

# Does an Improved Understanding of the Nature and Structure of the Physiological Systems Lead to a Better Understanding of the Therapeutic Scope of Complementary & Conventional Medicine?

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## Abstract

**Colour perception is associated with the function of the Autonomic Nervous System. This is linked to the function of the physiological systems, organs, cellular and molecular biochemistry. Stress is also linked to the function of the Autonomic Nervous System and influences the stability of the physiological systems. It affects the levels of proteins and their reactive substrates which release biophotons, unique for their colour and level/intensity, which subsequently influence visual perception. There is therefore a definable relationship between the neurosensory pathways, the autonomic nervous system and all aspects of the body's function.**

**The consequence is a new generation of medical technologies which regulate the natural physiological mechanisms responsible for health and wellbeing. The understanding that there are physiological systems regulated by the Autonomic Nervous System can be used to provide a viable explanation for the function of many medical techniques including those of conventional or complementary origins.**

**Keywords:** Virtual scanning; Autonomic nervous system; Physiological systems

## Introduction

The body is a wholly biochemical organism therefore all biochemical influences and forms of therapeutic intervention must directly or indirectly influence the body's prevailing biochemistry. These influence the molecular mechanisms influencing axon growth and regeneration, synaptic plasticity, development and function; the mechanisms of gene regulation in the nervous system and of protein expression; the influence of pathologies upon the neurosensory and neurovisual pathways and function; the mechanisms influencing neurodegeneration; etc.

This covers a wide swathe of medical research and/or interventionist techniques e.g. cognitive and developmental psychology (CBT, NLP, etc), image and signal processing, virtual physiological human (virtual organs), biofeedback, pharmacology (pharmaceuticals, nutrition, etc), systems biology, computational neuroscience, etc.

That the Russian researcher I.G.Grakov (Grakov, 1985) has mathematically modelled the consequences of visual input and in particular of visual perception upon the autonomic nervous system and physiological systems (Ewing and Ewing, 2008) enables us to review existing knowledge

from a systems-based perspective rather than the prevailing consensus which considers only the biochemical consequences of systemic dysfunction. Such a viewpoint is not new to the GP who routinely use techniques to evaluate systemic function e.g. breathing, digestion, excretion, sleeping, blood pressure, blood glucose, blood cell content, and temperature; however such an approach remains relatively empirical, failing to take into account the context dependent, multi-systemic and multi-level nature of the body's physiology. The application of mathematical modelling is however a radical innovation which encounters an understandably sceptical response. Nevertheless such innovations are considered the inevitable consequence of medical research by respected figures (Brenner, 2002).

The body reacts (and/or 'resonates') with its environment at many different levels. It's interaction with ultrasound, x-rays, positron-emission, and magnetic resonance can be harnessed with diagnostic effect. Drugs and nutrition seek to compensate for biochemical dysfunction arising from stress influences. Similarly, most complementary or alternative medical techniques are based upon the body's interaction with its environment which can also be harnessed to provide a diagnostic or therapeutic effect e.g. heat (thermography), excretion (colonic irrigation and sauna), breathing techniques (Alexander Technique, yoga, meditation, exercise, etc), posture (osteopathy and chiropractic), digestion (nutrition and diet), etc. Other techniques are based upon the subtle influences of sensory input e.g. of light, sound, smell, taste and touch (Chromotherapy /Colour therapy, Audiotherapy/Music, Aromatherapy, Ayurvedhic medicine, Virtual Scanning, etc); whilst approaches such as sleep, hypnosis, yoga, meditation and Virtual Scanning use the subtle influence of the brain waves upon health. It represents a huge area of unexplored potential for medical research. Such techniques are based upon the body's innate regulatory mechanism i.e. the physiological systems which regulate all aspects of our function e.g. sleeping, breathing, blood pressure, digestion, excretion, etc. These are the systems which the body naturally uses to maintain stability (homeostasis), health and wellbeing. If such knowledge could be adapted it should be possible to regulate the body's function thereby improving health and wellbeing e.g.

- The company MATERIA MEDICA (see reference) now uses 'homeopathic technology' to isolate and manufacture the antibodies which have been produced in the body arising from the use of homeopathic remedies. These 'polyclonal antibodies' are used in patented pharmaceutical products. Furthermore the study of polyclonal antibodies is now an area of research for leading phar-

maceutical companies.

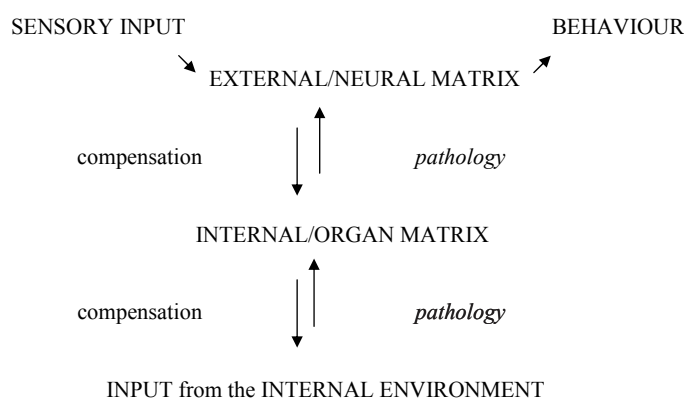
- Endocrinologists have hypothesised the existence of physiological systems which regulate the body's function whilst Psychoneuroendocrinologists have illustrated how stress influences affect the endocrine organs, immune function and their related biochemistries.
- Systems Biologists now research the existence and function of neuronal networks and their interaction with the body's physiology. There is increasing acceptance that the body's function is regulated by a complex network of organ networks.
- Eminent researchers have predicted (Caplan, 2003) that 'the ability to download information from the brain would lead to a new generation of diagnostic and therapeutic technologies!'; the need by researchers to make the transition from thinking in terms of cellular processes to a systems-based model and to embrace an interdisciplinary approach which can link cellular and molecular neuroscience to cognitive psychology (Kandel, 2006); and of 'brainwave coherence' (Fields, 2006).

### Physiological Systems and Autonomic Nervous System

The Physiological Systems, increasingly researched as Neural Networks, regulate the body's 'executive functions'. They are regulated by the autonomic nervous system and, in turn, regulate organ and cell function. This influences the rate and completeness of reactions and extractions occurring in the body (see Figure 3).

Although there is not universal agreement on their structure, the existence of physiological systems and of associated homeostatic limits is not in doubt. The conventional and prevailing understanding is of cardiovascular, respiratory, nervous, skin, musculoskeletal, blood, digestive, endocrine, urinary, and reproductive systems

Figure 1



– it does not include provision for an immune ‘system’ - yet there are inherent limitations with this simplistic model which excludes consideration of several of the body’s executive functions. Nevertheless it is widely recognised that the Autonomic Nervous System and Physiological Systems influence all aspects of biochemical function (figure 1) and that there are hyper and hypo levels of function for each system. The following Physiological Systems , their structures and organs, and their mathematical relationship have been identified in the following inclusive model.

Sleeping, Breathing, Digestion, Excretion, Osmotic Pressure, Blood Pressure, Blood Cell Content, Blood Volume, Blood Glucose, Sexual Function, pH, Temperature, Posture and Locomotion. (Origin: Grakov, 1985).

These systems comprise a network of organs which are synchronised and regulated by the Autonomic Nervous System (Figure 2).

Such an understanding complements biochemical research by providing a structured understanding of the body’s function rather than considering only the biochemical consequences of systemic dysfunction.

Stress in its various manifestations affects the stability of the physiological systems (Marks, 2008). Consequently significant changes to the reaction conditions affect the body’s biochemistry e.g. altered mineral levels, metabolic rate, etc. These are indicative of the systems which regulate all aspects of physiological function. This includes osmotic pressure, temperature, pH, blood pressure, blood cell content, blood glucose, the excretory system (elimination of toxins), breathing (blood oxygen levels), etc. This influences the levels of minerals e.g. Ca, Mg, Na, K, Fe, Cr, etc; which influence all aspects of the body’s function including the absorption and transport of oxygen, inter-cellular communication, the rate and completeness of protein-substrate reactions, etc (see Figure 3).

**The Relationship with Cognition**

There is evidence that colour perception deficits are not related to eye dysfunction but are instead influenced by the progression of disease i.e. they are not linked to retinal morphology but are instead linked to the function of the autonomic nervous system and hence to the magnocellular and parvocellular neurovisual pathways. The Autonomic Nervous System is influenced by sensory input, in this case

**Figure 2:** Examples of the structure of the Physiological Systems.

**1. Blood Glucose**

Component organs:  
Brain Pituitary gland Thyroid Gland Adrenal Glands Liver Pancreas  
Blood and peripheral blood vessels Small Intestine Kidneys

**2. Blood Pressure**

Component organs:  
Brain Pituitary gland Thyroid Gland Adrenal Glands Liver Heart  
Blood and Peripheral Blood Vessels Spleen

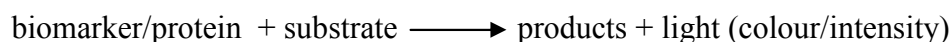
**3. Breathing**

Component organs:  
Brain Pituitary Gland Thyroid Gland Adrenal Glands Nose Lungs and Bronchi  
Heart Blood and Peripheral Blood Vessels Skin Kidneys Small Intestine

**Figure 3**

**The effect of the Physiological Systems upon Reaction Kinetics:**

(reaction conditions/regulated by the physiological systems)



by visual contrast and colour (Krakov, 1941) i.e. biomedical signaling, cognition and visual perception, are associated with our health and wellbeing. Both drug-induced dyschromatopia and pathologies are associated with visual perception deficits (Ewing and Ewing, 2008). Consequently it may be possible to make an evaluation of a person's health by assessing the cognitive deficit. Changes to the levels of proteins and of their reactive substrates in the body affect the release of biophotons and hence the intensity and colour of the light released (Figure 3). This affects visual perception which can be measured and related to the processes of disease. Fundamental proof of concept is in a working technology.

### Virtual Scanning

Virtual Scanning (Ewing and Ewing, 2007; Ewing et al., 2007; Hankey and Ewing, 2007) is an illustration of the principles outlined earlier. It is a unique light/colour-based technology, commercialised in Russia since 2001, where over 500 GPs have been trained in its use. It is the result of over 20 years R&D by multidisciplinary teams, commencing at the University of Krasnoyarsk. Its innovations in cognitive and developmental psychology, image and signal processing, computational neuroscience, and the computer modelling of the physiological systems and brain function, were developed by a research team led by I.G.Grakov and form the basis for its

proprietary computer software. The brief visual test provides an astonishingly detailed broad-spectrum health assessment (Figures 3.1 and 3.2), a psychological profile and a light-based system of treatment, (claimed by Russian researchers (Vysochin et al., 2003) to have been 93.2% effective in a review of medical outcomes at various medical institutes) able to restore optimal functioning to organs and organ systems. It is a precise methodology, based upon the mathematical modelling of the relationship which exists between visual perception, the autonomic nervous system and the physiological systems. This compares with empirical approaches e.g. photic stimulation (Noton, 1997), which have been researched since the mid-1930's. Virtual Scanning therapy stimulates the body's natural mechanisms responsible for homeostasis and hence for health and wellbeing. It is therefore a more natural approach than that of biomedicine, which is based on the reductionist approach - which evaluates the effects and side-effects of biochemistry, altered patterns of behaviour, etc.

The existence of Virtual Scanning illustrates: (1) the brain and body is a complex data processing entity following predictable rules which regulate its function; (2) psychology is the manifestation of our physiology; (3) the brain is part of structures which regulates the function of the physiological systems and associated organs; (4) pathologies influence colour perception. Conversely, colour may be used to influ-

Figure 3.1: Example Organ report: Brain.

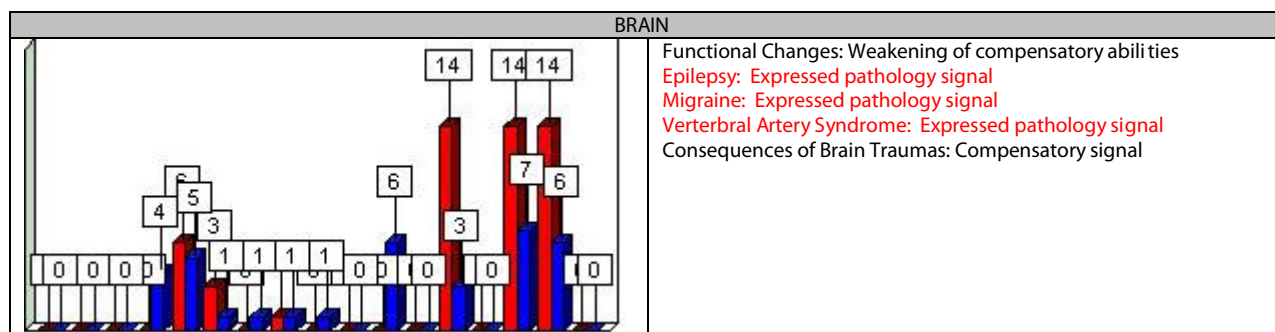
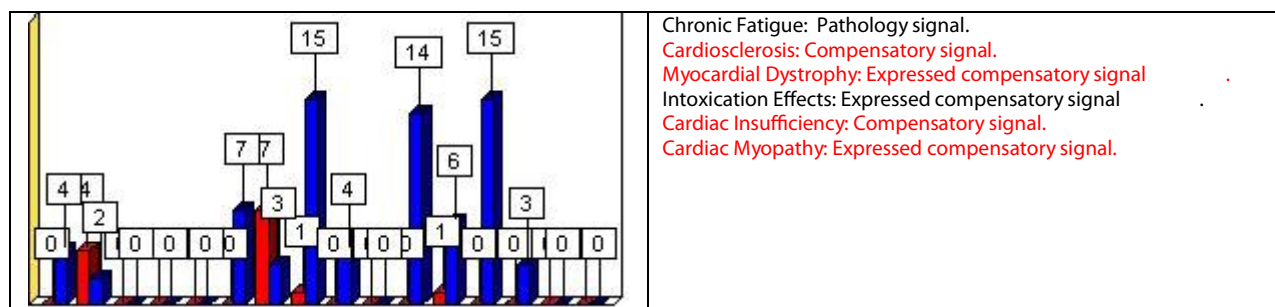


Figure 3.2: Example Organ report: Heart.



ence the regulation of the physiology's functional systems in precise ways (as in colour therapy). (5) Stress influences are a significant factor in the development of disease.

Virtual Scanning is the first of a new generation of technologies which is able to diagnose AND treat medical conditions of a psychosomatic or systemic nature. A full Virtual Scanning health report includes: (1) psychological summary, (2) assessment of system stability, (3) assessment of organ stability, (4) the degree of progression of disease(s) in each organ (reported in medical terminology), (5) the morphology of each organ. It presents a convergence of various medical disciplines such as biomedicine, complementary medicine, computational neuroscience, cognitive and developmental psychology, and psychoneuroimmunology, and may offer advantages over current practice i.e. it may avoid the simplistic assumptions, inherent errors and limitations which plague the reductionist approach.

## The Multi-level Nature of the Body's Physiology and Function

That the body's function is multi-level is not in dispute (Noble D, 2007) however, as yet, there is little understanding of how this can be so. An understanding of the role played by the brain waves may provide further insights. The brain processes information differently when influenced by different frequencies. Subliminal messages can be delivered in a rapid sequence (at typically 30-60 hz) of images e.g. as in television. Our normal perceptive abilities function at the beta-frequency range (15-30 hz). There is significant evidence to suggest that these are part of the body's multi-level function which also includes alpha (8-15hz), theta (4-8hz) and delta (1-4hz) frequencies. We recognise that these are associated with varying degrees of physiological function associated with thought (alpha), pain (theta) and physiological damage (delta).

There is also evidence that the body's function and brain waves act dynamically, that specific brain waves alter biochemical function. This can be shown to have a negative effect e.g. in photosensitive migraine and epilepsy, and a positive effect e.g. in biofeedback. It is also established that biochemical change alters brain waves (e.g. with caffeine or ephedrine).

The theta and delta frequencies are largely associated with the regulation of the body's physiology because these frequencies function continuously and are prevalent during sleep (a physiological system). That delta frequencies are involved at the deepest and most physiologically significant level of the body's function is emphasised by noting how severely injured patients go into coma i.e. that the body's

function focusses upon mitigating the effects of damage and upon the processes of repair and regeneration. Accordingly, an understanding of the therapeutic significance of the brain wave frequencies and in particular of the delta wave frequencies may lead to a greater understanding of the body's natural regenerative mechanisms.

## In Summary: The Consequences for Medicine

Such an understanding provides a cohesive framework for the explanation of a wide range of medical techniques including conventional and complementary medicine e.g.

- (1) Sense based Therapies: Aromatherapy, Massage, Sound Therapy (including music), Colour and Light therapies (including Ayurvedha and Virtual Scanning);
- (2) Physical stimulation of the physiological systems: Breathing (Alexander technique), Exercise, Excretion (Colonic Irrigation), Osteopathy, Chiropractic, Massage;
- (3) Brainwave based Therapies: Sleeping, Biofeedback, Meditation, Yoga, flashing-light therapies (including Virtual Scanning), etc;
- (4) Pharmacological: Pharmaceutical, Homeopathy, Herbal medicines, Acupuncture, Nutrition.

Each acts at a different level in the body's function (see figure 1): at the sensory, neural, system, organ, cell and molecular levels. They exert differing levels of influence over the body's physiology, overall function, and subsequent behaviour. Therapies focussing upon beta and alpha wave ranges will treat at the psychosomatic level whilst therapies focussing upon theta and delta wave ranges will treat at a physiological level and hence will also influence at the psychosomatic level i.e. influencing behaviour. The most significant issue(s) is not whether such techniques can be therapeutically beneficial, since drugs are only circa 50% effective (Heath-Chiozzi and Huff, 2001), but instead the extent of their specificity and effectiveness and the required level of competence of a trained practitioner.

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## Statement of Interest

Graham and Elena Ewing (Dr) are Directors of Montague Healthcare a company devoted to the commercialisation of

Virtual Scanning and hence to the diagnostic and therapeutic use of Virtual Scanning. They are co-authors of the book 'Virtual Scanning – a new generation of healthcare – beyond biomedicine?' ISBN 978-0-9556213-0-7 published by Montague Healthcare books.

## References

1. Brenner S (2002) The Nobel Prize in Physiology or Medicine.
2. Caplan A (2003) Is better best? A noted ethicist argues in favor of brain enhancement. *Sci Am* 289: 104-5. » [Pubmed](#) » [Google Scholar](#)
3. Ewing GW, Ewing EN (2008) Cognition, the Autonomic Nervous System and the Physiological Systems. *J Biogenic Amines* 22: 140-163.
4. Ewing GW, Ewing EN (2007) *Virtual Scanning - a new generation of healthcare – beyond biomedicine?*. ISBN no 978-0-9556213-0-7. Pub Montague Healthcare Books, UK.
5. Ewing G, Ewing EN, Hankey A (2007) *J Altern Compument Med* 13: 9. » [CrossRef](#) » [Google Scholar](#)
6. Fields RD (2006) Beyond the Neuron Doctrine. *Sci Am Mind* 17: 24-27.
7. Grakov IG (1985) Strannik Diagnostic and Treatment System: a Virtual Scanner for the Health Service. *Minutes of Meeting No. 11 of the Praesidium of the Siberian of the Academy of Medical Sciences of the USSR* (AMN) held in Novosibirsk 4 December 1985.
8. Hankey A, Ewing E (2007) New Light on Chromotherapy: Grakov's 'Virtual Scanning' System of Medical Assessment and Treatment. *Evid Based Complement Alternat Med* 4: 139-144. » [CrossRef](#) » [Pubmed](#) » [Google Scholar](#)
9. Heath-Chiozzi M, Huff J (2001) Clinical Applications of Pharmacogenetics. *Trends in Mole Med* 7: 201-204. » [CrossRef](#) » [Pubmed](#) » [Google Scholar](#)
10. Kandel E (2006) Essay: The New Science of Mind. *Sci Am Mind* 17: 62-69.
11. Krakov SV (1941) Color vision and the autonomic nervous system. *J Opt Soc Am* 31: 335-337. » [CrossRef](#) » [Google Scholar](#)
12. Marks AR (2008) Physiological systems under pressure. *J Clin Invest* 118: 411-412. » [CrossRef](#) » [Pubmed](#) » [Google Scholar](#)
13. *Materia Medica*. <http://www.materiamed.com/info.php?rid=112>
14. Noble D (2007) Claude Bernard, the first systems biologist, and the future of physiology. *Exp Physio* 93: 16-26. » [CrossRef](#) » [Pubmed](#) » [Google Scholar](#)
15. Noton D (1997) PMS, EEG and Photic Stimulation. *J Neurotherapy* 2: 8-13. » [CrossRef](#) » [Google Scholar](#)
16. Vysochin YV, Lukoyanov VV, Yaichnikov IK, Tkachuk MI, Chyev VA, et al. (2003) The research of the universal computer medical-diagnostic and prophylactic program "Virtual Scanner" efficiency for the establishment of the Russian Federation "Health of the Nation" program and (2) for the invigoration of different population groups. English translation available at: <http://www.montague-diagnostics.co.uk/files/Grakov/Article7.pdf>.