

Computer diagnosis in cardiology: oxidative stress hypothesis

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Abstract

Background: Virtual scanning is one of the emerging technologies in complementary medicine practice. The diagnostic principle is hinged on perception and ultra weak light emission, while the treatment options associated with it includes diet, flash light, exercise and relaxation. However, a mechanism that links the diagnostic and treatment principles has yet to be elucidated. **Aims:** The objective here is to further explanation of oxidative stress concept as the biochemical basis of the technology. **Materials and Methods:** Using available literature and basic science textbook, the function of the hypothalamus-pituitary-adrenalin axis as neuro-endocrine physiological system that is strongly linked to the rate of alterations in biochemical processes through to cardiovascular complications is articulated. **Results:** The hypothesis brings to fore the potential of using the alterations in biochemical processes associated with cognition as tool to validate the Virtual Scanning technology for possible incorporation into clinical practice. Or vice versa to use Virtual Scanning technology to determine the chemiluminescence-related biochemical changes resulting from pathologies that could benefit from relaxation, light therapy, exercise and antioxidant nutrition. **Conclusions:** This article advances the applicability of cognitive test procedure for indication of the disease(s) affecting heart function. The implication for some laboratory indices that are already available in clinical practice is highlighted. Investigation of this hypothesis will help provide clear link between plausible mechanism and the theory proposed.

Keywords: Virtual scanning, oxidative stress indices, chemiluminescence, clinical diagnosis, computer technology, cardiology.

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Introduction

Advances in noninvasive technologies in cardiology are growing and improving both the diagnosis of heart disease and the guidance of therapy [1]. There are currently many emerging technologies, which are being used in the alternative and complementary medicine practice, including computer meridian diagnostics and Virtual scanning. The latter has been presented earlier in this volume [2].

Suffice to note that the body is a dynamic system in which reaction kinetics are affected by the reaction conditions. This influences the levels of biochemicals and the rates at which they react.

Many commonly observed visual perception deficits are associated with disease states and altered biochemistry. In particular, visual defects are associated with heart

Implication for colour perception

It is known that antioxidant activities involve reactions with proteins with concomitant emission of ultra weak light and are increased in obstructive sleep apnoea states [20]. It is also known that oxidants contribute to the exacerbation of sleep apnoea, particularly including the cardiovascular complications [21]. At this juncture, it is pertinent to note at least the following half-a-dozen points:

- 1 Biochemical changes associated with disease or drug substances influence perception of color [3].
- 2 Changes to the levels of proteins and reactive substrates in the body cause the release of ultra-weak light albeit chemiluminescence [10].
- 3 The emissions are measurable luminescence as index of oxidative stress [22].
- 4 Oxidative stress as a common event that can lead to emission of chemiluminescence has been indicated in studies on erythrocytes [23]. Further support is provided by studies indicating that emission can be attenuated or increased by addition of antioxidants or reactive oxygen species respectively [24-26].
- 5 ATP is the ultimate of glucose metabolism. The associated increase in free radicals is involved in chemiluminescence when a high energy state intermediate changes to a lower energy state. Above all, alteration in ATP level is correlated to photon chemiluminescence [27].
- 6 Photon emission affects color or heat perception and intensity and this property is utilized in CT scan [28]. Therefore, abnormal level of emissions arising from biochemical processes during disease conditions could affect color vision.

What this article brings to fore is that there is a non-invasive cognitive test procedure, Virtual Scanning technology, which utilizes the chemiluminescence arising from biochemical processes to assess and manage stress-related cardiological conditions. The biochemical basis of the technology has not been previously explained, except as implied in our papers [29-32]. This article furthers explanation that oxidative stress effect of luminescence on cognition and colour perception is possibly the biochemical basis of Virtual Scanning technology.

The Virtual Scanning

Principle

It may be likened to other emission-based technologies such as CT scan, magnetic resonance, or ultrasound, but there is a difference. Other technologies involve the body's interaction with, and response to, some exogenous agents being inputted to the system as source of emission. Virtual Scanning is based upon the body's inherent biochemical processes as source of light emission and defects in color perception.

The cognitive test procedure, which is presented earlier in this volume [2], is based upon restoring the colors of an image on a computer. The computer then processes the

patient's response and shows the results on the screen. Each condition comprises a pair of blue and red signals. The red signals report the extent of the pathology whilst the blue signal reports the extent of the body's natural compensatory response (Fig. 3). In general, signals below 10-units are pre-symptomatic whilst those above 10-units are symptomatic.

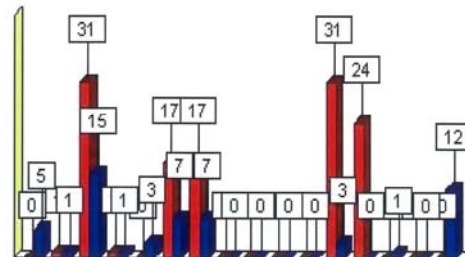


Fig. 3 A typical Virtual Scanning report indicating cardiological problem [2]. “Formatted comments included in the report Compensatory signal: 5/0 Ischemic Heart Disease Expressed pathological signals (from left to right): 15/31 Angina Pectoris, 7/17 Cardiosclerosis, 7/17 Chronic Fatigue, 3/31 Cardiac Insufficiency, 0/24 Cardiac myopathy”

Therapeutic

The diagnosis procedure ends with a recommendation of patient treatment strategy and the standard therapy involve a basic concept of three stages [33]. First, the area (organ, system) where correction is necessary and features that are subject to correction are identified. Second, the course or dose and sessions of flashing light therapy are determined.

The Virtual Scanning light therapy involves the presentation of flash lights of uniquely selected colors, shapes and frequencies. The emission is transmitted at delta frequencies to the autonomic nervous system by the computer through his eyes. The third stage of the therapeutic procedure is where healing signals are sensed, as the patient's system (vision) responds, through the monitor. The brain establishes synchronized neural function – and hence synchronized function of the autonomic nervous system and physiological systems – thereby restoring its normal physiological stability and functions [33]. The principle is referred variously as brain-wave coherence, brain-wave entrainment, or photic stimulation amongst others [34, 35]. One session of treatment takes average of 30 minutes and one module of therapy comprises typically 24-36 sessions. Several modules of therapy may be required. Other treatment options of Virtual Scanning technology (not emphasized in this article) are nutrition, exercise and relaxation.

Applicability to cardiology: Does light therapy attenuate cardiology problems?

We have explained that metabolic and physiological interactions such as glucose metabolism and HPA, respectively, enable the generation of reactive oxygen species and consequential existence of oxidative stress.

The feedback and feedforward responses to oxidative stress reactions form the biochemical basis of pathological processes and systemic instability including cardiological problems (Fig. 2). The chemiluminescence arising from oxidative stress are perceived and memorized as characteristic of different disease conditions according to colour perception and intensity and attenuated by flash light using Virtual Scanning technology. Perhaps, the question would be 'is this applicable to cardiological diseases?'

Light is conducted within the body along the acupuncture meridians, and clinical benefits of light therapy have been known [36]. What is yet unknown are the biochemical and/or metabolic basis of the light that is conducted within the body and the basis of therapeutic applicability in cardiology. We had posited that the biochemical basis of signal employed by Virtual Scanning technology is antioxidant activities. We postulate that oxidative stress induced chemiluminescence and susceptibility to flash light therapy is the basis of Virtual Scanning technology [29, 30]. Furthermore, we rationalize the applicability to cardiological problems to be based on the attenuating effect of light on oxidative stress. Our postulation is based on the available itemized knowledge on flash light therapy in relation to cardiological problems:

1. The level of blood glucose is a factor in Virtual Scanning technology [33]. Increased glucose metabolism is implicated in stress and cardiology (Fig. 2).
2. Light therapy affects cortisol rhythm [37, 38].
3. Low level (infrared) light therapy attenuates hyperglycaemia-induced oxidative stress and enhances the antioxidant protection system [39].
4. Flash light therapy attenuates venous cannulation pain [40].
5. The concept of selective photothermolysis is applicable in vascular lesions management [41].
6. Atherothrombosis can be cleared, at least in part, by flash light therapy by the principle of laser thrombolysis [42].

Therefore, given the available knowledge listed above, there is credible evidence that flash light therapy is applicable in the management of cardiological problems. However, validation research would be required to enable incorporation of any new technology such as Virtual Scanning into conventional clinical practice.

Suggestions of laboratory indices for validation research

A number of laboratory tools can be employed in a validation research. Salivary cortisol is a laboratory index in mental health and stress [38]. This is being incorporated in another closely-related emerging technology, Neuropattern, which is based on the argument on neurobehavioral medicine and stress-related disorders that manipulation of the brain by photostimulation technologies can be applied in clinical management [43].

While Neuropattern technology acknowledges cortisol rhythm without recourse to light therapy, Virtual Scanning uses light therapy without recourse to laboratory assessment of cortisol. Therefore, except for reason of availability and cost effectiveness, salivary cortisol test can be employed to monitor and validate therapeutic outcome in Virtual Scanning.

Based on Fig. 2, a panel of tests can be developed from currently available laboratory indices. This would include blood glucose level as well as vitamin C, vitamin E and whole blood viscosity. It would be expected that increased blood glucose level, antioxidant imbalance and increased whole blood viscosity will be observed at baseline stress; and normalized after Virtual Scanning therapy. This hypothesis is in agreement with the implication of oxidative stress and blood flow/shear stress that are involved in several processes of atherogenesis [44].

Conclusions

The association between the triage of (i) biological stress, (ii) cardiology, and (iii) cortisol level is known [45]. This paper articulates that color perception (i) is influenced by biological stress, (ii) is useful for the management of cardiological problems and (iii) can be monitored and validated using cortisol level or the suggested panel of associated biochemical indices, which are centered on oxidative stress. Especially, it is known that oxidative stress is a common mediator of apoptosis and cardiac damage and that antioxidant as adjuvant therapy is effective in improving parameters of cardiac function [46]. What this article contributes is a basis to use blood glucose level, vitamin C, vitamin E and whole blood viscosity as a laboratory panel to validate the technology for possible incorporation, as well as monitor the technology's treatment outcome in clinical practice. It has been argued that Virtual scanning technology lacks clear link between plausible mechanism and the theory proposed. It is hoped that investigation of this hypothesis will provide the missing link.

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