higher than normal organic entropy; thus, to induce health, entropy must first be reduced; this is biconditional. Contemporary thermodynamics defines entropy (or chaos) in an intelligent system as a deficiency in energy and/or information. Therefore, entropy is inversely related to information and energy availability.

According to Shannon, father of the 'Information Theory', and Weaver, 'information is always a measure of the decrease of uncertainty at a receiver or molecular machine' (7). Thus was born the concept of informational entropy, which they concluded was equivalent to a shortage of information content in a message. About the same time, Weiner (1954) established the possibility of interpreting information carried by a message as '… essentially the negative entropy, and the negative logarithm of its probability' (8) since 'the relationship between information (J) and thermodynamic entropy (S) is constant (S + J = const)' (9). Thus, the work of such eminent minds as: Boltzmann (10), Gibbs (11), Szilard (12), Von Neumann (13), Schroedinger (14), Prigogine (15), Shannon and Weaver (7) and Weiner (8,13), brought about the dawn of new emergent fields, including: informational thermodynamics, information theory, biological information theory and cybernetics all dealing with energy, information and entropy in mechanical and living systems.

A basic common premise in the new thinking proposes that information and energy had an inverse, i.e. opposite, correlation with entropy. In other words, evidence suggests that no suitable organization can be attained in living systems that possess reduced levels of information or energy. Disease, therefore, may be defined as a state of disorganization, i.e. higher organic entropy, corresponding with a low energo-informational status of the system.

In consequence, if a reduction in illness is to be achieved, entropy must be reduced. A comprehensive way of accomplishing this is administering negative entropy, or order, through adaptogens and tonic plants which stimulate the production of energy and provide survival information to the immune, neuroendocrine and cellular systems.

To recap, the tendency to reach order depends on the available energy and information within the system, which determines the possible level of stable organization possible. The quantity of true information (conceptual data, not noise) transferred to the system's modulating intelligence allows for chaos and/or confusion management and, enhances the system's ability to attain a higher level of organization.

Moreover by definition, only an intelligent system can process information and energy to reduce entropy. This unequivocal fact then demonstrates the existence of a regulating biological intelligence within the human body. Intelligence is the way in which life affronts entropy.

What is Intelligence?

The importance (and significance) of a system's intelligence is pivotal. How can this controversial and subjective concept be defined accurately? I confronted this dilemma by examining its definition in different fields. Table 1 lists different concepts of the term intelligence.

Table 1. Definitions of intelligence

Domain	Reference	Definition of intelligence
Cybernetics	Norbert Wiener (8)	That whose core concepts are communication, control and learning, by means of feedback mechanisms.
Physics		Refers to regulation processes.
Biophysics		Living system's endogenous regulation processes effectively constitute intelligence.
Encyclopedic	Webster's New World Dictionary (16)	(a) Ability to learn or understand from experience. (b) Ability to acquire and retain knowledge. (c) Ability to respond quickly and successfully to a new situation. (d) Use of the faculty of reason in resolving problems, directing conduct, etc. effectively. (e) An intelligent spirit or being. (f) Having knowledge, understanding or awareness.
Multivarious	World Wide Web	(a) Ability of a system to process general information to react appropriately to specific events. (b) The product of communication, resulting from the collection, processing, integration, analysis, evaluation and interpretation of available information. (c) Ability to acquire, store, retrieve, process and generate information. (d) Ability to learn or understand or to deal with new or challenging situations. (e) Accumulation of experiences together with the understanding of how these experiences are connected. (f) Capacity to act purposefully, to think rationally, to communicate and to deal effectively with his or her environment. (g) Entity. (h) Emergent.

Intelligence = informational entity

By analyzing common traits within the definitions given in Table 1, intelligence may be defined as that emergent informational entity, capable of learning, exerting control, emitting and receiving communication, handling energy flows, establishing feedback mechanisms and creating organization for survival. Emergent implies a higher level of intelligence of the whole, stemming from the intelligence of its parts. According to Laszlo, living systems are special third-stage systems, self-creating and self-replicating, that engender order out of chaos (17).

According to Wiener 'It is my thesis that the physical functioning of the living individual and the operation of some of the newer communications machines are precisely parallel in their analogous attempts to control entropy through feedback' (8). Thus, the notion of intelligence that I will adopt throughout this article is that of an informational entity, i.e. one which is emergent, can generate, process and exchange informational flows in order to control entropy. The concept of intelligence becomes more objective, and functional, when treated as an informational entity, one dependent on information exchange, which as we know has a thermodynamic interpretation. A change of entropy (ΔS) will produce a change or variation in information availability, and therefore a change in intelligence and order in the biological system. Any entity that can exchange informational flows can also generate changes of entropy. Thus, informational flow↔change of entropy↔change in intelligence.

According to Stonier's (18) proposed theory 'Pure energy can perform no 'useful' work (entropy reducing) without a concomitant input of information. Conversely, all expenditures of energy lead to a reorganization of the universe, hence a change in its information status. Energy and information are interconvertible'. This theory could provide additional support for the indispensable existence of an intelligent entity to handle information, since information without intelligence is without value.

There may be a corollary: intelligence is that entity which can causatively alter entropy; and vice versa, entropy changes will also affect intelligence. Figure 2 shows an intelligent cell, an example of an informational entity capable of modifying entropy.

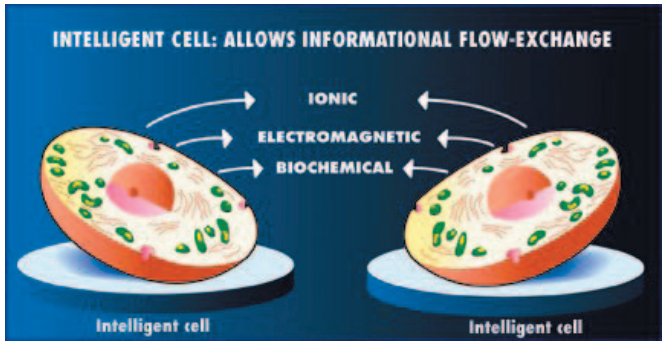

Figure 2. A living system possesses intelligence and is capable, as has been demonstrated by human cells, of an informational flow and exchange with other cells, organs and living systems. This communicational flow may have various 'vehicles' and 'avenues'.

Synergy and Informational Systems

Synergy is a quality of informational systems. It may be understood as emergence, i.e. the informational participation of each fractal member of the system in order to achieve a higher plateau of self-organization and survival (5). It can also be understood as the resulting effect that is greater than the algebraic sum of the parts. Synergy is an important characteristic of third-stage systems. The increase of energy availability within a third-stage, living, system also decreases its entropy, potentially generating an endogenous tendency for informational flow and a heightened intelligence; this in turn generates organization. By analogy, an increase of information will, on its own, raise intelligence which will positively influence energy and organization. In synergic terms, each of the three elements shown above has the capacity to affect (increase or decrease) the other two. Thus we derive the following synergic biconditionals, inherent to any third-stage system: survival potential = health = $\uparrow I \leftrightarrow \uparrow E \leftrightarrow \uparrow O \leftrightarrow S \downarrow$ and also demise = sickness = $\downarrow I \leftrightarrow \downarrow$ $E \leftrightarrow \downarrow O \leftrightarrow S \uparrow$.

Informational Substantiation of Biological Intelligence

If there is communication, intelligence exists. Communication is a manifestation of intelligence. The existence of biochemical and biophotonic communication in cells has been corroborated: biochemical communication, for example, between the neurological and immune systems, has been examined, among others, by Blalock, Cavagnaro and more recently Takeda and Okomura and Cooper (19–22).

The biophotonic communication concept was discovered by Alexander Gurwitsch in 1923, as an 'ultraweak' photon emission from living systems (onions, yeast…) (23). About the same time, Frolich, father of the 'coherent' notion of living systems, discovered that nucleated cells are capable of picking up, storing and broadcasting information about the environment. The term biophotons '…denotes a permanent spontaneous photon emission from all living systems…' and explains '… biological phenomena like intracellular and intercellular communication, cell growth and differentiation, interactions among biological systems and microbial infections…' (24). Different scientific groups have confirmed the existence of (and suggested some uses for) this subtle photon emission in: Australia (25,26), Japan (27,28), Poland (29) and Germany. (24). Prominent scientists in the study of biophotons are Professor Voeikov (30) and Dr. Albrecht-Buehler. This last supports the thesis that cells are intelligent: 'capable of deriving abstract data and emitting near infrared signals' (31,32).

Biological Intelligence (BI)

Intelligence is best measured by its manifestations. In structural terms, the BI is 'omnipresent' in the organism due to the intelligent nature of all cells (23); however, in functional terms, the BI's common denominator is comprised of the

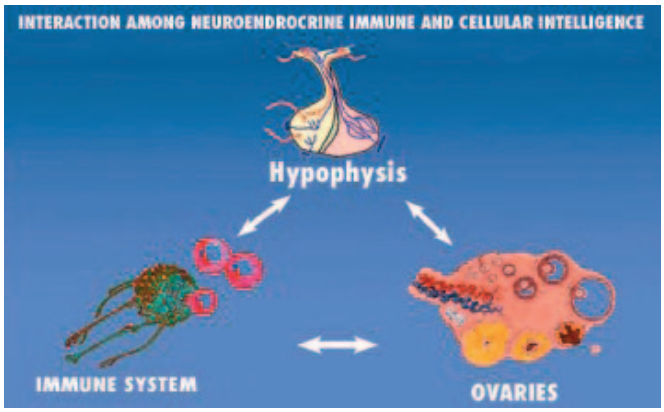

Figure 3. An example of the known cross-talk communication, bidirectional and biconditional, between the I^I (immune intelligence), C^I (cellular intelligence) and B^I (biochemical or neuroendocrine intelligence) in a human living system.

immune intelligence (I^I), cellular intelligence (C^I) and biochemical (or neuroendocrine) intelligence (B^I) (19–22).

The BI functions as an emergent informational entity, oriented towards survival, capable of autoregulation, bidirectional communication, generating, processing and manipulating energy flows within the body. It is in charge of establishing, maintaining and restituting the organization. Figure 3 shows the interaction between neuroendocrine, immune and cellular intelligence. C^I is the most important of BI's constituents since it regulates genetics and metabolism of each and every organic cell and gives birth to the autonomous I^I and B^I. These three elements also constitute a synergistic trio, since none of them can exist in the absence of another, due to essential feedback and information exchange amongst them (19–22).

BI could also be represented schematically as a triangle, since alterations to one side of a triangle always affect the other two. Its healing potential may be defined as the mathematical product of its immune, cellular and neuroendocrine state, i.e. $BI_{(HEALING\ POTENTIAL)} = I^I \times C^I \times B^I$. In consequence, it is possible to enhance BI by increasing any of its three essential components, for example with immune modulators (33–37). The opposite also holds true, a collapse of any component will affect the other two.

Any decline (chronic disease) is due to 'life impacts': aggressors of a mental, physical, chemical or biological nature that increase entropy, suppress BI and generate illness and eventual death. For clarification spiritual intelligence is separate from BI, though they obviously have a strong interaction. Suppression of the spirit acts as the trigger that can negatively affect BI; for example, a heavy loss that ends in cancer (38–40). Thus all all mental oppression or losses increase confusion (disorder) in the individual and thus entropy. The result is a decline in BI. This explains psychosomatic illness.

To heal the organism, one must first reactivate the BI with any method that supplies negative entropy, as with spiritual aid when the origin of the sickness is emotional. The origin of some cancers has been traced back to stress, mental duress or heavy emotional losses (38–40) that cause a breakdown in the neuroendocrine system and consequent immune suppression (38,41). In fact, in all pathologies of mental origin, spiritual aid should be the first line of treatment accompanied by effective therapy to rehabilitate the BI (42).

The Law of Action and Intent of Greater Reaction with Reference to Cancer

My findings (43) led me to formulate that 'when intelligent aggressors attack a living system, the targeted I intends an opposing but greater pro survival reaction' (44). The defendent's strategy consists of endogenous ↑IEO that causes ↑entropy in the aggressor. Its success determines survival. This success is also dependent on the reaction velocity at which the system increases IEO to overcome aggressors. The onset of 'incurable' disease then occurs when BI becomes overwhelmed either by force or by velocity. This law constitutes a basis of immunology, homeopathy and hormesis. It also gives an insight into the reaction of a tumorous cell in cancer.

Based on the former, a neoplasm could then be understood as a cellular survival reaction when the organism's protective mechanisms have failed (45). Why? Because cells have a higher probability of reacting with neoplasia—to achieve genetic survival—when menaced by anarchy and chaos in a high entropy system (45,46) that is disintegrating (47) under the strain caused by stressor agents—not excluding the second law of thermodynamics as a stressor (48). Oncogenesis is more probable in critical entropy states. In other words, cancer could be induced by increasing entropy to a critical level.

It has been confirmed that the probability of neoplasia (cell anarchy) increases when tumor suppressor or differentiating genes suffer maximum information degradation (49,50). Thus, high biological entropy, i.e. critical organic disorder (↓↓O), induces low functional energy reserves (↓↓E) and malfunction of the system's intelligence (↓↓BI), resulting in greater probability of cancer. Therefore, cancer's common denominator is: S↑, ↓↓BI and cell anarchy (51).

Clear examples of this are the following pathologies: hepatitis B and C; human immunodeficiency virus (HIV); cytomegalovirus; human papilloma virus (HPV); chronic gastritis; benign prostate hypertrophy (BPH); endometrial hyperplasia; hypophyseal adenoma; ulcerative colitis; hepatic cirrhosis; regional enteritis; colonic polyposis; chronic pancreatitis; Epstein–Barr virus; fibrocystic breast disease; thyroiditis; ovary cysts; leukoplakia; chronic esophagitis; chronic laryngitis; chronic obstructive pulmonary disease (COPD); pancreatic cyst; and even diabetes (52). All of these tend to degenerate into cancer when they become aggravated, i.e. S↑↑ and BI↓↓.

Synthesis: Disease when aggravated has a higher probability of converting into cancer if BI is taken to a point of collapse. Evidence to support this is the number of pathologies which if uncontrolled develop into cancer. It is my thesis that in an environment of anarchy the intelligent cell 'rebels' in search of survival.

Golden Rule of Etiology

Most pathology originates from a collapse of spiritual or biological intelligence. One can affect the other due to the mind–body connection.

Golden Rule of Therapeutics

All therapeutic formulae should provide negentropy in the following manner. (i) Via positive information exchange with the patient, that serves as spiritual healing or support, since this reduces mental entropy, and, as consequence, physiological disorder. There is a mind–body connection! (53–55). (ii) E↑ stimulators of ATP life fuel. Adaptogens stimulate the mitochondria to produce energy (56), thus setting in motion a cascade of synergetic reactions, such as increasing non-specific resistance, activating the pituitary–suprarenal axis and immune system. (iii) I↑, informational carriers that promote higher phagocytic activity in immune cells and enhance neuroendocrine and cellular activity (57). (vi) O↑, pathologically targeted enhancers (33,34,58–62).

Spiritual Healing and the Placebo Effect

Effective spiritual healing is a vital tool. The process consists of entropy reducing information exchange, in the direction of a patient's peace of mind, i.e. mental order. Similarly, mental entropy reduction also explains the placebo effect. A person that receives information in the direction of healing tends to get better, probably due to mental syntropy. This reflects positively on his physiology; even if the person is not cured. The placebo effect may then be harnessed and utilized as a healing instrument, rather than be seen just as a mere curiosity; if we are actually seeing improvement with placebos, then an endogenous healing tendency must precede this.

Physical Conditioning

Physical exercise increases a system's capacity for work, which in absolute terms generates entropy reduction. This explains its therapeutic benefits.

Active Principle and Action Mechanism

Summing up, under thermodynamic criteria, the active principle for healing is comprised of energy and information, whereas the action mechanism consists of negative entropy—from adaptogens, tonics and effective spiritual guidance—that induce an endogenous tendency towards healing and reorganization. This more inclusive scientific point of view encompasses the specific pharmacological one, whereby biochemical substrates enhance organization, O↑, by providing active principles that modulate or enhance cell metabolism, hormones and neurotransmitters.

Example of a Negative Entropy Adaptogen

Rhodiola rosea, part of the Russian Pharmacopoeia, has the capacity to activate synthesis and resynthesis of ATP in mitochondria and reparative energy processes (56,57,61). Nature provides life's survival tools!

What about Cancer?

In the case of cancer, it may be convenient to carry out non-iatrogenic tumor destruction (63) such as electrotherapy (64) and/or localized non-iatrogenic surgery, if possible, to substitute highly entropic chemo- and radiotherapies. This last may sound controversial; however, besides personal experience in this field, important data endorse this argument. The American Cancer Society has documented that in 1950, 193 people in every 100 000 died from cancer (65). This is exactly the same mortality rate as in 2002 (65). In other words, mortality remains the same despite the advent of chemotherapy in the 1950s. If chemotherapy destroys many types of tumors, why is there no change in the mortality rate?

The answer is simple: many cancer patients now die from chemotherapy, not cancer. This is ignored by society at large, possibly due to financial pressure by the pharmaceutical industry and clinics. For moral, ethical and humanitarian reasons, a cancer patient is entitled to a non-iatrogenic (non-entropic) medicine. Another source of statistical data on chemotherapy, and sequelae, is Moss (66).

What then is an Ideal Medicine?

An ideal medicine, natural or synthetic, must have the capacity to increase I, E and O in the oppressed human body, i.e. all ideal medicines should provide negative entropy (67), therefore providing or increasing informational flow and promoting organization. Non-optimal medicine, whether natural or synthetic, may enhance one or two sides of the health triangle (1), but it will simultaneously suppress the remaining side(s). These phenomena are referred to as secondary and/or adverse side effects. Non-optimal medicine provides positive entropy, i.e. an increase in disorder, a decrease in energy availability and creation of a shortage of information flow within the body. Some notorious cases of non-optimal medicine are thalidomide, rofecoxib, valdecoxib, celecoxib, naproxen, ibuprofen, meloxicam, lodine and nimesulide.

Adverse events caused by such remedies could be avoided by techniques designed to measure entropy changes. This would constitute a truly progressive scientific methodology, essential to determine the global health benefits or harm of each drug, rather than just their particular effect on a specific symptom. Furthermore, most harmful synthetic non-steroidal anti-inflammatory drugs (NSAIDs) can effectively be replaced by non-steroidal anti-inflammatory tonic herbs, of equal efficacy, that, additionally, supply negative entropy to the living system. Ideal medicines exist! Why risk it with cyclooxygenase-2-inhibiting drugs that may affect the cardiovascular system and others? There are NSAID alternatives: natural, effective, non-iatrogenic, such as: *Harpagophytum procumbens* (68), *Morinda citrifolia* (69), *Tribulus terrestris* (70), *Hydrastis canadensis* (71,72) and *Uncaria tomentosa* (73).

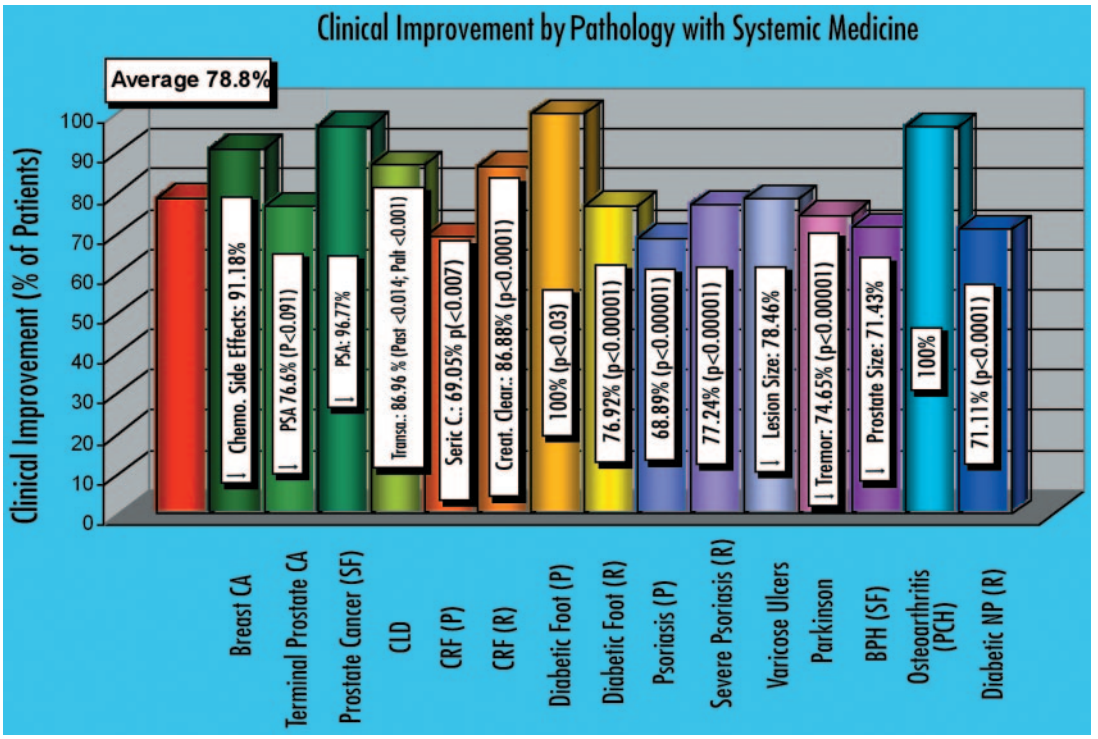

Figure 4. Histogram of clinical improvement % in 15 different pathologies, in patients treated with Systemic Medicine. Total average improvement in all pathologies and significance of results are also provided. PCH = Perez Carreño Hospital; SF = San Felix Hospital; CLD = Chronic Liver Disease; CR = Chronic Renal Failure; NP = Neuropathy; CA = Cancer; R = Retrospective study; P = Prospective study.

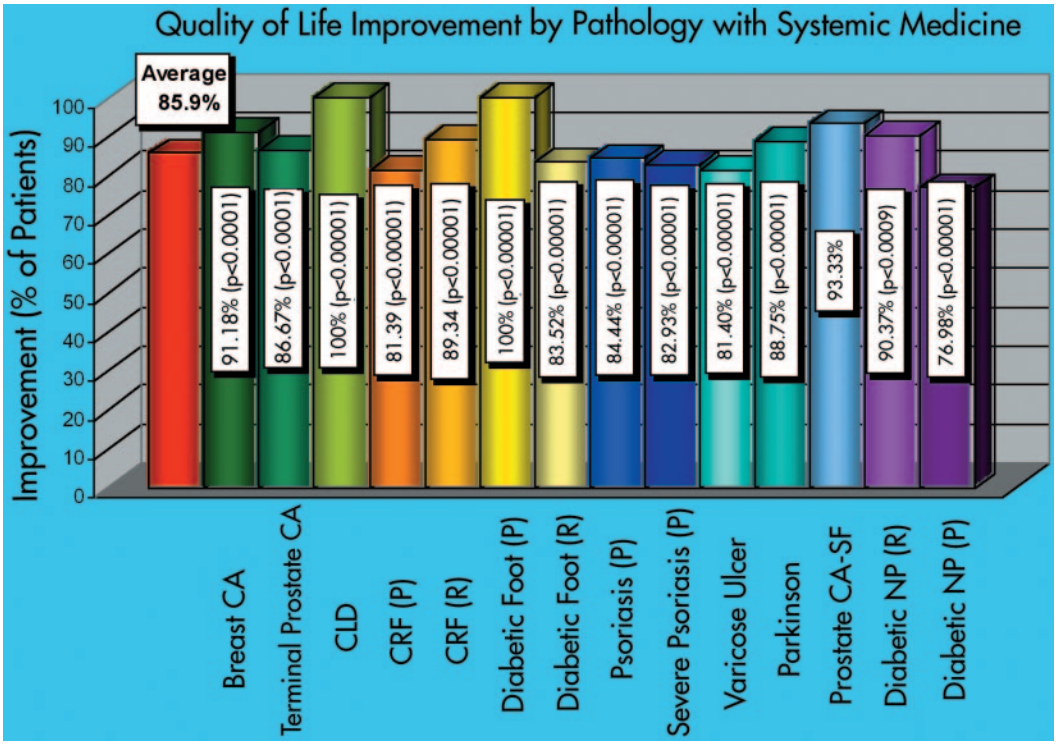

Figure 5. QoL improvement histogram, by pathology with Systemic Medicine. Average QoL, for all pathologies and significance of results are also provided. QoL = Quality of Life; SF = San Felix Hospital; CLD = Chronic Liver Disease; CRF = Chronic Renal Failure; NP = Neuropathy; CA = Cancer; R = Retrospective study; P = Prospective study.

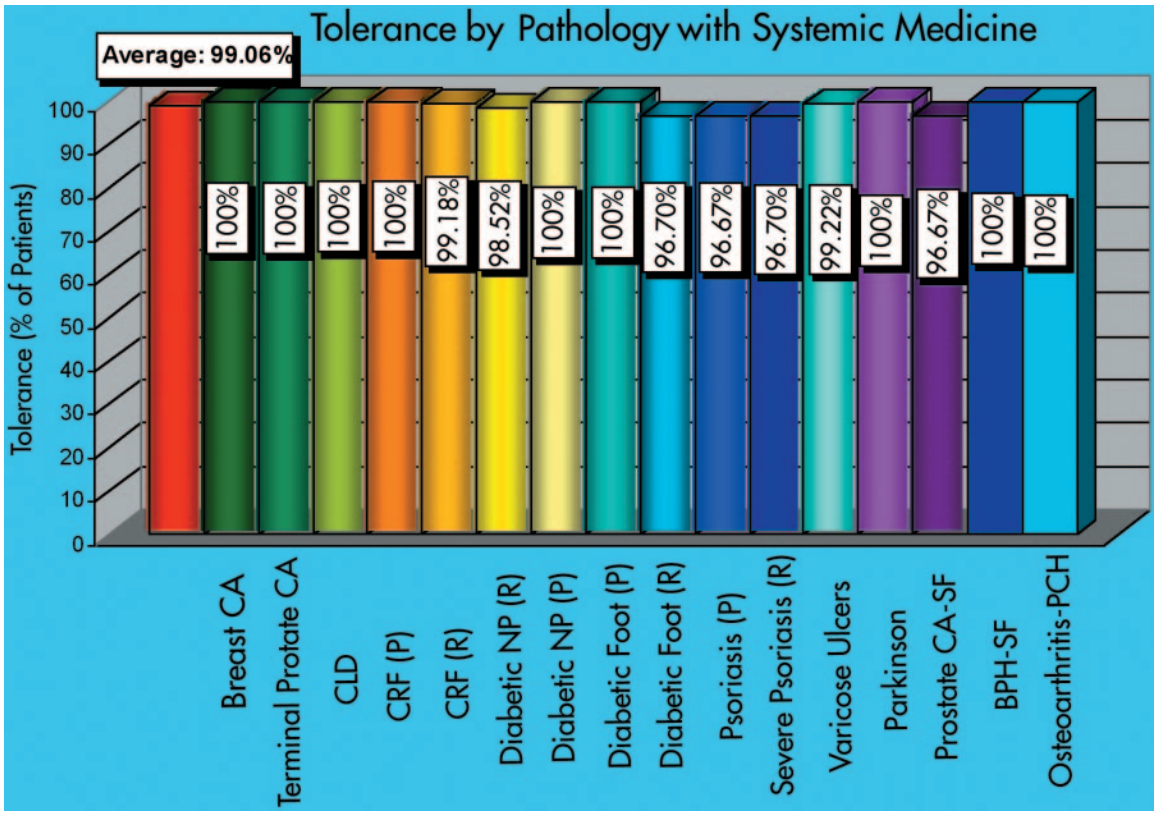

Figure 6. Systemic Medicine protocol's tolerance histogram by pathology. Average tolerance is also included. PCH = Perez Carreño Hospital; SF = San Felix Hospital; CLD = Chronic Liver Disease; CR = Chronic Renal Failure; NP = Neuropathy; CA = Cancer; R = Retrospective study; P = Prospective study.

The Superior Remedy

A superior plant may be defined as any herb that provides vital information to increase E, I and O in the living system (3) via entropy reduction, that results in an increase of survival potential; it is implicit that there can be no after effects. This definition may be extended to include many non-herbal nutraceuticals.

Potential Value: Results of Application

The potential value of SM has been confirmed by its positive clinical influence and results of 17 clinical studies. The outcomes were presented at the First International Congress of Systemic Medicine, GDV and Electrotherapy, held in Caracas in January 2005 (74). The studies were performed, between 2002 and 2004, in Venezuela and Puerto Rico. Overall results were: 79% clinical improvement by pathology (Fig. 4); 86% QoL enhancement by pathology (Fig. 5); and 99% tolerance to treatment (Fig. 6). Clinical studies, methodology etc; are in the congress proceedings and are available upon request.

Next Topic

In the next article I shall expand on the following: (a) Herbal synergetics and bi-directionality; (b) Disease of hypo-energetic etiology; (c) Description of major energy adaptogens; (d) Multiple bi-directionality of complex tonic-adaptogenic formulations; and (e) Need for an Ideal Medicine based on a solid philosophy. 'The remedies and nutritional supplements that are thought canonical as CAM in the West often do not seem to have a solid systematic foundation in disease cognition or a healing philosophy' (6). In subsequent articles I shall outline application and results, as well as 'ideal remedies' utilized according to this new approach. I also hope to clarify the main differences between Systemic and other holistic systems such as South Asian systems of medicine -if time and space allow it.

Acknowledgments

I express my sincere appreciation, and gratitude, to Professor Edwin L. Cooper for his tutoring and guidance in making this article possible, also to En. Oswaldo del Castillo for his intellectual contribution.

References

1. Olalde, J. The systemic theory of living systems and relevance to CAM. Part I: the theory. *eCAM* 2005;2:13–8.
2. Olalde, J. The systemic theory of living systems. Proceedings of the First Neurobiotelecom Congress. St Petersburg, 2004.
3. Olalde, J. Teoría Unificada de Systemics y más de 500 Fórmulas Terapéuticas. Caracas: Editorial Adaptogenos Internacionales CA (Spanish), 2003.

4. Olalde, J. Systemics La Revolución de los Adaptogenos en la Salud. Caracas: Editorial Melvin CA (Spanish), 2001.
5. Haken, H. Information and Self-Organization. A Macroscopic Approach to Complex Systems. New York: Springer, 2000.
6. Terasawa, K. Evidence-based reconstruction of Kampo medicine: Part I—Is Kampo CAM? *eCAM* 2004;1:11–6.
7. Shannon CE, Weaver W. The Mathematical Theory of Communication. Champaign: University of Illinois Press, 1999.
8. Wiener, N. The Human Use of Human Beings. Boston: Houghton-Miffin, 1954.
9. Korotkov, K. Light after Life. Fair Lawn: Backbone Publishing Co., 1988.
10. Lindley, D. Boltzmann's Atom: The Great Debate that Launched a Revolution in Physics. New York: Free Press, 2001.
11. Deltete RJ. Gibbs and the energeticists, no truth except in the details. *Boston Stud Philos Sci* 1995;167:135–69.
12. Leff HS, Rex AF (eds). Maxwell's Demon: Entropy, Information, Computing. Princeton: Princeton University Press, 1990.
13. Heims SJ, von Neumann J, Wiener N. From Mathematics to the Technologies of Life and Death. Cambridge: MIT Press, 1980.
14. Schroedinger, E. What is Life? Cambridge: Cambridge University Press, 1992.
15. Prigogine, I. Order Out of Chaos. Bantam Books, 1984.
16. Neufeldt V, Guralnik D (eds). Webster's New World Dictionary. New York: Simon & Schuster, 1988.
17. Laszlo, E. Evolution, The Grand Synthesis. Boston: Shambhala Publications Inc., 1987.
18. Stonier T. Information as a basic property of the universe. *Biosystems* 1996;38:135–40.
19. Blalock JE A molecular basis for bidirectional communication between the immune and neuroendocrine systems. *Physiol Rev* 1989; 69:1–32.
20. Cavagnaro J, Lewis RM. Bidirectional regulatory circuit between the immune and neuroendocrine systems. *Year Immunol* 1989;4:241–52.
21. Takeda K, Okomura K. CAM and NK cells. *eCAM* 2004;1:17–27.
22. Cooper, EL. Commentary on CAM and NK cells by Kazuyoshi Takeda and Ko Okumura. *eCAM* 2004;1:29–34.
23. Gurwitsch A.G. Principles of Analytical Biology and of the Theory of Cellular Fields. Moscow: Nauka, 1991.
24. Popp FA. Properties of biophotons and their theoretical implications. *Indian J Exp Biol* 2003;41:391–402.
25. Trushin M. Studies on distant regulation of bacterial growth and light emission. *Microbiology* 2003;149:363–8.
26. Tilbary RN, Quickenden TI. Spectral and time dependence studies of the ultraweak bioluminescence emitted by the bacterium *Escherichia coli*. *Photochem Photobiol* 1988;47:145–50.
27. Takeda M, Tanno Y, Kobayashi M et al. A novel method of assessing carcinoma cell proliferation by biophoton emission. *Cancer Lett* 1998; 127:155–60.
28. Kobayashi M, Devaraj B, Usa M, Tanno Y, Takeda M, Inaba H. Development and applications of new technology for two-dimensional space-time characterization and correlation analysis of ultraweak biophoton information. *Front Med Biol Eng* 1996;7:299–309.
29. Slawinska D, Slawinski J. Ultraweak photon emission in model reactions of the *in vitro* formation of eumelanins and pheomelanins. *Pigment Cell Res* 1987;1:171–5.
30. Voeikov VL. Mitogenic radiation, biophotons, and non-linear oxidative processes in aqueous media. In: Popp FA, Beloussov L (eds), Integrative Biophysics. Biophotonics. Dordrecht: Kluwer Academic Publishers, 2003, 331–359.
31. Albrecht-Buehler G. Is cytoplasm intelligent too? *Cell Muscle Motil* 1985;6:1–21.
32. Albrecht-Buehler G. Altered drug resistance of microtubules in cells exposed to infrared light pulses: are microtubules the 'nerves' of cells? *Cell Motil Cytoskel* 1998;40:183–92.
33. Kohguchi M, Kunikata T, Watanabe H, Kudo N et al. Immuno-potentiating effects of the antler shaped fruiting body of *Ganoderma lucidum Biosci Biotechnol Biochem* 2004;68:881–7.
34. Kidd PM. The use of mushrooms glucans and proteoglycans in cancer treatment. *Altern Med Rev* 2000;5:4–27.
35. Bocharova OA, Lyzhenkova MA, Mezentseva MV, Semernina VV, Knyazhev VA. Phytoadaptogen for preventive oncology: immunobiological criteria of composition. *Bull Exp Biol Med* 2003;136:591–4.
36. Geng XX, Yang Q, Xie RJ, Luo XH et al. *In vivo* effects of Chinese herbal recipe, Danshaohuaxian, on apoptosis and proliferation of hepatic stellate cells in hepatic fibrotic rats. *World J Gastroenterol* 2005;11:561–6.
37. Kormosh N, Laktionov K, Antoshechkina M. Effect of adaptogenic preparation 'AdMax' on cell-mediated and humoral immunity of patients with advanced ovarian cancer. N.N. Blokhin Cancer Research Center, Russian Academy of Medical Sciences, 2004 Moscow, in press.
38. Reiche EM, Nunes SO, Morimoto HK. Stress, depression, the immune system, and cancer. *Lancet Oncol* 2004;5:617–25.
39. Schwarz R, Heim M. Psychosocial considerations about spontaneous remission of cancer. *Onkologie* 2000;23:432–5.
40. Hamer RG. Summary of The New Medicine. Amici di Kirk, 2000.
41. Baltrusch HJ, Stangel W, Titze I. Stress, cancer and immunity. New developments in biopsychosocial and psychoneuroimmunologic research. *Acta Neurol (Napoli)* 1991;13:315–27.
42. Tamburini M, Gangeri L, Brunelli C et al. Cancer patients' needs - during hospitalisation: a quantitative and qualitative study. *BMC Cancer* 2003;3:12.
43. Olalde, J. El Cáncer sí se Cura. Caracas: Editorial Adaptogenos Internacionales CA (Spanish), 2003.
44. Kumar V, Contran R, Robbins S. Basic Pathology. Buenos Aires: Mac Graw Hill Interamericana, 1997.
45. Patiño, JF. Oncología, caos, sistemas complejos adaptativos y estructuras disipativas. *Rev Colomb Cir* 2002;17:5–9 (Spanish).
46. Pappas PT. Theory of cancer. Proceedings of the First German Conference of Alternative Medicine. Munich, 2004.
47. Klimek R. Neoplasms and medical thermodynamics. *Ginekol Pol* 2003; 74:746–53.
48. Prigogine I. Chemical kinetics and dynamics. *Ann NY Acad Sci* 2003; 988:128–32.
49. Gatenby RA, Frieden BR. Information dynamics in carcinogenesis and tumor growth. *Mutat Res* 2004;568:259–73.
50. Gatenby RA, Frieden BR. Application of information theory and extreme physical information to carcinogenesis. *Cancer Res* 2002; 62:3675–84.
51. Abbas A, Lichtman A, Pober J. Cellular and Molecular Immunology. Buenos Aires: Mcgraw-Hill Interamericana, 2002.
52. Barnard, RJ. Prevention of cancer through lifestyle changes. *eCAM* 2004; 1:233–9.
53. Adams JD, Garcia C. The advantages of traditional Chumash healing. *eCAM* 2005;2:19–23.
54. Luskin FJ. Transformative practices for integrating mind–body–spirit. *J Altern Complement Med* 2004; 10 Suppl 1: S15–23.
55. Walach H, Jonas WB. Placebo research: the evidence base for harnessing self-healing capacities. *J Altern Complement Med* 2004;10: S103–12.
56. Abidov M, Crendal F, Grachev S, Seifulla R, Ziegenfuss T. Effects of extracts from *Rhodiola rosea* and *Rhodiola crenulata* (*Crassulaceae*) roots on ATP content in mitochondria of skeletal muscles. *Bull Exp Biol Med* 2003;136:585–7.
57. De Bock K, Eijnd BO, Ramaekers M, Hespel P. Acute *Rhodiola rosea* intake can improve endurance exercise performance. *Int J Sport Nutr Exerc Metab* 2004;14:298–307.
58. von Stockar U, Liu J. Does Microbial Life always feed on negative entropy? Thermodynamic analysis of microbial growth. *Biochim Biophys Acta* 1999;1412:191–211.
59. Brekhman II, Dardymov IV. New substances of plant origin which increase non-specific resistance. *Annu Rev Pharmacol* 1969;9:419–30.
60. Khasina EI, Dardymov IV, Brekhman II. Effects of eleutherococcys extract on the readaptation processes after 7 h hypokinesia in rats. *Kosm Biol Aviakosm Med* 1983;17:55–8.
61. Antoshechkin A. Leuzea and Your Health. Clearwater: Ceptima Publishing Co., 2000.
62. Antoshechkin A. The Primary Adaptogens: Powerful Remedies of Prophylactic Medicine. Clearwater: Ceptima Publishing Co., 2001.
63. Klimek, R. Biology of cancer: thermodynamic answers to some questions. *Neuro Endocrinol Lett* 2001;22:413–6.
64. Xin Y. Advances in the treatment of malignant tumours by electrochemical therapy (ECT). *Eur J Surg Suppl* 1994;574:31–5.
65. Jemal A, Murray T, Ward E et al. Cancer statistics, 2005. *CA Cancer J Clin* 2005;55:10–30.
66. Moss R. Questioning Chemotherapy. Lemont: Equinox Press, Inc., 2004.
67. Korotkov K, Williams B, Wisneski LA. Assessing biophysical energy transfer mechanisms in living systems: the basis of life processes. *J Altern Complement Med* 2004;10:49–57.

68. Chrubasik S, Model A, Black A, Pollack S. A randomized double blind pilot study comparing Doloteffin and Vioxx in the treatment of lower back pain. *Rheumatology (Oxf)* 2003;42:141–8.
69. Su C, Wang MY, Nowicky D, Jensen CJ, Anderson G. Selective COX-2 inhibition of *Morinda citrifolia* (Noni) *in vitro*. Proceedings of the7th Annual Conference Eicosanoids and Other Bioactive Lipids in Cancer, Inflammation and Related Disease. Nashville, 2001.
70. Hong CH, Hur SK, Oh OJ et al. Evaluation of natural products on inhibition of inducible cyclooxigenase (COX-2) and nitric oxide synthase (iNOS) in cultured mouse macrophage cells. *J Etnopharmacol* 2002;83:153–9.
71. Tai WP, Luo HS. The inhibit effect of berberine in human colon cell line cyclooxygenase-2. *Zhonghua Nei Ke Za Chi* 2003;42:558–60.
72. Fukuda K, Huoiya Y, Mutoh M et al. Inhibition by berberine of cyclooxygenase-2 transcriptional activity in human colon cancer cells. *J Ethnopharmacol* 1999;66:227–33.
73. Sandoval-Chacon M, Thompson JH, Zhang XJ et al. Anti-inflammatory action of cat's claw: the role of NF-kappaB. *Aliment Pharmacol Ther* 1998;12:1279–89.
74. Olalde J, del Castillo O. Report on First International Congress on Systemic Medicine, Gas Discharge Visualization (GDV) and Electro-Oncotherapy (ECT). *eCAM* 2005; Advance Access Published as April 7, 2005.

Received March 4, 2005; accepted April 7, 2005