A CORRELATION BETWEEN GLUTATHIONE LEVEL WHEN MEASURED BY NORMAL BLOOD SERUM AND EIS TECK TECHNOLOGY

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MASTER OF SCIENCE

PROGRAM IN ANTI-AGING AND REGENERATIVE SCIENCE

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Riamsiri Charoenpao

Independent Study Title	Independent Study: A Correlation between Glutathione Level when Measured by Normal Blood Serum and EIS teck Technology
Author	Riamsiri Charoenpao
Degree	Master of Science (Anti-aging and Regenerative Science)
Supervisory Committee	Dr. Jarasphol Rintra

ABSTRACT

Glutathione is considered a potent endogenous anti-oxidant that has the ability to slow down the aging process and related function such as inflammation and oxidation, which may be the most prominent cause of degenerative disease. The initial step needed to measure the level of glutathione is a traditional blood serum analysis.

However, there is a new medical technology known as, EIS "teck," which allows for the non-invasive investigation of related physiologic functions. This device is fairly new in the medical field, making further analysis appropriate. The results of glutathione blood serum analysis and EIS "teck" are investigated to find a correlation between this non-invasive intervention and blood serum analysis of glutathione.

Keywords: EIS teck Technology/Glutathione/Glutathione reductase/Glutathione disulfide

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CHAPTER 1

INTRODUCTION

Diagnosis, by definition is the identification and process of elimination, of anything that may lead to something at the root cause of a condition. The process of elimination, in medical diagnosis in a clinical context includes; signs, symptoms, medical history, surgical history, medication side effects, and current treatment which may include non-traditional supplementation. Specific examinations are required if the clinical context cannot be used to arrive at enough information to make a reasonable diagnosis. These specific examinations include, but are not limited to; imaging, in vitro laboratory tests and in vivo physiologic measurements.

At the end point of the examination, the physicians' knowledge of limitation and interpretation is the most important. By integrating the clinical information along with specific examination results, the physician can use the information in his/her process of elimination and gain greater accuracy in determining the final diagnosis. The human body is complex, therefore, the accuracy of blood work and other examinations are critical in order for the physician to diagnose with precision.

Although blood serum analysis has been commonly used as a standard examination for quite some time, in the healthcare field; technology is advancing, new discoveries are being made, and diagnostics are improving. The EIS teck is a new medical advancement. EIS teck offers the physician a non invasive "quick" overview of the patient's functional capability, at the organspecific electromagnetic level.

EIS teck enables the physician to get a comprehensive of functionality on all major organs. It evaluates major biochemical, anti-oxidant, vitamin and mineral content in relation to human conductive matrix physiology. EIS teck technology glides and scans over a particular

organ system such as the digestive system to evaluate each related organ and its respective conductivity. This may comprise liver function and its related conductivity, along with the enzymatic reserve potential, which includes glutathione reductase.

However, the results from the EIS teck technology only allow the physicians to have a broad view or screening of each organ system throughout the body. The results may support a physician's hypothesis of diagnosis, the direction of treatment, must therefore be confirmed by further examination such as; system specific blood serum analysis, X-ray, Ultrasound, and/or Electro Cardio Gram (ECG), etc.

1.1 Origin and Background

Free radicals are formed within every cell of the human body as evidenced by Vina et al (1996). Anti-oxidant mechanism is of known importance, not only in the area of anti-aging but in all health-related fields. Attaining overall health is critically dependent on this mechanism to protect against the harmful effects of the free radicals and other forms of radiant energy that lead to oxidation and inflammatory patterns that accelerate degeneration and disease.

Over time, an imbalance can occur between the anti-oxidant and pro-oxidant mechanisms. Pro-oxidants are chemicals that induce oxidative stress due to elevated reactive oxygen species (ROS) or through inhibited anti-oxidant effects; this shift toward the pro-oxidant mechanism, is highly associated with various inflammatory diseases such as heart disease, diabetes, hypertension and neuropathies, to name a few (Vina et al., 1996).

Glutathione is responsible for protecting many cell functions. It is produced in the liver and plays a key role in mediating metabolism, immune response, hormone regulation, blood sugar control and detoxification to maintain optimal health. Glutathione or gamma-glutamylcysteinylglycine is a tripeptide component, composed of three amino acids, cysteine, glutamic acid, and glycine (Hemat, 2003). Glutathione is found in two forms, a monomer that is a single molecule of the protein and a dimer that is comprised of two of the single molecules conjoined (Maher, 2005).

The monomer form of glutathione, sometimes called reduced glutathione (GSH), is a tripeptide of GSH that acts as anti-oxidant, while the dimer is sometimes called oxidized

glutathione (GSSG) and this is a sulfur-sulfur linked molecule (Hemat, 2003). The active form of glutathione is the monomer form.

Oxidized glutathione is broken down into a single molecule by an enzyme known as glutathione reductase (GR). Glutathione reductase is a flavoenzyme, which catalyzes reduction of GSSG to GSH, using reductive catalyzing effect of NADPH. While glutathione reductase can be used as an indicator of oxidative stress, within the body, the ratio of GSH to GSSG is mostly used to measure the level of toxicity at the cellular level (Vina et al., 1996).

There are many functions of glutathione. Glutathione acts as a neurotransmitter, a neuromodulator and is necessary transport amino acids through the body. Its major role is to enhance liver and brain function and is central in the detoxification of chemicals and heavy metals. It is a very powerful endogenous antioxidant, not only needed to protect the cells from ROS (such as free radicals and peroxides), but it plays a vital role in recycling other antioxidants such as vitamin C and E (Vina et al., 1996). As a result, it plays a key role in limiting the role of precancerous conditions, as established by Dr. Linus Pauling Nobel Laureatte of Chemistry and Peace.

Glutathione helps decrease sugar cravings and stimulates the production of interleukin 1 and 2, which are known to regulate the inflammatory cascade and the immune system (Hemat, 2003). Due to its fundamental role in many metabolic and biochemical reactions within the human body, we are greatly affected by altered glutathione levels, especially in the immune, nervous, gastrointestinal and respiratory systems.

In the field of anti-aging, glutathione is considered the master antioxidant. In addition to all of the aforementioned roles and benefits of glutathione, it can inhibit the progression of premature aging, due to its potential to limit oxidative damage at the cellular level. In addition, several studies have shown that glutathione has antiviral properties.

1.2 Objectives

1.2.1 To evaluate and verify the accuracy of blood serum analysis of glutathione.

1.2.2 To evaluate and verify the accuracy of the screening results of glutathione in relation to EIS “teck” technology

1.2.3 To find an association between both analytical techniques and offer the physician a non-invasive means by which to screen for possible oxidative damage that may substantiate the need for the cost restrictive measurement of glutathione levels while increasing diagnostic efficacy and positive long term prognosis.

1.3 Benefits

There are a number of benefits of this study:

1.3.1 A better understanding of the importance of glutathione and its function.

1.3.2 A guideline for health practitioners in relation to the priority of specific examinations. In other words, they may use the EIS teck technology as a screening process to assist them in viewing a broader picture. While specific examination is added to make an accurate diagnosis, especially for those who are at risk of glutathione deficiency.

1.3.3 An improvement in treatment plan for the patients, both existing and non-existing.

1.3.4 The use of EIS teck as a reliable correlative monitoring tool in the future.

1.3.5 The information in this study may be utilize by other researchers for further investigation of glutathione and its benefits, including sexually transmitted autoimmune diseases, like AIDS in order to give the patients feedback to encourage compliancy with treatment and a better prognosis.

Hypothesis**:** This study will be conducted under the notion that there may be a correlation between glutathione level measured from normal blood serum analysis and EIS technologic scan results.

Since glutathione is directly associated with many functioning systems of the human body, especially the immune system which is a central key in cell regeneration, stability, and

metabolism; low levels of glutathione are consistently observed in numerous conditions; such as cancer, autism, liver disease, respiratory disorders and Parkinson's disease, etc. Moreover, many researchers believe, a glutathione analysis may essential in the initial steps of to gather diagnostic data to formulate a well rounded treatment plan (Meister, 1988).

As mentioned above, this study can only be completed with human subjects as participants. Although glutathione can be found in other species, the nature of this analysis requires blood serum and EIS "teck" technology, which cannot use the animal substitution model.

EIS "teck" protocol requires both upper and lower extremities to be fixed while the subject is sitting. Primates may be substituted for the human frame, but this will only lead to further associative data, not direct human evidence. This makes direct evaluation of human subjects tantamount. People cannot be assumed to give the same correlative data when substituted with a monkey or mouse.

1.4 Operational Definition

Glutathione is a tri-peptide molecule that is produced by the body and found in every cell in the body. It is the body's most important antioxidant, because it operates within the central system cells.

Glutathione reductase is an enzyme that converts oxidized glutathione (GSSG) to a reduced glutathione (GSH).

EIS "teck" is a medical computer-based technology that provides new applications employable in the fields of noninvasive, bioelectrical impedance monitoring and spectrophotometry.

Reactive Oxygen Species (ROS) are formed as a natural byproduct of the normal metabolism of oxygen and have important roles in cell signaling.

Endogenous Antioxidants are antioxidants produced by the human body and involve in the repair of free radical damage by initiating cell regeneration.

CHAPTER 2

LITERATURE REVIEW

Glutathione can be found in almost every cell within the human body. It plays a vital role in function, especially of the immune system. Glutathione metabolism along with increased oxidative stress has been an initiative in pathogenesis of many diseases (Reid & Jahoor, 2001) Some of the diseases that may occur due to alterations of glutathione metabolism are diseases of protein energy malnutrition, seizures, Alzheimer's, Parkinson's, sickle cell anemia, chronic accelerated aging and infection.

Vaziri, Wang, Oveisi and Rad (2000) found that in certain pathological conditions, increased ROS and/or depletion of antioxidant capacity led to enhanced ROS activity and oxidative stress. This process promotes lipid peroxidation, DNA damage, and protein modification. Oxidative stress can cause cellular injury and tissue damage.

There have been several other studies that have found that moderate stress often increases glutathione levels. However, too much stress may lead to a dis-stress in cellular function and result in depletion of glutathione, which can lead to more susceptibility of disease.

One aging theory that has received the most attention and research support is the free radical theory of aging. This theory proposes that there is an accumulation of oxidative damage with aging, which is the primary cause of the age-related decline in cellular function and further disease. Since glutathione plays a vital role in maintaining the oxidative balance of cells, a number of studies have looked at glutathione levels during aging and evidence has suggested that glutathione levels have a significant potential for reducing the functional losses associated with both diseases, degeneration and aging.

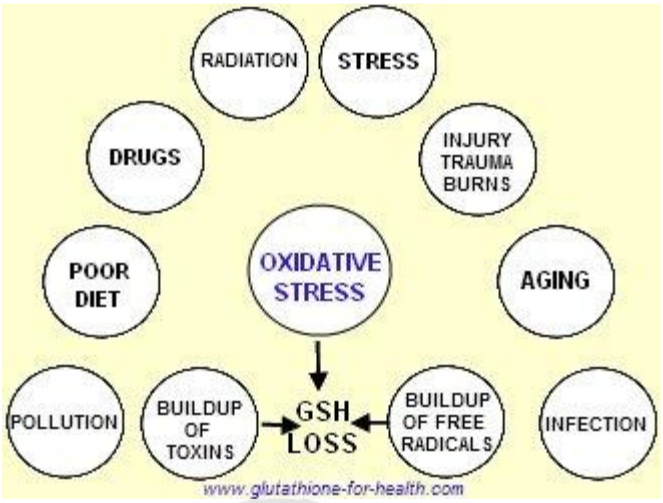

Figure 1.1 Glutathione and Oxidative Stress

Research published by Mockett, Sohol, and Orr (1999) discovered that an increase of glutathione reductase will improve the resistance to oxidative stress and slow down the aging process. They reasoned that the overexpression of glutathione reductase was a predictor to increase the supply of GSH and hence lead to an extension of lifespan (Mockett et al., 1999). From "Principles of Orthomolecularism" by Hemat (2003) glutathione is said to be homeostatistically controlled (Hemat, 2003). It is believed to be adjusting itself constantly with respect to the balance between GSH systhesis and its oxidized form, GSSG, along with its utilization (Hemat, 2003). As a result, glutathione's reducing power is used in combination with other anti-oxidants to protect the cells, and to facilitate and regulate their functions; therefore, it is undeniably important to acquire healthy glutathione levels for its reducing power.

Research completed by a group of scientists in the Department of Experimental Medicine and Biomedical Sciences at the University of Rome found that glutathione peroxidase, with its role to protect the organism from oxidative damage, can interfere with late stages of virus replication. The study confirmed data obtained in cells exposed to herpes virus type 1 showing that the suppression of virus replication by GSH is related to the selective inhibition of envelope glycoproteins.

An extended review in the role of glutathione and its associated with diseases has been reported in the “Principles of Orthomolecularism”, it asserts that the cumulative effects of oxygen radicals and oxidants are major contributors to degenerative disease and aging.

In living cells, glutathione exists mainly in a reduced form (GSH) in about 85 % in plasma bulk while the other 15 % is in the oxidized form (GSSG) (Hemat, 2003). When there is a depletion of GSH, it usually occurs in the plasma, liver, kidney and other tissues; the deficiency of glutathione is found to be associated with Alzheimer’s, Parkinson’s, diabetes and liver diseases.

The brain of those who are affected by Alzheimer’s disease are found to be more vulnerable to free radicals and at the same time, their GSH values appear to be lower in both immune and brain cells (Hemat, 2003). GSH depletion, inhibits the proper functioning of the immune cells, while the intracellular GSH of lymphocytes determines the magnitude of immunological capacity. This depletion of GSH is also associated with alcoholic and non-alcoholic liver disease while the level of GSSG is higher (Hemat, 2003).

Atherosclerosis, another life-threatening condition that cannot be overlooked, is a disease linked to oxidative damage that occurs within blood vessel walls. The “ Principles of Orthomolecularism” stated that, “there is a relationship between the lipid peroxides and glutathione levels;” Lipid peroxides increase dramatically while the level of glutathione is decreased (Hemat, 2003). Due to an increase in oxidative stress within atherosclerotic arteries, the depletion of glutathione and other anti-oxidants, shifts the pro-inflammatory mechanism and an anti-inflammatory mechanism transpires (Hemat, 2003). This shift in balance results in movement of eicosanoid balance from the anti-inflammatory response to pro-inflammatory response.

Glutathione depletion continues, is found to have similar effects in diabetic patients. Diabetic patients have been found to have lower glutathione levels while a drastic increase in the thromboxane A2 mechanism, thus resulting in a lower threshold for platelet aggregation (Hemat, 2003). This damaging reaction may be a factor contributing to an increased atherosclerosis seen in many patients living with diabetes. However, supplementation of anti-oxidants and exogenous glutathione may be utilized to help raise the threshold for platelet aggregation in diabetic patients (Hemat, 2003)

A deficiency in GSH seems to enhance viral replication in HIV patients; and many scientific findings have proven GSH to be low in HIV patients (Hemat, 2003). This has led many researchers to further investigate and concluded that glutathione inhibits the activation of the HIV virus, to a degree. In another HIV study, researchers concluded that the level of glutathione has a hindering effect on the replication process of the viruses (Palamara, 2009). This remains to be proven by double blind placebo controlled studies, but initial data seems to be supportive.

These documented evidence highlights glutathione as a central agent needed to protect and regenerate the human body. We suggest glutathione is an essential arm of immune detoxification, cellular protection and continued function.

CHAPTER 3

EXPERIMENTAL

Prior to the study, the number of subjects needed were calculated as follows:

Sample size is calculated by using the one-sample problem, one tailed.

The formula used is $n = (Z \alpha^2 PQ) / d^2$.

Where:

P = confident level from statistical finding from previous studies, which is 95 % or 0.95 (Lang, 720)

n = sample size from previous statistical finding that constitute the observation

d = maximum error that may occur or absolute precision, in this case, d = 5 %. In other words, when the sample size is used as calculated, the percent error allowed is equal to 5 %.

Z = the critical standard score, which is the value for which the cumulative probability is 1 – alpha, is therefore equal to 1.645

Q = 1 – the confidence level which is 0.95, thus, Q = 0.05

Compute the sample size value:

$n = ((1.645)^2 \times 0.95 \times 0.05)) / (0.05)^2$

$n = 0.1285/0.0025$

$n = 51.4$

Therefore, the minimum value of the sample size in the study is 51.

However, under any circumstances, should there be any participants who might drop out from this study, it is reasonable to round the sample size value to 55 people.

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3.1 Data collection

3.1.1 51 Randomized subjects are required to sign the consent form and complete an initial intake form.

3.1.2 On the same day, each subject will be arranged to have his/her EIS “teck” screening exam follow by a blood test specifically for glutathione level.

3.1.3 Results of the EIS “teck” screening exam for glutathione level will be recorded.

3.1.4 Results of the blood examination for glutathione level will be recorded.

3.2 Inclusion Criteria

3.2.1 Subjects age between 25-55 year old.

3.2.2 Both male and female are permitted to participate in the study.

3.2.3 Subjects with no chronic diseases.

3.2.4 Subjects who are not currently taking glutathione supplements.

3.2.5 Subjects who are not currently in treatment a liver disease.

3.2.6 All subjects must read and sign the consent forms accordingly.

3.3 Exclusion Criteria

3.3.1 Subjects should not have any dermatological lesions in contact with the electrodes or excessive perspiration should be eluded.

3.3.2 Subjects with dry skin.

3.3.3 Subjects within good health without chronic conditions should be in this study.

3.3.4 Subjects should not wear any defibrillators, cardiac pacemakers, life support devices or any implanted electronic device.

3.3.5 People who are unable to stay upright or stay seated should not be in this study.

3.3.6 Subjects should not have metal pins or prosthetic on extremities or joints.

3.3.7 Pregnant woman should not be in this study.

3.3.8 Subjects whose absence of one or more limbs is not suggested to be in this study.

CHAPTER 4

RESULTS AND DISCUSSION

This research was initiated under a hypothesis that there is a correlation between glutathione levels that were obtained from a classic blood serum analysis and EIS “teck” scan results.

Table 4.1 Raw data collected comparing level of glutathione both from blood serum and EIS teck method, obtained from 51 participants.

Subject	Free GSH (150-460 mg/L)	ES Glutathione
1	251	387
2	251	472
3	314	456
4	289	342
5	183	289
6	198	300
7	346	406
8	402	473
9	158	249
10	217	310
11	344	432
12	208	187
13	315	230

Table 4.1 (continued)

Subject	Free GSH (150-460 mg/L)	ES Glutathione
14	416	365
15	222	308
16	324	251
17	387	208
18	155	227
19	298	387
20	413	321
21	279	167
22	399	219
23	198	321
24	235	200
25	233	294
26	199	258
27	176	265
28	345	213
29	233	419
30	375	312
31	163	344
32	272	306
33	289	411
34	215	270
35	322	348
36	267	411
37	211	327
38	209	315
39	245	435
40	208	435

Table 4.1 (continued)

Subject	Free GSH (150-460 mg/L)	ES Glutathione
41	350	203
42	211	343
43	208	270
44	266	200
45	178	349
46	211	413
47	202	323
48	193	423
49	258	312
50	240	344
51	301	221

Note. GSH from blood serum: Mean = 262.4, Standard deviation = 72.3

GSH from EIS "teck:" Mean = 315.5, Standard deviation = 81.3

Table 4.2 Correlation coefficient with its statistical non-significant value are shown for each GSH level obtained from both blood and EIS "teck" techniques with $0.05 < p < 0.1$

Correlation	N	Correlation Coefficient (r_{xy})	Sig
GSH blood * GSH EIS	51	0.053	0.713

The displayed results prove the correlation not significant at alpha level of 0.05 The one-tailed test was used to test the hypothesis.

CHAPTER 5

DISCUSSION AND CONCLUSIONS

5.1 Discussion

Initially, the hypothesis of this study states that there is a relationship between the glutathione level measured from normal blood serum and EIS teck screening. However, after the statistical analysis of the data obtained from 51 randomized subjects; the results yielded a non-significant finding between the two methods of glutathione testing. In other words, the results obtained from the data failed to provide support for the original hypothesis.

The data obtained from blood serum analysis were not the same as the ones obtained from EIS "teck." After a careful statistical calculation of all 51subject derived data markers for both blood serum level and EIS "teck" level, the result yielded a non significant finding at 0.713 at the 0.05 level of confidence. This indicates that EIS "teck" cannot be used as a reliably indicate the need or lack of need of a traditional blood test, but may be used as an alternative for reassurance.

As mentioned earlier, glutathione plays a vital role in human health. It provides a central function within human cell physiology and more specifically, immune system potential. Glutathione in a succinct note is responsible for the process of detoxification of chemicals and heavy metal, while enhance the liver function along with its role as a major endogenous anti-oxidant. The issues concerning free radicals, anti-oxidant, and oxidative stress are well known among physicians, and health conscious individuals.

They undeniably interrelated and one is as important as the other.

It is imperative to note the cost of each test and its worth. In Thailand, the cost of blood test for glutathione level is estimated from 3,400-4,800 Thai baht, while the cost of EIS teck whole body scanner ranges from 6,000-7,500 Thai baht. The difference in the price range

depends upon the location one is getting the procedure(s) performed. As far as the comparable value between these two procedures, blood test is the most reliable source and considered to be the most valuable when glutathione level is needed to be acquired specifically.

The outcome of this study led to speculation that a traditional blood test is believed to be more accurate because it has been used within the medical field for many centuries.

Glutathione is a biochemical enzyme within the human body that is found in the plasma, therefore it is sensible to state that direct glutathione blood test is more reliable and it can not be assumed that EIS "teck" scans are well related to changes in these levels. The EIS "teck" machine may allow the subjects/patients to better understand their bodily function, but the process of calculating the level of specific specimens within the human body seems impractical.

EIS "teck" relies heavily on the differences of the interstitial fluids within the human body, but it is undeniably imprecise since error is bound to take place. A larger sample size or more specific intracellular measure of glutathione may be necessary to reach a more conclusive outcome in the final analysis.

Although the sample size was limited, the associative possibilities of EIS teck were not profound enough to detect to reach a reasonable conclusion that EIS measured electromagnetic organ scan is a reliable indicator of reduced glutathione levels.

The environmental error may need to be taken into account to understand how or why the EIS teck may not be as accurate as the blood test. The room temperature or ionic dampening due to electro magnetic field (EMF) may have had an effect on the results of the EIS, the slightest movement from the patient may also have fluctuated the results. These are some examples of the possible errors that occurred while the EIS teck procedure was performed during this researched sample and could have altered the data.

According to many researchers and physicians, the glutathione test is the essential step to take in order to formulate an effective treatment plan. From the results, it is appropriate to say that the blood test is a more reliable and accurate means of testing glutathione while the EIS teck technology may be more suitable for other areas related to the treatment plan. Since glutathione reductase is imperative for pointing out the level of oxidative stress, blood test is the more appropriate and accurate means while the EIS teck technology may be used an a monitoring device. It is not conclusive that EIS teck technology enables the physicians and patient to view

both glutathione reductase level and oxidative stress. Assumptions have been made regarding EIS teck techonology requiring further research and study.

5.2 Conclusion

Although, the study revealed a non-significant finding between glutathione levels measured from blood serum and EIS "teck," it has brought awareness of the importance of glutathione and human bodily function. Traditional blood test is more directly appropriate to measure glutathione levels. EIS "teck" may be useful to assist in process of communication between the doctor and patient to motivate compliance to treatment. EIS "teck" may offer the patient a motivational tool to better understand the consequence of unhealthy lifestyle habits. It is a non-invasive device that may be used to convince the patient to make wiser lifestyle choices.

Finally, it has been understood that claims made by new innovative technology must be backed by appropriate evidence as proof of effect. There are many emerging medical technologies and it must be respected that there may be parameters of the scientific analysis that cannot be measured. Often receiving a new piece of information may be more profound than the treatment applied.

Yet the effect of language and meaning on the patient is difficult to measure. There are no standardized scales in this area that are readily agreed upon through medicine. Sometimes psychotherapy is helpful, but in other cases it may be taken out of context.

Placebo effects are often seen to produce a 30% effectiveness ratio compared to the treatment, yet it may be nothing more than a sugar pill that is given to control blood pressure, for example. EIS "teck" technology can affect the mind or focus of the patient to gain a new understanding of their perceived health challenges.

It must also be respected that having an affect on the mental outlook of the patient is a two-way street. While the EIS "teck" technology may have some un-measurable benefit, it may incur some harm. It is important to use diagnostic devices that are not false or misleading. It is always tantamount to let the patient know that there is no real evidence for the assertions made by some technologies, but it is ultimately the patient's belief that may drive the final prognosis toward a positive outcome.

This delicate balance, the proof of evidence and the relation between the patient and the health practitioner is dependent upon holding the highest scientific standards for research, while acknowledging its possible limitations. Using a critical multi-leveled approach that is open to possibility can leave room for breakthrough discoveries.

Ultimately, “the important thing is to not stop questioning,” remarked Nobel Prize winner Albert Einstien.

REFERENCES

REFERENCES

Hemat, R. A. (2003). **Principles of orthomolecularism**. Blackrock: Urotext.

Maher, P. (2005). **The Effect of Stress and Aging on Glutathione Metabolism**. Aging **Research Reviews, 4**(2), 288-314.

Meister, A. (1988). Glutathione Metabolism and Its Selective Modification. **Journal of Biology and Chemistry, 263**(33), 17205-17208.

Mockett, R. J., Sohal, R. S. & Orr, W. C. (1999). Overexpression of Glutathione Reductase Extends Survival in Transgenic Drosophila Melanogastor under Hyperoxia but not Normoxia. **Federation of American Societies for Experimental Biology, 13**(13), 1733-1742.

Palamara, A. T., Perno, C. F., Aquaro, S., Bue, M. C., Dini, L. & Garaci, E. (2009). Glutathione Inhibits HIV Replication by Acting at Late Stages of the Virus Life Cycle. **AIDS Research and Human Retroviruses, 12**(16), 1537-1541.

Reid, M. & Jahoor, F. (2001). Glutathione in Disease. **Current Opinion in Clinical Nutrition and Metabolism Care, 4**(15), 65-71.

Vaziri, N. D., Wang, X. Q., Oveisi, F. & Rad, B. (2000). Induction of Oxidative Stress by Glutathione Depletion causes Severe Hypertension in Normal Rats. **Hypertension, 36,** 142-146**.**

Vina, J., Servera, E., Asensi, M., Sastre, J., Pallardo, F. V, Ferraro, J. A, García-De-La-Asunción, J., Antón, V. & Marín, J. (1996). Exercise Causes Blood Glutathione Oxidation in Chronic Obstructive Pulmonary Disease: Prevention by O2 Therapy. **Journal of applied Physiology, 81**(5), 2199-2202.

APPENDIX

APPENDIX

Date: ……

Patient information:

Name ……

Lastname ……

Sex Female……. Male…….

Age…….

Height ……. cm Weight ……kg

Occupation …….

Contact number ……..

Current health

Disease or current health

……

……

Current medications

Are you currently taking any medications? Yes… No…

If yes, please list and indicate how long you have been taking each medication

……

……

……

Do you have high cholesterol? Yes …. No ….

Do you have high triglyceride level? Yes…. No…. \

Do you have high LDL level? Yes…. No….

What is your HDL level? …….. mg/dl

Do you have high blood pressure? Yes …. No ….

If yes, what is your blood pressure? Systolic…. mmHg Diastolic…. mmHg

Nutritonal Supplements, herbs, homeopathic remedies

Please list the supplements, herbs, homeopathic remedies you are currently taking.

……

……

Family history

Please list any disease or condition that runs in your family. Please note which family members are affected.

……

……

Operations

Please list any operations which you have had, please note any complications, and whether the outcome was satisfactory.

……

……

Physical activity

How many times do you exercise per week?

1-2 day a week…

3-4 day a week…

Daily …

Dietary patterns

Please indicate how often per week you consume the following:

Fish …….	Alcohol ……..	Sugar/honey etc ……..
Wholegrains ……	Coffee ……..	Artificial sweeteners …….
Vegetables …….	Cigarettes ……	Coffee mate/milk substitute …….
Fruit ……	Fried foods……	Animal Proteins …….

Soft drinks/packaged juices ……..

Do you follow any particular diet or is there anything special about your diet that we should know?

……

Environmental influences

Do your symptoms vary with your geographical location?

…….

Do you have any amalgums? If so, how many, since when?

…….

Are you exposed to chemicals, dust, or fumes, metals, solvents, or significant pollutants (including traffic) at work or home?

……

Additional information

……

……

Consent Form

You are being invited to participate in a research study about glutathione level. The objective of this research project is to attempt to understand the relationship of glutathione level measured by different methods. There are no knows risks if you decide to participate in this research study, nor are there any costs for participating in this study. The information collected may or may not benefit you directly, but it should provide general benefits to the general population.

If you choose to participate, please carefully read the procedure, contraindications, complete the questionnaire and sign this consent form.

If you have any question or concerns about completing the questionnaire or being in this study, you may contact 089-962-6085 or rcharoenpao@gmail.com

Procedure:

If you volunteer to participate in this study, we will ask you to do the following:

1. Complete the intake form, answer as many questions as possible.
2. Arrange a date and time for an EIS teck screening and blood test for glutathione level.
3. Please carefully read the contraindications prior to the EIS teck screening below:

Contraindications for EIS

1. Subject should not have any dermatological lesions in contact with the electrodes or excessive perspiration should be eluded.
2. Subject with in good health without chronic conditions should be in this study.
4. Subject should not wear any defibrillators, cardiac pacemakers, life support devices or any implanted electronic device.
5. People who are unable to stay upright or stay seated should not be in this study.
6. Subject should not have metal pins or prosthetic on extremities or joints.
7. Pregnant woman should not be in this study.
8. Subject whose absence of one or more limbs is not suggested to be in this study.

Confidentiality

Any information that is obtained in the connection with this study and that can be identified with you will remain confidential and will be disclosed only with your permission. Information that can identify you individually will not be released to anyone outside the study. However, we may use any information that we get from this study in any way we think is best for publication or education. Any information we use to publication will not identify you individually.

Participation and Withdrawal

You can choose whether or not to be in this study. If you volunteer to be in this study, you may withdra at any time without consequences of any kind. You may also refuse to answer any questions you do not want to answer. The investigator may withdraw you from this research if your physician tells us that continued participation may injure your health.

I understand the procedures describes above. My questions have been answered to my satisfaction, and I agre to participate in this study.

……

Printed Name of Subject

……... ……

Signature of Subject Date

Post-Study Questionnaire

Thank you for your participation in this research study, please complete the following questions below.

1. Which method of examination do you feel most comfortable?

   Blood test… EIS teck…

2. If EIS teck option were available as an alternative procedure in the future, would you rather choose this method of test/check up over the classic blood test?

   Yes… No…

CURRICULUM VITAE

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NAME	Ms. Riamsiri Charoenpao
DATE OF BIRTH	8 March 1986
ADDRESS	349 Ladprao 115, Klongchan, Bangkapi, Bangkok 10240

EDUCATIONAL BACKGROUND

2004-2009	Bachelor of Science in Kinesiology, University of Illinois at Chicago, United States

WORK EXPERIENCE

2009-2010	Medical assistant to Dr. Richard DeAndrea and Customer Relations Officers at TRIA Integrative Institute, Piyavate Hospital, Bangkok, Thailand.
2008-2009	Ovarian Cancer Research Laboratory Assistant, Chicago, Illinois, United States.
2007-2009	Jesse Brown Veteran Hospital Volunteer, Chicago, Illinois, United States.
2004-2006	Flu Clinic Medical Assistant, Chicago, Illinois, United States.
2005-2007	Oysy Izagaya Japanese Restaurant, Chicago, Illinois, United States.

CURRICULUM VITAE (continued)

WORK EXPERIENCE

2004-2005	Kamehachi Japanese Restaurant, Chicago, Illinois, United States.
2004	Organizer for Blood Drive, Flanagan High School, Pembroke Pines, Florida, United States.
2003-2004	Pediatrics Newborn Thru Adolescent Care Clinic Health Science Student Intern.
2002-2004	Emergency Room Assistance Volunteer, Memorial West Hospital, Pembroke Pines, Florida, United States.
2002-2004	Wasabi Japanese Restaurant, Hostess, Pembroke Pines, Florida, United States.