# A DESCRIPTIVE STUDY TO DETERMINE THE USE OF LIGHT AND COLOUR AS A HEALING MODALITY

A research dissertation presented to the

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In the Programme of Homoeopathic Sciences by:

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Supervisor: _____ _____
(Dr Solomon) Date

Date of submission _____

## DECLARATION

I declare that this dissertation is my own, unaided work. Permission has kindly been given by the Dinshah Society for the use of material given within the book “Let there be Light” by Darius Dinshah. This research is being submitted for the degree of Masters of Technology at the University of Johannesburg, Gauteng. It has not been submitted before for any degree or examination at any other tertiary institution.

_____

(Signature of Candidate)

_____ day of _____

## DEDICATION

I dedicate this to all those who dare to envision and pursue higher ideals. I have had the privilege to meet many of these individuals in the process of this work and greatly encouraged by their dedication and resolve, when most would have succumbed and sacrificed their integrity to the hardships of every day life. I want to especially thank my father, Peter, without whom none of this would have been possible. Thank you for your continuing love, support and generosity.

## ACKNOWLEDGEMENTS

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## ABSTRACT

Light therapy is a general term used for all therapies that utilise different frequencies of light (colours) for therapeutic purposes. The use of light as a healing agent dates back into antiquity to ancient Rome, Greece, China and Egypt, where colour was used in worship and as a healing agent (Leven, 2000). In the year 1892, Niels Finsen of Denmark received the Nobel Prize for successfully treating skin tuberculosis lesions with ultra-violet light. Today, there are many modalities of light therapy of which laser therapy is the best known and researched. The medical profession utilises certain frequencies of light for conditions such as neonatal jaundice, improved healing of surgical wounds, sterilization of blood (externally) and certain types of skin cancer (Liberman, 1991). Extensive research into light and its effects on the human body have given rise to other, not commonly known, forms of light therapy such as Heliotherapy, Spectro-Chrome Therapy, Colourpuncture, Syntonics and the Homoeopathic light and colour remedies. Within this dissertation, the most successful and prevalent light therapies will be discussed in enough detail to give the reader a basic introduction into each modality.

The potentially valuable information regarding these healing modalities is widely scattered and therefore effectively out of the reach of the general health practitioner. Bringing this information together in a comprehensive and accessible format would serve to inform health practitioners of the possible alternative therapies available to help prevent/treat disease and deteriorative conditions.

The aim of this study is to investigate, compile and organise information regarding the various healing modalities of light and colour therapy, and to determine treatment effectiveness in terms of research and clinical findings. The study aims to create an easily accessible, comprehensive database of pertinent information.

Data, pertaining to the different light and colour therapies, will be collected from sources which include books, journals, articles, clinical trials, the internet and lecture notes. The information will be analysed according to the origin, development, application and existing clinical research, if any. From this information the efficacy each therapy can be explored. This information will be written up in the form of a literary survey.

Possible outcomes will include increased awareness of therapeutic alternatives to conventional medicine, a more complete and easily accessible information base on each modality, possible inclusion into homoeopathic and allopathic practice, and to stimulate further research.

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# CHAPTER ONE

# LITERATURE REVIEW

### 1.1.1 Problem Statement

Light therapy is a general term used for all therapies that utilise different frequencies of light, colours, for therapeutic purposes. The use of light as a healing agent dates back into antiquity to ancient Rome, Greece, China and Egypt, where colour was used in worship and as a healing agent (Leven, 2000). Today, there are many modalities of light therapy of which laser therapy is the best known and researched. The medical profession utilises certain frequencies of light for conditions such as neonatal jaundice, improved healing of surgical wounds, sterilization of blood, externally, and certain types of skin cancer (Liberman, 1991). Extensive research into light and its effects on the human body have given rise to other, not commonly known, forms of light therapy such as Heliotherapy, Spectro-Chrome Therapy, Colourpuncture, Syntonics and the Homoeopathic light and colour remedies. The potentially valuable information regarding these healing modalities is widely scattered and therefore effectively out of the reach of the general health practitioner. Bringing this information together in a comprehensive and accessible format would serve to inform health practitioners of the possible alternative therapies available to help prevent/treat disease. Within this dissertation, the most successful and prevalent light therapies will be discussed in enough detail to give the reader a basic introduction into each modality.

### 1.1.2 Aim

The aim of this study is to investigate, compile and organise information regarding the various healing modalities of light and colour therapy, and to determine treatment effectiveness in terms of research and clinical findings. The study aims to create an easily accessible, comprehensive database of pertinent information.

### 1.1.3 Methodology and Data Analysis

Data, pertaining to the different light and colour therapies, will be collected from various sources which include books, journals, articles, clinical trials, the internet and lecture notes. The origin, development and application of each therapy will be investigated and written in an easily understandable and comprehensive format. Examples of existing clinical research, or lack thereof, will be explored and noted. From this information the efficacy each therapy can be discovered. Within some of the modalities there exists differing approaches (e.g. Syntonics)

toward applying that particular therapy. These differences will be discussed and compared with one another within the individual section. In conclusion, a summary of the information presented in this dissertation will be discussed and compared with each light and colour healing modality, as well as their connection to the philosophy of Homoeopathy.

## 1.2 Introduction

### 1.2.1 The Use of Light and Colour as Therapy in Antiquity

Colour and light have been used in many different ways throughout history. To primitive man, its use was mainly symbolic with a simplistic idea of what each colour represented. Paints were created form from certain mixtures of plant resins and crushed rocks. Different colours were assigned to their various gods and to the elements of nature. During war or worship, these colours were used to paint their faces and bodies to inspire ferocity, protective or devotional powers.

The Ancient Egyptians used mineral compounds to create six colours: green, red, blue, yellow black and white. Each colour had a specific symbolic meaning. For example blue, made by combining iron and copper oxides with silica and calcium, represented birth, creation and connection to the sky/divine realms and black pigments, created from carbon compounds such as soot, ground charcoal or burnt animal bones, symbolised death, the underworld and paradoxically, rebirth or renewal. Each of these colours had great significance in all forms of worship and art (Leven, 2000).

The use of light and colour as a healing agent also appears to have appeared in the ancient Egyptian and Greek eras. According to four thousand years ago, in the ancient healing temples of Greece (at Heliopolis: “helios” meaning Sun, “opolis” meaning city) and Egypt (*also* named Heliopolis), sunlight and colour were considered Divine and used in both in temple rituals and as a Divine healing agent. The priests performed healing rituals using different coloured crystals to separate white light into one of the seven colours of the rainbow/spectrum to shine onto a sick patient. Sick individuals were bathed in a specific colour, according to what was deemed necessary for their healing. It is claimed that the priests primarily treated the spiritual difficulties a patient was presenting with and this would then, in turn, cure the mental and physical ailments (Leven, 2000). The Greeks referred to the sunning of the body as *heliosis*, after their sun god Helios, and they used to take sand baths in the sun, which they called *arenation* to cure diseases of the body and soul (Hobday, 1999).

The Greek physician Soranus of Ephesus (110.AD) prescribed heliosis for chronic diseases which included epilepsy, paralysis, haemorrhage, asthma, disease of the oesophagus, jaundice, elephantiasis, diseases of the bladder, and obesity. He combined heliotherapy with various forms of hydrotherapy, such as bathing in natural springs and sea bathing. The Greek surgeon Antyllus (300 AD) and Herodotus (200AD) also supported and practiced heliotherapy (Hobday, 1999).

The Ancient Romans were great believers in sun therapy and used it as a form of preventative medicine. The Roman scholar Pliny the Elder (23 - 79 AD) described sunbathing as '*the best of all self-administered remedies*'. The Roman philosopher Cornelius Celsus advocated exposure to the sun for the debilitated and corpulent, or those suffering from dropsy (oedema). In his treatise '*On Medicine*', Celsus says that swollen parts should be exposed to the sun for short periods of time. An Arabic philosopher and physician, Ibn Sina (980-1037 AD), recommended sun baths for asthma, sciatica, flatulence, swellings and dropsy (Scarborough, 1969).

In Ancient China, people were wrapped in red silk and placed in the sun to prevent scarring from chicken pox (Leven, 2000). Small pox was treated in a similar way. This principle would be examined in 1893 when Niels Finsen proposed a theory that the most dangerous and painful phase of small pox could be averted if patients were protected from ultraviolet radiation. This theory would be tested by two physicians later that same year who removed small pox patients from any source of UV radiation during their treatment. Their findings indicated that the suppuratory phase of the disease would remain absent as long as the patients were protected from all forms of UV radiation. Even the slightest exposure to this radiation would cause the suppuration to continue. It was also found that if the patients were exposed to red light, the healing process could be accelerated with little or no scarring. 'Red Rooms' were later used by physicians in Scandinavia and Europe for the treatment of small pox (Hobday, 1999).

With the fall of Rome and the rise of Christianity, sunlight therapy was viewed as a pagan form of sun worship and was therefore abolished. For the next thousand years, a period commonly (*and aptly*) known as the 'dark' ages, solar/light therapy would disappear completely (Leven, 2000).

### 1.2.2 Light Therapy Rediscovered

In the 17$^{th}$ century Isaac Newton's research into the scientific classification of light formed the foundation for our present understanding of colours as constituent parts of white light, which can

be broken up by a prism into the seven colours of the visible spectrum (called dispersion) and recombined into white light using his colour wheel (which depicted the seven colours and when spun appeared as a white disc) (Spitler, 1941).

The re-emergence of light and colour, used therapeutically, occurred in the 1800's when scientists made a number of interesting discoveries:

General Augustus J. Pleasanton (1876) published his book *Blue and Sun-lights* in which he declared that the quality, yield, and size of grapes could be significantly increased when grown in a specifically designed greenhouse, in which planes of blue glass were alternated with transparent glass panes. He further found that blue light had significant curative properties in certain instances. In animals, he found that blue light cured certain diseases, elevated fertility, and increased the rate of physical maturation. Pleasanton also stated that certain colours of light were effective in treating pain in humans. He claimed that, after much experimentation and practice, the use of combinations of the calorific rays of the sun, and the electric blue light, had an effect on the glands, nervous system and secretive organs of man and animals.

In 1877, Dr. Arthur Downes and Tomas Blunt discovered that sunlight (especially the blue, indigo and violet parts of the visible light spectrum) was effective in killing bacteria (Downes & Blunt, 1877). Based upon this research, German physicist and bacteriologist, Robert Koch discovered that sunlight was lethal to the *Mycobacterium Tuberculosis* organism (Hobday, 1999). In the same year Dr. Seth Pancoast (1877), a prominent physician, used sunlight filtered through panes of red or blue glass to stimulate or relax the nervous system.

Dr. Edwin Babbitt (1878), one of the most famous pioneers of colour therapy, published his book *The Principles of Light and Colour*. He developed several devices combining coloured filters with both natural and artificial light. One of these devices, the Chromo Disk, fitted with specific filters on a disk mounted in front of a light source was used to focus colour on the desired areas of the body for treatment. By irradiating water with sunlight filtered through a Chromo lens, Babbitt developed what he called solar elixirs. According to him, this "potentised water" retained the energy of the vital elements of the particular filter/colour used and demonstrated remarkable healing powers. He used many different hues of colours never used before in light and colour therapy. Babbitt claims to have had successful outcomes with even stubborn ailments.

In 1892, Niels Finsen of Denmark received the Nobel Prize for being the first person to successfully treat skin tuberculosis with ultra-violet light (Liberman, 1991).

War wounds, in the early 1900's, were found to heal faster and have less chance of infection if left exposed to the open air and sunlight. Without antibiotics, the bandaged wounds provided the perfect environment for the growth of bacteria and therefore increased the incidence of sepsis. Dr. Oskar Bernhard (1926), a surgeon-in-chief at the Oberengadin District Hospital during the early 1900's, began to use sunlight to heal wounds and tuberculosis. He earned a reputation for saving severely injured limbs that would otherwise have been amputated. Bernhard later worked at the prisoner of war camps in Germany, England and northern France as a Swiss Military Surgeon during World War I, and used surgery together with sun therapy to treat wounded soldiers.

Dr. August Rollier (1927), another prominent surgeon of the early 1900's, became disillusioned with the form of treatment of tuberculosis used at the time. Surgery was used to cut out the affected parts of the body and this rarely resulted in any form of cure. After Rollier's fiancé contracted tuberculosis and a close friend committed suicide as a result of unsuccessful surgery, he started to look for alternate forms of treatment for the disease. Eventually he found that Heliotherapy (sunlight therapy) to be a successful treatment not only for Tuberculosis as well as a number of other ailments as well.

**Figure 1**: Patients at Dr. Rollier's clinic, 'Le Chalet' (Hobday, 1999)

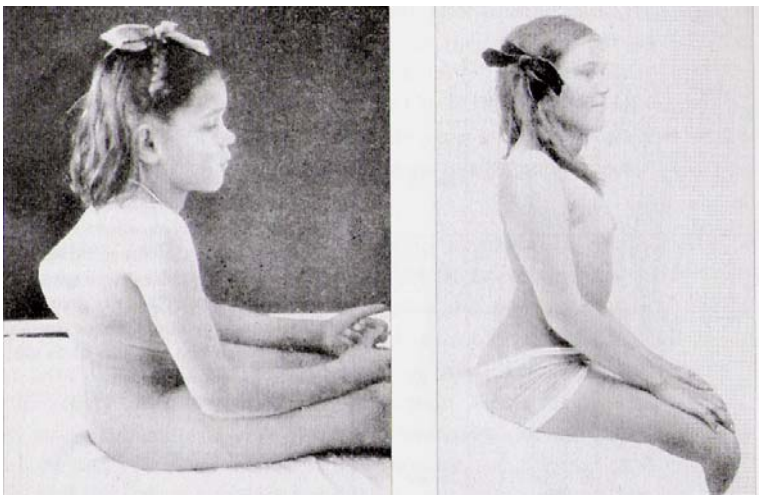

**Figure 2:** A 12 year old patient with extensive tuberculosis of the spine, paraplegia and atrophy of the muscles who was completely cured after 18 months of Heliotherapy at Leysin Clinic (Hobday, 1999).

According to the results achieved by Dr. Zane Kime (1980), who performed research on the effects of sunlight on human physiology, a series of exposures to sunlight results in effects very similar to that of exercise. These include: a decrease in resting heart rate, blood pressure, respiratory rate, blood sugar, and lactic acid in the blood, and increases in energy, strength, endurance, tolerance to stress, and the ability of the blood to store oxygen.

### 1.2.3 Examples of Documented Light Research on the Effects of Light and Colour

Before commencing with descriptions of the various modalities of the light and colour therapies, a few examples of the effects of light and colour on plants, animals, school children and its use within the medical field have been stated below. This will serve to introduce the reader to this subject by reviewing known and proven scientific evidence of the beneficial and detrimental effects in the use of light and colour.

#### 1.2.3.1 The Effect of Light on Man, Animals and Plants

John N. Ott (1973), creator of the full spectrum '*Ott Lights*', performed detailed studies on effects of natural and artificial light upon man, plants and animals. In a thesis, published by Pocket books, he detailed most of the results from his research. Included below are a few examples of his findings.

#### 1.2.3.1.1 Examples of the Effect of Light on Plants

An effect of light on plant growth can be demonstrated in an experiment Ott performed with Pumpkin seed sprouts and Elodea grass cells. According to his experimental evidence he claimed that when the seeds and grass were illuminated by light, filtered through ordinary glass (thereby eliminating the UV component), the plant cells displayed altered or abnormal cell functioning affecting photosynthesis, cell chemistry and growth with the result that the plants did not fully mature (Ott, 1973) .

#### 1.2.3.1.2 Examples of the Effect of Light on Animals

Experiments performed on the retinal pigment epithelium cells from a rabbit's eye indicated that when exposed to light, filtered through coloured lenses, abnormal cell function resulted. A blue filter caused cellular contortions. A red filter caused cellular wall weakening, followed by rupturing and death of the cell. Chickens living under artificial light were found to live half as long, be more aggressive, and produce eggs with a significantly higher degree of cholesterol than chickens living under natural sunlight. Mice living under pink fluorescent light lived an average of 7.5 months and had an increased incidence of cancer and reproductive problems. Mice living under normal sunlight lived an average of 16.1 months and were much healthier (Ott, 1973).

The Hebrew University of Jerusalem, department of animal sciences, performed a study of the effects of blue and green monochromatic light on the growth and development of chicks within a broiler house. Both the green and blue lights caused an increase in the body weight of the chicks when exposed to these lights in the early stages of their development, when compared to the development under normal conditions (Rozenboim *et al*., 2004).

#### 1.2.3.1.3 The effect of light on behaviour and academic performance of school children.

Children in classrooms illuminated with cool white fluorescents demonstrated hyperactivity, irritability and attention deficits. When the same classrooms were illuminated with full spectrum tubes, that same group of children demonstrated a marked improvement in academic achievement within one month, significantly less hyperactivity and had a 33 percent less incidence of cavities in the teeth (Ott, 1987).

### 1.2.4 Examples of the Use of Light in Allopathic Medicine

A study has been done on the effect of monochromatic phototherapy on the healing of pressure ulcers acquired by the elderly. Improved healing as well as a significant reduction in the size of the ulcer was noted on completion of the experiment (Dehlin *et al*., 2003).

The use of green or blue light *(Bili-Lights®)* on the skin is the currently preferred medical treatment for neonatal jaundice (Oschman, 2001). Phototherapy enhances the overall excretion of bilirubin by converting it to a form that is easily excretable in bile and urine. However these effects are not limited to infants. People that suffer from Gilberts Syndrome, which is characterized by chronic mild unconjugated hyperbilirubinemia (increased bilirubin in the blood), receive the same benefit from the sun's radiation when sunbathing (McDonagh, 1985).

Red light is used externally to sterilize donor blood of hepatitis, herpes, HIV and other organisms. Blue light has been used to partially relieve the pain of arthritis (Liberman, 1994).

Skin cancer cells treated with 'Photofrin®' become fluorescent under ultra-violet light for up to three days. If these cells are treated, within a certain time period, with red light they begin to self destruct with an 85 percent success rate (Liberman, 1994).

# CHAPTER TWO

# PROPERTIES OF LIGHT

### 2.1 The Sun

All natural light on the Earth is derived, either directly or indirectly, from the Sun. Before we discuss the properties of light and its effect on biological organisms we need to examine the source of all natural light - the Sun.

The Sun is the largest and most prominent feature of our solar system. The energy generated by the sun supports all the earth's energetic needs. Should the sun cease to exist, so would all life on this planet.

Over 1.5 million earths can be held within the circumference of the sun and 109 earths, placed side by side, would equal its diameter. It contains about 98 percent of the total Solar System's

mass. Solar energy is created at the core of the Sun. At the sun's core the temperature is 15 million degrees Celsius and has a pressure of 340 billion times that of the earth. In these extreme conditions, continual nuclear reactions occur due to fissional matter kept constantly at critical mass. In these nuclear reactions, 4 protons or hydrogen nuclei fuse together to form one alpha particle or helium nucleus. The alpha particle is about .7 percent of the mass of the four protons. The difference in mass is expelled as energy and is carried to the surface of the Sun, through a process known as convection, where it is released as light and heat. Energy generated in the Sun's core takes about one million years to reach its surface. Every second 700 million tons of hydrogen are converted into helium ash. In this process 5 million tons of pure energy is released, causing, as time goes on, the Sun to become lighter in mass. The surface of the sun is at a comparatively low temperature of 6000 degrees Celsius (Hamilton, 2004).

### 2.1.1 The Structure of the Sun

The Sun consists of three layers, the Inner Core, the Radiative Zone and lastly the Convection Zone of which the *Photosphere* is the outer part. The *Chromosphere* forms the inner part of the atmosphere beneath the *Photosphere*. Solar energy passes through this region on its way out from the center of the Sun. Faculae and flares arise in the Chromosphere. Faculae are bright luminous hydrogen clouds which form above regions where sunspots are about to form. Flares are bright filaments of hot gas emerging from sunspot regions. Sunspots are dark depressions on the Photosphere with a typical temperature of 4,000°C.

The *corona* forms the outermost layer of the Sun's atmosphere. It is in this region that 'Prominences' appear. *Prominences* are immense clouds of glowing gas that erupt from the upper Chromosphere. The outer region of the corona stretches far into space and consists of particles, often called the 'Solar Wind', traveling slowly away from the Sun. If solar activity is significantly strong, the 'solar winds' generated have the ability to disrupt electrical equipment on Earth. Solar eclipses provide the only opportunity to view the sun's corona (Hamilton, 2004).

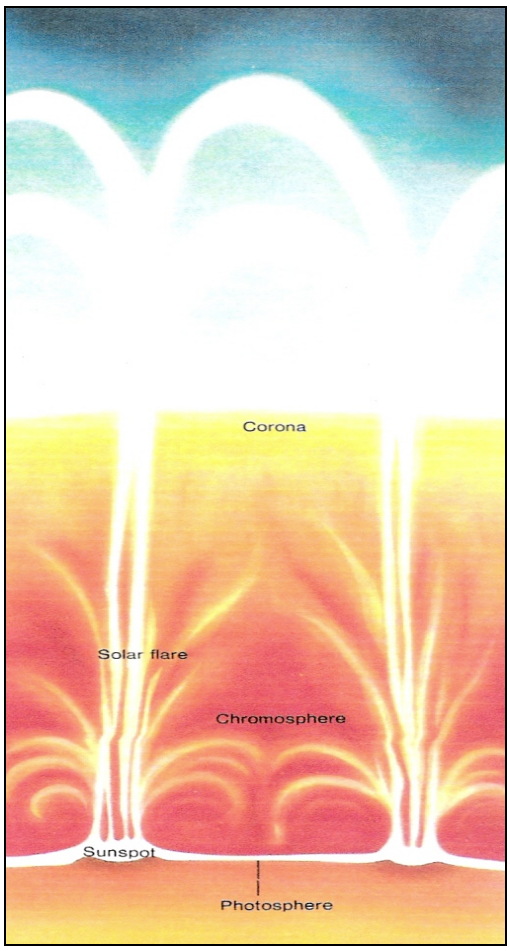


**Figure 3:** Structure of the Sun (World Book, 1987)

Calculations indicate the sun has a life span of less than 10 billion years of which 4.6 billion have passed. At the end of its lifespan, the Sun will start to fuse helium into heavier elements and begin to expand, eventually growing to such an extent that it will swallow the entire solar system. The sun would then become a 'Red giant'. After millions of years this giant will then shrink and become what is known as a 'White Dwarf'. This is the dying phase of the sun as it gradually cools over the next trillion years (Hamilton, 2004).

## 2.2 The Atom

### 2.2.1 Structure of the Atom

In order to see how light can be created we must first understand the basic nuclear principles of the atom and its makeup. The easiest way of picturing the structure of an atom is to think of a miniature solar system. The nucleus (central core) of the atom corresponds to the sun in the solar system. The rest of the atom is mostly empty space dotted with minute, almost weightless, negative charges called electrons. The electrons correspond to the planets within the solar

system. If an atom were the size of a foot ball field then the nucleus, which contains most of the mass within an atom, would be the size of a marble. The only reason matter has a solid appearance is due to the incredible speeds at which the electrons circulate and electrical charge repulsion between atoms (Harrison, 1999).

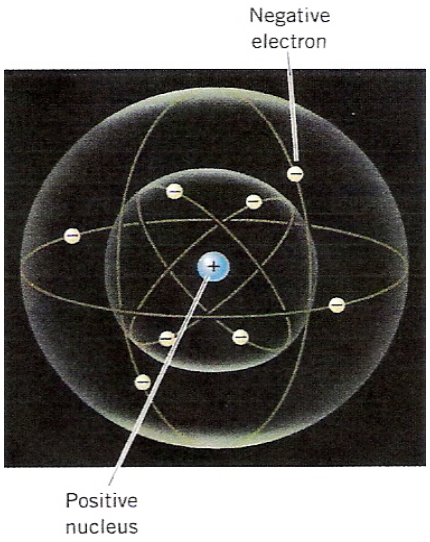


**Figure 4:** Structure of an Atom (Cutnell and Johnson, 2001)

The nucleus consists of densely packed particles called protons and neutrons. A general term for these particles is nucleons. The protons are electrically positive and neutrons are electrically neutral.

Electrons circulate around the nucleus in what may be described as orbits or shells. Electrons are negatively charged. Each of these shells can only contain a specific number of electrons. The innermost shell can hold two, the next eight, and so on. When the inner shells are saturated (filled with as many electrons as it can hold) another shell is started. Each shell or orbit around the nucleus corresponds to a specific energy level. These energy levels are given a specific whole number called a Quantum number (Cutnell & Johnson, 2004).

The neutral atom has a definite amount of electrons. The number of electrons determines the chemical behaviour of the element. All the atoms of a given element have the same number of protons. This number differs from the number of protons in the atoms of any other element. The protons inside a nucleus equal the amount of electrons surrounding that nucleus. Neutrons resemble protons but have no electrical charges. The atomic number of an element equals the number of protons in each of its atoms. This number determines the position of the element in the Periodic Table of Elements.

Negative electrons serve to balance out the equal number of positive protons within the nucleus of the atom, therefore an atom is normally electrically neutral. But, in the outer part of the atom, the electrons are loosely bound. They can be knocked out of the atom by violent collisions, as in an electrical discharge. An atom that loses an electron has a positive charge, and becomes a positive ion; if an electron is gained it acquires a negative charge. The loss or gain of electrons is called ionisation (Cutnell & Johnson, 2004).

Although the planetary model of the atom is easy to visualise, it is not entirely accurate. An electron moving around a nucleus has centripetal (always moves towards the centre) acceleration. When an electron is accelerating, it radiates electromagnetic waves. These waves carry away energy. With their energy constantly being depleted the electron should theoretically crash back into the nucleus. However, in 1913, Niels Bohr found that the electromagnetic radiation theory of the atom was incorrect. Bohr discovered that the when an electron is in a stable orbit around its atom it does not radiate energy thereby dismissing the idea of continuous electromagnetic radiation. The atom only emits energy if it receives energy, thereby causing an electron to temporarily maintain a higher orbit before falling to its original position, which is then released in a 'packet' of energy called a photon. The atom then returns to its previous stable state. This theory continues to support the planetary formula theory. Theories on the atom and its properties evolve as the understanding of the subatomic world increases. Therefore, the explanation of this model of the atom could possibly undergo additional changes in the future (Harrison, 1999).

### 2.2.2 Photons of Light

In the early 1900's, the German physicist Max Planck proposed a theory that radiant energy from atoms comes in little packets called quanta *(particles)*. Quanta later became known as photons (Halliday *et el*., 2003).

Planck's theory indicated the following:

If an atom, originally in an electrically stable state of a certain energy level, absorbs additional energy (e.g. if heated), it moves to a higher energy level. The atom has now become an 'excited atom'. The atom will always seek to stabilise itself and it does so by releasing energy. To do this the atom drops from the higher energy level back to a lower energy level. The atom does not always give out all its added energy in a single step but may return to its original energy level in two or more smaller steps, releasing energy each time. The amount of energy given off as radiation equals the difference between the two energy levels of the electron. The type of atom

also determines the frequency of the energy given off by an atom. The energy released by this process is called a photon. The higher the energy level the atom attains, the more energy is released when it drops back down to its starting level. Therefore photons are not all the same. This energy-level theory serves to explain how light can be produced by very hot objects such as a burning log, the filament of an incandescent bulb and the Sun (Halliday *et el*., 2003).

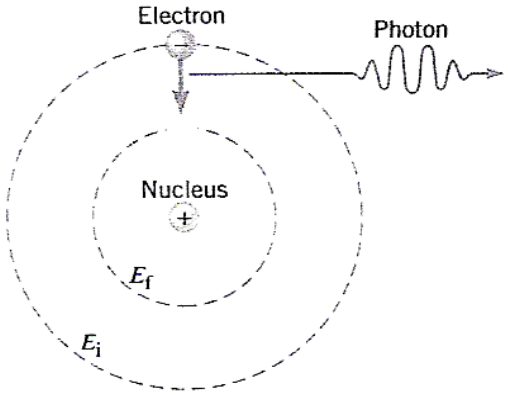


**Figure 5:** The drop of an electron from a higher energy level to a lower energy level resulting in a release of energy in the form of a photon (Cutnell and Johnson, 2001)

### 2.2.3 Electromagnetic Radiation

The previous section indicates that visible light (electromagnetic waves between 390 nm and 740 nm) consists of streams of photons and has differing frequencies and wavelengths. For this reason, light is considered part of a much larger class of waves known as electromagnetic waves. There is no limit to how short or how long the wavelengths of electromagnetic radiation can be**.** The principle source of this radiation is from the Sun.

A detailed representation of the Electromagnetic Spectrum can be found in *Appendix A*

#### 2.2.3.1 Electromagnetic Wave

An electromagnetic wave is a transverse wave because the magnetic and electric fields are perpendicular to the direction in which the wave travels.

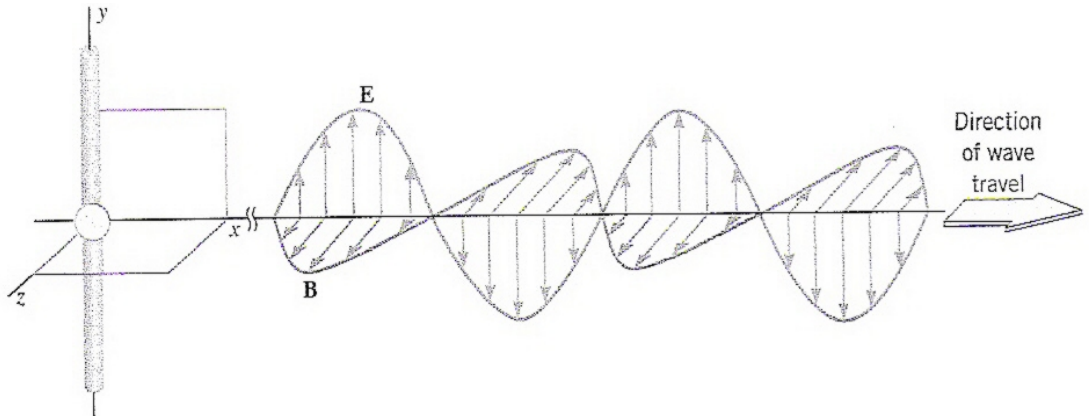


**Figure 6:** Electromagnetic Wave (Transverse Wave) (Cutnell and Johnson, 2001)

Transverse waves are *periodic* consisting of cycles or patterns that are repeated again and again as they travel through space. An electromagnetic wave does not require a medium, unlike a vibration of a string or a sound wave, in which to propagate. These waves can travel through a vacuum or material, since electric and magnetic fields can exist in either medium.

Like any other periodic wave, electromagnetic waves have a *frequency* and a *wavelength* that is related to the speed of the wave. The speed of light, and indeed of all electromagnetic radiation in a vacuum, is $3.00 \times 10^8$ m/s. Waves give rise to crests (highest point on wave pattern) and troughs (lowest point on wave pattern). The highest or lowest distance the wave reaches above or below the undisturbed position (baseline) is called the amplitude. The wavelength is the horizontal distance between two successive crests. A wavelength can also be referred to as a cycle. The unit of measurement used to denote wavelength is the Nanometre ($1Nm = 10^{-9}$ meters). The frequency of a wave is the number of cycles per second that passes a given point or location. Electromagnetic waves have a wide range of frequency, from values below $10^4$ Hz to $10^{24}$ Hz. This range of frequencies is called the electromagnetic spectrum (Cutnell and Johnson, 2001)

Only a small amount of the sun's energy reaches the surface of our planet. Most of the energy reaching the Earth is reflected by the atmosphere. Therefore solar radiation at ground level is composed of visible light, mid and near ultra-violet (UV rays – 740nm) and shortwave infrared waves (below 390nm) (Liberman & Grbevski, 2001).

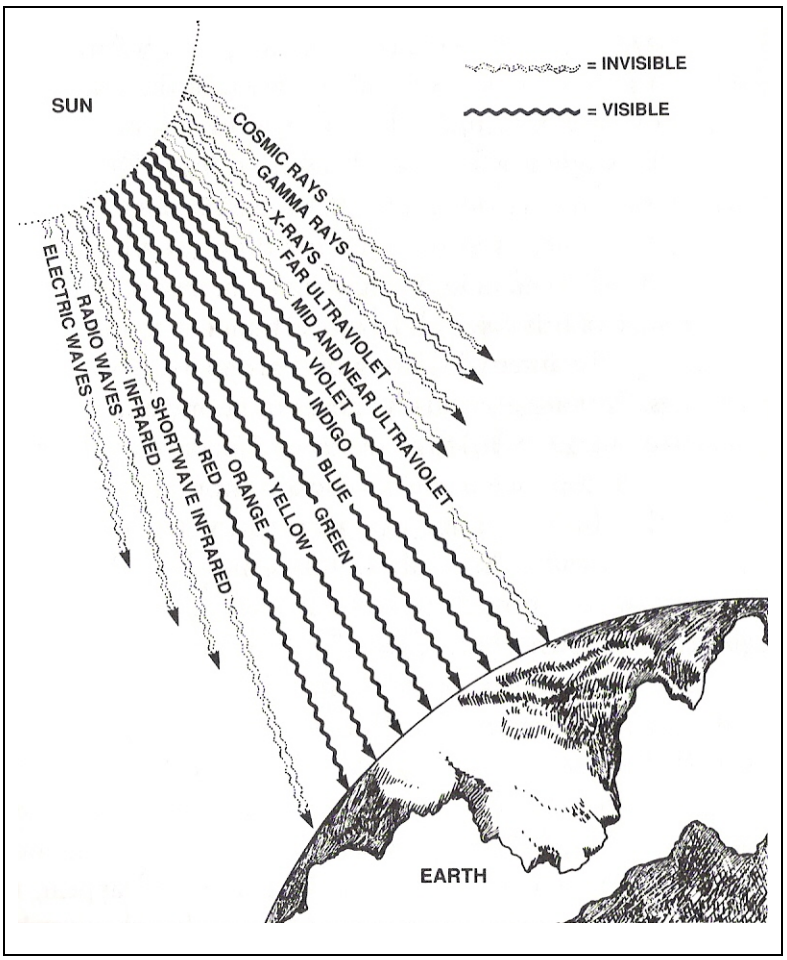


**Figure 7:** Electromagnetic Radiation Reaching the Earth (Liberman & Grbevski, 2001)

Of all the frequency ranges in the electromagnetic spectrum, the most familiar is that of visible light. Only waves between about 390 Nm and 740 Nm are perceived by the human eye. The higher colours of the visible spectrum have higher frequencies (green, turquoise, indigo and violet) and shorter wavelengths and the lower colours have lower frequencies and longer wavelengths (yellow, orange and red). White light is a mixture of the whole range of visible light. Thus white light contains all the colours of the spectrum. If white light is passed through a glass prism the different wavelengths spread out and are then seen as the entire colour spectrum (Christian, 2004).

Therefore, *Visible Light* can be defined as electromagnetic radiation that is produced in differing wavelengths between 390 and 740 nanometres that can be seen by the naked eye. When these light waves or beams of particles/photons reflect off objects and enter our eyes, they create the sensation of light and make the outer world visible to be perceivable to our senses.

*Colour* can be defined as any one or mixture of the constituents into which light can be separated as a spectrum or rainbow (Giancoli, 1997).

### 2.2.4 Spectral Analysis

When an atom moves from a higher to a lower energy level, the packet or quanta of energy released is called a photon. This photon's wavelength varies according to the type of atom it originated from and the size of the drop in energy from the high energy level of an 'excited atom' to the lower energy level of a 'stable atom'. This can be analysed by a spectrometer. A spectrometer is an instrument that spreads out light, from a source, into a spectrum and displays it for study. A typical spectrometer is an enclosed container that keeps out any extraneous light. Light from a source (a material being heated until it gives off light for analysis) enters through a narrow slit and then passes through a collimating lens. This lens causes the light to become a beam of parallel light rays. The parallel light beam is then passed through a prism, which breaks up the beam into its spectral colours. A lens focuses this light onto the exit slit. This is designed so that only one colour can pass through this slit at a time. Therefore, the prism must be rotated to bring the other colours into line with the exit slit in order to scan the specific spectrum given off by that particular substance. A circular scale records the angle of the prism, so the wavelengths can be identified as they pass through the exit slit (Cutnell and Johnson, 2001). Each element produces a pattern of lines that differs from the patterns produced by all other elements. These are called Fraunhofer lines. These patterns can indicate which atoms are in a sample and thus what their energy levels are. In this way, the exact components of any material in the sample can be identified. There are now newer technologies and instruments capable of performing these functions in a more efficient manner than described above. A few examples of a spectrometer's uses are for the detection of impurities in steel and other metal alloys, forensics, analysis of the composition of celestial bodies and to detect pollutants in air and water (NASA, 2005). This knowledge is important because it forms part of the theoretical basis for Spectro-Chrome Therapy (Section 1.9).

### 2.2.5 The Nature of Light: Particle or Wave?

Originally, light was thought to have only a particulate (particle-like) nature. This quality could be demonstrated by streams of photons coming into contact with an object, some being absorbed or reflected, and leaving a definite shadow behind the object. However, an experiment performed by English scientist Thomas Young, in 1802, demonstrated the wave nature of light by showing two overlapping light waves interfering with each other. This experiment involved light of a single wavelength (monochromatic light) passing through a single narrow slit and falling on two closely spaced narrow slits. The two slits opened out onto a dark background. A

pattern of alternating dark and light striped areas were found indicating that the 'particles' of light were interfering with each other constructively and destructively (i.e. either increasing the intensity of the light causing bright stripes or cancelling out completely causing dark stripes). This could be compared to how ripples in a pond interfering with each other when they come into contact. Some waves are cancelled out; others amplified or merely changed direction. All this depends on the angle at which the waves intersect.

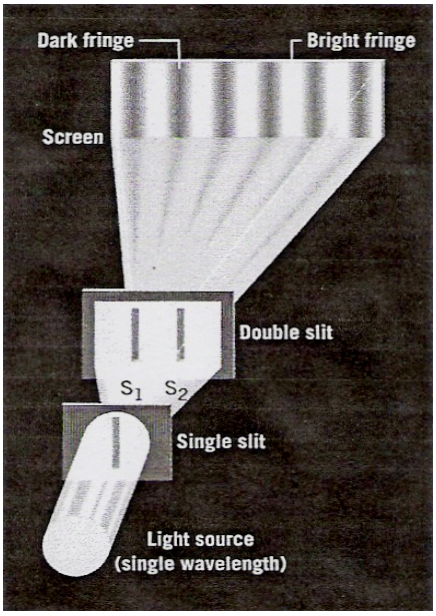


**Figure 8:** Thomas Young's Experiment demonstrating the wave nature of light (Cutnell & Johnson, 2001)

If the nature of light was only particulate then there would be only two strips of light and the rest of the background would be dark. This proved that light can exhibit wave-like properties. This apparent wave/particle duality has not been fully solved and for the present time it is considered that both are true (Cutnell & Johnson, 2001).

## 2.3 Light and the Human Body

### 2.3.1 Biophotons – The Light in our Cells

All living organisms, including humans, and even inanimate objects emit a low intensity glow that cannot be seen by the naked eye, but can be measured by photo-multipliers that amplify the weak signals several million times and enable researchers to register it in the form of a diagram. Cells and whole organisms give off a pulsating glow with a mean intensity of up to ten thousand photons per second and square centimetre. This light emission is very weak but can be recorded

by the use of a CCD camera whose input is transformed by a computer into colours displayed on a video screen. The colours range from infra-red through the visible spectrum to ultra-violet. This weak cellular light is often referred to as ultra-weak bioluminescence.

The existence of endogenous light within living cells was first discovered in the 1920's by Russian embryologist Alexander Gurwitsch. Gurwitsch discovered a light source at the end of the growing roots of an onion the light from which passed through quartz glass placed in contact with the root ends. He named this phenomenon 'the Morphogenic Field' of the plant, which controls the structure and functioning of the plant cellular processes. Later, in 1945, Italian biophysicists L. Colli and U. Facchini working at the University of Milan verified Gurwitsch's work using improved technology. Later Scientists such as Fritz Albert Popp expanded on this knowledge and, together with his collaborators at the University of Marburg, was the first to carry out systematic experiments and theoretical investigations of this new biological phenomenon. Popp has defined the properties of biophotons and has done a lot of work pertaining to the practical applications of the use of biophoton measurements with micro organisms, plants, animals and humans (Bischof, 2004). The next section will discuss a number of Dr. Popp's discoveries with regards to light and its effect on living organisms.

### 2.3.2 Fritz-Albert Popp: Cancer and Cellular Photo repair

Fritz-Albert Popp**,** a theoretical biophysicist, found that when a particular frequency of light was shone onto a cell, it would absorb light for a period of time (delayed luminescence) until saturated, and then the cell would shine brightly, emitting the exact same frequency of light as the stimulating light source. He then examined the effects of Ultra-violet light on a lethal carcinogen called benzo[a]pyrene. The result of this experiment had a strange optical effect. The substance absorbed the light but then re-emitted it at a completely different frequency. When the same test was performed on benzo[e]pyrene, which is almost identical to the former except for a slight difference in molecular structure making it harmless to humans, light passed straight through the substance unaltered. After numerous tests, it was found that non-carcinogenic substances always re-emitted UV light at the same frequency whereas carcinogenic substances always re-emitted UV light at different frequencies. Also, the carcinogens would only react to a specific wavelength – 380 nanometres (McTaggart, 2001).

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It is known from biological laboratory experiments that cells blasted with UV light result in 99 percent of the cell, including its DNA, being destroyed. However, if the cell were exposed to the same light yet at a lower intensity, it would be completely restored within 24 hours. This is

called the photo-repair mechanism and is little understood by today's scientists. Patients with the skin condition *Xeroderma Pigmentosum* eventually die because this mechanism is not working and the damage from the sun cannot be repaired. The photo-repair mechanism is found to work most efficiently at 380 nanometres. This is the same wavelength that the carcinogens reacted to. From this evidence Popp postulated that carcinogens cause cancer because they disrupt the photo-repair mechanism by blocking out light necessary for healthy cell growth and replication (McTaggart, 2001).

### 2.3.3 Photon Emission Coherency

#### 2.3.3.1 Coherent and Incoherent Light

In 1976, Dr. Fritz-Albert Popp and Bernhard Ruth created a machine that could record the amount of photons *(light)* emitted by living and non-living subjects. As has already been discussed, organisms permanently emit light. Through the use of this machine on living specimens they discovered that the photons emitted from advanced organisms is more coherent (in sync) and intense than the light emitted from simpler life forms. With further experimentation, Popp found an individual's light emanation pattern to be more coherent and in sync when in a good state of health. A diseased person, on the other hand, displayed incoherent and out of sync patterns of light emanations. When tested, cancerous patients were found to have a complete lack of coherent light emissions when compared to the ordinary person. Popp then checked each known cure or treatment for cancer and found the treatment that proved to have the most organising effect on the coherency of the cancer cell photoemissions was the plant *Viscum Album*, also known as Mistletoe (McTaggart, 2001). It is interesting to note that Mistletoe has been used as a medicinal plant for hundreds of years. In recent years, the use of mistletoe has increased significantly. Many cancer patients worldwide and particularly in Germany use mistletoe frequently in conjunction with other methods such as radiation, chemotherapy and/or surgery. Weleda, a homoeopathic drug manufacturer, has produced a homoeopathic remedy from mistletoe. This remedy is called Iscador®, known as Iscar® in the U.S.A. According to the Weleda research group studies, Iscador's action involves stimulating parts of the immune system that slow down the growth of cancer cells and increases the survival rate from a variety of cancers by an average of 40 percent longer when used in conjunction with other conventional cancer treatment methods (Weleda, 2005).

Spurred on by his findings, Dr. Popp wanted to see if he could apply his research to the food industry. He tested the photon coherency of free range eggs as opposed to those produced in a battery pen. The results showed that the free range eggs had far more coherent light emission than those produced indoors. He then proceeded to examine different food types and found the foods considered the healthiest by specialists were found to have the lowest and most coherent intensity of light. It is Popp's belief that when plants are consumed, the body breaks it down and then utilizes the energy or light present in the eaten plant and distributes it throughout the entire range of electromagnetic frequencies. This then becomes the driving force of the cells of the body (McTaggart, 2001). If the light emissions of a particular food are incoherent, this would somehow interrupt the bodies' proper utilisation of the energy present in the food and result in deficient absorption.

#### 2.3.3.2 Sub-atomic Coherence

In quantum mechanics there is a phenomenon called Sub-atomic Coherence. Coherence, in this context, means that subatomic particles are able to co-operate by means of bands of common electromagnetic fields. For example, an activated tuning fork can cause other passive tuning forks to resonate as well. This theory lead Popp and his partner to believe that what is done to one cell will have an effect on all the other cells of similar frequency. They then theorised that this might explain how reactions in the body could occur almost simultaneously in different parts of the body due to its ability to act as a 'field' rather than a 'hierarchy' (McTaggart, 2001). This is confirmed by M. Bischof (2004) in an article published by the Optometric journal of Optometry called "*Biophotons – The Light in our Cells*", which states that when a correctly indicated remedy for a given disease is applied the changes that resulted, occurred not only at the site of the treatment but simultaneously on other parts of the body.

Popp used the subatomic coherency theory to explain the mechanism of Homoeopathy**.** He explained that the application of a homoeopathic medicine could be seen as two tuning forks (diseased cells and the correctly indicated remedy), vibrating at the same or similar frequency, that could be brought together (administering the remedy to the patient) and would cancel each other out (cure).

After 25 years of striving to get his work recognised by the scientific community Popp, together with various groups of scientists from all over the world, formed the International Institute of Biophysics to further study the effects of light on living organisms (McTaggart, 2001).

### 2.3.4 Bioluminetics

In 1983 Patrick Richards designed a device which he called the Luminator which, among other functions, could measure the amount of light emanating from living organisms. It is this aspect of the machine that is used in Bioluminetics. As Popp's research indicated, all living things emit light and a healthy person emits more coherent light than an unhealthy person. Richard's Luminator photographs a client in a room by an imaging technique called VRIC (Visual Reference of Image Coherence). The photo may show the subject as blurred or clear according to state of that person's health (the light's incoherence or coherence). A remedy that is prescribed for the patient would be put in their hand and another photograph would then be taken. If the remedy was the correct one then the photo would show an increased light coherence or, basically, the picture would sharpen dramatically.

Another interesting effect occurs when a couple get their picture taken at the same time. If the one partner is under great stress and the other exhibits a calming, soothing influence, the picture taken would show a much clearer image of stressed partner *when in the picture with him/her*. A wife that is abused by her husband showed an increasingly blurred picture when they had their picture taken together and clearer when separated (Coghill, 2000).

### 2.3.5 Conclusion

The experimental findings of biophoton research seem to support the idea of an electromagnetic field that surrounds every living organism and that the sub-atomic light coherency of cells can influence health. From this point of view, the living organism is far more sensitive to the outside environment than currently believed. The field of an organism is able to react to a disturbance in the mental, emotional and physical areas by identifying exactly what it needs from the broad range of frequencies (ultraviolet, visible and infra-red light) and polarisations available in the immediate environment (e.g. medicines and remedies) and restore balance (Bischof, 2004). This may provide health professionals with a unique way of viewing health and the treatment of disease. Unfortunately, this kind of technology is still in its infancy and research is required to confirm its viability as a diagnostic tool.

# CHAPTER THREE

# LIGHT AND COLOUR THERAPY

## 3. Introduction

The following sections include information on the different light and colour therapies. Each individual therapy will be discussed according their history, original founders, principles, practical application and available research. They include Heliotherapy or Solar Therapy, Low Intensity Laser Therapy, Homoeopathic Colour Remedies, Colourpuncture, Spectro-Chrome Therapy and Syntonics (According to Dr. Harry R. Spitler, Dr. Jacob Liberman and Dr. Steven Vazquez).

## 3.1 Solar Therapy

The sun is directly, or indirectly, the source of all energy on earth and therefore it would be prudent to begin this discourse with the therapy from which all other light therapies originated - Solar Therapy. Until recently, little was known about the effects of sunlight on human health. Although sunlight had been used as a medicine for thousands of years, no one really knew how or why it worked. Practitioners such as Dr. Oskar Bernhard's and Dr. August Rollier's efforts in heliotherapy have aided the resurgence of the use of sunlight as a therapeutic agent. During the last two decades, scientists have advanced our understanding of the physiological and biochemical responses of the body to the sun's rays and it is becoming clear that sunlight has a greater influence on our health than was once thought to be the case. Sunlight may cause skin cancer, but there is evidence that the sun plays a key role in preventing and ameliorating a number of common diseases seen today. The role of sunlight in vitamin D production will be discussed in detail as this is the most obvious benefit of sunlight. Further discussions will cover other benefits of sunlight which may offset some of the current accepted opinions which only focus on the dangers of exposure to solar radiation.

### 3.1.1 Sunlight and Vitamin D

Exposing the skin to the sun's ultra-violet rays (specifically UVB radiation) activates the production of vitamin D, which is essential for the growth and maintenance of teeth, bones and a

healthy immune system. Vitamin D maintains the balance of calcium and phosphorus necessary for the constant process of bone formation and remodelling (Hobday, 1999).

### 3.1.2 Vitamin D Production Process

The skin of man has a high concentration of sterol cholesterol which is converted by enzymes in the skin to the sterol 7-dehydrocholesterol. Exposure of skin to sunlight for regular intervals results in the photochemical conversion of 7-dehydrocholesterol into pre-vitamin D3 (Rhoades & Tanner, 2003). This is sometimes referred to as 'soltriol', which means 'hormone of sunlight' (Hobday, 1999). This pre-vitamin D3 is then transported to the liver and is converted to 25-hydroxycholecalciferol and then to the kidney where it becomes the biologically active 1.25-hydroxycholecalciferol or Calcitriol. Dietary sources of vitamin D2 are derived from ergosterol (plant source), whereas vitamin D3 is derived from cholesterol (animal source). This form of vitamin D3 and D2 are then activated in the kidneys to become Calcitriol (Rhoades & Tanner, 2003).

Calcitriol is a hormone that, together with parathyroid hormone, regulates blood calcium levels and, in turn, bone density. In this role, calcitriol targets the intestine, where it promotes calcium absorption; and bone, where it catalyzes calcium release to help restore depleted blood calcium levels (Johnson, 2005).

Only about 15 percent of the available 7-dehyrocholesterol in the skin actually becomes vitamin D3, as prolonged exposure to the sun also converts pre-vitamin D3 into substances called lumisterol and tachysterol, which are both biologically inert. Therefore prolonged exposure to the sun will not create more vitamin D than shorter exposure time. Also the production of melanin in the skin in response to the UV radiation within sunlight reduces the production of vitamin D. Therefore people who spend a lot of their time in the sun will synthesise less vitamin D due to the increased darkness of the skin (Hobday, 1999).

Skin care products that block out UVB radiation reduce the skin's ability to produce vitamin D by at least 95 percent. However exposure to sunlight is not always guaranteed to produce enough Vitamin D for optimum health. During certain times of the day and year the UVB content in the sunlight fluctuates. The optimal times for vitamin D absorption are in the mid-morning and mid-afternoon periods of the day, and during the early summer months of the year. This exposure to sunlight is needed to store up enough vitamin D reserves for the winter months when UV radiation is at its lowest (Hobday, 1999).

### 3.1.3 Complications Involved with the Excess or lack of Vitamin D

#### 3.1.3.1 Insufficiency or Deficiency of Vitamin D

Vitamin D promotes the absorption of calcium from the digestive tract. If there is an insufficiency of this vitamin, the body tries to compensate through the release of parathyroid hormone. This is secreted into the bloodstream from the parathyroid glands which are situated at the base of the thyroid gland in the neck region. This increases the amount of calcium taken from the bones to regulate the calcium levels within the bloodstream when dietary or sunlight derived vitamin D is insufficient. Over a period of time, the lack of vitamin D, with the resulting reliance on the bones to maintain calcium levels, may lead to a condition called Secondary Parathyroidism. This condition is an important factor in age-related bone loss and increased risk of fractures. Due to this danger a supplementation of vitamin D is recommended in some cases. Oil extracted from the livers of fatty fish such as salmon, mackerel, herring and cod are good dietary sources of Vitamin D. (Chel, *et al* 1998).

#### 3.1.3.2 Excess Vitamin D and Calcium Absorption

Supplementation of Vitamin D is not without risk as toxic doses can lead to the absorption of too much calcium leading to hypercalcemia or abnormally high levels of calcium in the bloodstream. The symptoms include nausea, vomiting, excessive urination, extreme fatigue, depression and muscle weakness, coma and even death. The high calcium levels result in its deposition in the blood vessels, kidneys and other organs. Vitamin D can also trigger asthma in aspirin-sensitive patients and should be taken with caution by patients on anticoagulants. While Vitamin D aids in the absorption of magnesium, high calcium levels increases the excretion of magnesium from the body. This could result in a deficiency of magnesium which affects the muscles of the body, of which the heart is the most important, causing spasm in the coronary artery and possible myocardial infarction or heart attack. Therefore calcium intake needs to be carefully monitored in those taking extra supplementation.

All the complications involved with maintaining balanced vitamin D within the body, and therefore calcium levels, can be remedied by receiving adequate amounts of sunlight. Although the skin has the capacity to produce large amounts of vitamin D, the process is self-regulating and therefore cannot become toxic (Hobday, 1999).

### 3.1.4 Other benefits of sunlight

Below are a number of research studies stating possible benefits from sunlight exposure in moderate amounts.

#### 3.1.4.1 Cholesterol

According to document published by the World Health Organisation, studies show UV radiation exposure reduces serum cholesterol. This may influence general cholesterol levels within the body (W.H.O., 1976).

#### 3.1.4.2 Blood Pressure

A number of clinical and epidemiological studies have suggested that there is a correlation between Vitamin D-deficiency and high blood pressure. Recent studies demonstrate that Vitamin D is a potent endocrine suppressor of renin, which regulates the renin-angiotensin system (RAS). RAS plays a central role in the regulation of blood pressure, volume and electrolyte homeostasis. Inappropriate activation of the RAS can lead to high blood pressure. Mice, deficient in Vitamin D, displayed increased levels of renin and angiotensin which lead to hypertension, cardiac hypertrophy and increased water intake. Therefore the production of Vitamin D from UV radiation exposure or Vitamin D supplementation would then act to suppress renin thereby reducing blood pressure (Xiang *et al*, 2004). In another study, blood pressure was found to drop for several days upon exposure to UV radiation (W.H.O., 1979).

Rostand (1997) found in his study '*Ultraviolet Light May Contribute to Geographic and Racial Blood Pressure Differences'*, that there is a linear rise in blood pressure at increasing distances from the equator. Similarly, blood pressure is higher in winter than summer. Blood pressure can also be affected by variations in skin pigmentation. Altered calcium, vitamin D, and parathyroid hormone levels are also associated with hypertension and may vary with latitude and season. Since changes in UV light affect vitamin D and parathyroid hormone status and UV light intensity are influenced by seasonal change and latitude, Rostland concluded that there must be an association between blood pressure and ultraviolet light (Rostland, 1997).

Research published in the *American Journal of Physiology (1935)* shows that UV radiation (UVB not UVA) reduces blood pressure in 60 - 70 percent of hypertensive people involved in

the study. Within this study the systolic pressure dropped by as much as 40mm/hg and diastolic readings dropped by an average of 20mm/hg. Systolic pressure is the pressure exerted by the heart as it pumps blood through the bodily system. Diastolic pressure is the pressure within the heart in its relaxed state. (Hobday, 1999).

Regular exposure to adequate (but not excessive) amounts of sunlight alleviates atherosclerosis (Brock, 2005)

#### 3.1.4.3 Increased Tolerance to Toxic Substances

There are indications that ultraviolet radiation has an effect, to some extent, on the body's tolerance towards exposure to chemical substances such as nitrites, benzylpyrene and carcinogens, which produce general toxic, carcinogenic and allergenic effects. Prophylactic treatment with UVR preceding specific immunization reduces the risk of vaccination allergy and helps to increase the effectiveness of the immunization (W.H.O., 1976). Recovery from neonatal jaundice is speeded up by exposure to sunlight (specifically the blue part of the visible light spectrum) (Hobday, 1999).

#### 3.1.4.4 Skin Ailments

In the pre-antibiotic era, several forms of skin tuberculosis and skin infections were treated with UVR. At present, UVR treatment in medicine is largely confined to treating skin diseases, such as psoriasis, acne, atopic dermatitis, and recurrent boils (W.H.O., 1976).

In Kumar and Clark's "*Clinical Medicine*" for medical students it is stated that "ultraviolet radiation is potentially mutagenic and carcinogenic, but in controlled amounts can actually suppress cutaneous inflammation. Therefore, UV radiation can cause skin disease but can also be used to treat it."(Kumar & Clark, 1999)

#### 3.1.4.5 Endurance, Immunity and Hormones

Within his book '*Sunlight'*, Dr. Zane Kime states that sunlight has an elevating influence on endurance, sex hormone levels, and immunity. Exposure to sunlight increases the production of white blood cells (specifically lymphocytes) thereby strengthening the immune system (Francis, 1997).

### 3.1.4.6 Seasonal Affective Disorder (SAD) and Premenstrual Syndrome (PMS)

#### 3.1.4.6.1 Seasonal Affective Disorder (SAD)

Seasonal affective disorder (SAD) is a form of depression that typically comes on during winter months or from lack of exposure to adequate sunlight. Seratonin, secreted by the hypothalamus, plays a key role in determining our moods (increased levels give feelings of peace and happiness) and regulating sleeping patterns, body temperature, digestion and sex drive. It also suppresses the production of melanin, a neurohormone, produced by the Pineal gland. When levels of seratonin fall in the evening melanin is produced and secreted into the bloodstream. Melanin induces sleep by depressing activity in the brain and slowing down physiological processes. Scientists speculate that, during the winter months, the reduced sunlight exposure increases the melanin production leading to the symptoms of SAD syndrome. This leads to an imbalance of too much melatonin and too little seratonin (Smyth, 1990). In an article entitled "*Possible behavioural consequences of light-induced changes in melatonin*" he stated that the light intensity necessary to suppress melatonin secretion in humans is well above typical indoor lighting conditions, but well below normal outdoor daytime levels of illumination. Considering that significant portions of the population of first world countries spend most of there time indoors this may explain the high incidence of SAD within these groups (Garfield, 1985). SAD presents with symptoms of lethargy, fatigue, anxiety, irritability, lowered sex drive, avoidance of social activities, sadness and depressed mood, concentration difficulties, weight gain, food cravings, and interpersonal difficulties. Adequate sunlight exposure, and/or exposure to full spectrum light sources, eliminate or significantly reduce the effects of SAD (Smyth, 1990).

#### 3.1.4.6.2 Premenstrual Syndrome (PMS)

Premenstrual syndrome or premenstrual dysmorphic disorder, otherwise known as PMS, affects women seven to fourteen days before their menstruation. Symptoms of PMS include psychological symptoms such as depression, anxiety, mood changes, irritability, sleep problems, appetite changes, forgetfulness, crying, problems with alcohol and/or drugs, and low energy levels, and such physical symptoms as feeling bloated, breast swelling and tenderness, cravings, headaches, weight gain, oedema of the extremities, heart palpitations, backache, skin problems, and pains in the joints.

Dr. Lee Hartley (Licensed marriage, family and child therapist) has been performing light therapy using the *Cameron-Spitler Syntoniser*, a long tube-like instrument with an internal light source into which you can place colour filters, as well as the *Ott-Lite* (full spectrum fluorescent light boxes) with success in the treatment of Premenstrual Syndrome and Seasonal Affective Disorder. Together with psychotherapy and approximately an hour a day exposure to the light machine, the symptoms of PMS and SAD was significantly reduced or eliminated in the majority of her patients within three months of the start of treatment. Relapse of PMS symptoms would occur in some cases after a period of time when the light treatment had been stopped. The relapse would disappear after the light treatment was administered again.

Dr. Barbara Parry of the University of California San Diego's Department of Psychiatry has conducted several studies addressing light's effect on PMS. The PMS symptoms are found to be much worse in the winter months of the year. Her research found that two hours of full spectrum light administered either in the mornings or evenings and dim red light are all equally effective in reversing premenstrual syndrome's symptoms when used on an ongoing and consistent basis. Further studies recommend that two hours of 2500 lux bright light full spectrum phototherapy one to two weeks before menstruation would eliminate PMS symptoms (Breiling, 1996).

#### 3.1.4.7 Cancer

Recent studies imply that calcitriol may exert a number of biological effects on different tissues within the body. Circulating calcitriol enters cells and complexes with the genes in the cell nucleus. This affects DNA and, in turn, overall cell functioning and growth. Because calcitriol maintains normal cell division, it may play a role in the inhibition of cancerous growth. In addition, calcitriol may influence immune-cell activity thereby helping to explain vitamin D's beneficial role in infectious disease and immune-related disorders, such as multiple sclerosis, rheumatoid arthritis, and diabetes (Johnson, 2005).

Insufficient exposure to ultraviolet radiation may be an important risk factor for cancer according to a new study published in the prominent Cancer Journal that questions official advice about sunlight. The research examined cancer mortality in the United States. Deaths from a range of cancers of the reproductive and digestive systems were approximately twice as high in northern areas with poor sunshine quality as opposed to areas closer to the equator with abundant sunlight, despite a diet that varies little between regions. An examination of 506 regions found a close inverse correlation between cancer mortality and levels of ultraviolet B light. The likeliest

mechanism for a protective effect of sunlight is vitamin D, which is synthesized by the body in the presence of ultraviolet B.

While the study focused on white Americans, the same geographical trend affects black Americans, whose overall cancer rates are significantly higher. Darker skinned people require more sunlight to synthesize vitamin D.

There are 13 malignancies that show this inverse correlation, mostly reproductive and digestive cancers. The strongest inverse correlation is with breast, colon, and ovarian cancer**.** Other cancers apparently affected by sunlight include tumors of the bladder, uterus, esophagus, rectum, and stomach (Grant, 2002).

### 3.1.5 Dangers of Sunlight

The major concern over the past three decades has been the threat of skin cancer and premature ageing due to sun exposure. This has lead to widespread use of protective measures such as sunscreens and, in extreme cases, avoiding the sun all together. Recently, an article published in the Pretoria News daily paper indicated that medical practitioners in Australia are now advising people to stop using so much protection against the sun. Research indicated that the health of the average Australian has not increased due to sun protection, but has actually decreased from deprivation of the healing benefits of sunlight (Laurance, 2005). However excessive, prolonged exposure to sunlight over a period of time has been proven to increase the incidence of skin cancer and premature ageing (Kumar & Clark, 1999). Therefore it is necessary to discuss the dangers of overexposure to sunlight.

#### 3.1.5.1 Skin Cancer and Ultraviolet Radiation

Most skin cancers arise in sun-exposed areas and the incidence is highest in outdoor workers, sportsmen, sunbathers and especially those people who rarely enter the sun and then expose themselves to intense bursts of the sun's radiation. Light skinned people are the most susceptible. Skin cancers, caused directly or indirectly by the sun's ultraviolet radiation, include basal cell carcinoma, squamous cell carcinoma and malignant melanoma. It may also develop as a result of x-ray or radium burns and arsenic ingestion. (Kumar & Clark, 1999).

The Ultraviolet component of sunlight is divided into three categories: Near-UV or UVA radiation, Mid-UV or UVB radiation, and far-UV or UVC radiation. All of UVC and most of

UVB radiation is absorbed by ozone layer surrounding the earth. UVA and some UVB radiation are the two wavelengths that reach the earth with the potential to damage the skin. Both promote tanning and burning of the skin. UVB burns the skin more rapidly than UVA, but does not penetrate as deeply. UVB is named as the cause of most skin cancers, mostly squamous and basal cell carcinoma, and UVA the cause of premature ageing (due to the deep penetration there is damage to collagen and elastin tissue causing wrinkling) and malignant carcinoma. Although harmful in large doses, UVB is absolutely necessary for the production of vitamin D within the skin (Larsen, 2005).

When sunlight burns, it incites free radicals in the skin. Free radicals are highly reactive molecular fragments that can combine very destructively with other molecules of the body, in a process called oxidation. Free radicals are also formed due to environmental pollution, smoking, carcinogenic foodstuffs, alcohol consumption and normal metabolic processes. Free radicals cause damage to cells (most notably the cell's DNA) and are linked to the cause of a wide range of diseases such as cancer, heart disease, arthritis, and the ageing process (Levine, 2005).

#### 3.1.5.1.1 Squamous Cell Carcinoma

Squamous cell carcinoma is the second most common form of non-melanoma skin cancer. It develops on the face and the hands, and tends to develop in old age. It may develop in normal tissue, pre-existing actinic keratosis or patch of leukoplakia, or in scar tissue. It is more dangerous than basal cell carcinoma because it spreads to other parts of the body if left untreated. This form of skin cancer is caused by damage from cumulative exposure to ultraviolet radiation within sunlight, rather than sunburn, and exposure to certain industrial chemicals. The clinical appearance varies from a red papule (bump) or as red scaly areas which bleed easily and may sometimes ulcerate. A biopsy is essential for a diagnosis. Prognosis is very good if the cancer is caught early. Squamous cell carcinoma is treated using surgery and/or radiotherapy (Beers & Burkow, 1999).

#### 3.1.5.1.2 Basal Cell Carcinoma

Basal cell carcinomas, also known as 'rodent ulcers', develop on parts of the body which get the most exposure to the sun, particularly the hands and face. Most commonly it first develops as a shiny papule and enlarges slowly over a few years until it appears as a shiny, pearly border with prominent engorged vessels on the surface and a central ulcer. This cancer forms as a result of

total sun exposure but it has now been found that intermittent intense exposure after long periods without sunlight is a major causal factor for this form of skin cancer. Unlike other forms of cancer, basal cell carcinomas do not spread to other parts of the body, but if left untreated these small ulcers can grow into the underlying tissue and cause serious damage and disfigurement. A biopsy is recommended for diagnosis. Small carcinomas of this type can be treated with cryotherapy which involves freezing the damaged tissue. Surgery and/or radiotherapy may be needed for the larger lesions (Kumar & Clark, 1999).

#### 3.1.5.1.3 Malignant melanoma

Malignant melanoma, the most serious form of the disease, affects a much younger age group than Basal and Squamous cell carcinoma and may be triggered by several episodes of severe sunburn. This type of cancer spreads very quickly and unless diagnosed early can be difficult to treat. This ailment may be hereditary and affects woman more than men. Those with fair skin that burns easily are most at risk. Research indicates that people who spend most of their time indoors tend to be most susceptible to malignant melanoma as their skin is ill-prepared for long exposure to sunlight. The presence of moles increases the likelihood of contracting the disease. Very rarely, malignant melanoma can develop in areas not exposed to the sun. The developing melanoma is influenced by non-solar factors such as diet, changes in hormonal status, viruses, drugs, trauma to the skin such as burns or wounds, and occupations which involve exposure to chemicals. The number of cases of malignant melanoma is increasing and, as a result, major steps are being taken to warn people of the dangers of sunbathing (Beers and Burkow, 1999).

### 3.1.6 Premature Ageing

Chronic exposure to the sun for several hours a day, over many years, can cause permanent changes to the structure of the skin leading to premature ageing. Deeply penetrating UVA radiation is said to be the major contributing factor in this process. The radiation causes damage to the collagen and elastin tissue thus causing weakening and wrinkling of the skin (Hobday, 1999).

### 3.1.7 Safety Measures in Sunbathing

Sunbathing is considered safe in the early morning (before 11am) and late afternoon (after 3pm). This depends, however, on location according to longitude and altitude. Persons living near the

equatorial regions, and situated high above sea level, are at an increased risk for sun damage than those living closer to the poles and at lower altitudes. The use of a hat and sunglasses to protect the sensitive areas of the face, ears, eyes and neck is recommended. If a burn is felt apply high sun protection factor lotions or get out of the sun immediately. Observe for the presence of growths on the skin such as moles and eczemas. Any change in size and appearance of a skin growth should be followed by a doctor's examination to exclude possible complications (Coghill, 2000).

## 3.2 Specialised fields of light therapy

### 3.2.1 Laser Therapy

The word laser is an acronym for 'light amplification by stimulated emission of radiation'. A laser is a device that creates and amplifies a narrow beam of intense coherent light (Lucent, 2000).

#### 3.2.1.1 How Do Lasers Work?

Atoms emit radiation. Normally this is done in random directions at random times. The result is incoherent light – many photons going in different directions. This is called *spontaneous emission* (Lucent, 2000).

In a laser, the atoms or molecules of a crystal, such as a ruby or garnet (or of a gas, liquid or other substance) are excited in what is called a laser cavity so that more of them are at higher energy levels than at lower energy levels. Reflective surfaces at both ends of the cavity permit photon energy to reflect back and forth, which builds up energy with each passage. If a photon, whose frequency corresponds to the energy difference between the excited and ground states, strikes another excited atom, that atom is stimulated to fall back to a lower energy state and emit a second photon of the same (or proportional) frequency, in phase with and in the same direction as the bombarding photon. This process is called *stimulated emission*. The bombarding photon and the emitted photon may then strike other excited atoms, stimulating further emissions of photons, all of the same frequency and phase. This process produces a sudden burst of coherent radiation as all the atoms discharge in a rapid chain reaction (Lucent, 2000).

There are many different types of lasers depending on their source material. Different sources exhibit lasers of differing wavelengths. Excimer laser (Wavelength of 351 nm), Argon laser

(488-514 nm), Tuneable Dye laser (577 nm), HeNe laser (633 nm), Ruby laser (694 nm), GaAIAs Diode (600 – 1000 nm), NdYag (1060 nm) and Carbon Dioxide laser (10 600 nm) are examples of lasers of differing sources and wavelengths (Bradley, 2002).

#### 3.2.1.2 Present Laser Usage

Lasers are widely used in industry for cutting and boring metals and other materials, communications, scientific research and holography. They are an integral part of every day life with familiar devices such as bar-code scanners, scanners, laser printers, and compact disk players.

Of particular interest is their medicinal use. Laser Therapy is an example of modern use of light therapy. Of interest is the high intensity laser used to perform surgical procedures and the low intensity lasers that are used, not as a cutting instrument, but rather for their healing effects (Lucent, 2000).

##### 3.2.1.2.1 Surgical Lasers

Kumar Patel of Bells-labs in 1964 invented the carbon dioxide laser, which permitted surgeons to perform highly intricate surgery using photons, rather than scalpels, to both operate on and cauterise wounds. Lasers today can be inserted in the human body, performing operations that would be impossible without them, at little risk or discomfort to the patient. Shorter (green) lasers are used to repair detached retinas, change the corneal curvature (LASIK), or to burn away lens membrane discolouration following cataract surgery (Lucent, 2000).

##### 3.2.1.2.2 Low Intensity Laser Therapy

Low intensity laser therapy first appeared more than 30 years ago. Since then approximately 2000 studies have been published on this topic. Medical treatment with coherent light sources (lasers) or noncoherent light (Light Emitting Diodes, LED's) have greatly advanced today’s health care with numerous disciplines making use of laser healing properties. Laser therapy is being used by physiotherapists to treat various acute and chronic musculoskeletal aches and pains. Dentists use it to treat inflamed oral tissues and to heal ulcerations. Dermatologists have used lasers to treat oedema, chronic ulcers, burns and skin ailments. Rheumatologists use it for pain relief, treatment of chronic inflammations and autoimmune diseases, and other specialists utilize this therapy for treatment of middle and inner ear diseases, and nerve regeneration. Laser

therapy is also used in veterinary medicine (especially in racehorse training centers) and in sports medicine and rehabilitation clinics for the treatment of swelling and hematoma, relief of pain, improvement of mobility and for treatment of acute soft tissue injuries.

Common names for which this therapy may be listed under include Laser Therapy, Low Level Laser Therapy (LLLT), Low Energy Laser Therapy (LELT), Low Energy Photon Therapy (LEPT), Cold Laser Therapy and Laser Photobiostimulation. LLLT do not involve cutting or burning into the skin or affected areas. They stimulate the tissues and promote healing by penetrating deep into the tissues thereby initiating the process of photobiostimulation. The patient feels no discomfort related to the procedure (Karu, 2002).

#### 3.2.1.3 Lasers and Diodes

There are various light sources (lasers and LED's) with different parameters (wavelength, output power, continuous wave or pulsed operation modes, and pulse parameters) that can be utilized for laser therapy. These parameters are usually given in the manufacturer's manual.

A laser functions as a coherent light source whereas LED (Low Energy Diode/Light Emitting Diode) functions as an incoherent light source. The depth at which a practitioner wants to irradiate determines the treatment with either a laser or a LED. The deeply penetrating properties of laser light are used for deeper and larger volumes of tissues (e.g. inner and middle ear diseases, injured sciatic or optic nerves, deep inflammations etc.), whereas the LED is effective on surface tissue (e.g. surface injuries). The laser may also be used on surface tissue, however the LED is considered more than sufficient for this task (Karu, 2002).

#### 3.2.1.4 The Bodies Response to Laser Light Stimulation

Cells contain mitochondria which are responsible for producing energy. Primary Photo-acceptors (Quinones and Cytochromes) within the mitochondria are able to absorb light energy from an outside source and convert this energy into usable electrochemical energy. The receptors respond mostly to monochromatic light to initiate their photoelectric reactions. These photo-acceptors respond to the absorption of specific wavelengths of light. When a certain light capacity threshold (0,2 Watts/m2) has been reached the mitochondria are activated and trigger whole cascades of subsequent reactions in the dark. Cells will then transform the energy into pH gradients and thus increase membrane electrical potential. These energy sources can drive at

least five vital processes – increased motility of cells and organelles, transport of nutrients, synthesis of ATP (energy) within the mitochondria, bacteriophage activity (destruction of bacteria) or the initiation of new cell cycles (Ryberg, 2004)

Susceptibility to laser or LED irradiation depends on physiological status of irradiated cells. Diseased cells are more sensitive to radiation than normal healthy cells (Karu, 2002).

#### 3.2.1.5 Reported Laser Effects

Professor Bradley states, in his presentation on the therapeutic effects of lasers, that research has showed that lasers show beneficial effects on both cellular and physiological levels.

Reported cellular effects include an increased growth factor response, energy production (ATP synthesis), cell proliferation, cell motility and the synthesis of DNA and proteins.

Physiological effects include increased angiogenesis (blood formation) and alteration of blood flow, enhanced matrix remodelling of damaged cells, modulation of metabolism of neurochemicals (i.e. seratonin, cortisol, acetylcholine and endorphins), altered nerve conduction, reducing nociceptor activity and immune response.

This means that lasers have the potential to improve cellular and physiological functions to the extent that there is an increase in energy, faster and more efficient growth of new cells, and pain reduction. The changes it produces during the inflammatory phase, contraction and re-epithelisation and matrix remodelling of the injury site, results in accelerated and efficient healing of wounds. These responses allow the laser to be a valuable aid in the treatment of acute injury (Bradley, 2002).

#### 3.2.1.6 Treatable Conditions (Bradley, 2002)

The following conditions are known to respond positively to laser treatment:

a. Acute Injuries/trauma: Muscle and ligament tears, fractures and subluxations.

b. Musculoskeletal: Repetitive strain injuries, rotator cuff tears, carpel tunnel syndrome, reflex sympathetic dystrophy, fibromyalgia and temporomandibular joint pathologies.

c. Inflammatory conditions: Tendonitis, bursitis, myositis, fascitis, synovitis and rheumatoid arthritis.

d. Degenerative Conditions: Osteoarthritis, rheumatoid arthritis, chondromalacia Patella, calcifications (e.g. bone spurs), discogenic and vertebrogenic pain.

Contraindications for laser use include irradiation directly into the eye, irradiation of the uterus during pregnancy, cancer and organ transplant.

**3.2.1.7 Guidelines for the Use of Lasers by Professor Bradley (2002)**

Once it has been determined that a laser therapy is required there are a number of important points to consider in treatment:

- Apply laser directly to injured site, nerve roots and trunks, trigger points, acupuncture points, blood vessel and lymphatic sites

- Other considerations for treatment are the penetration of scar tissue, age, people with dark skin, open lesions, children, obesity and underlying pathology

- Lasers can be used with patients who have metal and plastic implants, growth plates and pace makers. It is also safe to irradiate the genital area

- Caution must be used in patients with epilepsy, infection and thyroid problems, and for those using steroid and anti-inflammatory medication as laser treatment may induce aggravating side effects.

- Action spectra also indicate which wavelengths are the best for irradiation: maximal biological responses occur when irradiated at 620, 680, 760 and 820-830 nanometres (nm).

### 3.2.1.8 Documented Examples of Laser Research

The following are a few examples of thousands of studies performed on this subject.

Dr. Fred Kahn's, President and CEO of Meditech International, Inc., compiled a clinical report on the results of 151 consecutively discharged patients following clinical treatment with low intensity laser therapy. Of the 151 patients, 35 percent had degenerative osteoarthritis, an excess of 35 percent involved sports injuries, 20 percent have repetitive motion injuries and the remaining 10% were composed of a variety of diagnoses such as rheumatoid arthritis, acromio-clavicular joint pathology, plantar fascitis and trauma. Analgesics, anti-inflammatory medications and cortisone had been utilized extensively in a large number of cases and many surgical procedures had been carried out, often with results that were less than desirable. On completion of therapy, Dr. Kahn states "…the results are sufficiently conclusive to establish laser therapy in its proper position as the ideal therapy in treating musculo-skeletal conditions, particularly when compared to symptom modulators such as ultrasound, interferential current and the use of pharmaceuticals (Kahn, 2002)". The summarized results of this study can be seen in *Appendix B.*

A study was carried out to investigate the influence of low-intensity polarized visible laser radiation on the acceleration of skin wound healing and found that low level/intensity laser therapy at adequate wavelength, intensity, and dose can accelerate tissue repair (Simoes-Ribeiro *et al*, 2004)

When intervention surgery is performed to unblock blocked blood vessels, a common complication is restenosis. Restenosis means the recently opened vessels become blocked again. Scientists are investigating various ways of preventing this occurrence and stimulation via low power/intensity laser therapy is a method currently under investigation. A special setup was prepared for intravascular photostimulation with 808 nm wavelength laser diode and special diffuser, delivering the laser light into the coronary artery. This device was used on patients with a history of developing restenosis in their coronary arteries. Six months after surgery and use of the laser a controlled angiography indicated that restenosis was absent. This research is continuing (Derkacz & Bialy, 2003).

A study was performed to determine the feasibility of the application of low level laser therapy for chronic tinnitus. A TCL-system, which consists of four diode lasers (using wavelengths of

635 - 830 nanometres), was used for the experiment. Six months after the treatment, 13 of the 35 research subjects claimed that their tinnitus was significantly reduced and 2 claimed that their tinnitus was entirely absent. This research is continuing (Tauber *et al*, 2003).

Low Level Laser Therapy was used on HIV/AIDS patients after tooth extraction procedures. A common complication of this procedure is sepsis and delayed healing of wounds due to lowered immune systems. All patients were instructed not to use any medications or supplementary treatments. After tooth extraction, the injury site was irradiated for two minutes using a low-level laser (790 nm) - GaAlAs laser. Assessment of the injury was done after eight days. The patients reported little to no pain and a comfortable postoperative period. Tissue regeneration and surgical wound healing took less time than with conventional procedures with no sepsis development (Giovanni *et al*, 2003).

### 3.3 Light Therapy and Homoeopathy

#### 3.3.1 Homoeopathy

Homoeopathy, meaning 'like suffering', is based on the principle of the Law of Similars. This law revolves around the existence of a similarity between the toxicological action of a substance and its therapeutic action or simply, that which causes disease can cure it. Homoeopathy originated from the experiments of Samuel Hahnemann, a physician who at the turn of the eighteenth century was dissatisfied with contemporary medicine and proceeded to 'prove' i.e., experimentally test, about a hundred remedies on himself and his family. In these experiments human 'provers', people of average health (i.e. Hahnemann and his family), took repeated doses of a specifically prepared form of substance until symptoms appeared. The symptoms observed with certain regularity in the majority of 'provers' were considered to express the characteristic pathogenic effects of the particular drug. When the symptom complex of any spontaneous illness was compared with the artificial symptom-complexes produced by the drug, a close resemblance between the disease picture and the picture of the effects of the drug on healthy people often existed. Hahnemann found that the drug whose symptoms most closely resemble the symptom-complex of the sick patient were found clinically to be the most successful drug for the treatment for that condition**.** For example: The drug *Cinchona Officinalis* (Peruvian bark), containing quinine, will produce malaria-like symptoms when repeatedly administered to healthy human volunteers. Its use, therefore, in the treatment of patients with malaria is in accordance with the Law of Similars (Jouanny, 1994).

The general term for the indicated medicine is the Simillimum. Simillimum is that remedy, within the Materia Medica, which most closely and accurately matches the entire symptom picture for that individual patient. A list of the proving drug pictures/symptoms of the various remedies can be found in a homoeopathic Materica Medica, comprising all the recorded mental, general and local signs and symptoms, modalities and pathological changes (Swayne, 2000). Since Samuel Hahnemann's time, the provings have been extended to more than a thousand substances – chemical, plant and animal – and the symptoms carefully recorded and tabulated for their particular details.

### 3.3.2 Remedy sources and Preparation procedures

There are three processes involved in the making of Homoeopathic remedies: serial dilution, succussion, and trituration. Diluting the original crude substance is necessary in order to reduce its toxicity. Serial dilution means that each dilution is prepared from the dilution that immediately precedes it. Succussion and trituration are the methods by which mechanical energy is delivered to preparations in order to imprint the pharmacological properties of the original substance/drug upon the molecules of diluted drug.

There are two main classes of original substances: soluble and insoluble. For soluble substances water or alcohol is used as the diluting agent. At each stage of serial dilution, violent agitation is carried out, either by hand or machine and this is what is meant by succussion. Insoluble substances are prepared differently to soluble substances in the initial stages. The diluting process is carried out by using lactose powder, instead of water-alcohol, as the diluting agent. Instead of succussion, trituration is the means by which mechanical energy is instituted into the diluted drug. This is carried out by a prolonged grinding with a mortar and pestle. Once a certain level of dilution has been reached ($1/10^6$), the drug may continue being diluted as per soluble substances. Thereafter the material is treated as for soluble substances (Lessell 1983).

There is a third class of original substance called the Imponderable Remedies. Presently this class is now being called the Universal Remedies. An example of this would be substances such as light and colour. If a certain frequency of light (i.e. colour) is directed through a medium (e.g. water/alcohol) over a period of time, the medium takes on the light's properties. This method of remedy preparation is not a method commonly used, however several homoeopaths claim to have had successful results when using the remedies therapeutically (Robbins, 2005).

There are two major scales of serial dilutions: the centesimal or ‘c’ scale, and the decimal or ‘x’ scale. The centesimal scale involves serial dilutions of 1/100. The decimal scale involves serial dilutions of 1/10. The potency of the remedy refers to the number of dilutions and succussions that have been made (Lessell 1983).

### 3.3.3 Homoeopathic Remedies made from Colour and Light

The following three remedies are examples of homoeopathic remedies, made from light and colour, which are utilised clinically by homoeopaths worldwide.

#### 3.3.3.1 *Sol (Sunlight)*

The remedy *Sol* is made from Sacharrum Lactis (lactose) which is exposed for a period of time to concentrated sunlight and stirred with a glass rod. This is then potentised in the normal Hahnemannian method (Clarke 1978).

The Proving pictures of *Sol* indicate that it could be used in the following conditions: epithelial cancer, rodent ulcers, parasitic diseases, moles, birth marks, freckles, headaches, systemic lupus, premature menses, paralysis, sunburn and sunstroke.

The exact proving symptoms can be obtained in detail within Clark’s Dictionary of Materia Medica (Stevenson & Witko, 1998).

#### 3.3.3.2 *Luna (Moonlight)*

The remedy Luna is also made from the exposure of lactose, placed on a glass plate, to the rays of the moon and stirred periodically with a glass rod. This is then potentised in the normal Hahnemannian way (Clarke, 1978).

The clinical indications for *Luna* are acidity, epilepsy, headache, metrorrhagia, oedema, physometra, somnambulism and worms. The full proving can be found in Clark’s Dictionary of the Materia Medica (Stevenson & Witko, 1998).*bb*

#### 3.3.3.3 *Indigo*

The remedy *Indigo* is made from an indigo dye extracted from several plants, chiefly *Indigofera Tinctoria* (Vermuelen, 1994).

*Indigo* has a marked action on the nervous system. It is useful in the following conditions: Neurasthenia, epilepsy accompanied with great sadness, hysteria, vertigo with nausea, stricture of the oesophagus, eructation, sciatica (Boericke, 1927).

### 3.3.4 Colour Homoeopathic Remedies

Homoeopathic colour remedies offer homoeopathy a possible additional tool with which to combat disease. Within the next section, the colour homoeopathic remedies will be discussed according to Ambika Wauter's method of interpretation. Many homoeopaths regard the colour remedies with scepticism and doubt, however the provings of these remedies were performed according to the strictest protocol required for any remedy and therefore it would be prudent to investigate this subject further.

#### 3.3.4.1 Development of the Homoeopathic Colour Remedies

In her first year of Homoeopathic studies, Ambika Wauters discovered that homoeopathic remedies could theoretically be made from any substance on earth. With this in mind she theorised that colours could also be made into remedies. After Ambika qualified as a homoeopath in America, she was encouraged to further her research in colour homoeopathy by the Dutch Homoeopath, Dr. Jan Scholten. Dr. Jan Scholten is the author of "*Minerals and Homoeopathy*" which discusses the application minerals for use in homoeopathy. Ambika then, over many years, researched the application of compounding colour into a remedies and performing proving studies.

**Figure 9:** Ambika Wauters (Homoeopath)

The first batch of remedies was made in the Lake District of Northern England in 1989. The provings were performed on various people yielding promising results. Three examples of these results are; a nun from a Buddhist centre found that her arthritic pain disappeared after taking only one dose of Indigo 30x, a man who suffered from insecurity and self-confidence issues found there was an increase in his self-esteem while on Indigo 30x, and blue was found to decrease the suffering of depressive patients. Wauters (1999) spoke about her findings at the Society of Homoeopaths annual meeting in 1997 and received additional support and aid for her research.

### 3.3.4.2 Making of Homoeopathic Colour Remedies

Wauters (1999) used theatrical lighting gels in full spectrum colours as the source material. Mirrors were arranged around glass beakers containing distilled water. The different colour frequencies were imprinted, after a full twenty-four hours of sunlight, on the distilled water and thereafter potentised and stored in alcohol (98% ethanol).

In 1992, John Morgan and his staff at the Helios Pharmacy in Tunbridge Wells, Kent, England, officially produced the remedies. One batch of remedies was made during the winter solstice and one during the summer solstice. The colours red, orange and yellow were found to be strongest during the winter solstice and blue, indigo and violet were strongest during the summer solstice. The strongest remedies of each solstice were thereafter used to make the colour remedies used presently. The ranges of colours produced are red, orange, yellow, green, turquoise, indigo, violet, magenta, pink and full spectrum (Wauters, 1999).

### 3.3.4.3 Clinical Provings and Research

In the provings each patient kept a notebook of all symptoms experienced for three weeks. The observations were analysed in depth by an independent homoeopath. The remedy was given in three split doses over 24 hours, and each day the homoeopath and prover discussed everything that could be remembered about the previous day. At the end of three weeks, the supervising Homoeopath would ascertain whether the symptoms experienced were old or new. In every case the prover had changes in mental, emotional and physical symptoms.

Many provings were also done in clinical situations where the remedy was indicated for the patient and used to treat clinical symptoms. A classical homoeopathic case was taken, and the patient's emotional, mental and physical presentation of symptoms documented. The choice of

remedy was determined by the site of the physical ailment, the organs involved and understanding the emotional connection to the disease. The chakra system (see section 3.4) was used by Wauters as an aid in the prescription of a colour remedy. The results of the provings and clinical trials indicated that the remedies affected the physical, emotional and mental levels.

It was found to be more useful to prescribe a colour remedy based on a clinical diagnosis with specific symptoms than choosing colours randomly in an experiential sense. When given a remedy randomly unusual results came about. One prover, on the randomly selected colour of red, became so agitated that she tried to stab her husband in the chest with a dinner fork. Another prover, on the orange remedy, threw his wife's china onto the floor in a violent rage. In these cases an obvious aggravation occurred which lasted from a few hours to a few days.

The colour remedies can be used individually, however, according to Dr Wauters, they are most effective when used inter-currently with traditional homoeopathic remedies (Wauters 1999).

#### 3.3.4.4 Colour Remedy Indications (Kondrot, 2005)

The information listed below gives a summary of the possible indications for each of the colour remedies made by Wauters.

Red: Pain and irritation related to any bone or ligament tissue, difficulties with the bowel and rectum, circulatory problems involving stasis and autoimmune deficiencies. Exhibit emotional feelings of separation or disconnection leading to despair, depression and grief.

Orange: Sexual problems for both genders, menstrual and lower back problems, allergies, constipation, eating disorders, low vitality, adrenal exhaustion and autoimmune deficiencies. Poverty consciousness, loneliness and depression.

Yellow: Problems with the liver, gallbladder, stomach and pancreas. Osteoporosis, right eye vision loss, decongestant for colds and lung complaints. General detoxifier. Anger, lack of self-esteem, impaired cognitive abilities and dependence.

Green: Diuretic in any type of oedema. Regulates and calms the heart. Avoidance of change, jealousy and for those who are easily taken advantage of.

Blue: A catarrhal remedy. Sore throat, hoarseness, problems with the thyroid and parathyroid glands, neck and shoulder pain, substance abuse. Lack of will power to complete tasks, inability to express their views and opinions and for compulsive liars. For aid in the release of sorrow and grief-like emotions.

Indigo: Problems with the eyes, nose and ears. Anti-insomnia and calmative remedy. Good for sinus problems, fever, congestive headaches. Anti-inflammatory. Feelings of anxiety.

Violet: An antiseptic and aid in the healing of wounds. Soothes nausea and nervous energy. Improves left eye vision. Good for jaundice and liver complaints. Chaotic feelings, egotistical, prejudice, restlessness, sleeplessness and dull perception of life.

Pink: To increase milk production. Anti-stress and eases fearfulness and anxiety. Want of maternal instincts, need to be nurtured, emotional problems to do with the mother figure, feelings of abandonment and heartache.

Magenta: Serves to increase vital energy. Normalises sexual excess and deficiency. Fear of change and rigidity of ideas.

Spectrum: Physical and emotional burnout, post viral infections and trauma conditions.

### 3.4 The Human Chakra System

Ambika Wauter's makes extensive use of the human chakra system as a tool for the selection of a specific colour remedy in therapy, therefore a brief discussion of the chakra system is necessary. This has nothing to do with the provings of each colour remedy and should only be seen as an aid, according to Wauters, in choosing the correct remedy.

#### 3.4.1 Chakras: Wheels of Energy

The word Chakra comes from a Sanskrit word meaning "wheel". According to Eastern philosophies, chakras are the primary conduits for all energies coming into and radiating out of the body. They control the impulses of our energy system. Although not a part of the physical body, they link the subtle energy fields surrounding the body to the activities of the body itself. The chakras help the body distribute energy for its various physical, emotional, mental and spiritual functions. They are connected to the body via the peripheral and central nervous

system, spinal cord and the endocrine centres. The distribution of energy flows via the nervous system, blood circulatory system and energy meridian paths. This forms the basic premise for practices such as acupuncture, kinesiology and Chinese Traditional Medicine. In this way, it is believed all organs, various tissues and individual cells receive their specific energy vibrations.

One of the means of balancing these chakras is through the use of colour. Each of the seven energy centres, or chakras, of the body has a specific colour associated with it. If an imbalance occurs, a colour or combination of colours is used to restore homoeostasis (Andrews 1999).

### 3.4.2 The Human Endogenous Field

The Endogenous field, also sometimes known as the 'Aura', is an electromagnetic field that surrounds the human body. This field can be found around any object animate or inanimate. Every element in the body is made of atoms and molecules which all have their own electromagnetic signature. Considering that the body is composed entirely of atoms and molecules, it exhibits its own electromagnetic signature which is not commonly seen by the average eye. Thoughts and emotions also exhibit their own electromagnetic signature (partially measurable with an electroencephalogram - EEG). Therefore it can be said that there are a number of layers within this field which represent different properties of the human organism. The first layer is related to the physical state, the next to the emotional state and then to the mental state. There are further layers thought to represent our spiritual nature but this is beyond the scope of this project. The chakras are interconnected with the aura and determine its appearance and consistency. The quality of the aura is determined by a person's health and their mental and emotional state at the time when viewed.

In 1911, Dr. Walter Kilner (director of the X-ray department at St. Thomas's Hospital and inventor of the Kilner jar for preserving fruit) published a book called '*The Human Atmosphere or The Aura made Visible with the Aid of Chemical Screens*'. In it he described how the emanations from the human body could be seen through specially made glasses which allowed vision in the ultraviolet part of the spectrum. The glasses have a double screen containing a liquid dye called *Dicyanin* which is dissolved in alcohol. Using this screen, Kilner saw what appeared to be an inner band of grey-blue light surrounding the body and a second 'vapourous band of varying coloured light extending away from the body. He also found that he could notice a discolouration in certain areas of the body which was later found to be diseased tissue. Dr. Kilner was criticized for his work but continued his experiments until the start of World War I when his supplies of *Dicyanin* from Germany ceased (Coghill, 2000).

### 3.4.3 Physical Locations of the Chakras

This drawing, by artist Brook Garten, depicts the apparent location of the chakras within the body. There are seven main chakras that are numbered starting form the bottom or base chakra located at the base of the spine and ending with the seventh chakra located on the crown of the head. Further information on the chakras and their anatomical locations can be viewed in *Appendix C.*

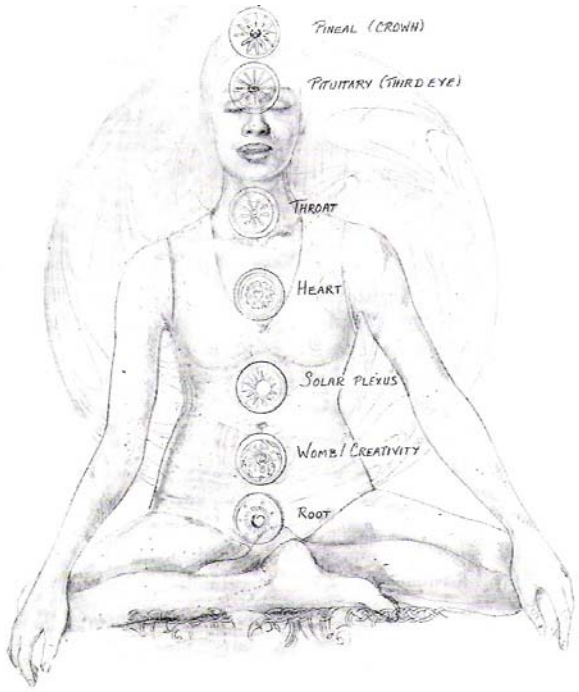


**Figure 10:** An Artist's drawing of the chakra locations within the body (Eden, 1998)

### 3.4.4 Mental and Emotional Aspects of the Chakras

Aside from the physical locations of the chakras, each of the seven chakras has related mental and emotional functions. A brief summary of these functions will be discussed to give the reader a general idea of how the functions could be applied to the prescription of homoeopathic remedies. It is important to realise that the information below is not stated as fact but is meant only as an optional guide that may or may not aid in the selection of a colour homoeopathic remedy (Judith, 2000).

### 3.4.4.1 Base or Root Chakra – Red (1)

The Base or root chakra situated at site 1 or the base of the spine is primarily associated with issues to do with basic needs such as physical health and vitality, food, shelter, safety and security are functions of this chakra. It is here that instinctual fight or flight response starts. When survival is threatened then fear is experienced. Fear counteracts a sense of safety and security. When a disproportionate amount of fear is experienced then this chakra is said to be malfunctioning. Looking after bodily needs (by balanced eating, exercising, sleeping patterns, bodily pleasure and financial security) ensures a healthy base chakra. The foods that are primarily associated with this chakra are protein based.

It is also believed to have a stabilising function. For those who struggle to turn ideas and thoughts into reality, are easily rattled by mental and emotional stress, and have difficulty completing tasks, the base chakra is said to be unbalanced (Judith, 2000).

### 3.4.4.2 Sacral Chakra – Orange (2)

The function of this chakra deals with desires, emotions, pleasure, sexuality, nurturing and procreation. The ability to accept and deal with change, and the duality of the female and masculine aspects within every human being (including relationships with the opposite sex), are integral aspects of this chakra. Sexual abuse, sexual excess or suppression, problems with emotional expression, and a fear of change lead to a malfunction in this area. The second chakra is associated with water. Adequate consumption of water helps to keep this area in good health (Judith, 2000).

### 3.4.4.3 Solar Plexus Chakra – Yellow (3)

Will, power, vitality and assertiveness are the aspects of the human psyche this chakra represents. A lack or excess in this area involves problems with self-confidence or arrogance. To ascertain whether this chakra is out of balance is to determine if a person is predominantly cold or hot (preference for hot and cold drinks), enjoys spicy foods or strives to avoid them, is completely undisciplined or overly disciplined, and/or has an quick aggressive temperament or is slow and lethargic. If a person has too much ‘fire’ in their personality they could appear power hungry and overwhelming to others. Too little ‘fire’ could result in feelings of powerless and unhealthy passivity. A blocking of this energy from full expression would result in a cool, controlled or aloof temperament.

Anger needs to be expressed in a constructive way. The 'fire' of anger that is overly expressed or suppressed cause malfunctions within the solar plexus chakra. People with liver problems commonly tend to have an anger problem as well. Problems with digestion, diabetes, ulcers and hypoglycaemia relate directly to this area. Starches nourish this chakra (Judith, 2000).

#### 3.4.4.4 Heart Chakra – Green (4)

The heart chakra forms the central core of the human being. Due to this, disruption within this chakra will cause all other chakras to be unbalanced. The psychological function of the fourth chakra is the ability to express the qualities of compassion, understanding and love. It involves the integration, unity and balance of all aspects of life. The love experienced here is different from the 'passion' love of the second chakra. Sexual love is object orientated – stimulated by another person only. The love coming from the heart chakra is not dependant on outside stimulation but is rather a state of being.

It is the driving force behind most people on earth. Human beings are always searching for 'perfect' love in various different ways. The use of sex, the need for approval, and the accumulation of money and power are misplaced methods used for the integration and balance that the heart chakra represents.

Undue attachment to one person, jealousy, old resentments, hurt experienced from rejection and failed relationships, and bigotry all reduce and block the flow of energy from this area. Love involves union and wholeness. Anything that encourages separation from (e.g. racism) rather than unity disrupts the ability to experience this purist form of love.

The breath, as an air element, is one of the primary keys to health within the heart chakra. Any disruption of the breathing process (e.g. lung disease) would indicate a severe blockage of this chakra. The yogic practice of '*pranayama'*, or breath control, and the consumption of vegetables clear and revitalise this chakra (Judith, 2000).

#### 3.4.4.5 Throat Chakra – Blue (5)

Chakra five is the centre related to communication through sound, vibration, self-expression and creativity. Its attributes include listening, speaking, writing, chanting, singing and artistic talents which are all forms of expression.

The relationship with 'self' and everything that is 'not-self' is the dominant feature of this area. Suppression of the self due to external (mild to severe childhood abuse) and internal influences (shyness, lack of self-esteem) would cause a blockage in the fifth chakra and affect our ability to give voice to self-expression or creativity.

Speaking the truth with kindness and keeping our word strengthen this chakra. Lies, gossip and unreliability dilute and weaken it. Fruit stimulates healthy function of the throat chakra (Judith, 2000).

#### 3.4.4.6 Brow Chakra – Indigo (6)

This chakra's function has to do with our perception of the outer world, via the light that brings this world to the brains through the eyes, and the inner world of dreams and imagination.

The principal agent that brings information about the world is light. This light is channelled and changed into nerve impulses by the eyes. It could be said that it is not the eyes that see but actually the mind. Matter is only perceived as different frequencies of light and the mind then interprets this information as an object. Colour is the form through which light is perceived. Sunlight entering the eyes is split into the different frequencies of colour by this chakra and is used to harmonise every chakra in the body according to their individual colours i.e. split up into the full spectrum of colours that constitute white light. Intuitive and visualisation powers are governed here. When perception of reality does not correspond to actual reality then the brow chakra (or 'third eye' as it is popularly known) would be out of balance. Entheogens balances this chakra (Judith, 2000).

#### 3.4.4.7 Crown Chakra – Violet (7)

This chakra connects man/woman to divine intelligence and the source of all creation. It is the means through which understanding, knowing and meaning is attained within life. It is the consciousness or awareness that inhabits the body. This chakra rules the intellect and belief systems. It also relates to the 'awareness' that makes use of the mind as a tool for constructive thought.

The mind assimilates experience into memory and then creates meaning. This then gives rise to belief systems. This determines how man perceives reality according to beliefs. Dogmatic

inflexible belief systems restrict the growth within this chakra. Feelings of loneliness, confusion and depression are the problems associated with an undeveloped and/or blocked seventh chakra.

Meditation, prayer and fasting are a means by which this chakra may be developed and strengthened (Judith, 2000).

### 3.4.5 Conclusion

It must be stated that many respectable scientists and intellectuals find the chakra system offensive and are completely against its use as a diagnostic tool. While their opinions must be respected and considered, the theory of the chakras existed long before the coming of modern medicine. Chinese (including acupuncture) and Ayurvedic medicine, predating modern medicine by thousands of years, make extensive use of the chakra and meridian systems as a diagnostic and treatment tool (NCCAM, 2005). Therefore investigation into this subject is warranted if not easily tolerated.

## 3.5 The Use of Colour in Acupuncture

### 3.5.1 Acupuncture

Acupuncture is an ancient Chinese method of relieving pain and treating disease by inserting needles along various points along the 12 energy meridians of the body. These meridians have been mapped out thousands of years ago by the pioneers of acupuncture. Meridians are the channels through which energy or life force (Qi or Chi pronounced *'chee"*) flows within the body. According to the Chinese doctrine, disease is caused by an unequal balance of yin or yang energies. The balancing of these two forces, by the use of needles and Chinese herbs, brings the body back into a state of harmony thereby eliminating disease. Acupuncture can be used to relieve pain and to treat various conditions, including arthritis, asthma, migraine, ulcers, poor eyesight, and some mental illnesses. Acupuncture has even been used in surgery as an anaesthetic (Seem, 2004).

### 3.5.2 Colourpuncture

Light provides the cells with the information they need to heal, rather like eradicating viruses on a bio-computer. The needle free nature of Colourpuncture makes it a preferred choice with children.

Colourpuncture is a system of coloured light therapy largely based on the concepts of acupuncture, transmitting light energy through the meridian system. This new method presupposes that the balanced flow of energy through the meridian system will support good health. Whereas acupuncture uses needles, colourpuncturists utilise an *Acu-light® Pen*, a pen-sized light source capable of beaming coloured light of different frequencies, to apply to the various acupuncture points. The colour puncture points are derived from the traditional acupuncture points and from other holographic grid systems such as reflexology and kinesiology, as well as from new points discovered by the founder of Colourpuncture, Peter Mandel. Each colour offers a differing wavelength or frequency which is then transmitted into the bodily energy system. It is thought that when coloured light meets the skin, it is translated into vibrational impulses at the molecular level, which travel along the meridian system to the brain at the speed of light. The use of the correct colour on the correct acupuncture point clears and balances the entire energy system (Croke, 2002).

Peter Mandel, a German naturopath, chiropractic practitioner and acupuncturist founded the system of colourpuncture. The use of Kirlian photography sparked Mandel's interest into further research on how the bodies' energy field could be manipulated for the betterment of the individual. Kirlian photography involves a high voltage photographic device developed in the 1940's by Russian scientists Semyon and Valentina Kirlian. Kirlian photographs show the electromagnetic field or aura around objects and have been used extensively in Russia and Europe for the ability to show the state of physiological functioning in plants, animals and humans. After observing the energy surrounding the fingers and toes of hundreds of patients using the camera, Dr. Mandel noticed that certain diseases have a characteristic energy patterns which could be influenced through the use of acupuncture.

Dr. Fritz Albert Popp's experiments (section 1.4.1) demonstrated that all cells emit and absorb small pockets of electromagnetic radiation or light, and that cells communicate using light within the spectrum of visible light and microwave energy. Therefore, according to Popp, when a cell becomes disturbed in some way, the light vibration around that cell becomes disharmonious. The disharmonious light is thought to detrimentally influence the vibrational pattern of neighbouring cells. This can be experienced as disease.

Influenced by the work of Dr. Popp, Dr. Mandel postulated that the meridians were pathways of light and the acupuncture points are the 'door ways' through which light can be introduced. He also hypothesised that if the energy or light emitted by diseased cells were too strong or too weak, then the addition of the complementary colour, at the appropriate acupuncture site, would

serve to balance the diseased cells and promote health. For the next 15 years, Mandel researched a systematic set of colour puncture treatments in which different colours of light are applied to specific points, depending on the exact state of energy imbalance. Colour puncture uses the seven basic colours to add or decrease energy to the meridian system. The stimulating colours are red, orange and yellow and the sedating colours are green, blue, indigo and violet (Examples of Mandel's interpretation of the different colours and their effects can be found in *APPENDIX D*) (Breiling, 1996).

### 3.5.3 Colourpuncture Treatment

A treatment usually starts with the practitioner taking a case history of the patient's physical, mental and emotional issues that they would like to be resolved. Mandel (1986) then takes a picture of the energy emissions from the toes and fingers using the Kirlian camera and then makes an assessment of the patient's energetic health. A particular light treatment is selected and administered to the patient. Once the treatment has ended another photograph is taken to determine the efficacy of the treatment.

Treatments usually begin with the focus on the body and balancing the flow of energy. There are a variety of treatment options which include the release of stress, promotion of relaxation, energy detoxification treatments that stimulate the release of stored toxins, and to rebuild energy in degenerative conditions. This forms the foundation for the next level of advanced treatments which address old energy blockages from prenatal, childhood, and past traumas (Mandel, 1986). Diseases that are treatable with a combination of colour and acupuncture are listed in *Appendix F*.

### 3.5.4 Research and Case Studies

Recent European studies to evaluate Mandel's Colourpuncture Therapy are presented below. There are limitations in research design or sample size. However, improvement is a general trend in the studies, and should be viewed as preliminary data showing promise in therapy.

In an article written by Anna Cocilovo, published in the American Journal of Acupuncture, a number of case histories related to the application of Colourpuncture for various complaints are given. Each case involved treatment exclusively with colourpuncture.

The first case deals with a women patient suffering from frequent migraines lasting for up to five days at a time. After Colourpuncture treatment with the blue colour on the relevant acupuncture points, she claimed the headache disappeared within minutes. This did not completely cure her of migraines but reduced the incidence and aborted any acute occurrences.

The second case deals with a 45-year-old athletic woman who developed idiopathic bilateral leg swelling, worse on the right, which was preceded by cramping. She was also diagnosed with intestinal cancer which was successfully treated using surgery; however her cramping and oedema persisted. Treatment with conventional acupuncture yielded little to no results. Use of a blue light for cramping and purple light for swelling on the relevant acupuncture points resulted in quick pain relief and gradual reduction in swelling. Her ailment was not cured but the treatment served to supply pain relief and control of her symptoms.

The third case involved a woman with chronic nasal congestion. After treatment with the colour green her congested sinuses gradually, over twenty four hours, eased and her nose began to run freely before drying up. Her sense of smell also returned. With periodic treatments she continued to remain symptom free.

A woman had been suffering from insomnia for the past four years since her husband died in a car accident. She also developed a number of other problems within this period such as obesity, chronic sinus headaches, rhinorrhea, bruxism, and irregular menstruation. She was treatment with the colour violet on the relevant acupuncture points. After the first treatment she slept eight hours and woke up feeling relaxed. After the third treatment she averaged five good sleeping nights a week. Her problems with sinus headaches, bruxism and menstruation also coincidently disappeared over the course of three treatments (Cocilovo, 1999). *Appendix E* displays all the known diseases that can be treated using acupuncture and colourpuncture.

### 3.6 Spectro-Chrome Therapy

#### 3.6.1 Introduction

Spectro-chrome therapy is a form of colour therapy that officially began in 1920 by Dr. Dinshah P. Ghadiali. The information contained in Ghadiali's *Spectro-chrome Encyclopaedia*, together with Dr. Harry R. Spitler's work recorded in *The Syntonic Principle*, forms the theoretical basis of most colour therapies in use today. Ghadiali's son Darius Dinshah (Darius does not use his

father's surname), summarized his work in the book: *Let There be Light* which serves as the basis for most of the information in this section.

### 3.6.2 Definition of Spectro-Chrome Therapy

Spectro-Chrome therapy is a healing modality which utilises coloured light projected directly onto specific designated areas of the body (Ghadiali, 1933).

### 3.6.3 Principles of Spectro-Chrome Therapy

From his research, Ghadiali postulated the three basic principles behind Spectro-Chrome Therapy. Firstly, the human body has specific reactions to different light stimuli. Secondly, colours are related to physiological functions and, lastly, exposing the body to coloured light aids bodily function (Dinshah, 1985).

### 3.6.4 Spectro-Chrome Philosophy

When viewed through a spectroscope, every chemical element in nature will, when in an excited state, give off a characteristic set of coloured bands called spectral emission lines. These sets of frequency emissions are the identifying fingerprint for a specific element and are called Fraunhofer lines. If an excited element is exposed to white light it will absorb the same frequencies of light it gives off. Dinshah P. Ghadiali theorized that the human body, which uses many of these elements, would also absorb and give off light. He studied the Fraunhofer spectrum for each element within the body to determine its predominant colour and then matched each element's primary colour emission with its known physiological function. He theorized that an element's predominant colour was directly related to its function in the human body and could be used therapeutically to aid that element's activity. Ghadiali then developed a set of twelve attuned colour filters to be used with the Spectro-chrome system of healing. These filters are inserted into a light projector and directed at the desired area of the body. His theories have not been scientifically validated, however all who have used them have verified the success of his methods in clinical use (Liberman, 1991).

### 3.6.5 Development of Spectro-Chrome Therapy

Dinshah P. Ghadiali was born in India on November 28$^{th}$**,** 1873. He learned to speak eight oriental and occidental languages. Dinshah studied medicine, chemistry and physics. He also

began a business installing electric lights, door bells, and burglar alarms. Dinshah later became an electrical engineer with the Peninsular Steamship Company and visited the United States for the first time in 1896. Here he lectured on x-rays and radioactivity before returning to India. Dinshah then began his medical practice and played a significant part in the successful treatment of the bubonic plague that had spread through India at the time (Dinshah, 1985).

**Figure 11:** Dinshah P. Ghadiali (Originator of Spectro-Chrome Therapy)

The year 1897 marked the turning point in his medical thinking. The niece of one of his colleague's was dying from mucous colitis. Her physician determined that her case was terminal. Having read "The Principles of Light and Colour" (1878) by Dr. Edwin Babbitt and "Blue and Red Lights" (1877) by Dr. Seth Pancoast, Dinshah applied this knowledge when using colour therapy on the ailing patient. He shone light onto the young patient from a kerosene lantern that was filtered through an indigo-coloured glass bottle. He also exposed milk, put into the same colour bottle, to sunlight for a short period and gave it to her to drink. The diarrhoea, which was occurring continuously throughout the day, was reduced significantly after the first day of treatment. After three days the diarrhoea had ceased and she was able to get out of bed and walk around. This successful treatment would mark the beginning of 23 years of experimentation and research before a colour healing system, that he would later call *Spectro-Chrome Therapy*, was finally developed in the year 1920.

The Spectro-Chrome Institute was established in New York City, where students could learn how to apply colour therapeutically. He travelled the U.S.A giving lectures. During the next 46

years of his life he continued to lecture, develop improvements on his Spectro-Chrome light devices and its accessories, and legally defended himself in numerous litigations. One accusation was directed at the inefficacy of his light machine on health. He was found not guilty when a number of people including medical practitioners testified on his behalf. Those that were sceptical of his treatments were invited to observe him in practice. Dinshah did not win all his litigations however and had to pay penalties of up to 20 000 dollars and prison sentences of two months to five years, of which he served 18 months. In 1924 he opened a Spectro-Chrome Institute in New Jersey and in 1933, he wrote the Spectro-Chrometry Encyclopaedia which became known as the authoritative treatise on colour therapy. Dinshah P. Ghadiali died in 1966 (Dinshah, 1985).

### 3.6.6 Terms and Definitions

Ghadiali has created many terms which are specific to this therapy which may be difficult to understand and therefore need explanation. Below is a list of terms and definitions that were used to describe certain concepts within the Spectro-Chrome discipline (Dinshah, 1985).

a. **Tonation** – shining a Spectro-Chrome Colour on a person's body, or part of the body. This is usually one colour on a given area for about one hour.

b. **Colours** used in Spectro-Chrome Therapy are Red, Orange, Yellow, Green, Blue, Indigo, Violet, Magenta and combinations of these colours.

c. **Area** – The part of the body you are going to tonate is called the area. The areas are numbered from 1 to 22.

The diagram (fig 12), on the next page, gives a visual representation of the areas of the body which may be tonated during a Spectro-Chrome treatment.

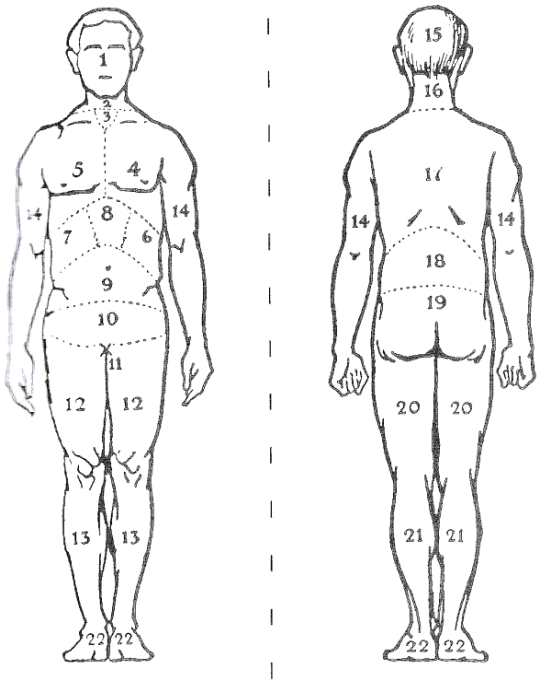


**Figure 12:** Spectro-Chrome Area Chart (Dinshah, 1985)

Table 1 displays which regions of the body are related to the numbered areas in the diagram above.

| | |
|---|---|
| 1. Pituitary, pineal, brain (front) | 2. Neck |
| 3. Thyroid, Parathyroid | 4,5. Lungs, Heart, Thymus, Female mammary glands |
| 6. Spleen | 7. Liver (also 8), Gall bladder |
| 8. Stomach (also 6), pancreas (front) | 9. Intestines (also 10) |
| 10. Bladder, Appendix, Internal Reproductive Organs | 11. External Reproductive Organs |
| 12. Thighs | 13. Shins |
| 14. Arms | 15. Brain (back) |
| 15 to 19. Spine and Spinal Cord | 16. Nape of neck |

| | |
|---|---|
| 17. Lungs (back) | 18. Kidneys, Adrenals, Pancreas (back) |
| 19. Rectum, Buttocks | 20. Back of thighs |
| 21. Calves | 22. Feet |

**Table 1:** (Dinshah, 1985)

d. **Systemic** – Systemic 'front' refers to tonation of the entire front of the body and systemic 'back' refers to the entire back side of the body. P/M/S Systemic indicates the use of the colours purple, magenta and scarlet almost exclusively for affecting the heart and the circulation. Allergies and high blood pressure frequently require both sides of the body before a change is brought about.

e. **Projector** – The filters can be used with almost any incandescent lamp as a light source or projector. Fluorescent tubes are not suitable.

f. **Infra-green and ultra-green** – Infra-green indicates the spectrum of colours with a lower frequency than green (red, orange, yellow and lemon). Ultra-green indicates the spectrum of colours with a higher frequency than green (turquoise, blue, indigo and violet), i.e. using green – the centre of the spectrum and chakra system as reference.

g. **Aura** – The energy field surrounding and extending from the physical body, generated by the electro-chemical cellular activity of the body is called the aura in the Spectro-Chrome System. The aura diminishes rapidly as the distance from the body increases so tonations must be on bare skin to obtain optimum results. Colour therapy acts by reinforcement or interference of the aura. Any pain, illness or traumatic event will result in a change in the colour of the aura and/or alter its brightness. If there is a weakening of the aura in a particular area tonatation with the colour necessary in order to reinforce that area. On the other hand, if there is an excess of activity in a particular area then it would be necessary to tonate with the opposite or complementary colour.

h. **Acute or chronic** – The person's temperature is used as a guide to whether the problem is acute of chronic (an acute condition having a higher temperature than normal). In general, acute cases use tonations of Ultra- green colours, and chronic conditions use tonations of Infra-green colours (Dinshah, 1985). This is very similar to the application of Syntonics (section 1.10).

i. **Colour Schedules** – There are 331 colour schedules listing tonations for over 400 health conditions in the Spectro-Chrome System (the individual colour attributes can be seen in *Appendix F*).

j. **Normalate** – bringing the dysfunction within the body back into equilibrium (Dinshah, 1985).

### 3.6.7 Equipment

Specific Equipment is needed in order to apply Spectro-Chrome therapy properly and efficiently. Not all colour treatments are of the same quality and therefore not as successful in the treatment of disease conditions. A discussion on the type of equipment needed is necessary in order to avoid unsuccessful or negligible results.

#### 3.6.7.1 Filters

Almost any colour can be used for 'colour therapy' but there are reasons why Spectro-Chrome colours are not monochromes or just any colours. The original filters were made of glass coloured according to specific frequencies. It is difficult to have these made according to exact specifications therefore a cheap and effective alternative is a set of Roscolene plastic filters, manufactured by Rosco Laboratories. The Roscolene filters, when put together, approximate the original glass filters. Both plastic and glass filters are of equal efficacy (Dinshah, 1985).

#### 3.6.7.2 Light Sources

Light sources varying from a lantern to sunlight (any full spectrum light source) can be used with equal effectiveness. However, for practical purposes, a 100-watt projector is the standard model. Anything with wattage of more than 4.5 watts to about 2000 watts is suitable. The quality and not the quantity of the light are of importance. A fluorescent tube is not suitable because it emits a considerably different spectrum when compared to an incandescent bulb. Today, specialised bulbs are available for these purposes (e.g. Ott lights) (Dinshah, 1985).

### 3.6.8 Spectro-Chrome Therapy for pre-diagnosed disorders

When an accurate diagnosis has been made, by whatever discipline, there are tried and tested colour treatments given according to 'colour schedules' outlined in the Spectro-Chrome practical manual, "Let There be Light". Duration of each treatment may be from twenty minutes to an hour, every day for as long as it takes to achieve results.

There are 331 colour schedules for pre-diagnosed conditions. Three examples of colour scheduled treatments are:

1. Chronic fatigue syndrome:

Expose the entire back portion of the body (systemic) to the colour lemon if there is no fever. If fever is present then turquoise should be tonated over the entire front of the body. When fever subsides then there can be a continuation of the lemon on the back until cured.

2. Allergies:

Expose the entire back and front portion of the body to the colour lemon and follow with the colour yellow on the same area for the next two weeks. If this does not completely cure the individual then change the yellow to the colour orange for another two weeks.

3. Burns (fire):

Expose the burned area to the colours blue and indigo until the pain subsides and the crust of scab forms. This should be followed by the colour turquoise tonated over the entire body on the same side as the effected area. Green would then aid the healing process. The kidney area should be exposed to scarlet should kidney function fail. Repeat indigo if pain or exudations continues (Dinshah, 1985).

### 3.6.9 Spectro-Chrome Recommendations for Optimal Treatment Results

As in any therapeutic discipline, there are a number of things to consider before any treatment can begin (Dinshah, 1985).

1. Dinshah recommends that all steps should be taken to ensure a healthy diet. He recommends a vegetarian diet. Elimination of wheat products, artificially flavoured and coloured foods, chemical preservatives, coffee, tea, colas and alcoholic beverages. Minimize salt, refined sugar and spices. Use fresh food in preference to frozen or canned. Food should be thoroughly chewed before swallowing. It is safer to drink and cook with filtered water.

2. Stop the use of tobacco, marijuana and other drugs, in any form.

3. An ill person should sleep alone. This is to ensure that the sick person's 'aura' does not interfere with another's in a detrimental way.

4. Exercise is vitally important (Even if bedridden, a patient can be helped to walk around for short period of time).

5. Avoid continuous exposure to fluorescent light and avoid using dark or coloured sunglasses.

Sometimes a tonation can result in a rash, headache or diarrhoea. This is good as it is a sign of the reparative process taking place. As soon as the body has finished eliminating this 'debris', the symptoms will disappear, therefore don't interfere with the healing process.

### 3.6.10 Poor or Delayed Results

Spectro-Chrome Therapy does not always give the results expected of it. Some possible causes are the use of the incorrect colours and too many layers of clothing / blankets, insufficient time period - the amount of time needed to heal long term illnesses is about one month for every year of illness. This is an estimate, as some patients may heal much faster while others may take much longer than expected. Other factors which may interfere with recovery are irreversible damage and/or the patient's vitality is too low, poor diet and if the root cause of a disease condition is not identified and treated. Lastly, there are a number of conditions which have a low expectancy of an entirely successful outcome. These include hardened granulations of the eye, reducing tumours beyond a certain point, fully developed cataracts, large kidney stones, long-standing nerve problems and hernias in adults. Women should not be treated during menstruation (Dinshah, 1985)

### 3.6.11 Case Studies

The following are examples of a number of case studies performed by Dr. Kate Baldwin within the Philadelphia Womans' Hospital (WRF, 2005).

A young girl suffered burns on four-fifths of her torso. The burns covered the middle of the body up to the clavicle and under the arm, from the elbow up into the axillary, down to the groin, about four inches on the left leg, back up onto the back and around onto the side. The skin was destroyed as well as the fascia of the muscle. The fascia is a layer of tissue that covers all

muscles of the body. The case was considered terminal by her attending physicians. Baldwin began treating the girl twenty four hours after the incident. She was treated principally with the colour blue, though other colours were used intermittently. The girl survived with significantly reduced scarring than was expected by the original attending doctors.

In very extensive burns in a child of eight years of age, there was almost complete suppression of urine for more than 48 hours, with an elevated temperature of. Fluids were forced to no effect. The case was judged to be terminal. Baldwin applied the colour scarlet over the kidneys at a distance of eighteen inches for twenty minutes, all other areas being covered. Two hours later, the child voided eight ounces of urine and in time the girl began to take in fluids. The child survived.

Dr. Martha Peebles, a medical inspector for the Brooklyn New York Department of Health, and a front line army company surgeon. She was declared an invalid due to arthritis and neuritis. After meeting Baldwin she underwent Spectro-chrome treatment and after approximately a month, Dr. Peebles displayed no signs of neuritis and her arthritis no longer restricted her movements.

According to the late Dr. Kate Baldwin, senior surgeon for 23 years at Philadelphia Woman's Hospital who incorporated the Spectro-chrome system into her hospital and private practice, after nearly thirty seven years of active hospital and private practice in medicine and surgery, she claimed to produce quicker, more accurate and less stressful results with colours than with any other form of treatment. If surgery was required, the healing process could be significantly improved when colour therapy was used before and after the procedure. Dr. Baldwin claimed that sprains, bruises, septic conditions (regardless of specific organism) cardiac lesions, asthma, hay fever, pneumonia, inflammatory conditions of the eyes, corneal ulcers, glaucoma, cataracts and trauma of any kind were particularly yielding to colour treatment.

### 3.7 Syntonics

Syntonics (optometric phototherapy), utilized clinically for over sixty years, is that branch of ocular science dealing with the application of selected visible light frequencies through the eyes. Numerous ailments ranging from physical ailments to mental and emotional issues are treated using this method treatment. The primary area that is involved in Syntonics is the Nervous and Endocrine systems. Therefore a brief discussion of these systems would aid in the understanding of this particular therapy.

#### 3.7.1 Nervous and Endocrine System: Definition

The Nervous System consists of a network of nerve cells and nerve fibres that conveys sensations to the brain and motor impulses to organs and muscles. All that is seen, felt, tasted, smelt and heard is conveyed to the brain via sensory nerve pathways. The information is then processed by either the brain (for storage and thinking processes) or the spinal cord (reflexive and immediate reactions) and then messages are sent out via motor nerve pathways to stimulate organs and muscles to respond accordingly (Guyton & Hall, 1997).

The Endocrine System is a body control system composed of a group of glands that maintain a stable internal environment by producing chemical regulatory substances called hormones. This system includes the pituitary gland, parathyroid glands, adrenal glands, pancreas, thymus gland, pineal gland, ovaries, and testes. Glands that manufacture and secrete hormones are called endocrine glands. The hormones they secrete are like ‘messengers’ that, when released into the blood, travel to distant tissues and organs to elicit specific functions necessary for the organism (Farabee, 2001).

##### 3.7.1.1 The Basic Structure and Function of the Nervous and Endocrine Systems

The nervous system includes all the nerve tissue throughout the human body. Two major anatomical subdivisions of this system are the *Central Nervous System* (or CNS) which comprises the Brain and Spinal Cord and the *Peripheral Nervous System* (or PNS) comprising all the nerves that appear externally to the brain and spinal cord. The CNS is responsible for integrating, processing, and coordinating sensory data and motor commands. Sensory data conveys information about conditions inside and outside the body. Motor commands control our muscular movements and glandular function. The CNS also controls our balance. It is the source of the higher functions of the brain such as intelligence, memory, learning, and emotion.

The PNS includes all the nervous tissue outside of the CNS. This system delivers sensory information to the CNS (afferent division – travelling to the CNS) and carries out motor functions/actions directed by the CNS (efferent division - travelling to the muscle). The efferent division of the PNS is again divided into the somatic (voluntary muscular motion) and visceral/organ (involuntary glandular and organic functions) components (Martini, 1995).

Of particular interest to this project is the visceral/organ component of the efferent system, also called the *Autonomic Nervous System* or ANS. The autonomic system controls the automatic, involuntary regulation of smooth muscle, cardiac muscle, and glandular functions. In other words, the ANS controls the entire *Endocrine System* thereby making it one of the most important controlling mechanisms of the body (Farabee, 2001).

The endocrine system controls the production and release of the majority of hormones within the body. This affects growth, metabolism, immune system, blood sugar levels (glucose), sleeping patterns, stress response, sexual development, digestive tract and many other mechanisms responsible for proper functioning of the body.

The ANS is further divided into the sympathetic and parasympathetic divisions. The sympathetic nervous system (PNS) controls the fight and flight response of the body to stress. This causes the release of a cascading number of reactions throughout the body to prepare it for physical action (e.g. the release of adrenalin from the adrenals glands of the kidneys, increase of heart rate and blood pressure, peripheral vasodilatation, etc). This causes feelings of alertness, tenseness of musculature and frees up energy. The parasympathetic nervous system causes the body to move into a state of relaxation and repair. The feelings associated with this response are calm, peace and relaxation (Martini, 1995). It is these two systems that are manipulated with the syntonic system.

### 3.7.2 Photocurrent Pathways

Most of this information is based on an article, written by L. Joubert (2005), called "*The Neurological Mechanism of Coloured Light Therapy"* published in the Eyesite (Optometric) Magazine. This section explains how the mechanism behind the basic visual system as well as other, less well known, visual pathways which are have functions not related to the mechanism of sight itself. This information forms the factual basis of the how light affects the human body and how, with this knowledge, a therapist can effectively manipulate the bodies nervous system and endocrine glands to the advantage or disadvantage of patient health.

### 3.7.2.1 Sight – The Basic Visual System

When light enters the eye it first passes through the cornea of the eye and is then focused onto the retina by the lens, which acts as an alterable convex lens. The retina is a thin multilayer membrane of specialised cells at the back of the eyeball. This layer contains about 137 million photoreceptor cells which are divided into rods and cones. The rods register shades of black and white light, and the cones perceive coloured light. When light strikes a photoreceptor or ganglion, it becomes stained with the colour and/or shade of that light. Once the ganglions have become stained a recovery period is needed. This is made possible by microscopic movements (nystagmus) of the eye (Rosenzweig *et al,* 2004).

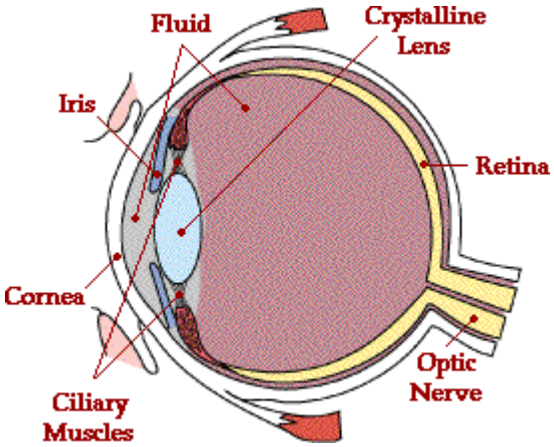


**Figure 13:** Cross Section of the Eye (TPC, 2004)

The movement focuses light on other ganglia allowing the previous ganglia time to recover in order to receive another light or colour 'stain'. The resulting neural signals from the rods and cones then undergo complex processing by other neurons of the retina, and are transformed into action potentials in retinal *Ganglion* cells whose *axons* form the optic nerve.

*Ganglions* (photoreceptors) cells form 90 percent within the retina. Of these 10 percent are M (Magnocellular) cells, 80 percent are P (Parvocellular) cells and 10 percent are K (Koniocellular) cells. P cells are selective for form and colour (cones), have a slow conduction velocity, low contrast sensitivity and high resolution. The M cells, however, are colour blind (rod cells), have a high conduction velocity and contrast but low resolution. K cells have only recently been discovered and as yet not much is known about them. An *axon*, or "nerve fiber," is a long slender projection of a nerve cell (in this case a ganglion), or "neuron," which conducts electrical

impulses away from the neuron's cell body or soma. The impulses running from the retinal axons travel to the brain at a speed of 234 miles per hour.

The impulses travelling via the optic nerve are then split at the optic chiasma and sent to the LGN (Lateral Geniculate Nuclei - on either side of the brain). The LGN is a folded sheet of neurons on each side of the brain and has six layers. Each layer receives input from only one eye. Layer 1 and 2 receive information from the M cells, and layers 3 to 6 receive information from the P cells. From the LGN, neurons project via the optic radiations to the primary visual cortex in the occipital cortex. In this area colour, form, object discrimination, complex patterns, motion and stereoscopic depth are interpreted by the brain into the images we see and take for granted every day (Rosenzweig *et al*, 2004)

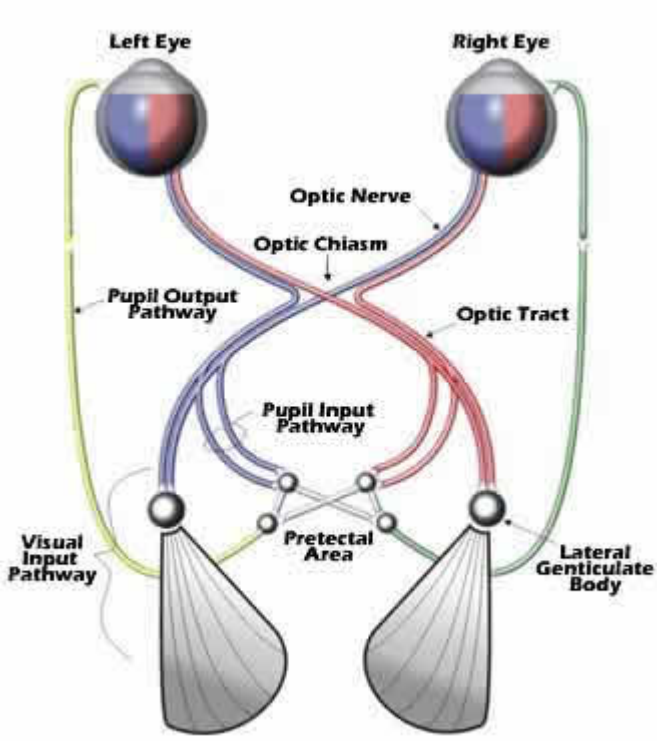


**Figure 14:** A Representation of Visual Nerve Pathways (V.P., 2005)

### 3.7.2.2 Secondary Pathways

The next two visual pathways are not involved with the mechanism of sight. This includes the Retino-tectal tract and the Retino-hypothalamic tract.

#### 3.7.2.2.1 Retino-tectal Tract

The Retino-tectal tract deals with a combination of information received from the optic, auditory and vestibular nerves. Twenty percent of the fibres within the optic nerve form secondary collaterals to the retino-tectal pathway. These are made up of mainly M fibres which carry information from the periphery of the retina, via the thalamus and through to the superior colliculus of the midbrain. The thalamus is the major centre for sensory integration. If the eyes are closed, penetrating light can still have an effect on these visual fibres. The superior colliculus also receives input from the auditory and vestibular nerves and integrates these signals with visual information to help with balance, spatial orientation and eye movement control. This is thought to be how those who are clinically blind and yet are still able to perceive objects in front of them (Joubert, 2004).

#### 3.7.2.2.2 Retino-Hypothalamic Tract

The Retino-hypothalamic tract deals with light information sent from the retina to the pineal and other hypothalamic glands. Ten percent of the fibres from the optic nerve form secondary axon collaterals to the retinohypothalamic pathway. This pathway travels from the retina, down the non-visual inferior accessory optic tract, to the transpenduncular nucleus in the midbrain (which is colour sensitive). It then goes to the intermediolateral cell columns of the spinal cord, the superior cervical ganglion and then to the pineal gland via the paraventricular nuclei of the hypothalamus. This pathway is stimulated by light immediately after birth and precedes the function of the optic pathway (Joubert, 2004).

### 3.7.2.3 Physiological Effects of the Retino-Hypothalamic Tract

The hypothalamus, which receives direct information from the retina, regulates over 100 bodily functions which operate on daily rhythms, thereby making it one of the most important organs within the human system. The hypothalamus controls the entire CNS (central nervous system), pituitary gland, limbic and reticular activation system (responsible for alertness, emotion, learning and attention).

The pituitary gland is active in the day and the pineal gland is active at night. Light encourages the secretion of seratonin from the hypothalamus during the day and inhibits the secretion of melatonin by the pineal gland. Therefore melatonin can only be produced at night. Light

perceived by the eyes synchronizes both of these glands. The Pineal organ, considered the 'regulator of regulators', also utilizes light information, sent by way of the eyes to orchestrate and synchronize the bodies internal functions with the subtle changes in the outside world (e.g. day and night rhythms, the seasons of the year, earth's electromagnetic field, etc).

According to Dr. Joubert, studies performed on completely blind people (eyes have been enucleated/removed) as compared to sighted or blind (can still perceive light and/or the eyes have not been enucleated/removed) subjects show that the former had lower levels of ACTH (Adrenocorticotropic Hormone), cortisol, testosterone, TSH (Thyroid-Stimulating Hormone) and growth hormone. Further studies on pre- versus post-cataract patients indicated that deficiencies in the endocrine and metabolic systems were completely restored after surgical intervention. This indicates that even if a person is clinically blind, if an eye is present to receive light stimulation the metabolic systems are kept in balance.

The nervous system also responds differently to different frequencies of light. The Parasympathetic System shows an increased sensitivity to the blue part of the spectrum. When stimulated with a blue colour it leads to decreased anxiety and hostility resulting in relaxation. The Sympathetic System however is sensitive to the frequency of red. This results in excitement and increased tension. Blind subjects, who still have intact optic pathways, respond in the same way as sighted subjects when exposed to these frequencies of light (Joubert, 2004).

Cool white florescent lighting, so often used in places of business and school rooms, are deficient in the red and blue (also indigo and violet) spectral ranges. People exposed to this from of light for only two weeks show increases in ACTH and cortisol (the stress hormone). ACTH and cortisol are related to the body's response to stress and weaken the immune system. They also act as growth inhibitors. Symptoms of fatigue, agitation and decreased mental abilities are also experienced in these conditions. These levels return to normal after two weeks of exposure to full spectrum artificial lighting or sunlight. When full spectrum lighting is used within school classrooms there is a marked improvement in behaviour, performance, academic achievement with reduced hyperactivity (Rourke, 1985).

### 3.7.3 Syntonics: The Concept

The word *Syntony* means to bring into balance. Within the Autonomic system, there exists a state of dynamic antagonistic tension between its two systems, the sympathetic and parasympathetic. Optometric Syntonics theoretically serves to correct imbalances within these systems. When these two systems are in balance the nervous system is said to be in a syntonic state. Basically, disease of the human system is, according to syntonic principles, primarily a disorder in the Autonomic Nervous System and phototherapy is used to manipulate the nervous system back into balance and health (College of Syntonic Phototherapy, 2002).

There are two schools of thought within the Syntonics community. The first, best documented and researched, is Dr. Harry Riley Spitler's method. This entails the use of specific frequencies of light for specific physical ailments especially those related to ocular diseases. This therapy treats only physical illnesses and focuses very little on mental and emotional ailments. The second focuses on the latter. People such as Dr. Jacob Lieberman and Dr. Steven Vazquez are two researchers that have broadened the scope of Syntonics into the field of holistic psychology/psychiatry. Three different syntonic methods will be discussed, according to Harry R. Spitler, Jacob Liberman and Steven Vazquez. This will give examples of the use of Syntonics on each level of the human organism - physical, emotional and psychological.

### 3.7.4 The Development of Syntonic Phototherapy

Early researchers such as Pleasanton, Babbitt, Pancoast and Dinshah, clinically found that colour, applied to the skin, could have profound, yet non-intrusive curative effects on bodily ailments. In 1909, Dr. Harry Riley Spitler investigated the role of the eyes in phototransduction, as well as the role of light and colour in organic function and development. After seventeen years of research and clinical application, Spitler discovered that different frequencies of light entering the eyes could augment the brain's major control centres that regulate all bodily functions. He stated that the portions of the brain that control the autonomic nervous system and the endocrine system, are also connected to the eyes by the shortest, most direct, and most highly organised nerve pathways in the brain. He concluded that by altering the colour and quality of the light entering the eyes, he could alter, beneficially or detrimentally, the balance within both systems of the autonomic nervous system thus affecting resultant functions.

Based on his discoveries, Spitler formed the principles for a new, exclusively optometric, functionally orientated clinical science that he called Syntonics. In 1927, Spitler developed the

first light-dispensing instrument for ocular application called the Spitler AmblioSyntonizer. In 1933, Spitler established The College of Syntonic Optometry as a research and educational centre for this work. By 1940, the findings of more than 3000 patients confirmed that this method could improve visual functions, normalize many visual dysfunctions, and often improve or eliminate certain pathological conditions affecting the eyes. Over 90 percent of the more than 3000 patients treated responded positively after an average of less than eight sessions. These findings were later confirmed by over one thousand optometrists who have clinically used Syntonics since the 1930s. Syntonics is practiced primarily in the United States of America, Australia and Europe (Becraft *et al*, 1995).

### 3.7.5 Spitler's (1941) Principles of Syntonics

The principles as originally stated by Harry R. Spitler can be found in *Appendix G.*

### 3.7.6 Syntonic Assessment

A detailed case history, standard optometric visual examination, functional colour visual field analysis and a pupillary stress test is carried out to determine if syntonic therapy is required. Colour visual fields indicate the ability to see colour in an individuals field of vision. Reduced colour fields are the most obvious indication for the need for treatment with syntonics. The Pupillary stress test indicates whether the patient's system is parasympathetic or sympathetic dominant. This would determine from which side of the colour spectrum the syntonist would primarily work. The oculomotor balance test indicates whether the eye muscles are strained. Strained eye muscles often confirm restricted visual fields. This test is not important with regards to syntonics and is used as a confirmatory test. An example of a case history is provided below together with an explanation of colour visual fields and the individual colour field meanings, the pupillary stress teat and oculomotor imbalance (Stern, 2005).

#### 3.7.6.1 Case history

There are three main areas that affect eye health. The first involves environmental factors such as general health, exercise habits, sleeping patterns and work conditions. The second involves inherited factors, and lastly psychological or emotional factors. It is important, however, to obtain as detailed a case history as possible as there are many factors that can influence visual

health. Stated below are a number of examples an optometrist and/or Syntonist may need to take into consideration to determine vision health status.

1. Toxicity or trauma – physical, emotional; stress – physical, emotional and mental.
2. Present illnesses – acute or chronic.
3. Medication.
4. Hormonal imbalances.
5. Allergies.
6. Childhood illnesses.
7. Pregnancy/birth factors.
8. Accidents/injuries.
9. Headaches – physical, toxic, emotional.
10. Asthenopia (eyestrain) - eyes tire easily; tearing; rubbing eyes.
11. Eye pain.
12. Transient or recurrent blurring even after correction by spectacles or contact lenses.
13. Diplopia (double vision).
14. Blurring when shifting gaze from one distance to another.
15. Reading ability – comprehension, letter/word reversals, skips words, words run together, loses place frequently while reading.
16. Poor memory – visual, auditory.
17. Poor attention span.
18. Reduced peripheral visual fields.
19. Head tilt/turn.
20. Dizziness/nausea.
21. Emotional factors.
22. Stress/lifestyle factors.
23. Behavioural problems.
24. Hyperactivity/hypoactivity.
25. Fatigue – visual/non-visual; energy.
26. SAD (Seasonal Affective Disorder).
27. Sleep patterns.
28. Sensitivity to light; poor night vision.
29. Irregular gait/posture; poor coordination (athletic skills); clumsiness.
30. Difficulty driving; judging distance; depth perception (Becraft *et al*, 1995)

### 3.7.6.2 Colour Visual Fields

Optometrists using Syntonics have historically evaluated functional, in addition to physiological, visual fields. They are primarily concerned with how much of the field is being used for higher level visual functions, such as colour and form recognition, rather than merely for the detection of movement. Although optometrists using Syntonics have long recognized the functional relationship between the expanse and sensitivity of one's visual fields and their ability to maximally use vision for learning, athletics, and general performance, contemporary vision research has now demonstrated that each different portion of the visual cortex has a three dimensional topographical map of the visual field imprinted on it (Ramachandran, 1990). These findings, combined with the fact that brain mapping technology has demonstrated that the process of vision involves the entire brain, leads to the conclusion that functional visual field studies evaluating motion, colour, and form recognition, directly relate to how much of the brain is being used.

Visual field testing includes testing the white field (1m/m target – non-seeing to seeing) within a 360 degree radius. In this test the optometrist moves a white target in from the periphery until it is seen by the patient. The next test is the colour field test which is a much more accurate indicator of healthy visual fields. In this test the colours red, green and blue are substituted for the white target and the vision field is then mapped again in the full 360 degrees. Generally the green field tends to be the closest to the centre of the visual field, red is situated in the middle and blue the furthest away from the centre. This testing should be done both with and without prescription glasses as lenses constrict the vision fields (glasses emphasize the central field). Visual fields deteriorate firstly in colour then in form and lastly in motion detection, this may also vary from morning to evening. Asymmetrical fields usually mean toxicity (meshing or overlapping) locally or generally.

Visual fields can reduce dramatically in trauma and disease, though the most common factors are stresses that occur in every day life. Fields are significantly affected by emotional state. Fear and insecurity tend to result in reduced visual fields. 86 percent of all children with learning disorders or emotional instability have reduced colour vision fields. 25 percent of the mentally impaired have reduced colour vision fields and 21% of normal or gifted people have reduced visual fields (Becraft *et al*, 1995).

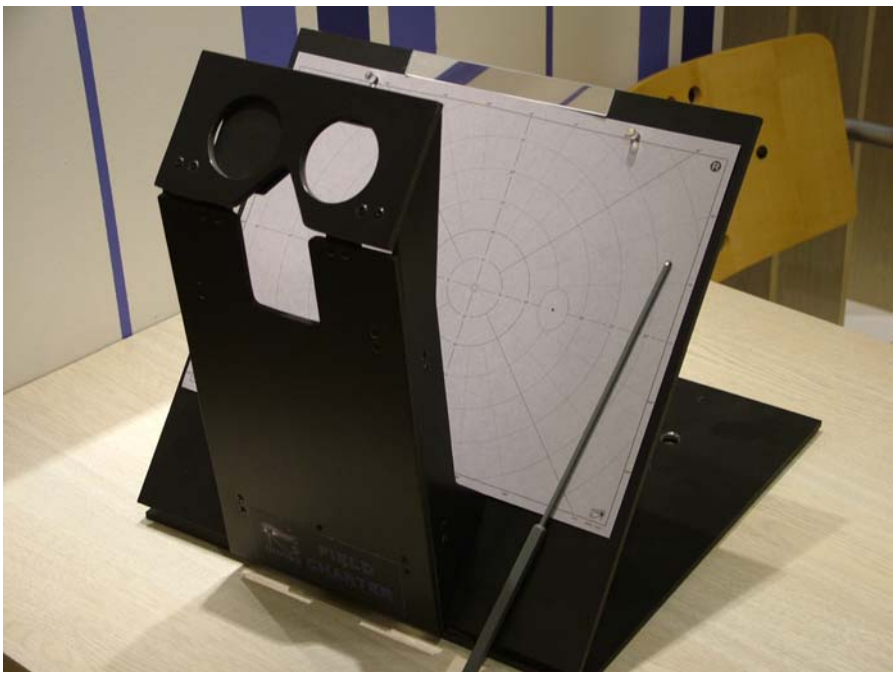

**Figure 15:** Indigo Visual Field Screener (used to chart motion and colour visual fields) (Heinrich, 2004)

### 3.7.6.3 Constricted Colour Fields and Their Meanings (Wallace, 2002)

Should the colour vision fields be constricted there are a number of ways of interpreting this information besides as an indication for syntonic treatment. There are three colour fields that are tested – green, blue and red. Each field has physical, emotional and psychological attributes. This information has been formulated to indicate possibilities and not as a definitive diagnostic method.

#### 3.7.6.3.1 Green Fields

**a. Physical Level**

The green field represents possible acute conditions such as infections in the teeth, tonsils and sinuses affecting the choroidal (outer layer of the eye)) vasculature of the eyes. It may also represent poisoning that is either exogenous or endogenous affecting retinal vasculature of the eyes, oedema of pulmonary or cardiac regions, and immune dysfunction of the thymus gland.

**b. Psychological Level**

A person with a constricted green field tends towards difficulties within relationships as well as problems with bitterness, grief, anger and loneliness. This may lead further to self-centeredness and lack of forgiveness issues.

**3.7.6.3.2 Red Fields**

**a. Physical Level**

The red field represents systemic integrity – Chronic health issues
A constriction here might indicate problems with congestion, circulatory system, intestinal stasis, constipation, high blood pressure, diabetes, chronic fatigue and adrenal dysfunction.

**b. Emotional Level**

Contracted fields as a result of issues to do with separation from family or place, resulting in grief and/or depression.

**c. Psycho-Educational Level**

This is the Symbolic field which involves the recognition of symbols such as squares, triangles and rectangles brought in form the periphery. Loss of red could (while making those shapes within the peripheral field) indicate a magnocellular pathway defect correlating with reading problems.

The Endocrine function of the adrenal glands supplies the energetic basis for such life issues as survival, grounding and how one fits into one's surroundings:

- Security issues – from relationships to material attachment.
- Abuse and indulgence of appetites.
- Excessive behaviours

Interlacing of red/green – indicates toxic conditions from psychological or physiological standpoint.

#### 3.7.6.3.3 Blue Fields

**a. Physical Level**

Constriction of the blue fields relates to the integrity of the heart and adrenal system

- Build up of catarrh (mucous), thyroid and parathyroid toxemia
- Migraine headaches
- Sinus infections.

**b. Emotional Level**

Constriction here represents psychological stress more accurately than the other fields. A person with this problem would internalise their tension creating enormous stress possibly resulting in severe headaches and migraines.

Blue fields represent creative expression as well as integrity issues:

- Fears, shyness, clarity of thought
- Love-hate relationships
- Resentment, grief and anger issues
- Self centering and self knowing
- Lack of strengths in decision making
- Lack of strengths in word usage
- Deficiency in ability to express oneself and to exercise judgement and critical thought.

**c. Psycho-Spiritual Level**

Associated with the pineal gland and therefore related to the higher expression of spiritual matters, conscience and self-knowledge. A constricted field would represent:

- Inability to learn
- Vague or unclear thinking
- Narrow-mindedness

- High levels of rationalization or having no conscience
- Illogical, unreasonable or lack of self-awareness

### 3.7.6.4 Pupillary Stress Response

The Pupillary Stress Test is an important test that demonstrates what in state the Autonomic Nervous System is presently. By shining a penlight into the pupil, the pupil would then constrict reflexively as a normal response to light stimuli. With the Pupillary stress test, special attention is paid to the behaviour of the pupil after contraction during continuous light stimulation (Gottlieb, 2005).

The following are basic responses may occur during the test (Gottlieb, 2005):

1. The pupil constricts and holds the constriction, with some fluctuation, for at least 15 seconds, indicating normal reaction and normal field.
2. The pupil constricts but fails to remain constricted, reopening slowly, indicating probably a normal field but with physical stress and low adrenal action (very common and has been called the Alpha-Omega Pupil in Syntonics, which indicates a person that has been in a state of nervous tension for long periods of time and can not maintain any significant levels of stress before exhaustion of the bodily system. The patient would experience emotional and physical exhaustion, adrenal fatigue, fluctuating sugar levels, mood swings and feelings of frustration.
3. The pupil constricts but immediately releases and remains dilated, which would indicate a significantly restricted vision field and complete sympathetic dominance of the patient due to constant severe anxiety, fear and stress.
4. The pupil fails to constrict at all. This could indicate complete blindness, functional field loss, or a drugged system.
5. The procedure must be done in both eyes separately.

According Ray Gottlieb (2005), Dean of the College of Syntonics in the U.S.A, the timing of the pupillary contraction and dilation can be interpreted by the experienced syntonist to determine if a person is strongly sympathetic (long period before initial contraction in response to light), weakly sympathetic (e.g. the Alpha-Omega Pupil), strongly parasympathetic (fast initial contraction and very slow dilation over long period of time) or weakly parasympathetic (slow contraction which cannot maintain itself for long). A weak sympathetic pupil may be difficult to

distinguish from strong parasympathetic. An entire field of study is being dedicated to this form of pupil diagnosis. Using more refined technology, it is thought that future therapists will be able to diagnose certain conditions of the body by noting the action and timing of the pupil reflex (e.g. diabetes manifests with a long dilation after constricted pupil. This is an advanced form of pupillary stress test and is not needed for the average syntonist).

#### 3.7.6.5 Oculomotor Imbalance

This test demonstrates the functionality of a persons eye muscles by following the movement of the physician's finger while keeping the head in a fixed position, as well as possible visual field abnormalities. When testing the patient's eye muscles, difficulty in following motion and continual movement of the physician's finger might indicate weakness of the eye musculature. Continual movement of the head of the patient to see the moving finger may indicate constricted visual fields.

After the case history has been completed and the findings from the visual field, pupillary response and the oculomotor imbalance tests are assessed, it can be determined whether syntonic treatment is required. Should syntonic treatment be indicated, a series of approximately twenty sessions, administered about four times a week is recommended. A session consists of viewing the appropriately prescribed light frequencies (colour) for a total of twenty minutes. Re-evaluation of the patient should take place every eight sessions, though this may be altered at the therapist's discretion (Stern, 2005).

### 3.7.7 Standard Treatment Protocols

"The Blue Book" (1995) compiled by the College of Syntonic Optometry and Dr. Harry Riley Spitler's "The Syntonic Principle", provides all the principles and guidelines on the treatment for specific conditions related to optometry. Since the formulation of the initial syntonic guidelines there have been a number of people who have used the syntonic principles in different areas beyond optometry and have thus formulated their own ideas on its effective use. Therefore, within today's arena, the treatment one syntonist might apply could differ significantly from the approach of another.

### 3.7.8 What can be treated using Syntonics?

Light therapy is being utilised with continued success in the treatment of visual dysfunctions such as strabismus, amblyopia, accommodation, convergence, vision related learning disorders, asthenopia, visual field deficits, visual field constriction related to stress, degenerative ocular disorders such as AMD (age related macular degeneration), emotional trauma and the visual sequellae of traumatic brain injuries.

Large numbers of children have a reduction in the sensitivity of their peripheral vision which causes learning problems. When treated with light therapy, the children displayed a dramatic improvement in their academic results when their peripheral vision sensitivity was brought back to normal. Control subjects, not getting the treatment, showed no improvements. Maximum results are achieved in combination with other forms of vision therapy.

Seasonal Affective Disorder (SAD) has been also been effectively treated using Syntonics (Liberman, 1986). It is also making an impact in the medical arena where it has been shown to have significant benefits in the treatment of jet lag, PMS, sleep disorders and conditions related to the bodily rhythms. Exposure to certain colours has also been found to affect behaviour, mood and physiological functions. Brief examples of various syntonic case histories can be found in *Appendix H* as well as examples of its potential use (*Appendix I)* in Sports medicine (Becraft *et al*, 1995).

### 3.7.9 Basic Colours and their Effects according to Optometric Syntonics (Stern, 2005)

The full spectrum of colours used in syntonics are:

| **Red (R)** | **Orange (O)** | **Yellow (Y)** | **Green (G)** | **Blue (B)** | **Indigo (I)** | **Violet (V)** |
|---|---|---|---|---|---|---|
| Alpha | Delta | Mu-Delta | Mu | Upsilon | Omega | Beyond Omega |

The reason for the use of Greek symbols to represent the colours is due to the fact that a very specific colour frequency is needed. For example: There are many shades of red but only a small range that are optimally therapeutic. The particular frequency of red that is needed, in Syntonics, is 360nm and this is called alpha. Therefore when a syntonist uses alpha, it is known exactly what frequency is being used. This is a system that standardises the colours.

Through the work of Dr. H. R. Spitler and other researchers it has been found that the red end of the spectrum stimulates the sympathetic portion of the autonomic nervous system, while the blue end of the spectrum stimulates the parasympathetic portion of the autonomic nervous system. Also, red colour was found to create stimulation of function while the blue end created depression.

From these findings, the idea of the balance board approach originated:

R O Y G B I V

**Δ**

Affects sympathetic (stimulant)

Affects the parasympathetic (depressant)

Based on this model, green, being the mid-point or balance point, would be included in most treatments as a stabilizer.

Clinical use of the colours led to the realization that broader bands of the spectrum were more effective than individual bands. This led to certain combinations of frequencies. Below are examples of mixtures of certain colours and their therapeutic indications as seen in clinical trials:

| R+Y (alpha delta) | Y+G (Mu delta) | G | G+B (mu epsilon) | B+V (upsilon omega) |
|---|---|---|---|---|
| ***Red/orange*** | ***Lemon*** | **Δ** | ***Turquoise*** | ***Indigo*** |
| Strong stimulant<br>Excites senses<br>Used for paralysis | Chronic equilibrator<br>Detoxifier | | Acute equilibrator<br>Anti-inflammatory<br>for infection, fever, stroke and head trauma | strong depressant<br>for pain, headaches, twitches and to shrink masses |

For conditions involving emotions, heart, circulation, and/or the reproductive system, scarlet, purple and magenta (combining the two extremes of the spectrum, referred to by Syntonists as the alpha/red and omega/violet) were found to be very effective. On the following page are the indications for the colours scarlet, magenta and purple:

| ¾R + ¼V (alpha epsilon) | ½R + ½V (alpha omega) | ¼ R + ¾V (delta omega) |
|---|---|---|
| ***Scarlet*** | ***Magenta*** | ***Purple*** |
| Increases functions of heart, emotions, reproductive and vascular system | Balances functions of heart, emotions, reproductive and vascular system | Decreases functions of heart, emotions, reproductive and vascular system |

### 3.7.10 Research and Case Studies

Frank W. Forgnoni, an optometrist, successfully treated a patient with early Age-related Macular Degeneration (AMD) using syntonics. His patient was having increased difficulty reading from books, magazines and her computer. She was then diagnosed by both her optician and ophthalmologist with age related macular degeneration. Forgnoni treated her with a blue-green (turquoise) colour for twenty minutes three times a week. After a period of one month the patient reported “My reading is less cumbersome with each day, and it’s easier to look at the computer screen. My reading attention has markedly improved since I first began...I feel I have improved eyesight”.

A six year old learning disabled child presented with visual efficiency deficits involving convergence, pursuits and saccadic tracking, accommodation as well as various visual perceptual delays. Forgnoni began treatment with ten minutes of blue-red colour and then ten minutes with a lime filter. After four weeks all his tests were found to be within the normal range for his age and his parents remarked that he had become more verbal and confident whereas before he had been very quiet and fearful (Forgnoni, 2001).

A study entitled “Changes in Form Visual Fields in Reading Disabled Children produced by Syntonic Stimulation." was performed by Dr. Robert-Michael Kaplan. He applied syntonic phototherapy in a university optometry clinic for the treatment of learning disabled children. The control group of children were treated with only white light while the other group were treated using syntonics. The control students showed no or significantly less improvement in their peripheral vision, symptoms or performance when compared to the significant improvement in the children treated with syntonics (Kaplan, 1983).

Dr. Jacob Liberman published research on the effects of phototherapy, or syntonics, on the cognitive and visual functions of children. He measured changes in children's vision and

cognition due to syntonic phototherapy in an optometric office setting. A test group and control group were established, both of whom would receive optometric vision training except that the test group would also receive light therapy. An improvement of visual skills, peripheral vision, memory, behaviour, mood, general performance and academic achievement were found in the test group whereas the control group displayed little or no improvement (Liberman, 1986).

Steven Ingersol (1999) investigated the syntonic effects on children when integrated into an elementary school curriculum and used in conjunction with vision therapy. The children were offered academic tutoring and vision therapy, a portion of the children given syntonic treatment in addition to the tutoring and visual therapy. Ingersol found the experimental group receiving academic tutoring, vision therapy *and syntonics* had significantly superior outcomes than students given tutoring and vision therapy but no syntonics.

A female patient with a history of head trauma from a motor vehicle accident presented with double vision, nausea, constant extreme headaches, near and far visual blurring and constant vertigo. The patient was in a neck brace and on heavy medication. Dr. Charles Butts treated her using deep blue colours and a green-blue combination. By the 15th treatment her headaches were almost absent, she regained normal reflexes and stopped most of the medication. She also reported to have greatly increased energy. By the twentieth treatment she had almost fully recovered (Betty, 1993).

### 3.8.1 Syntonics as practiced by Dr. Jacob Liberman

Dr. Jacob Liberman is considered a pioneer in the therapeutic use of light and colour and its relationship to human consciousness and personal transformation. He has a doctorate in optometry and is a past president of the College of Syntonic Optometry in the USA. He was awarded an honorary Doctorate of science by the Open International University for Complementary Medicine, in recognition for his contributions to the field of health and wellness.

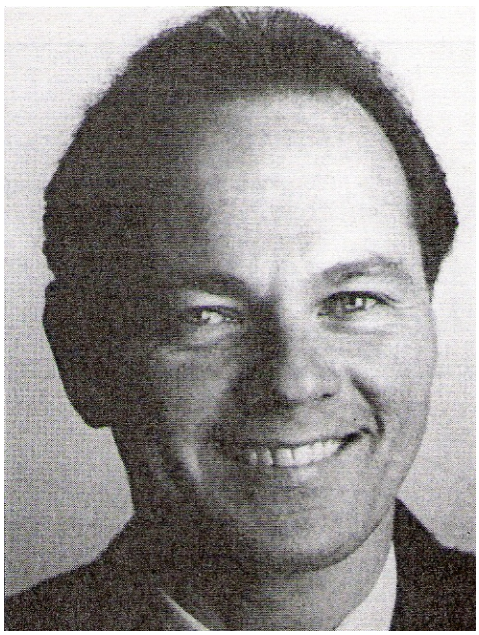

**Figure 16:** Jacob Liberman, O.D., Ph.D., F.C.S.O

Since 1973, Dr. Liberman has used his methods with more than 30 000 individuals. He wrote his first book "Light: Medicine of the future" in 1991. His second book "Take off your Glasses and See: A Mind/Body Approach To The Healing Of Your Eyesight And Expanding Your Insight (1995)" offers an approach to vision improvement and the relationship of vision to all aspects of life. He designed the Colour Receptivity Trainer – CRSII; a non-medical device designed to enhance receptivity to the entire visible spectrum and later the SRS II (Spectral Receptivity System) or *Spectral Illuminator* (Breiling, 1996).

When he began his Optometric practice, Dr. Liberman discovered that the average optometrist faces a situation where patient's vision was in constant deterioration. When visual acuity becomes worse, the practitioner gives the patient a new, stronger pair of glasses and sends them on their way. Liberman claimed that the eye, being part of the body, is a self healing or homoeostatic mechanism and the idea that the eye's vision continued to deteriorate was contrary to the body's natural law of healing. Further research yielded the fact that when a child came in to get glasses due to visual difficulties experienced at school (often with reduced vision acuity and reduced visual field), almost every case had experienced an emotional trauma of some kind. By stabilizing these traumas with the use of light therapy would bring the child's sight back to perfect 20/20 acuity and their visual fields would return to normal in the majority of cases.

Liberman pursued this idea and began treating older patients with successful results. He theorised that if a visually impaired person took off their glasses for increasing periods of time daily, the emotional blocks that inhibited that person would surface naturally and could be speeded up with light therapy. As the emotional issues were resolved the eye sight improved until the point where the patient could see perfectly without their glasses. Based on this research he wrote the book "*Take off your Glasses and See*"*: A Mind/Body Approach to the Healing of Your Eyesight and Expanding Your Insight*".

Liberman felt that the optometric use of this tool of Syntonic Phototherapy was still too limited to the idea of treating only symptoms and was not getting to the root cause of a physical and/or mental disease. After fourteen years of optometric practice and use of syntonics, he retired, went on to study Psychotherapy, and began using syntonics in a different way. From his own experiences and years of clinical research he claimed that coloured light could unlock forgotten emotional traumas. Once exposed to colours, the emotions related to the trauma would come up and, with a facilitator present to aid the healing process, could be resolved. Liberman stated that often an alleviation or complete remission of symptoms would occur only once the emotional difficulties had been dealt with (Liberman, 1991).

#### 3.8.1.1 Spectral Illuminator

The Spectral Illuminator (or SRS II – Spectral Receptivity System – designed by Dr. Lieberman) is one of many instruments that can be used to apply coloured light of sufficient quality to the eyes. The device includes twenty scientifically designed and balanced colour filters, holographic light sculpting diffuser providing increased light output with no appreciable heat, computerized remote control module with full programmability, quiet and variable flash rate, industrial grade components and metal housing with durable, scratch resistant finish, universal power supply and direct current for optimal bio-compatibility (Atomic, 2004).

**Figure 17:** Spectral Illuminator (Atomic, 2004)

### 3.8.1.2 Treatment Protocol

The main difference between Liberman's syntonic method and other syntonists is that he always uses the entire colour spectrum, as opposed to a single colour, in the treatment of his patients. The following protocols are suggested, by Dr. Liberman, as general guidelines for the treatment of any patient and can be altered according to practitioner's specifications. At least a week's break should be given between protocols. These protocols are designed, according to Liberman, to create complete emotional and psychological balance within the patient.

There are three treatment protocols:

**Protocol One**

The first protocol would take place over the period of ten days. This involves use of twenty colours that range from one end of the colour spectrum to the other. In the first treatment, each colour is viewed for not longer than fifteen seconds each. This serves to gradually introduce the patient to the treatment process, ensuring that there is very little chance of aggravation of the patient's physical, mental and emotional states. Then over a period of ten days, which can be altered according to the practitioner's discretion, the time is gradually increased to one minute and thirty seconds per colour. There is no flickering or flashing of the colours in this protocol.

Most treatments need never progress past this first protocol as patients normally respond to their own maximum benefit within this area.

There are a number of suggestions which need to be considered when performing a treatment. Firstly, a practitioner should not do more than is stipulated when working with children. Expose the patient gradually to treatment (if sensitive then proceed even more slowly) and if the colours cause the eyes to become exhausted then treatment is proceeding too fast. Reverse light sequence for alternate sessions and take a week or two break before beginning Protocol Two (Liberman & Grbevski, 2001).

**Protocol Two**

The second protocol involves exposure to only four colours during each session. This is done over twenty sessions. The first session would begin with two minutes per colour and continue until all twenty colours have been seen (5 sessions). Then the treatment would begin again except the length of exposure would be increased by a full minute. This process is repeated four times, with a minute added to the exposure time in each successive repetition. The second protocol provides the patient with a more in depth treatment, getting to deep unconscious issues with which the patient has trouble dealing (Liberman & Grbevski, 2001).

**Protocol Three**

It is important to note that people subject to seizures or those sensitive to flashing light should not be subjected to this protocol.

The third protocol is almost never used in ordinary practice. Only an experienced syntonist with training in psychological counselling should attempt this protocol. This is the most deeply penetrating phase of treatment and can be used for deeply hidden traumas of the mind and body. It can also be used as a self development tool for expanding consciousness. This is potent method may cause profound experiences of anything ranging from distress to deep states of calmness and serenity. It involves using the twenty colours and a flicker rate that begins very slowly (one per second or 9 Hertz). When distress is experienced the patient is encouraged to experience and verbalise their feelings and sensations. This would normally resolve within a certain time period. If the distress continues or gets worse then the flicker rate is adjusted to a slower and slower rate until the episode has passed. The patient would then work on getting

through the presenting issue in the following sessions. The treatment ceases when all the flicker rates had been viewed and no further emotional, mental and physical distress is experienced (Liberman & Grbevski, 2001).

#### 3.8.1.3 Suggested Treatments Accompanying Syntonics

- Visual training or exercises are normally given together with syntonic treatment. These exercises strengthen the papillary muscles and the extraocular muscles.

- The prescription of both therapeutic (temporary spectacles for alleviation of symptoms – e.g. double vision, etc) and corrective spectacles and contact lenses are given if needed.

- Advice on diet, health issues and referral to relevant health practitioners where indicated.

- Palming (covering the eyes with the palms of the hands for certain periods of time) allows the muscles of the eye to rest and chemical recipients are allowed to recover completely (Liberman & Grbevski, 2001).

### 3.8.2 Syntonics Psychotherapy as practiced by Dr. Steven Vazquez

Dr. Steven Vazquez is the creator of Confluent Somatic Therapy. This is a blend of psychotherapy and energy medicine. He is the Clinical Director of The Health Institute Of North Texas and also the founder of the Wholeness Institute, which is a non-profitable organisation that conducts research into non-pharmacological methods of treating life threatening illnesses and supporting the attainment of wholeness.

Vazquez discovered light therapy when he went to a seminar performed by Jacob Liberman and has since integrated the use of light therapy into Psychotherapy. The resultant treatment was called Brief Strobic Phototherapy using the Lumatron Ocular Light Stimulator which is a non-medical device (Breiling, 1996).

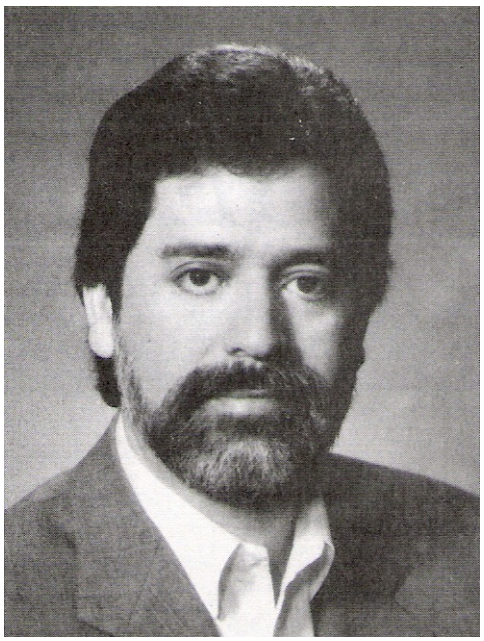

**Figure 18:** Dr. Steven Vazquez, Ph.D.

It is his belief that illness, injury, pain, and psychological distress give one the opportunity to make a quantum leap in physical, mental, emotional and spiritual evolution. All the stresses of life, if dealt with properly, make the individual stronger mentally, emotionally and spiritually than before. Therefore life should be viewed as a constantly evolving process whereby more and more happiness is attained. 'Problems' are needed to point the way to greater wholeness (O'Malley & Nixon, 2005).

### 3.8.2.1 Brief Strobic Phototherapy

Brief Strobic Phototherapy is best combined with psychotherapy. A typical session involves active verbalisation, with a qualified therapist while viewing flashing coloured lights. There are a number of intervention techniques which may be introduced to deal with an individual's reactions to the therapy

According to Vazquez's there are unconscious activities or fears that people are completely unaware of. The entire personality, with its eccentricities and addictions, is influenced by this subconscious debris. The light stimulation acts as a catalyst, causing unconscious material within the patients psyche to surface. Progress towards mental and emotional health can be made with resolution of these resurfaced emotions. This therapy can greatly speed up the psychological healing process (O'Malley & Nixon, 2005).

### 3.8.2.2 Treatment Protocol

This is a basic indication of what can be treated, however this is always subject to change according to the facilitator's intuitive direction. A general case history is taken with special attention given to emotional states and if there is a history of photosensitive seizures.

Criteria for selecting the colour for initiation of treatment with new subject:

1. **Violet –** Excessive need for control; head pain.

2. **Indigo** – Confusion or obsessive compulsive thinking.

3. **Blue** – Introversion; problems with the ears, nose and throat.

4. **Blue/green** – Overly intellectual with suppression of emotions; amnesia of repressed trauma.

5. **Yellow** –extreme fatigue and unresponsiveness.

6. **Ruby** – Apparent separation from the senses (e.g. numbness or detachment from sensory experience.

A table has been provided to indicate how the different colours are used in Brief Strobic Phototherapy and their inherent meanings (*Appendix K*)

*Appendix L* provides examples of patients treated with Strobic light therapy over a six month period at a psychiatric clinic Dr. S Vazquez runs in North Texas.

Assessment of the patients is made during and after the treatment process in order to determine progress and the next course of treatment. A complete questionnaire describing the assessment can be found in *Appendix J* (Breiling, 1996).

### 3.8.2.3 Therapeutic Use of Flicker/Flash/ Rate

When starting treatment it is necessary to find the patients comfort zone. This is done by beginning the treatment with the recommended standard flicker rate and then, after a period of time, the rate is adjusted to a faster rate and then to a much slower rate. This is to ascertain what

flicker would make the patient uncomfortable as opposed to comfortable. The level where comfort meets discomfort is the area where treatment can begin. Signs of discomfort may include an emotional reaction, physical discomfort, perceptual distortions and uncomfortable thoughts. If the practitioner can measure the galvanic skin response (GSR) then an increase in GSR, decrease in skin temperature and increase in muscular tension would also indicate patient stress. A sudden increase in discomfort can be resolved by slowing the flicker rate down until the patient relaxes once again. By gradual exposure to an aggravating colour, traumatic memories may begin to surface and can then be dealt with (Breiling, 1996).

#### 3.8.2.4 Intervention Techniques

According to Vazquez, should a patient have difficulty dealing with traumatic emotions then there are several techniques which may prove useful. The first and most utilised method is simply to voice all surfacing emotions. This serves as an effective releasing mechanism. Vazquez also suggest a number of eye movement techniques which aid in the movement of emotional energy. The movements of the eyes access certain parts of the brain that allows for faster resolution of emotional traumas. Different breathing techniques, alteration of flicker rate, the use of colours in a descending order (violet to ruby) are also an efficient ways of dealing with problematic emotions. Once the emotional response has decreased then the practitioner may change to other colours. A session is complete when the physical and emotional symptoms have been eliminated or significantly reduced. It is the responsibility of the practitioner to return the patient to a sense of stability and peace once the session is completed. Therefore it is recommended to use the colours of indigo and/or blue to stabilize the patient when the particular issue the patient is presenting with is resolved. The use of colour therapy should be used with caution as it can cause profound reactions in fragile patients. Particular attention must be given®® to the severely depressed and suicidal patient (O'Malley & Nixon, 2005).

#### 3.8.2.5 Patterns of Psycho-Emotional Energy Movement in the Body

When working on emotional difficulties during a light session, the emotional reaction is usually accompanied by sensations within the body itself (e.g. the heart palpitations accompanying fear or the sensation of a 'knot in their stomach' when anxious). With the gradual resolution of the trauma, Dr. Vazquez has found that these connected sensations tend to move about within the body. According to the majority of cases there are three basic directions in which emotional energy can move. The ideal movement is upwards. For example, should anxiety over a traumatic event be felt in the stomach, a movement of this energy into the chest, then the neck

and lastly the head indicates the patient is processing and resolving the information properly. Other directions may be forward and/or downward. These energy movements are typically what are seen in therapy sessions, although a deviation from this can be expected periodically (O'Malley & Nixon, 2005).

#### 3.8.2.6 Conclusion

Dr. Vazquez's therapeutic methods involve extensive use of high flicker rates and single colours in order to elicit a beneficial change in the patient's mental status. This constitutes the main difference between Dr. Liberman and Dr. Vazquez approach to light therapy. It appears that Liberman believes the use of the entire spectrum is all that is needed to successfully balance out patients mental and emotional imbalances. Should a patient respond in any way to a particular colour, he would then pause at that colour until any feelings and emotions were resolved before continuing treatment with the rest of the colour spectrum. The importance of the individual colour meaning is not emphasized but rather on identifying which colour a patient is having difficulty with and its resolution. Vazquez, however, focuses in on a particular mental or emotional ailment that a patient presents with and treats only with the corresponding colour or its complimentary colour. The use of the flicker rate is his main therapeutic mechanism for effecting change within the problem colour.

### 3.8.3 The Use of Light in Chiropractic

Robert Dubin, a chiropractic practitioner, has found that light used in combination with Chiropractic treatments can resolve stubborn musculo-skeletal ailments that occur from time to time within the practical chiropractic clinic. Basing his light therapy methodology on Dr. John Downing's techniques, using the syntonics light machine (Lumatron Ocular Light Device), he has had success with the relief of musculo-skeletal pain.

It is Dubin's belief that once conventional chiropractic treatments fail to give lasting relief other avenues of treatment need to be addressed. He states that there are traumas that are experienced by people that cause a "recoil" effect. This occurs in an external as well as an internal manner. The person cringes or withdraws from that trauma inside themselves and may stay in that state for days, months or even years. This condition of constant tension in the emotional and mental spheres may eventually cause physical problems to manifest in different ways. The light therapy is a way of "unwinding" the trauma from the psyche and thereby releasing the cause of the musculo-skeletal complaint. Patients experiencing light treatment may have strong emotional

reactions to the therapy which need to be accepted, experienced, and released. Spontaneous resolution of the ailments may occur. He claims that Cranial-Sacral Therapy complements Syntonics in resolving a patient's complaints (Breiling, 1996).

# CHAPTER FOUR

# CONCLUSION

## 4.1 All is Light

Dr. David Bohm - "*…Matter, as it were, is condensed or frozen light…all matter is a condensation of light into patterns…light is what enfolds the universe…light can carry information about the entire universe…light can produce particles and all the diverse structures of matter…*" (Eklof, 2003)

"$E = MC^2$" - Albert Einstein

From this equation, Albert Einstein proved that all matter in the Universe is simply energy. Dr. David Bohm, acclaimed theoretical physicist and one time associate of Albert Einstein, takes this further and states that light, which is pure energy, is therefore the basis of all physical matter. Should this be true then how can this information be interpreted and utilised?

The Sun sends electromagnetic radiation to the earth continuously, of which visible light, ultraviolet and infrared are the range of frequencies which penetrate the earth's atmosphere. All living organisms have been evolving in the presence of this light for millions of years. Living organisms have adapted to this light and learned to utilise it for their physical needs i.e. conversion of solar energy by plant chlorophyll into usable forms of energy. In turn, animals and insects feed off plants (or each other) and convert a small percentage of the solar energy present in the plant into the energy they need to survive. So a picture is formed of solar energy filtering its way through the ecosystem supplying all life's energetic needs thereby ensuring survival and evolution.

Until recently, analysis of the body and its various processes could only take place at a cellular level. Today, through the study of quantum physics the scientist is now able to delve into the atomic and sub-atomic realm. Using a spectroscope, the energetic makeup of the each particular nutrient can be seen in the form of spectral lines as a colour or number of colours. Therefore,

Dr. Fritz-Albert Popp, a theoretical biophysicist, states that when plants are consumed the body breaks it down and then utilizes the energy or light present in the eaten plant and distributes it throughout the entire range of electromagnetic frequencies. This then becomes the driving force of the cells of the body (McTaggart, 2001). A possible interpretation of this information would be that food, at a quantum level, consists of varying frequencies of light which is broken down in the digestive process and distributed to the areas in the body that require those particular frequencies to function. This is a representation of the digestive process viewed from a quantum level perspective. If this should prove true then it could be said that deficiencies, within the human body, in certain parts of the light spectrum (e.g. improper nutrition) could result in ill health. The correction of these deficiencies through proper diet and/or supplementation would supply the needed frequencies of energy/light and thereby improve health.

According to Karl Ryberg (2004) and Professor Bradley (2002) the body's cells are able to absorb various light frequencies, whether projected from a coherent (laser) or an incoherent (LED) light source, via photoacceptors such as quinines and cytochromes which are present in the cell mitochondria. This energy is then utilised in various dark reactions by the cells of the body to create improved cellular function efficiency and thereby speeding recovery from injury or disease. From this point of view, it may be said that the body can absorb a small portion of its energetic needs from direct light stimulation instead of solely from its main source of energy in the form of food. Therefore, theoretically, light or colour can be used for therapeutic purposes.

**4.2 Sunlight: Blessing or Curse**

Any living organism deprived of light for extended periods of time becomes riddled with disease and ultimately dies. This suggests that health cannot simply be maintained by food and water alone but also requires direct solar energy as an essential part of the upkeep of the human bio-energetic system.

Numerous scientific studies indicate that over exposure to the sun's radiation can cause skin damage in the form of skin cancer and premature ageing. Many studies also indicate that under exposure to sunlight can lead to vitamin D deficiency, decreased immunity (Francis, 1997), depression (Garfield, 1985) (Grant, 2002) and increases in blood pressure (W.H.O., 1979) (Xiang *et al*, 2004) (Rosland, 1997). Some studies even imply that vitamin D can act as a preventative for cancer and therefore decreased levels due to lack of sunlight exposure, or dietary supplementation of vitamin D, could increase the predisposition for cancer (Johnson, 2005).

Therefore, a balanced and educated approach to the use of sunlight should adhered to in order to reduce the chances of sun damage yet also ensuring all the benefits the sun has to offer.

## 4.3 Light Therapy in a Nut-Shell

### 4.3.1 Means of Application

There are three mediums through which light and colour can be applied: The eyes, surface of the skin and acupuncture meridian points. Traditional Syntonics utilises the eyes to effect beneficial changes in the body by manipulating the sympathetic or parasympathetic nervous system back into balance. It has recently also been used for the therapeutic resolution of mental and emotional traumas. Spectro-Chrome and Laser Therapy utilises the skin as a medium through which to apply its therapeutic qualities. Colourpuncture's gateway into the bodily system is through the acupuncture points. The homoeopathic colour remedies are a comparatively new addition to light therapy and can be applied orally.

### 4.3.2 How is Colour used to affect the Body?

Colour is used therapeutically in two ways (excluding laser therapy). The first method is the application of either the blue or the red side of the colour spectrum to 'cool' or 'energise' a perceived imbalance within the body. For example colourpuncture uses colours to either add energy or decrease the energy flow into a meridian. Red would be the most extreme stimulator whereas violet would be the strongest suppressor of energy. A fever treated with the colour blue would be an example of an excess of energy/heat within the body that is 'cooled down' by the application of a 'cooling' colour. The second method involves the use of a single colour for its own particular therapeutic attributes. An example of this can be seen in spectro-chrome therapy with use of the colour lime for its detoxification qualities or the colour purple for its effects on the female reproductive system. All the therapies use these two formulas in varying degrees. Laser therapy, on the other hand, focuses only on the effects of light on a local cellular level. The changes to the cellular function resulting in improved injury repair. The only light therapy that is similar to laser therapy in its application is Spectro-Chrome Therapy except the theory behind its mechanism of action differs (see section 3.5).

### 4.3.3 Efficacy of Colour Treatment

The quality and effectiveness of a treatment in any of the disciplines is dependant on the quality of the colours given (e.g. correct frequency and purity of colour), the duration and repetition of the treatment. Most colours used by many colour therapists are mixtures of colours rather than colour in a pure form (e.g. a pure colour is pure green, not a mixture of yellow and blue which may be seen as green as well). This seemingly small fault is apparently a major reason for unsatisfactory treatment results. Using each treatment for the duration and repetition specified by each therapy is also important to obtain successful results.

Therefore the only major difference between each modality is the medium through which the colour or light is delivered. The principles of each therapy seem to be similar in basis and the differences that exist are only due to the perspective of the personage that discovered each of the light therapy modalities.

### 4.3.4 Conclusions with regards to research performed within Light and Colour Therapy

The efficacy of the various light therapies can only be determined by the research done in each field:

Laser therapy is undoubtedly the most thoroughly researched therapy and as a result is regarded as acceptable to the scientific and medical health authorities.

The discipline of Syntonics is an accepted branch of optometry in America and Australia. Optometric Syntonics has an abundance of scientific research, much of which can be found in the '*Syntonic Principle*' written by Dr. Harry Riley Spitler in the 1920's and the '*Blue Book*' compiled by the College of Syntonics in America. The use of syntonics in the area of psychology is also heavily researched and is considered an adjunct to psychotherapy.

Spectro-Chrome therapy has had its share of controversy in the scientific world. Numerous law suits were brought against its founder, Dinshah P Ghadiali, by various medical establishments. The main reason for this is due to Ghadiali's claim that he could cure people of disease with colour. Most of the law suits were won by Ghadiali, however some were lost as well. He performed a large volume of research before he established his therapy, most of which can be found in the *Spectro-Chrometry Encyclopaedia*, however this information has not been

published in reputable scientific journals and therefore this therapy is largely disregarded by the health profession.

Colourpuncture, founded by Peter Mandel, is largely accepted by most of the acupuncture health profession as a valuable addition to the ancient profession of Chinese Traditional Medicine and Acupuncture. There is a moderate amount of research on this therapy available, however this appears principally within acupuncture and alternative medicine sources and not within conventional medicine journals and articles.

The Homoeopathic Colour Remedies are the least researched of the light therapies. Further research is required before it can be fully accepted into the homoeopathic profession.

### 4.4 The Link to Homoeopathy

The principle of 'likes cure likes' forms the basis of the practice of Homoeopathy. The homoeopathic colour remedies function according to this principle by using the colour that is associated to the particular problem which is decided using the Chakra diagnostic system. However, this principle can be seen in other light therapies as well, principally in the practice of Syntonics. This discipline functions on both allopathic and homoeopathic levels. For example: The colour red stimulates the nervous system causing excitement, whereas blue depresses the nervous system resulting in peace and calm. The use of the colour blue to calm down a stressed patient is symptomatic treatment and very effective for stabilizing a patient quickly. This would be an allopathic approach to colour therapy. This principle is used in the traditional form of syntonics as created by Dr. Harry Riley Spitler. Dr. Steven Vazquez (Breiling, 1999) and Dr. Jacob Liberman (Liberman, 1994) utilise colour according to homoeopathic principles. They claim that the colour that aggravates a patient is seen as the key to the resolution of their presenting complaint whether physical or emotional. For example, Liberman would continue to display the aggravating colour until the unpleasant sensation and/or emotions subsides and claims this leads to a long term cure. Use of the opposite or complementary colour, as applied in an allopathic approach, is only necessary to stabilise the patient should the aggravation be too severe.

## 4.5 Conclusion

According to the research performed within the various modalities of light therapy it can be determined that light and colour has a definite and scientifically measurable effect on the physical (especially the nervous and endocrine system) and emotional level which may be used for the benefit of suffering patient. Thus light therapy shows great potential as an additional tool to existing conventional therapies. Further research is needed, however, to expand on existing information with regards to the beneficial and/or detrimental effects of light on physical and emotional health.

Suggested topics within the realm of light therapy for future research include:

- Perform a 'Proving' study to determine the symptom picture of each individual homoeopathic colour remedy. This will serve to expand on existing drug symptom pictures of the colour remedies which will better inform the practicing homoeopath as to the range and capabilities of the remedies.

- A study to determine the application of coloured light in the treatment of disease according to homoeopathic principles. This could involve the use of Homoeopathic colour remedies and/or the direct application of coloured light for particular ailments. A group of patients presenting with similar complaints (e.g. Irritable Bowel Syndrome) could be divided into a control group, a group treated with coloured light only, a group treated only with homoeopathic remedies and, lastly, a group treated with both light and homoeopathic remedies. The researcher would use the appropriate colour as determined by the symptoms presented, possibly using the chakra system as a diagnostic tool, for treatment.

- A study investigating the use of light therapy in the control of blood glucose. Syntonic practitioners Monica Byrne O'Malley and Alice Nixon (2005) claim that orange and/or yellow coloured light, when exposed to a patient for a period of twenty minutes, temporarily stabilises glucose levels in the blood. This has, however, never been scientifically researched and validated. Should this study prove successful, it may play a role in the control of diabetes, hypoglycaemia and food cravings.

- The application of light therapy as a stimulus to the immune system. In section 3.1.4.3, it is mentioned that exposure to sunlight increases the production of white blood cells

(specifically lymphocytes) thereby strengthening the immune system (Francis, 1997). A study involving the use of artificial light therapy and its effect on immunity may yield promising results.

- In section 3.1.4.2 it is mentioned that sunlight has a beneficial effect on blood pressure. A study investigating the effects of artificial light therapy on blood pressure may prove to be an interesting topic for further research.

- A study investigating the application of light therapy for desensitisation to allergens. Dr. Rob Fox, a syntonist at the Santa Fe congress of light and vision held by the college of Syntonic Optometry in 2005, claimed that blue light had a beneficial effect on preventing and treating allergic reactions (Fox, 2005). This claim has not been proved by scientific research and an investigation into this area may be warranted.

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# APPENDIX A

**The Electromagnetic Spectrum (Fist, 1999)**

| Band Name | General Information | Energy Levels | Wave Type | Meters | |
|---|---|---|---|---|---|
| **Gamma** | Effectively, these are high-energy particles | 4000 eV | | $10^{-10}$ m and smaller<br><br>$10^{-9}$ m | molecular and atomic sizes |
| **X-ray** | X-rays extend up from about 10nm. | 400 eV | X-ray | $10^{-9}$ m<br><br>$10^{-8}$ m | 1 nm -- 1 nanometre The largest carbon molecule is this size.<br><br>10 nm |
| **UV-light** | Extreme UV -- 100 to 200 nm Far UV -- 200 to 300 nm (Ultraviolet) | 40 eV | Ultraviolet | $10^{-8}$ m<br><br>$10^{-7}$ m | 0.01 microns (10 nm) cell membrane size<br><br>0.1 micron (100 nm) |
| | Near UV -- 300 | | UV light | $10^{-7}$ m | 0.1 micron |

| | | | | | |
|---|---|---|---|---|---|
| **Visible Light** | to 390 nm<br>**Visible Light**<br>Violet-to-Blue 390 to 455 nm<br>Blue-to-Green 455 to 492 nm<br>Green-to-Yellow 492 to 577 nm<br>Yellow-to-Orange 577 to 597 nm<br>Orange-to-Red 597 to 622 nm<br>Deep red 622 to 770 nm<br>Near IR (Infra-red) -- 770 to 1300 nm | 10 eV<br>ionising limit<br>4 eV | UV boundary at 390 nm<br>**Visible Light**<br>IR boundary 770 nm<br>Infra-red | $10^{-6}$ m | (100 nm)<br>1 micron (1000 nm) |
| **Near IR** | Near IR 770nm -- 1300 nm<br>Middle IR 1300 -- 6000 nm<br>Far IR -- 6000 to 40 000 nm | 0.4 eV | Infra-Red | $10^{-6}$ m<br>$10^{-5}$ m | 1 micron (1000 nm) 1/80th hair thickness<br>10 microns (10 000 nm) |
| **Infra-Red** | Far Infra-Red boundary | $4 \times 10^{-2}$ eV | Far Infra-red | $10^{-5}$ m | 10 microns Large cell size |

| | | | | | |
|---|---|---|---|---|---|
| | at 40,000 nm<br>Far-Far Infra Red<br>from 40 000 nm to 1 mm | | | $10^{-4}$ m | Hair thickness 0.1 mm |
| **Far-far IR** | Far-far IR/radio boundary at about 1 mm. | $4 \times 10^{-3}$ eV | Infra-red | $10^{-4}$ m<br>$10^{-3}$ m | 0.1 mm<br>Tissue structural size<br>1 mm |
| **EHF Extreme High Frequency** | Now being reserved for satellites and LMDS short-range television systems (Millimetric waves and Microwaves). | $4 \times 10^{-4}$ eV | Millimetric waves<br>Microwaves | $10^{-3}$ m<br>$10^{-2}$ m | 1 mm<br>Finger width 1 cm |
| **SHF Super High Frequency** | Satellites and short-range television<br>5 GHz is about the limit of concrete/brick building penetration. | $4 \times 10^{-5}$ eV | Microwave | $10^{-2}$ m<br>$10^{-1}$ m | 1 cm<br>Hand span 10 cm |
| **UHF** | 2.45 GHz microwave | | Microwave | 0.1 m | |

| | | | | | |
|---|---|---|---|---|---|
| **Ultra High Frequency** | ovens<br><br>PCS pocket pedestrian phones -- 1.8 GHz<br><br>Cell phones -- 800 - 900 MHz | $4 \times 10^{-6}$ eV | Radio | 1 metre | |
| **VHF Very High Frequency (Radio TV)** | Distances of 200 km (TV), up to 1000 km. These frequencies use surface waves. | $4 \times 10^{-7}$ eV | Radio-TV | 1 m<br><br>10 m | |
| **HF High Frequency (Short Wave radio)** | These frequencies bounce off both the ionosphere and water in good conditions and so propagate by sky-wave reflections around the globe. (Short wave radio) | $4 \times 10^{-8}$ eV | Shortwave radio | 10 m<br><br>100 m | 0.01 km<br><br>0.1 km |
| **MF or MW Medium Frequency (Medium Wave – AM radio)** | AM radio broadcasting | $4 \times 10^{-9}$ eV | AM Radio | 100 m<br><br>1000 m | 0.1 km<br><br>1 km |
| **LF** | These are the old | | Early radio | 1000 m | 1 km |

| | | | | | |
|---|---|---|---|---|---|
| **Low Frequency (early radio)** | shipping radio channels, not much used now. | $4 \times 10^{-10}$ eV | | 10 000 m | 10 km |
| **VLF Very Low Frequency** | Submarine communications. These frequencies follow the earth's curvature and penetrate deep into water | $4 \times 10^{-11}$ eV | Undersea communications | 10 000 m<br>100 000m | 10 km<br>100 km |
| **ELF Extremely Low Frequency** | These Frequencies wrap around the globe. | $4 \times 10^{-12}$ eV | Telephone | 1 million metres | 100 km<br>1 000 km |

# APPENDIX B

**A definitive study based on the results of 151 consecutively discharged patients following clinical treatment with low intensity laser therapy (Kahn, 2002).**

The table below is a summarised version of the results following this study.

**Frequency Distribution with average success rate**

| Frequency Distribution Diagnosis | # of Cases | % of Sample | Average Success (%)+/-0.2 | Average Age | Average # of Txs |
|---|---|---|---|---|---|
| Degenerative Osteoarthritis | 45 | 29.8 | 86.1 | 58.4 | 12.3 |
| Tears | 24 | 15.9 | 95.8 | 41 | 10.6 |
| Rotator Cuff Injury | 17 | 11.3 | 84.1 | 51.3 | 12.6 |
| Other | 17 | 10.6 | 90 | 41 | 11.2 |
| Medial Epicondylitis | 11 | 7.3 | 99.5 | 52.7 | 8.3 |
| Tendonitis | 7 | 4.6 | 95.7 | 26.4 | 9 |
| Trauma | 5 | 4.0 | 98 | 54.2 | 5.8 |
| Herniated Disc | 5 | 3.3 | 91 | 45.4 | 17.8 |
| Myofascitis | 4 | 2.6 | 100 | 46 | 7.5 |
| Carpal tunnel | 4 | 2.6 | 52.5 | 56 | 15.7 |
| Plantar Fascitis | 4 | 2.6 | 78.5 | 67.5 | 14 |
| Rheumatoid Arthritis | 3 | 2.0 | 90 | 31.6 | 16.3 |
| Facet Joint Syndrome | 3 | 2.0 | 100 | 25.3 | 5 |
| Fracture | 2 | 1.3 | 100 | 48.5 | 7.5 |
| **Total** | **151** | **100** | **90.1** | | |

# APPENDIX C

**Physiological Locations of the Chakras (Judith, 2000)**

| | | | |
|---|---|---|---|
| Base Chakra | Colour: Red | Location: Perineum | Organs Chakra Supplies: Legs, feet, bones, large intestine.<br><br>Endocrine glands: Adrenals<br><br>Malfunctions: e.g. Obesity, Anorexia, Sciatica, Constipation. |
| Sacral Chakra | Colour: Orange | Location: Sacrum | Organs Supplied: Womb, Genitals, Kidney, Bladder, Lower Back, circulatory system<br><br>Endocrine glands: Gonads<br><br>Malfunctions: e.g. Sexual and urinary problems |
| Solar Plexus Chakra | Colour: Yellow | Location: Solar Plexus | Organs Supplied: Digestive system, Liver, Gall Bladder (controls metabolism)<br><br>Endocrine glands: Pancreas and Adrenals<br><br>Malfunctions: e.g. Digestive troubles, Chronic Fatigue, Hypertension |
| Heart Chakra | Colour: Green | Location: Heart | Organs Supplied: Lungs, Heart, Circulatory system, Arms and hands |

| | | | |
|---|---|---|---|
| | | | Endocrine glands: Thymus<br><br>Malfunctions: e.g. Asthma, Coronary disease, Lung disease |
| Throat Chakra | Colour: Blue | Location: Throat | Organs Supplied: Throat, Ears, Mouth, Shoulders and Neck<br><br>Endocrine glands: Thyroid, Parathyroid<br><br>Malfunctions: e.g. Sore Throats, Neck and Shoulder pain, thyroid and hearing problems |
| Brow Chakra | Colour: Indigo | Location: Brow | Organs Supplied: Eyes, Base of Skull, Brow<br><br>Endocrine glands: Pineal<br><br>Malfunctions: e.g. Visual problems, Headaches, Nightmares |
| Crown Chakra | Colour: Violet | Location: Top of the Head | Organs Supplied: Central Nervous System, Cerebral Cortex<br><br>Endocrine glands: Pituitary<br><br>Malfunctions: e.g. Depression, Alienation, Confusion, apathy, boredom, inability to learn |

# APPENDIX D

**Spectro-Chrome Colour Attributes and Tonations by Symptomology (Dinshah, 1985)**

RED

- Stimulates the sensory nervous system (sight, hearing, touch, taste and smell)
- Supports and stimulates the liver.
- Increases production of platelets and haemoglobin in blood
- May causes external reactions on the skin. This is a sign of the cleansing process of internal organs (e.g. skin redness, itching, and pimples).
- Counters burns from Ultra-violet

ORANGE

- Enhances and stimulates respiratory function
- Stimulates Thyroid function
- Depresses Parathyroid function
- Antispasmodic
- Stimulate the flow of breast milk (Galactogogue)
- Mild Stimulation of stomach functions (e.g. digestive acid production)
- Emetic
- Relieves flatulence or gas in the digestive tract
- Enhances bone growth and deposition

- Tissue stimulant, decongestant

YELLOW

- Stimulates the motor nervous system which energises muscular function (good for paralysis). Supports nerves for sensory and motor systems
- Stimulates the lymphatic system. Mild tissue stimulant
- Stimulates the intestines, pancreas, and production of digestive fluids – bile, hydrochloric acid
- Increases peristaltic movements of the bowel
- Spleen depressant; relieves melancholia
- Expels worms and parasites

LEMON

- Produces a favourable change in the process of nutrition and repair in persistent disorders. Dissolves blood clots
- Promotes coughing to expel mucous and fluids from the lungs and air passages
- Enhances bone growth
- Stimulates brain function
- Stimulates the thymus gland
- Laxative
- Equilibrator after extended use of ultra-green tonations

GREEN

- Cerebral and physical equilibrator
- Pituitary stimulant and equilibrator
- Enhances repair of muscles and tissues
- Acts as an antiseptic, cleanses and prevents decay

TURQUOISE

- Produces a favourable change in the processes of nutrition and repair in acute disorders.
- Brain depressant
- Rebuilds burned or damaged skin tissue
- Equilibrator after extended use of infra-green tonations

BLUE

- Relieves itching, and irritation of abraded surfaces
- Encourages perspiration
- Mild sedative.  Reduces or removes fever and inflammation
- Pineal stimulant and enhances general vitality

INDIGO

- Stimulates parathyroid gland
- Depresses thyroid glands
- Depresses respiratory system

- Causes contraction, dissolves abscesses, decreases secretions and discharges, and stops haemorrhages (astringent, antipyic, anti-emetic, and haemostatic).
- Improves immune system efficiency
- Lactifuge (decreases breast milk)
- Mental and physical sedative

VIOLET

- Stimulates spleen function.
- Decreases muscular activity, including heart muscles.
- Depresses lymphatic gland and pancreas function.
- Tranquilizer.
- Promotes production of leucocytes and thereby improving immunity

PURPLE

- Depresses kidney and adrenal function.
- Analgesic and promotes relaxation and sleep.
- Increases functional activity of veins.
- Lowers blood pressure by three effects:
    - Dilates blood vessels (vasodilator).
    - Reduces heart rate
    - Decreases activity of the kidneys and adrenals
- Lowers body temperature

- Controls fever and high blood pressure in malaria and recurrent fevers (antimalarial).
- Depresses reproductive system.
- Moderates blood pressure between the heart and lungs. Controls lung haemorrhage (may also use magenta or scarlet). This also applies for cases of dry coughing

MAGENTA

- Emotional equilibrator, and aura builder, systemic front.
- Builds and equilibrates the functional activity of:
    1. Heart
    2. Blood circulatory system,
    3. Kidneys and adrenals.
    4. Reproductive system

SCARLET

- Stimulates kidney and adrenal functions
- General stimulant. Increases functional activity of the arteries.
- Raises blood pressure by three effects:
    1. Constricts blood vessels (vasoconstrictor),
    2. Increases heart rate
    3. Stimulates activity of the kidneys and adrenals
- Accelerates the birthing process. Stimulates the reproductive system, and menstrual function (emmenagogue)

# APPENDIX E

**Therapeutic Effects of Colours in Colourpuncture as interpreted by Peter Mandel** (Breiling, 1996)

| | |
|---|---|
| **RED** | Yang energy (stimulating)<br><br>Physical: Tonifies and produces heat. Stimulates vital energy, aids circulation of the blood, decreases anaemia, diseases of the larynx, certain skin diseases (e.g. eczema), and chronic coughs. Stimulates nervous system, the senses, healing of wounds, and chronic infections.<br><br>Psychological: Associated with the easily angered, bad tempered personality. Red can cause the patient to experience feelings of anger, and cause them to be more hyperactive. |
| **ORANGE** | Gentler than Red's stimulating action<br><br>Physical effects: Stimulates appetite and lactation, relieve cramps and spasms, increases blood pressure, induces vomiting, relieves gas, and builds bones.<br><br>Together with blue, it regulates the endocrine system. Can be used in the treatment of arteriosclerosis, sclerencephaly, anaemia, and anorexia.<br><br>Psychological effects: Stimulate joy, optimism and enthusiasm<br><br>Treats conditions of depression, certain conditions of mental illness, pessimism. |
| **YELLOW** | Mildest stimulating colour<br><br>Physical effects: Stimulates and strengthens the motor nervous system, metabolism, and glandular, lymphatic, and digestive systems. Increases gastric secretions and bowel movements and general energy levels. Indicated for conditions of the liver, bladder, kidneys and the stomach. |

| | |
|---|---|
| | Psychological effects: Stimulates intellectual functioning such as learning and comprehension in adults and children with learning disabilities. Problems with self-confidence. |
| **GREEN**<br><br>**(complementary colour is red)** | Neutral<br><br>Physical effects: Used in the treatment of the lungs, inflammatory conditions of the eyes, diabetes, musculoskeletal and inflammatory joint conditions, and ulcerations. Antibacterial, disinfectant, and aids in the detoxification of the body.<br><br>Psychological effects: Calms, soothes, relaxes and balances. Associated with slow moving, unemotional and apathetic personality. |
| **BLUE**<br><br>**(complementary colour is orange)** | Yin energy (cooling or sedating effect)<br><br>Physical effects: Profound relaxation of the body and mind. Reduces fever, congestion, itching, irritation, and pain (especially headaches and migraines), arrests discharges, haemorrhages. Can be used to treat high blood pressure, burns, and all diseases where a lot of heat is involved. It also contracts tissues, muscles (spasms), haemorrhoids, and hyperthyroid conditions.<br><br>Psychological effects: Treatment of Attention Deficit Disorder and Post Traumatic Stress Disorder, insomnia, phobias, and endocrine imbalances.<br><br>Should not be used for the treatment of depression |
| **VIOLET**<br><br>**(Complementary colour is yellow)** | Most Yin colour<br><br>Physical effects: Used for the spleen and together with yellow to increase lymph production, control appetite, and balance the nervous system<br><br>Psychological effects: Reduces irritability and balances the right brain.<br><br>Enhances the effects of meditation (Mandel 1996) |

# APPENDIX F

**Diseases that are Treatable with a Combination of Colour and Acupuncture (Breiling, 1996)**

In 1979, at the international seminar on acupuncture, acupuncture anaesthesia, and moxibustion held in Beijing, China, The World Health Organisation enumerated a provisional list of diseases that respond favourably to acupuncture treatment. The list is based on clinical experience. The use of light in acupuncture has many potential applications. It shows similar effects, requires less skill, and has fewer side effects.

| | |
|---|---|
| Upper Respiratory Tract | Acute Sinusitis. Rhinitis, Common Cold, Tonsillitis. |
| Respiratory System | Acute Bronchitis, Bronchial asthma. |
| Gastro-intestinal disorders | Acute Bacillary Dysentery, Diarrhea, Hiccough, Gastric Hyperacidity, Chronic Duodenal Ulcer (pain relief), Acute Duodenal Ulcer (without complications), Constipation, Paralytic Ileus, Acute and Chronic Gastritis, Spasms of the Oesophagus and Cardiac muscles. |
| Neurological and Musculo-skeletal System | Nocturnal Enuresis, Intercostal neuralgia, Cervicobrachial Syndrome, “Frozen Shoulder”, “Tennis Elbow”, Sciatica/Low Back Pain, Osteoarthritis, Sequelae of Poliomyelitis (early stage), Migraine/Headache, Trigeminal Neuralgia, Facial Palsy (early stage), Pareses following a stroke, Peripheral Neuropathies, Meniere’s Disease, Neurogenic Bladder Dysfunction. |
| Disorder of the Eye | Acute Conjunctivitis, Central Retinitis, Myopia (in children), Cataract (without complications). |
| Disorders of the Mouth | Toothache, Post Extraction Pain, Gingivitis, Acute and Chronic Pharyngitis. |

# APPENDIX G

**Dr. Harry Riley Spitler's Principles of Syntonics (Spitler, 1941)**

1. There exists a closely predictable relationship between light frequency incident into the eyes and their responses.

2. There exists a relationship between light frequencies and the rate of growth of cells and tissues, and their rate of cell division.

3. There exists a relationship between light in the environment and the physical development of the individual.

4. There exists a relationship between light frequency in the eyes and the mass body potential.

5. There exists a relationship between the light frequency environment and the development of the biotype, modifying hereditary tendency

6. There exists a relationship between light and light frequency and the action currents leaving the eye toward the brain, these action currents being both qualitatively and quantitatively altered.

7. There exists a relationship between light frequency incident into the eye and the functioning power of the pituitary gland.

8. There exists a relationship between the reproductive cycle and the light frequency environment, probably a quantitative one in respect to the number of individuals of any species

9. There exists a relationship between light frequency environment and the dynamic tension present between the two divisions of the autonomic nervous systems.

10. There exists a relationship between the light frequency environment and the secretion of hormones by all of the co-acting as well as antagonistic endocrine glands with the pituitary gland as the "master" gland.

11. There exists a relationship which is largely predictable between light frequency environment and the restoration of health following departures from the normal which are still within physiological limits, particularly those departures which may be directly influenced by the autonomic or the endocrines toward health.

12. There exists a relationship between light frequency into the eye and the degree of nerve cell irritability thus modifying reflexes.

13. There exists a relationship between light frequency into the eye and bodily health.

14. There exists a relationship between nerve impulses from the eye, due to incident light frequency and the state of tension in the autonomic nervous system.

15. There exists a relationship between light frequency into the eye and either its vitamin A content, or the degree of its adaptation

16. There exists a relationship between light frequency into the eye and the perception of pain.

17. There exists a relationship between light frequency into the eye and the relative responses of both striated and smooth muscle.

18. Syntony of the autonomic may be produced by light frequency to the eye.

19. The ability to continue to live depends upon syntony of the autonomic in both acute and chronic illnesses, and this attainment of syntony may be aided by light frequency into the eye.

# APPENDIX H

**Name of Therapist:** Peter Heinrich (2004)

**Qualifications:** Dip. Optom. (1971) FOA (S.A.) FCSO (USA) ACSV (RAU)

**Case Study 1. (2004)**

**Patient:** ES **Sex:** Female **Age:** 49yrs

**Complaints:**

Diplopia (double vision) due to a history of thyroid disease (low T4 count) resulting in a paresis of the right superior rectus muscle. This double vision varies with direction of gaze, is worse on looking upwards or lying on left hand side, and least on downward glance. It also varies according to state of health, stress, emotions and fatigue.

**Examination results:**

- Unaided vision: R Less than 6/60 L Less than 6/60
- Refraction: Medium myopia with a small degree of astigmatism, viz.
    - R -5.25 / -0.50 axis 10 - Corrected vision 6/6-
    - L -4.50 / -0.75 axis 5 - Corrected vision 6/6
- Muscle posture: High degree of left hypertropia
    - 11 prism diopters base up right eye
- Functional colour vision fields severely reduced

**Treatment:**

1. Contact lenses for correction of myopic astigmatism
2. 10 sessions of full spectrum syntonic phototherapy
3. Natural vision rehabilitation exercise program
4. Dietary advice
5. Eye massage and visual resting techniques such as sunning and palming.

**Results:**

Reduced incidence of diplopia (worse only when she argues with her husband), single binocular vision in primary direction of gaze, increases in functional colour fields (i.e. better central and peripheral vision coordination, demonstrated as improved fusional abilities). In latest blood tests T4 count normalized.

**Case Study 2 (2004)**

**Patient:** CO **Sex:** Female **Age:** 50yrs

**Complaints:**

Photophobia (light sensitivity); Vision deterioration at far and near distances; family history of ametropias (eye problems requiring correction) starting in their early 20's.

**Examination results:**

- Unaided vision: R 6/9- L 6/9
- Refraction: Astigmatism, viz.
    - R Plano / -1.00 axis 115 - Corrected vision 6/5
    - L -0.25 / -0.75 axis 75 - Corrected vision 6/5
- Muscle posture: Exophoria
    - 2 prism diopters exophoria at 6 meters, 9 exophoria at 40 cm.
- Functional colour vision fields severely reduced

**Treatment:**

1. 10 sessions of full spectrum syntonic phototherapy
2. Eye massage, sunning and palming techniques

**Results:**

Unaided vision R & L 6/5, no spectacle correction required, reduction in photophobia to the point that she no longer needs sunglasses, increases in functional colour fields,

**Case Study 3 (2002)**

**Patient:** CF **Sex:** Female **Age:** 10yrs

**Complaints:**

Vision deterioration at far; holds her book excessively close when reading; intermittent diplopia (double vision), history of psychosomatic disorders. medication: Serotide for asthma, Ritalin for 'hyperactivity' – poor concentration at school.

**Examination results:**

- Unaided vision: R 6/12 L 6/9-
- Refraction: Emmatropic (no correction indicated)
    - R Plano - Corrected vision 6/9-
    - L Plano - Corrected vision 6/9+
- Muscle posture: Small degree of exophoria
    - 1 prism diopters exophoria at 6 meters, 4 exophoria at 40 cm.
- Functional colour vision fields extremely small (tunnel vision).

**Treatment:**

10 sessions of full spectrum syntonic phototherapy

**Results:**

Unaided vision R & L 6/5, Ritalin treatment stopped, need for Serotide pump lessened, increases in functional colour fields, vast improvement in concentration ability, behavior "remarkably less aggressive".

**Case Study 4 (2002)**

**Patient:** AF **Sex:** Female **Age:** 12yrs

**Complaints:**

Vision variable at far; eyes burn at school, frontal headaches with visually related tasks, diplopia (double vision) at near, current medication: Lac.Can. & Nat. Mur. (potency unknown).

**Examination results:**

- Unaided vision: R 6/6- L 6/6
- Refraction: Low myopia
    - R -0.50 DS - Corrected vision 6/6
    - L -0.25 DS - Corrected vision 6/6
- Muscle posture: Exophoria
    - 1 prism diopters exophoria at 6 meters, 8 exophoria at 40 cm.
- Functional colour vision fields small.

**Treatment:**

1. 10 sessions of full spectrum syntonic phototherapy
2. Natural vision rehabilitation program

**Results:**

Unaided vision R & L 6/5, reduction in headaches; no diplopia reported; significant increases in functional colour fields.

**Case Study 5 (2004)**

**Patient:** BF **Sex:** Female **Age:** 15yrs

**Complaints:**

School performance deteriorating; due to be transferred to the remedial class, distance vision problems, photophobia (light sensitivity).

**Examination results:**

- Unaided vision: R 6/18 L 6/9-
- Refraction: Low myopic astigmatism
    - R -0.50 /-0.50 axis 85 - Corrected vision 6/6
    - L -0.50 / -0.50 axis 85 - Corrected vision 6/6-
- Muscle posture: Exophoria
    - 3 prism diopters exophoria at 6 meters, 3 exophoria at 40 cm.
    - High AC/A ratio – 7/1 (ratio of accommodative convergence change to 1 diopter of accommodative change)
- Functional colour vision fields extremely small (tunnel vision).

**Treatment:**

1. 10 sessions of full spectrum syntonic phototherapy
2. Spectacles for distance use only
3. Natural vision rehabilitation program with emphasis on fusional abilities

**Results:**

Significant increase in functional visual fields, corrected vision R 6/5 L 6/5, school performance much improved, photophobia no longer reported, and concentration span lengthened.

**Name of Therapist:** Denise Hadden (2005)
**Qualifications:** B. Sc. Hon., FBOA (UK), FSMC (UK), FAO (SA)

**Case Study 1 (01.06.2005)**

**Patient:** P.O. **Sex:** Male **Age:** 17 (9.6.88)

**Complaint:** Assessment requested because Mother 'felt he needed lights'. Patient is Gr 11 WP rowing team, going for overseas trials, c/d team rugby, frontal headaches, and poor sleeper. Specs up to date –myopic with astigmatism.
Initial fields –warped 10-15 degrees with enlarged blind spot

**Treatment and Results:**

Home machine with Blue/Green filter for 10 sessions
2nd field- slightly less warped 15 –22 degrees
Sleeping better, 'feeling happy'. Had major anger outburst

Home machine with Blue/Green filter for another 7 sessions
3rd field – almost circular, 25 degrees, blind spot normalised

Coach moved him up to a team in rugby last week- said he seemed more intense, agile, faster and much more concentrated. Left for rowing trials.

**Case Study 2 (18.04.2005)**

**Patient**: S.S **Sex:** Male **Age:** 16 years

**Complaint:** Assessment for deteriorating distance vision. Wearing –0.50 DS R&L. On antibiotics for acne, weekly occipital h/a. Parents myopic. Sleep poor, stressed, accident with horse in 1999, brother died. Low phorias and fusions. 1st Field – warped 7-10 degrees.

**Treatment and Results:** Home machine for 2 weeks on Indigo/Blue
2nd field – 29.04.05 – warped 10-15 degrees.
Feeling calmer, sleeping improved, more tired at night.

Home machine for 3 weeks on Blue/Green
3rd field – 27.05.05 –more circular 12-17 degrees
not worn glasses as much, feeling less blurred
Doing WP shooting trials.

Home machine for next 2 weeks on Lime
4th field – 4.06.05 – more circular 15 –20 degrees, blind spot improving
Done well in shooting trials, feeling 'better', more relaxed, unconcerned about vision now

Home machine for 2-3 weeks on Lime
5th field – 25.06.05 – more circular, 22- 25 degrees
Leaving for trials shooting, happy, more relaxed, vision ok.

**Case Study 3** (23.03.05)

**Patient**: J.H. **Sex:** Male **Age**: 6 years

**Complaint:** Assessment for poor tracking- referred by OT
Mother unaware of any problems, very bright child- 6yrs old and his vocabulary is that of a 10-12yr old, allergic, asthmatic, on an inhaler and Zertec daily, clumsy, accident at 2yrs, grommets, Mother myopic. Poor fusions, phorias, saccadics, reduced steropsis, low gross motor skills, visual memory at 8y 9m, field- 3-5 degrees

**Treatment and Results:**

Began visual training
Home machine Blue/Green for 2 weeks
2nd field – weepy, frustrated, but also 'somehow more', field 5-10 degrees

Home machine for month on Blue/Green
3rd field – flu badly, stopped lights for 2 weeks, 12-15 degrees
using less antihistamines as well as all other medication, still coughing
Change to Lime

Home machine for 2 weeks on Lime
Very little movement of field, but cough disappeared after two days and he perked up quickly , feeling happier and healthier, confident, allergies better
5th field – 18 degrees

Finished VT program, saccadics improved, much more confident, less medications, less allergic reactions. Break for holidays.

# APPENDIX I

**A short study to determine changes effected in optometric measurements and functional visual fields in athletes by exposure to syntonic (coloured light) stimulation (Heinrich, 2004)**

The aim of this study was to determine whether a measurable improvement in visual skills and functional visual fields can be obtained when a number of athletes are exposed to a set program of Syntonic (coloured light) stimulation.

7 athletes taking active part in sporting activities with normal colour perception and no participation in previous sports vision enhancement programs. 2 other subjects started the program, one turned out to be colour defective and the other dropped out because of work pressures.

A detailed case history including signs and symptoms (especially those pertinent to their particular sporting activity), optometric examination and functional colour visual fields, done on the Indigo Visual Field Screener, were performed before and after syntonic intervention.

**Syntonic Treatment Protocol:**

10 sessions of syntonic phototherapy on the Atomic Technologies SRS II instrument according to the following protocol:

- Session 1
    - 5 minutes each of **Ruby** – *for 'emotional fatigue' (alpha omega pupil, adrenal fatigue, poor coping, mood swings, frustration*) and **Lime** - *for' chronic syndrome' (physiological, toxic, neuroendocrine)* at a flash rate of 7 Hz.
    - 10 minutes of full spectrum exposure – 20 colours at 30 seconds each, starting at the red end of the spectrum, ending with purple, magenta, scarlet and white.
- Session 2 –
    - 5 minutes each of **Ruby** and **Lime** at a flash rate of 7 Hz.
    - 10 minutes of full spectrum exposure – 20 colours at 30 seconds each, starting at the violet end of the spectrum, ending with purple, magenta, scarlet and white.

- Session 3 –
    - 5 minutes each of **Ruby** and **Lime** at a flash rate of 7 Hz.
    - 15 minutes of full spectrum exposure – 20 colours at 30 seconds each, starting at the red end of the spectrum, ending with purple, magenta, scarlet and white.
- Session 4 –
    - 5 minutes each of **Ruby** and **Lime** at a flash rate of 7 Hz.
    - 15 minutes of full spectrum exposure – 20 colours at 30 seconds each, starting at the violet end of the spectrum, ending with purple, magenta, scarlet and white.
- Session 5 –
    - 5 minutes each of **Ruby** and **Lime** at a flash rate of 7 Hz.
    - 20 minutes of full spectrum exposure – 20 colours at 30 seconds each, starting at the red end of the spectrum, ending with purple, magenta, scarlet and white.
- Session 6 –
    - 5 minutes each of **Ruby** and **Lime** at a flash rate of 7 Hz.
    - 20 minutes of full spectrum exposure – 20 colours at 30 seconds each, starting at the violet end of the spectrum, ending with purple, magenta, scarlet and white.
- Session 7 –
    - 5 minutes each of **Ruby** and **Lime** at a flash rate of 7 Hz.
    - 25 minutes of full spectrum exposure – 20 colours at 30 seconds each, starting at the red end of the spectrum, ending with purple, magenta, scarlet and white.
- Session 8 –
    - 5 minutes each of **Ruby** and **Lime** at a flash rate of 7 Hz.
    - 25 minutes of full spectrum exposure – 20 colours at 30 seconds each, starting at the violet end of the spectrum, ending with purple, magenta, scarlet and white.
- Session 9 –
    - 30 minutes of full spectrum exposure – 20 colours at 30 seconds each, starting at the red end of the spectrum, ending with purple, magenta, scarlet and white.
- Session 10 –
    - 30 minutes of full spectrum exposure – 20 colours at 30 seconds each, starting at the violet end of the spectrum, ending with purple, magenta, scarlet and white.

After the above the pre-testing was repeated and changes evaluated and patient questioned as to any changes in signs, symptoms and especially as to changes noted in performance, attitude or concentration during sport activities.

**Tabulation of Data:**

**Table 1. Functional Colour Visual Fields - Pre-syntonic intervention:**

| **Subject (Age)** ***(Sport)*** | | **White Field** Nasal Temp | **Red Field** Nasal Temp | **Blue Field** Nasal Temp | **Green Field** Nasal Temp |
|---|---|---|---|---|---|
| **DH** ***(Tri-athlete)*** | OD<br>OS | 29.9 / 29.2<br>23.5 / 26.3 | 19.0 / 23.7<br>18.2 / 22.5 | 18.3 / 22.2<br>19.2 / 16.1 | 14.5 / 12.5<br>13.8 / 14.3 |
| **CH** ***(Clay Pigeon Shooter)*** | OD<br>OS | 35.1 / 32.5<br>34.0 / 32.4 | 29.0 / 26.2<br>23.8 / 21.8 | 25.0 / 19.7<br>18.8 / 18.3 | 26.8 / 21.8<br>21.9 / 19.8 |
| **HH** ***(Clay Pigeon Shooter)*** | OD<br>OS | 26.2 / 25.1<br>27.6 / 29.0 | 17.4 / 21.3<br>23.7 / 19.4 | 10.1 / 8.5<br>16.4 / 12.5 | 14.3 / 12.5<br>17.1 / 15.9 |
| **JS** ***(Clay Pigeon Shooter)*** | OD<br>OS | 28.6 / 29.3<br>32.1 / 30.9 | 19.7 / 25.1<br>24.9 / 22.6 | 16.6 / 20.8<br>20.8 / 21.0 | 12.7 / 18.5<br>12.7 / 15.2 |
| **AR** ***(Rugby Coach – School)*** | OD<br>OS | 30.0 / 26.5<br>30.5 / 29.7 | 11.9 / 12.0<br>13.5 / 17.5 | 13.8 / 13.4<br>20.2 / 22.9 | 7.3 / 8.8<br>9.7 / 9.9 |
| **AL** ***(Martial arts instructor)*** | OD<br>OS | 33.3 / 31.7<br>33.9 / 31.5 | 20.5 / 23.5<br>25.4 / 26.2 | 29.4 / 28.7<br>30.6 / 28.7 | 17.9 / 25.7<br>29.1 / 26.8 |
| **NB** (***Martial arts instructor)*** | OD<br>OS | 31.0 / 30.4<br>32.5 / 30.4 | 13.5 / 12.4<br>13.0 / 11.9 | 17.7 / 19.5<br>17.8 / 20.5 | 8.5 / 8.0<br>9.6 / 8.9 |
| **Average** | OD<br>OS | 30.6 / 29.2<br>30.6 / 30.0 | 18.7 / 20.6<br>20.4 / 20.3 | 18.7 / 19.0<br>20.5 / 20.0 | 14.6 / 15.4<br>16.3 / 15.8 |

- OD/OS in degrees (º) Recorded as:

    - OD Temporal field average / OD Nasal field average
    - OS Temporal field average / OS Nasal field average

The visual chart representations for the individual participants follow the project beginning on page 132 (The chart shows the results first and then the original fields).

**Table 2. Functional Colour Visual Fields - Post-syntonic intervention:**

| **Subject (Age)** ***(Sport)*** | | **White Field** Nasal Temp | **Red Field** Nasal Temp | **Blue Field** Nasal Temp | **Green Field** Nasal Temp |
|---|---|---|---|---|---|
| **DH (66)** ***(Tri-athlete)*** | OD<br>OS | 34.5 / 30.6<br>30.0 / 30.3 | 23.0 / 28.7<br>22.6 / 24.3 | 22.2 / 23.8<br>23.9 / 21.0 | 17.2 / 22.5<br>22.5 / 16.5 |
| **CH (56)** ***(Clay Pigeon Shooter)*** | OD<br>OS | 35.9 / 34.4<br>36.4 / 33.2 | 32.5 / 28.9<br>33.1 / 31.3 | 32.8 / 28.2<br>32.8 / 30.9 | 31.6 / 28.4<br>32.5 / 30.8 |
| **HH (41)** ***(Clay Pigeon Shooter)*** | OD<br>OS | 31.3 / 30.4<br>33.9 / 32.1 | 30.5 / 30.4<br>30.8 / 29.7 | 28.8 / 29.5<br>29.0 / 28.8 | 29.5 / 27.4<br>24.8 / 26.7 |
| **JS (43)** ***(Clay Pigeon Shooter)*** | OD<br>OS | 34.1 / 32.4<br>35.0 / 33.3 | 30.5 / 30.9<br>34.7 / 32.0 | 30.8 / 32.4<br>33.2 / 31.3 | 32.8 / 32.5<br>32.3/ 30.3 |
| **AR (32)** ***(Rugby Coach – School)*** | OD<br>OS | 34.8 / 27.5<br>34.7 / 33.0 | 27.3 / 24.3<br>30.8 / 30.6 | 30.1 / 28.0<br>33.1 / 31.8 | 30.3 / 26.1<br>32.5 / 31.3 |
| **AL (37)** ***(Martial arts instructor)*** | OD<br>OS | 35.2 / 33.6<br>35.3 / 32.8 | 27.8 / 29.6<br>32.6 / 30.7 | 31.1 / 30.5<br>34.5 / 30.8 | 27.5 / 30.0<br>31.5 / 29.4 |
| **NB (23)** ***(Martial arts instructor)*** | OD<br>OS | 33.4 / 31.8<br>23.5 / 28.6 | 15.3 / 16.3<br>14.8 / 14.3 | 22.0 / 22.0<br>23.8 / 25.0 | 12.8 / 14.0<br>13.9 / 12.5 |

| | | | | | |
|---|---|---|---|---|---|
| **Average** | OD<br>OS | 34.2 / 31.5<br>32.7 / 31.9 | 26.7 / 27.0<br>28.5 / 27.6 | 28.3 / 27.8<br>30.0 / 28.5 | 26.0 / 25.8<br>27.1 / 25.4 |
| **% Change** | OD<br>OS | +11.8/+7.8<br>+6.8/+6.3 | +42.8/+31.0<br>+39.7/+36.0 | +51.3/+46.3<br>+46.3/+42.5 | +78.0/+67.5<br>+66.3/+60.8 |

- OD/OS in degrees (º) Recorded as:

    - OD Temporal field average / OD Nasal field average
    - OD Temporal field average / OS Nasal field average

**Conclusion:**

There is a marked increase in the functional visual fields especially in the colour fields, viz.:

White fields: Right increased 9.8%
Left increased 6.6%

Red fields: Right increased 36.9%
Left increased 37.6%

Blue fields: Right increased 48.8%
Left increased 44.4%

Green fields: Right increased 72.8%
Left increased 63.6%

These increases were accompanied by subjective reports of improvements in sport performance in almost all cases described below.

**Interesting personal experiences/anecdotes reported during the therapy:**

**AS**

- After 6 sessions of Syntonic phototherapy he reported that in clay pigeon shooting practice he had shot a '98 out of 100' where he had previously been shooting under 90 as a rule.

- At a provincial shoot in Natal shortly after completing the 10 sessions, he won both gold and silver medals.
- He reported that, where previously he had seen a blur leaving the trap house when taking a bead (aim) on the corner of the trap house, he now not only saw the clay leaving, but imagines he can see the rim on side of the clay.
- He reported that when he was shooting the 'duck' in skeet (a clay launched from the trap house right next to the shooter), he normally tended to shoot behind the clay, now he was leading the clay, shooting in front, in that his previous conditioning told him that he had previously first seen the clay a distance away, and now, seeing it sooner, he had pulled the trigger too quickly. Practice will recondition this in time.
- His children previously had delighted in scaring him from hiding, but since the therapy he picks them up easily with his peripheral vision before they can jump out and scare him.

**AL**

- He trains students in 'Amok' blade-fighting and his weak spot has always been the stomach area, particularly to horizontal cross-cuts. He now blocks and parries cuts to this area as easily and quickly as any other area.
- He reports that his peripheral awareness is noticeably sharper and he feels that he has "all the time in the world" to react to attacks in various different disciples of combat.

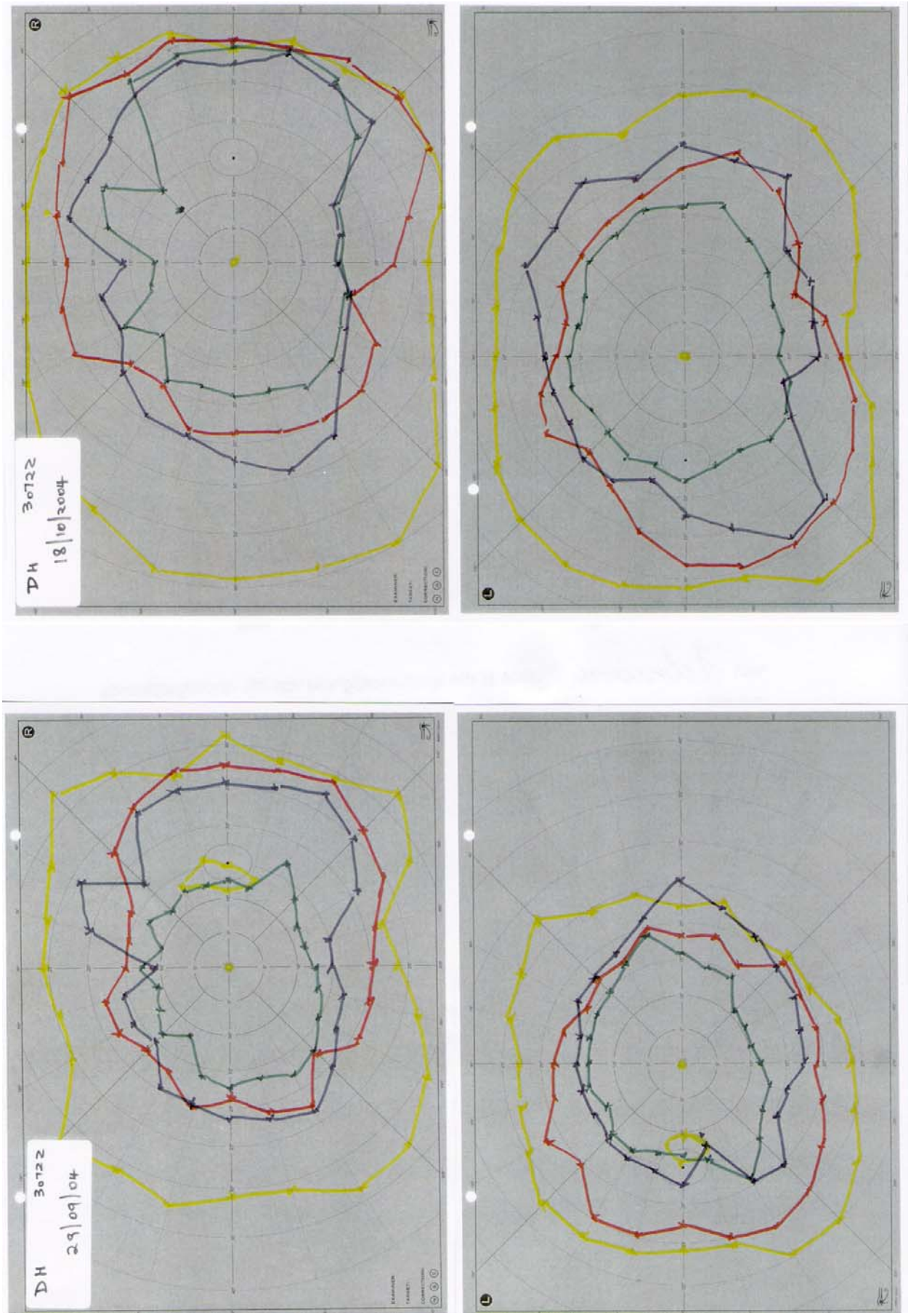
**CH**

- In a sporting discipline CH has always had difficulty with certain 'birds' (Clays). In the Club's Christmas shoot, he had no difficulty in 'powdering those particular birds'. He is delighted!

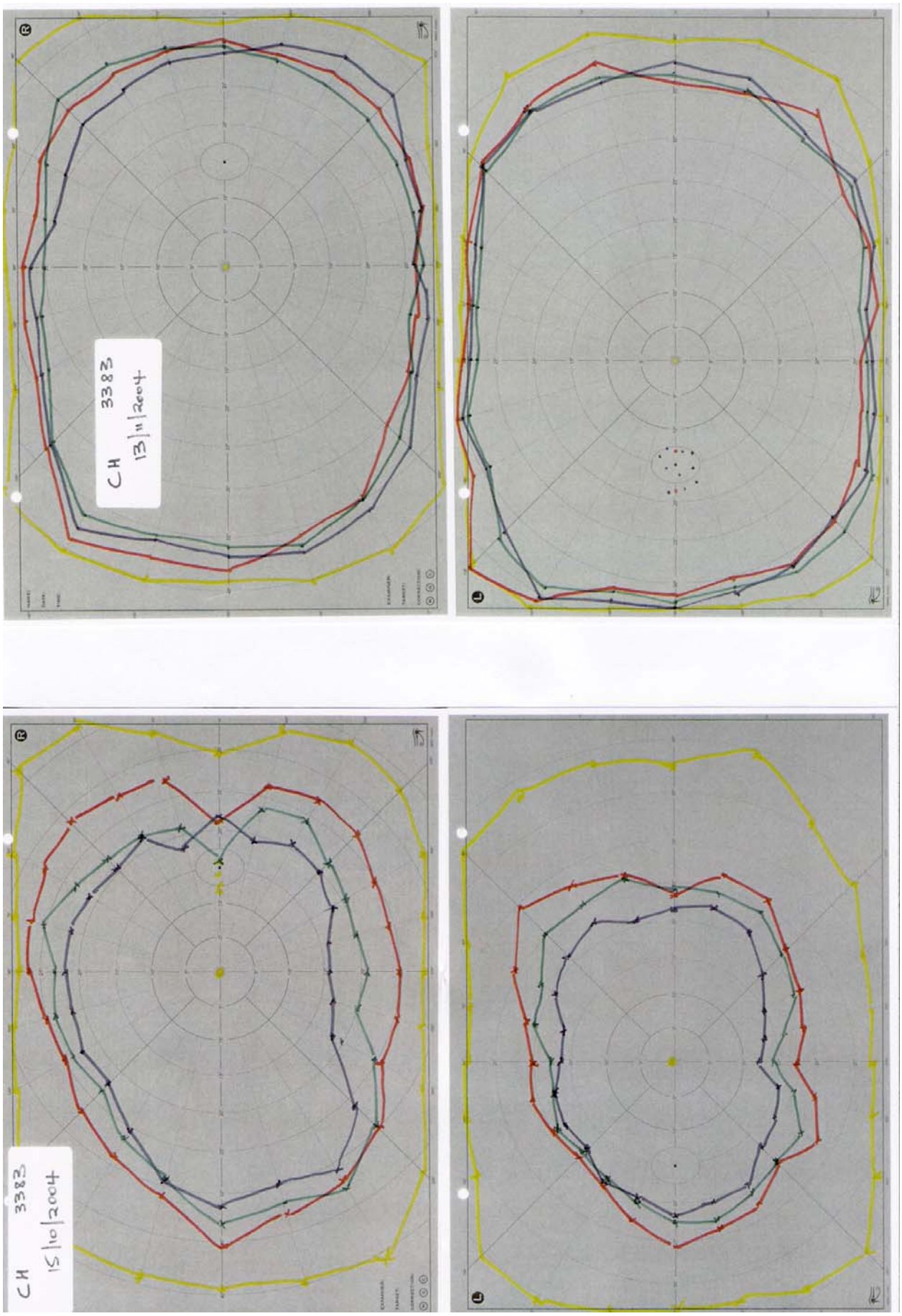
**Conclusion:**

The study has shown that significant and measurable functional visual field changes can be achieved with the application of coloured light therapy, and that vision therapy programs can be enhanced and speeded up by the parallel use of syntonic phototherapy. It also demonstrates the importance of the use of functional colour visual field screening to monitor prognosis of visually focused therapy of any kind.

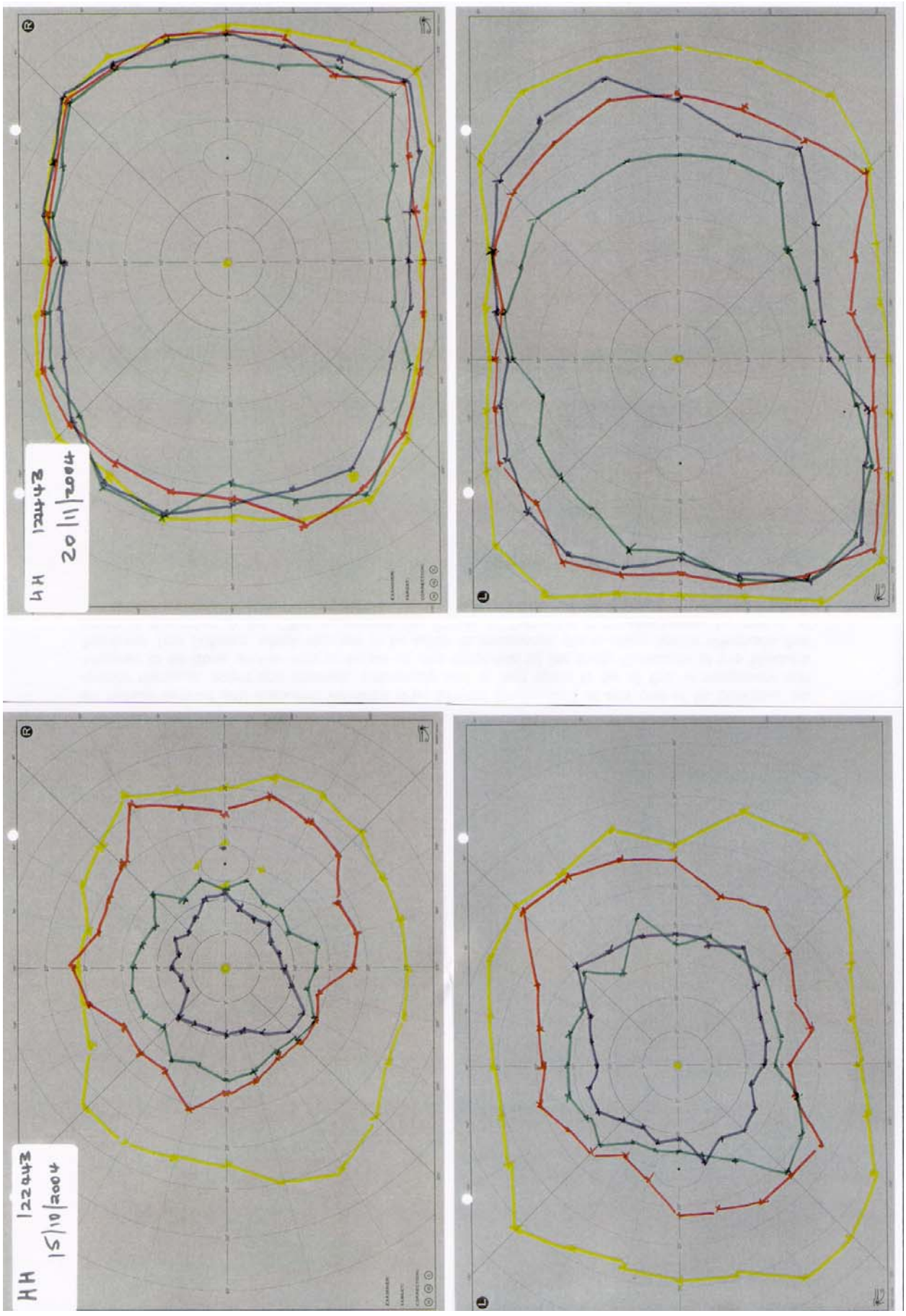
**Visual Field Chart 1 (DH)**



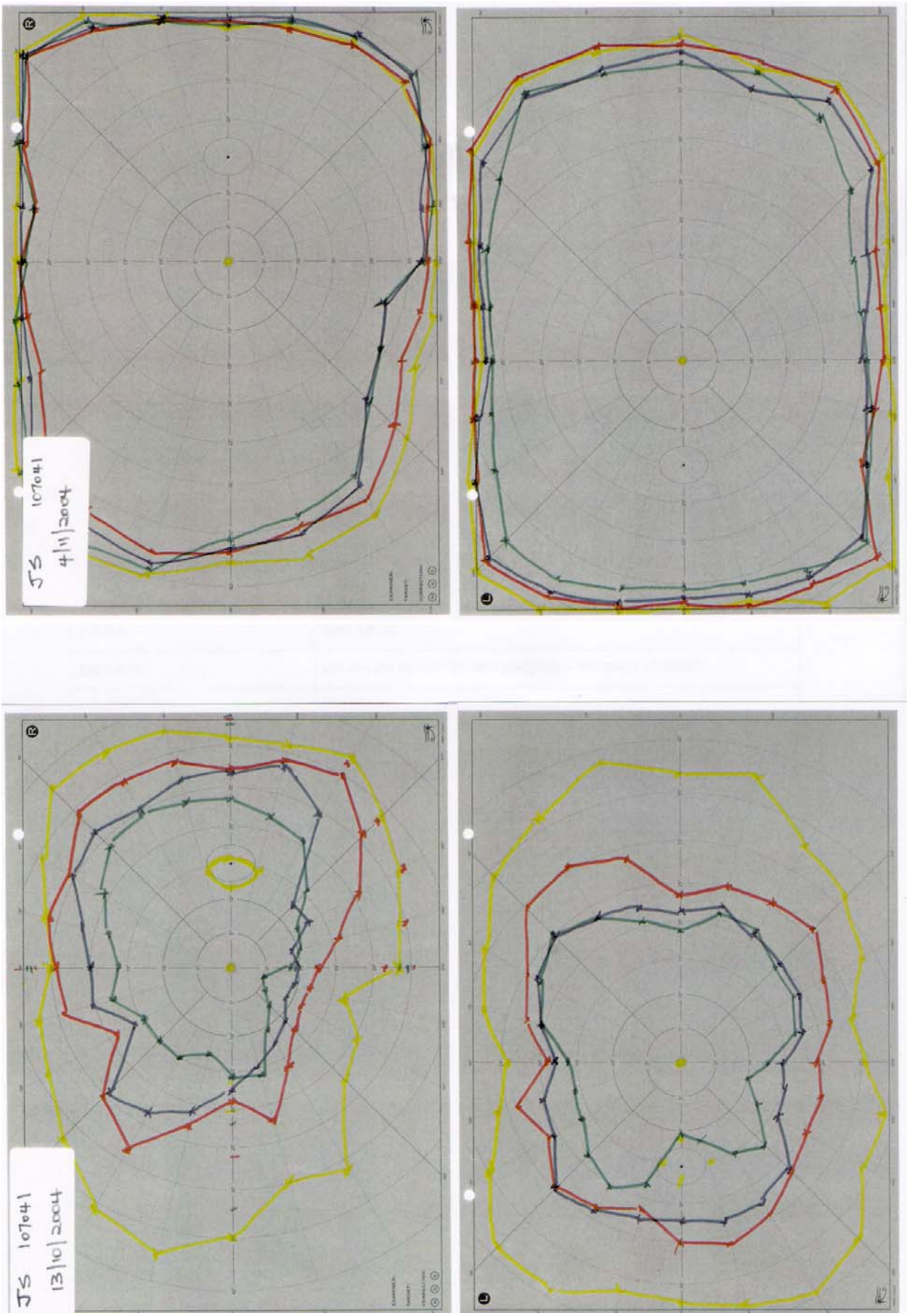
**Visual Field Chart 2 (CH)**



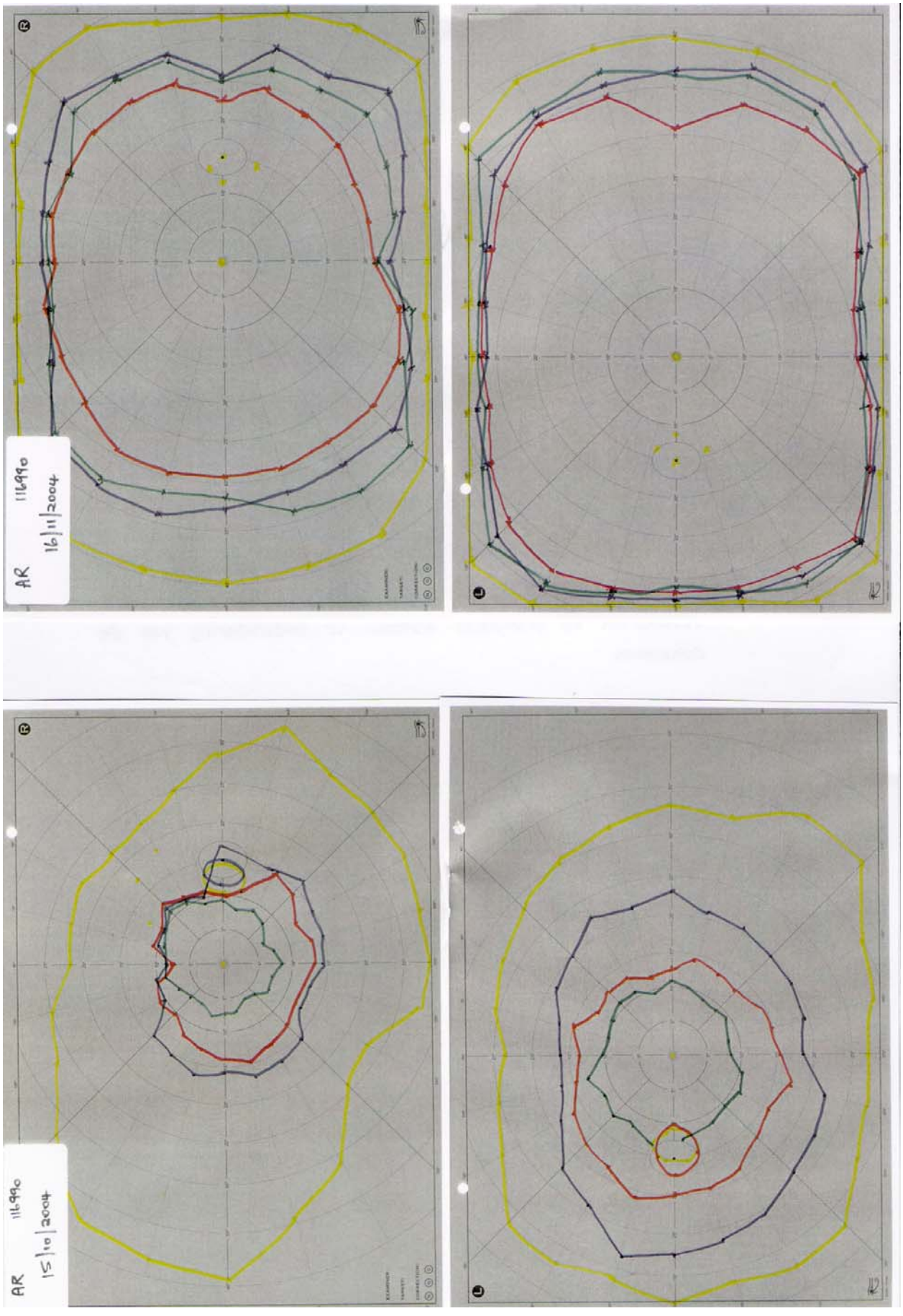
**Visual Field Chart 3 (HH)**



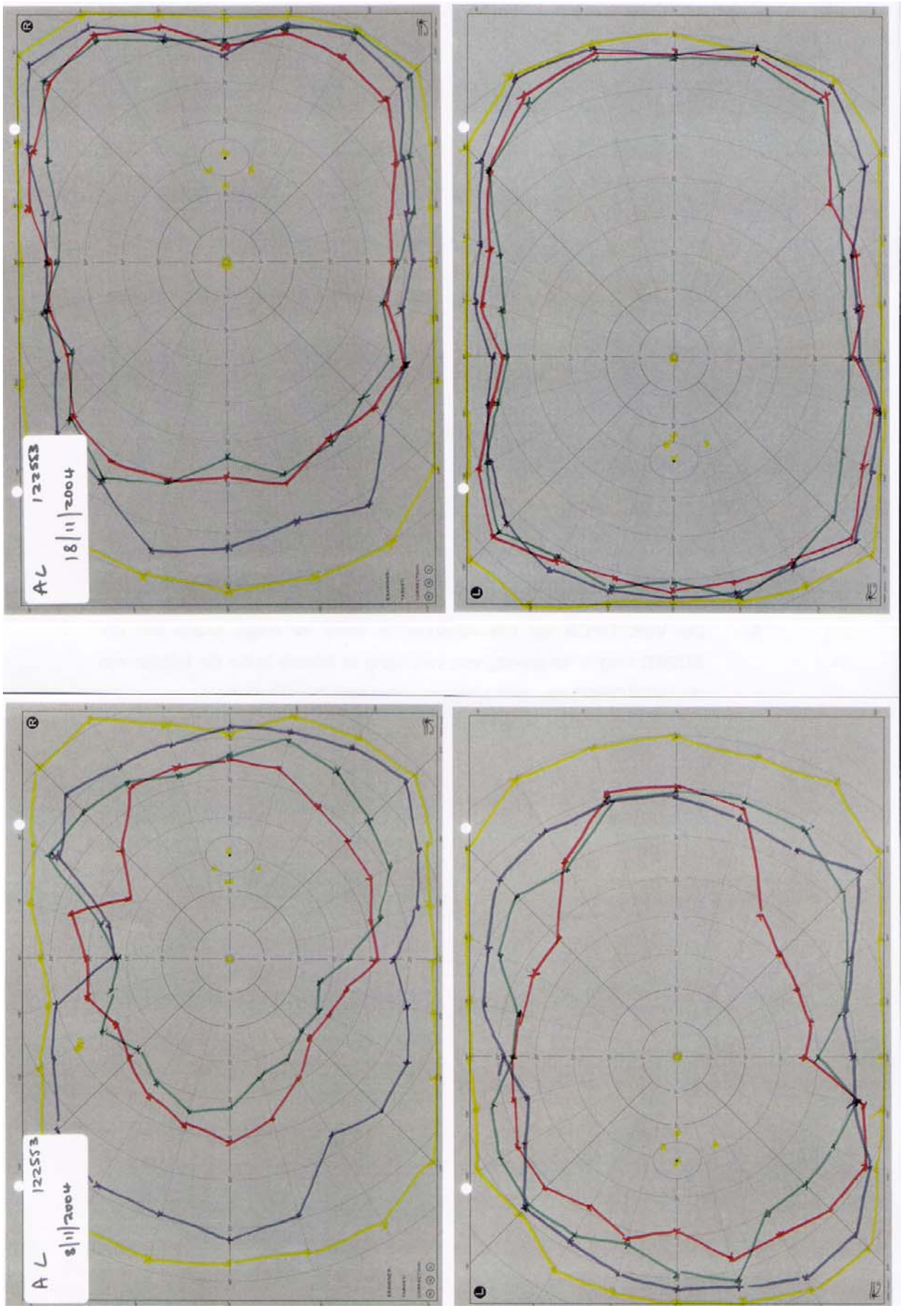
**Visual Field Chart 4 (JS)**



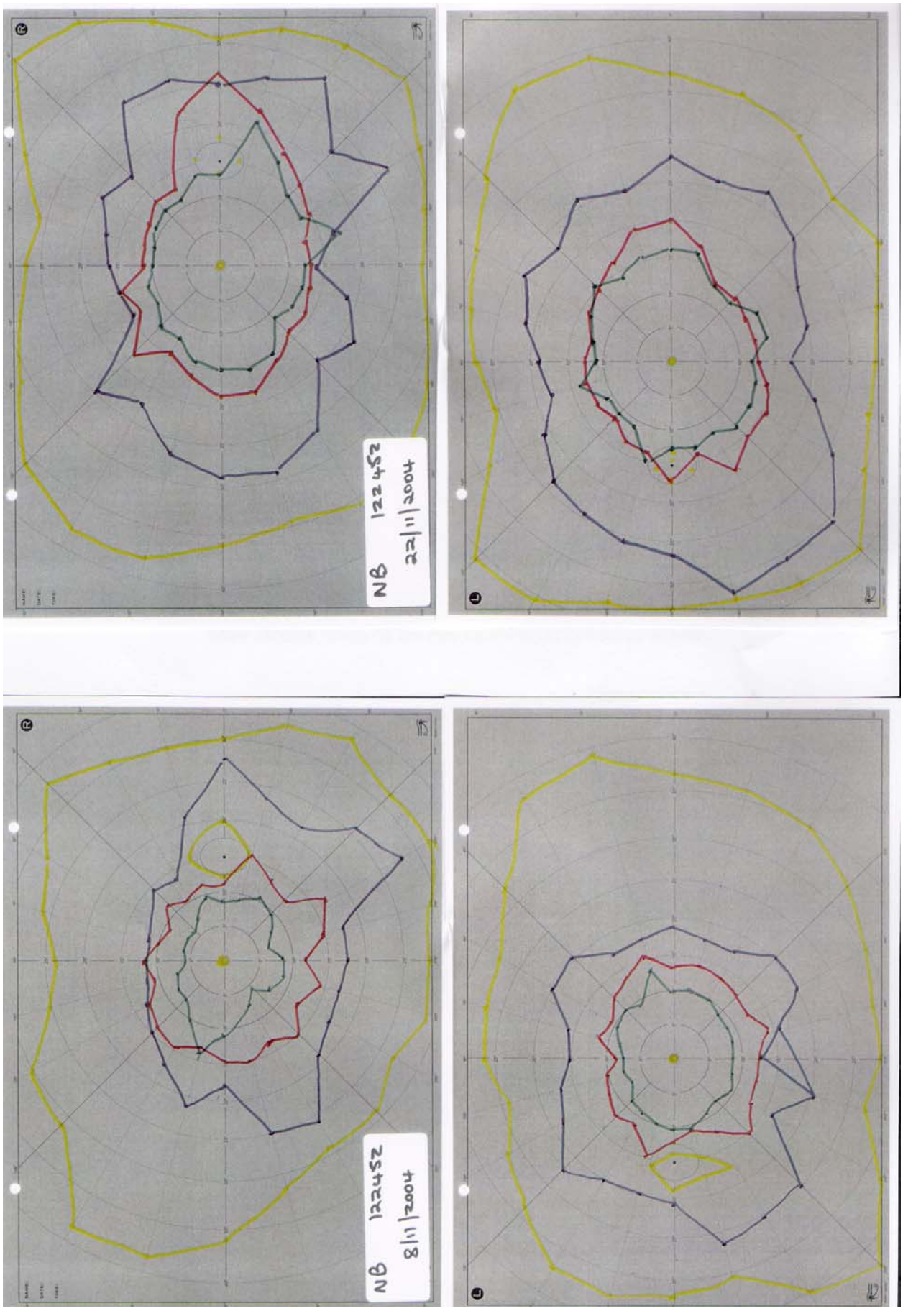
**Visual Field Chart 5 (AR)**



**Visual Field Chart 6 (AL)**



**Visual Field Chart 7 (NB)**



# APPENDIX J

**Brief Strobic Phototherapy Assessment Questionnaire (Breiling, 1996)**

Objective: To assess the subject's individual response to various wavelengths of Strobic light.

Before any assessment establish if the patient has any photo-sensitivity issues or are taking photo-sensitising drugs. Should this be the case then do not proceed with any treatment without consultation without the patient's medical doctor's advice. People that suffer from photo-sensitive seizures cannot undergo Strobic Phototherapy.

The information below is a standard assessment as advised by to Dr. Vazquez.

1. Seat the patient in front of the Lumatron with their eyes about 18 inches from the light.

2. Ask the subject to close their eyes.

3. Set the flicker rate to 14 for the initial session.

4. For each of the seven colours:

a. Ask the subject to open their eyes.

b. Say "this colour is called _____."

Do not spend more than two minutes on each colour, or the results will be adversely affected.

c. Ask the following questions and briefly record the response.

    1. What reaction do you have to this colour?

    2. What does it look like in terms of colours seen, movement, and other appearances?

    3. What is your bodily experience while looking at his colour and where do you feel it?

    4. What thoughts and emotions do you have when you look at this colour?

5. On a scale of 1 to 10, with 10 being the most preferable, how would you rate this colour?

d. Ask the patient to close their eyes.

e. Set Lumatron for next colour and repeat step 6.

Once completed, a list should be made up of the most therapeutic colours in order of priority (colours that the subject has the most reaction to) and the colours of least priority.

Determine what your treatment objective is and then set out a colour regimen for future therapeutic use.

# APPENDIX K

**Coloured light and Associated Anatomy and Psychological issues according to Brief Strobic Phototherapy formed by Dr. Steven Vazquez (Breiling, 1996)**

**A. Psychological Issues**

| Colours and their attributes | Unresolved issues | Potential Experience |
|---|---|---|
| **RUBY**: Colour of life instinct | | |
| Death wish | Existential issues | Desire to live |
| Survival, insecurity | Safety issues | Stability, rootedness |
| Numbness, shock | Sensory issues | Sensory awareness |
| **RED:** Colour of passion | | |
| Sexual depravity or omission | Sexual issues | Sexual pleasure |
| Primitive rage | Anger issues | Euphoria |
| Danger | Risk issues | Purpose in life |
| **RED/ORANGE: Colour of Freedom** | | |
| Guilt, shame | Issues of conscience | Spontaneity |
| Inhibition | Issues of inner child | Creativity |
| Excessive sense of responsibility | Issues of interpersonal boundaries | Playfulness |
| **ORANGE: Colour of self-esteem** | | |
| Ego distortion | | |
| Passivity | Issues of identity | Self-concept |
| Inferiority | Issues of disclosure | Assertiveness |
| | Issues of confidence | Self-love |
| **YELLOW: Colour of hope** | | |
| Corrupted power | Issues of power | Flexibility |
| Helplessness, panic | Issues of control | Empowerment |
| Resentment, frustration | Issues of letting go | Optimism |
| **YELLOW/GREEN: Colour of peace** | | |
| Adversarial relationships | Love, hate issues | Compatibility |

| | | |
|---|---|---|
| Jealousy, envy<br>Abandonment | Issues of hurt<br>Issues of separation | Acceptance of love<br>Union with others |
| **GREEN: Colour of love**<br>Deprivation of affection<br>Destructive affection<br>Loneliness, loss | <br>Issues of needing affection<br>Issues of distorted affection<br>Issues of grief | <br>Fulfilled affection<br>Appropriate affection<br>Inspiration |
| **BLUE/GREEN: Colour of Wholeness**<br>Extreme Italicisation<br>Detachment, impersonal<br>Unawareness of self | <br>Issues of emotion vs. thought<br>Issues of mind vs. body<br>Issues of somatic awareness | <br>Confluence<br>Harmony<br>Self-awareness |
| **BLUE: Colour of Joy**<br>Introversion, inarticulate<br>Distortion of communication<br>Dependency | <br>Issues of verbalisation<br>Communication issues<br>Issues of bonding contact | <br>Expression<br>Healthy contact with others<br>Independence |
| **INDIGO: Colour of understanding**<br>Confusion<br>Inner conflict<br>Overwhelmed | <br>Issues of logic and philosophy<br>Issues of inner search<br>Issues of ordered thinking | <br>Clarity<br>Insight<br>Inner peace |
| **VIOLET: Colour of Faith**<br>Mistrust<br>Worry<br>Aberrant spirituality | <br>Trust issues<br>Issues of letting go<br>Religious issues | <br>Trust<br>Contact with spirit<br>Vision |

**B. Anatomical Locations (Breiling, 1996)**

| | Anatomy | Primary site | Secondary site | Issues |
|---|---|---|---|---|
| **RUBY** | Coccyx<br>Sacrum<br>5$^{th}$ lumber | Rectum, anus<br>Hips, bones, buttocks,<br>lower legs, ankles, feet | Head,<br>heart,<br>stomach | Existential<br>Safety<br>Sensory |

| | | | | |
|---|---|---|---|---|
| | | | | awareness |
| **RED** | 4th lumber<br>3rd lumber | Prostate, lower back muscles, sciatic nerve, sex organs, uterus, bladder, knees | Back of neck<br>Stomach | Sexual<br>Anger<br>Risk |
| **RED/ ORANGE** | 2nd lumber<br>1st lumber | Appendix, abdomen, upper leg, large intestine, inguinal ring | Trapezuis shoulders | Conscience<br>Inner child |
| **ORANGE** | 12th thoracic<br>11th thoracic<br>10th thoracic | Small intestines, lymph circulation, kidneys, ureters | Heart<br>Throat | Interpersonal boundaries<br>Identity<br>Disclosure<br>Confidence |
| **YELLOW** | 9th thoracic<br>8th thoracic<br>7th thoracic<br>6th thoracic | Adrenal, supra-adrenal glands<br>Spleen<br>Pancreas, duodenum<br>Stomach | Back of neck<br>Arms<br>Hands<br>Upper legs | Power<br>Control<br>Letting go |
| **YELLOW/ GREEN** | 5th thoracic<br>4th thoracic | Liver, solar plexus, blood<br>Gall bladder, common duct | Top of head<br>Feet | Love, hate<br>Hurt, separation |
| **GREEN** | 3rd thoracic<br>2nd thoracic | Lungs, bronchial tubes, breast<br>Heart, coronary arteries | Sacrum<br>3rd lumber | Needing affection<br>Distorted affection<br>Grief |
| **BLUE GREEN** | 1st thoracic<br>7th cervical | Oesophagus, trachea, forearms, hands, wrists fingers, thyroid gland, bursa in shoulders | | Emotion vs. thought<br>Mind vs. body<br>Somatic awareness |
| **BLUE** | 6th cervical<br>5th cervical<br>4th cervical | Neck muscles, shoulders, tonsils, vocal cords, neck glands, pharynx, nose, lips, | | Verbalization<br>Communication<br>Bonding contact |

| | | | | |
|---|---|---|---|---|
| | 3rd cervical | mouth Eustachian tube, cheeks outer ear facial bones, teeth | | |
| **INDIGO** | 2nd cervical<br>1st cervical | Sinuses, mastoid bones tongue, forehead, eyes, optic nerves, auditory nerves<br>Pituitary gland, bones of face, brain, inner and middle ear | | Logic and philosophy<br>Inner search<br>Ordered thinking |
| **VIOLET** | Top of skull | Hypothalamus, cerebrospinal fluid, brain | Coccyx | Trust<br>Letting go<br>Religious |

# APPENDIX L

**A survey of thirty patients performed within Dr. Vazquez's clinic (Breiling 1996):**

| **Number of cases treated with light** | **Psychological diseases** |
|---|---|
| 8 | Dysthymic Disorder (form of depression) |
| 7 | Cyclothymic Disorder |
| 5 | Multiple Personality Disorder (MDP) |
| 2 | Gender Identity Disorder |
| 2 | Psychogenic Disorder |
| 2 | Generalized Anxiety Disorder |
| 2 | Dependant Personality Disorder |
| 1 | Anorexia Nervosa |
| 1 | Simple Phobia |
| 1 | Obsessive Compulsive Disorder |
| | **Medical Conditions** |
| 4 | Cancer in remission |
| 2 | Multiple Sclerosis |
| 1 | Acquired Immune Deficiency (AIDS) |
| 1 | Myocardial Infarction in recovery |
| 1 | Temporomandibular Joint Pain |
| 1 | Rheumatoid Arthritis |
| 1 | Migraine Headache |
| 1 | Sjogren's Syndrome |
| 1 | Partial Hearing impairment |
| 1 | Hydrocephalus |
| 1 | Hashimoto's Disease (Autoimmune) |

Psychological Outcomes after six months:

1. Depression was resolved in most cases after several sessions.
2. Panic attacks subsided in almost all cases.
3. Rage became manageable.

4. Dependant behaviour became autonomous in a dramatic way in most cases.
5. Grief concluded in most cases.
6. Anxiety relinquished in almost all cases.
7. Traumatic experiences abreacted and concluded in a high proportion of cases.
8. Shame and guilt transformed into self-esteem in the majority of cases.
9. Obsessive thought diminished in most cases
10. In MPD with the uncovering of new personalities, reversal of dissociative phenomena occurred dramatically.

Physiological outcomes after six months

1. Migraine headaches were eliminated.
2. Severe arthritic pain that previously existed over 15 years was eliminated in one case.
3. A viral skin condition in the AIDS patient disappeared.
4. Irritable bowel syndrome was reduced in a single session.
5. A peptic ulcer was eliminated after several sessions.
6. Dramatic change in insomnia occurred in numerous cases.
7. Coughing, sore throats and other upper respiratory problems had a rapid reduction (within 3 minutes).
8. Major decreases in sinusitis during sessions for several cases.
9. Amenorrhea was reversed after a series of five sessions.

Thus, in the majority of cases with a presenting symptom, a dramatic change for the better was experienced.