

Applied Photonic Therapy in Veterinary Medicine

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Authors : Wood, T.R., McLaren, B.C.

Abstract

There can be no question that specific systemic physiological results occur, when red light (660nm) is applied to the skin, it is now more a question of detailed mechanisms. Before gathering statistically significant clinical trial data, it is important to first enumerate the type of results observed in practice. Case histories are presented highlighting the use of photonic therapy in veterinary medicine. Over 900 surgical procedures have been performed and documented, utilizing the principles of photonic therapy, and while hemostasis, pain relief, and nausea relief, were the primary goals, the peri-operative death rate, the post-operative seroma, and post-operative infection were reduced to almost zero, and there was a noticeable increase in the healing rate. Scientifically applied photonic therapy, rather than supplanting conventional veterinary medicine, compliments and increases the veterinarian's set of skills. This paper proposes a hypothesis of how 660 nm light applied to specific points on the skin, produces various physiological changes in animals. By using animals, there can be no placebo, hypnotic, or psychosomatic confounding effects.

Key Words: Photonic Therapy, Red Light, Complimentary Medicine, Placebo

Introduction

It will be helpful to take a brief look at the historical use of light as a healing modality. Throughout history, man has used the visible solar radiation as a method of healing⁽¹⁴⁾. The efficacy of phototherapy has long been known, even though it has taken some time to clarify the mechanism of action. Any retrospective view of the development of light therapy inevitably loses itself in the mists of primitive practice, from the earliest times when man worshipped the sun. In a 1500 BC Sanskrit document, the "God of the Sun" was worshipped as a divine physician by the Aryans in India. Through the histories of the ancient Egyptians, Greeks and Romans, one finds references to the healing powers of light. Apollo, the "God of Healing" was also the "Sun God" or the "God of Light". Hippocrates (460-370 BC) practiced heliotherapy and Galen (131-201 AD) routinely prescribed sunbaths for his patients. Henri de Mondeville (1260-1320 AD) used red light in the treatment of smallpox. John of Goddesden, physician to Edward II of England, in 1510 treated a prince with smallpox, using red dyes, red bedclothes, and red curtains (never drawn to bathe the person in diffuse red light), and cured him without a vestige of pock marks⁽²⁰⁾.

In 1900 a French doctor, Dr. Chantinière reported that 6 hours of red light had an abortive effect on measles. He also noted the marked nervous phenomena in workmen employed in making photographic plates in rooms lit with red lanterns. In the Caucasian region of central Europe it was the custom to dress children in red garments in the case of eruptive disease, especially measles⁽³⁾. In 1903 a Danish doctor, Niels Finsen, was awarded a Nobel Prize for treating tuberculosis and smallpox with red light to abolish suppuration and lessen scarring⁽⁴⁾.

Standard practice today is to use blue light to treat kernicterus in neonates⁽⁸⁾. Rickets is treated through the photochemistry of sunlight. Photodynamic therapy is the use of fluorescent dyes combined with either ultra-violet light or infrared to treat skin diseases and some cancers^{(6) (28)}. Photo-immunology is the study of the effects of non-ionizing radiation on the immune system⁽²⁵⁾. The use of lasers in surgery (as a light scalpel) is now common⁽⁴⁾.

Isaac Newton first proposed that light traveled both in waves and as “silver bullets”. Einstein refined this theory and called the discrete quanta of light energy, photons⁽¹²⁾. The electromagnetic frequency theory, a more scientifically accurate concept, describes light (electromagnetic radiation) as the variations in the electrical field strength propagated in a given direction, within a given medium, where the frequency and amplitude are the features of importance⁽¹²⁾. To understand the concept of electrical fields, it is appropriate to make use of common physical analogies such as the patterns formed by iron filings near a bar magnet. One may imagine equivalent lines of force surrounding an electric dipole, which is a separated pair of electric charges, of equal magnitude but opposite signs. The lines of force are known as the associated electric field.

It must be stressed however that like photons, electric fields as such, do not exist as physical entities. They are mere concepts (methods of bookkeeping, if you like), to keep track of the forces of attraction and repulsion between like or unlike charged particles, depending on the size of the charge and the distance between them. All other descriptions are simplified paradigms, which are used to summarize, and perhaps predict, scientific data, with many articles incorrectly describing the interactions of light with tissue as being wavelength dependant, particularly those prior to 1990^{(2) (16) (17) (23)}.

Photonic therapy is the use of the energy of light to produce a therapeutic effect, and may be defined as the application of monochromatic light to classical acupuncture points. Photonic Therapy is the correct name for what has been described as low-level laser therapy. This is because the name describes the generic cause of the stimulation, and not just one method of generating a form of light. Understanding the biological effects of light's action in tissue demonstrates unequivocally that there are disadvantages, but no clinical or biological advantages, in using a low level laser light compared to using a non-coherent light⁽¹³⁾.

By understanding the phylogenetic evolution of the body's electro-magnetic field sensory systems, allows a rational explanation of the origin of acupuncture points, and how stimulation of cutaneous photoreceptors (acupuncture points) with light can result in changes in physiological parameters.

Evidence Based Medicine

The day following my (T.W.) introduction to photonic therapy in 2001, an otoplasty was performed and it didn't bleed! It was difficult to accept that photonic therapy could do such a thing, but it soon became apparent that it was possible to do much more. Since then, numerous (uncounted) clinical

cases have been treated and over 900 routine surgeries have been performed. These surgeries include spays, neuters, otoplasties, tumor removals, and onchyectomies, using photonic therapy to provide hemostasis, nausea control, and pain relief. Using photonic therapy prior to any surgery, produces up to 65% reduction in bleeding time⁽²⁴⁾.

During and following these surgical cases improved rates of healing, more satisfactory surgical results, without seroma formation have been recorded. Seven dogs “died” during the surgical procedures (i.e. cessation of heart-beat, stopped breathing, lack of corneal reflex, and blood seepage), though all dogs were able to be successfully revived using photonic therapy methods.

The essential component of a definition of science, is the reproducibility of a given results under a given set of conditions. While randomized, double blind, placebo controlled trials may be classed as the “gold standard” of scientific research, it is recognized that in some areas such as surgery, such trials were not always conducted prior to techniques being put into practice. With a discrete occurrence such as surgery, the *internal validity* can not be challenged, therefore it is only the size of the test population, and the variation between results, that governs the *external validity*, of how such results may apply to the population at large⁽²⁹⁾.

Case Histories

Case History 1. One of the first cases where photonic therapy was used, was an adult feline spay and declaw. The surgery was performed routinely with the exception of treating the animal with 660 nm red light, on nominated areas pre and post-operatively. When the cat was presented for suture removal in 10 days, the owner demanded to know what had been done to her cat, as she has had several cats operated on previously, and none had recovered as well as this one. Cats recover from anesthetic more quickly and more smoothly after post-operative treatment with photonic therapy. Within a minute they are licking their nose, and are able to assume sternal recumbency within half an hour.

Case History 2. Otoplasties normally bleed strongly and the cut portion of the ear tends to continue oozing, more than the animal’s cut ear, which seems to go “cold”. After photonic therapy the ear seems to stay at a normal temperature. When an ear is trimmed, the skin reflects away from the cut edge and has to be sutured back. Following photonic therapy pre-surgically, not only is there obviously far less bleeding, but wounds do not gape, and in the case of an otoplasty the skin does not reflect from the wound. This is the first time this information has been presented publicly, and unpublished data⁽¹⁴⁾ suggests this is due to changes in the skins electrical potential at the site of the wound.



1. Skin retracted from injury during standard otoplasty



2. Skin on treated animal after experimental otoplasty procedure

Case History 3. A 4 year old male Dachshund presented with severe epaxial muscle pain at the thoraco-lumbar junction. The owner was quite concerned, as the pet had not been able to breathe easily or relax for 48 hours. About half way through the treatment with photonic therapy, the dog let out a huge sigh and lay down on the table in a totally relaxed position. The owner was amazed but pleased. Originally just using the light was not a totally comfortable position, so following the success of gaining pain relief and relaxation an injection of flunixin meglumine (Banamine, Schering Plough Animal Health Corp., Union, N.J. 07083) was given, and the pet developed a 1 cm diameter area of scar tissue, sub-cutaneously in the shoulder. The reward for the western pharmacological treatment was an adverse reaction.

Case History 4. A 5 ½ year old neutered male Schnauzer was presented for halitosis, gastro-intestinal upset, and vomiting since staying with the owner's daughter for 1 week. The dog was used to eating a dry kibble but was fed canned food for the week. The physical examination was unremarkable, except for the presenting complaints. However, on palpation of an area along the back near the last rib, the pet fell onto his belly on the examination table. This reaction occurred each time the pet was palpated on that area. Photonic therapy was used on the standard points, as well as specific points associated with stomach problems, and on re-examination the pet did not collapse when palpated along the previously reactive areas. The owner, noticing the pet was better, kept asking what injection had been given, and was reluctant to believe that none had.

Case History 5. A 3 year old male cocker spaniel/golden retriever presented with a severely swollen scrotum (post-neuter), and severe bruising all around the incision. The owners reported his urine was dark brown to black ever since the surgery had been performed by another veterinarian. The animal was underweight, and had a history of 12 liver shunts, of which 11 were surgically repaired when he was a puppy. He had been given a special diet and had been sickly his entire life. The owners did not wish to return to the original veterinarian. Due to the marginal liver function, the pet was not a good candidate for anesthetics, so photonic therapy was selected as the treatment of choice. Later the same day, the owners were called as the swelling was down, a lot of the bruising was gone and the pet was much more active. The pet was treated again the next day and sent home, eating well and gaining weight.

Case History 7. Horses are extremely responsive to skin stimulation, so by using a combination of reflex reactions, allows the horse to indicate his problem. A large quarter horse gelding that the owner rode in the mountains of Colorado was presented for treatment. He had been diagnosed with an old injury of a bowed tendon in a front leg, and the owner had been advised to sell the horse as it was believed he wouldn't be safe to ride. He was 100% sound after 4 treatments. This horse had a violent reflex reaction at the base of the neck indicating teeth problems, and he had a very minimal reaction

after the teeth were floated. In Western Medicine it was his previously injured tendon that was causing the lameness. Photonic therapy demonstrated it was pain in the shoulders and muscles, caused by the horse holding himself stiffly to protect his mouth that was the problem. The old “war injury” of the bowed tendon was co-incidental, and not the cause.

Not a Panacea

In the introduction and case histories mentioned, favorable results have been highlighted, but this method is not a total panacea, as one surgical death and one post-operative infection have also been experienced.

Case History 8. A 4 month old female Blue Tick Coonhound was run over by a car 20 minutes prior to being presented for treatment with one of the tires having passed over her abdomen. Symptoms included: white mucous membranes with no capillary refill time, a rapid-weak heartbeat, cold extremities and a pear-shaped abdomen. An IV catheter was inserted and 2 L of lactated Ringer’s Solution infused, but the bleeding was stopped with photonic therapy. The pet had fresh blood in the urine and stool, but this feature stopped over the next several hours and the pet became conscious and able to stand and walk. The owners were warned that so much damage had occurred it was very likely she could die by the third day. Unfortunately, while she continued to improve with the daily treatment that is what happened. While this is a testimony of the power of the light to stop bleeding and fight shock, as evidenced by this pet “bleeding out” into her abdominal cavity, some damage is too severe to overcome, but it is believed the light treatment did help her to “die well”.

Mechanism of Action

With the skin being the largest sensory organ in the body, it may be demonstrated that in all species the skin contain numerous electromagnetic sensors, capable of responding to various stimuli, utilizing neural and extra-neural pathways. Cutaneous photoreceptors (acupuncture points) are not points at various depths as classically taught ⁽¹⁾⁽²⁷⁾, but are areas about the size of a 25 cent piece, and are in the superficial layer of the skin ⁽⁷⁾⁽¹⁰⁾⁽¹⁸⁾⁽³⁰⁾. These areas also have distinct histological features with double the number of Malphigian, Pacinian and Ruffini’s corpuscles, Merkel disks and “bare” nerves ⁽¹⁹⁾, and an increased electrical conductivity due to a range of factors, such as the skin being thinner, or an increased concentration of subcutaneous collagen (with strands to the fascia, pleura, and peritoneum). Built into the external pellicle of all species, in both the plant and animal kingdoms are methods for electromagnetic sensing, with the eyes of the higher species being only one way for receiving and interpreting electromagnetic radiation ⁽¹³⁾.

Fish have eyes and "ears" but they feel their way underwater, while sharks have electromagnetic sensors in their snouts for sexual attraction, and prey detection, as do the platypus and other monotremes. Polar bears will walk out onto the ice for miles, and then pound on the ice to get at seals underneath, which they can not see or hear but have detected them electro-magnetically. Snakes have infrared sensitive, scale covered pits around their mouths, similar to a primordial eye, but innervated by the trigeminal nerve, which in the snakes case leads to the optic centre. Moths have large antennae, and yet it is commonly proposed that they attract their mates by pheromones, diluted to millions of times in the air, and supposedly even working upwind. Electromagnetic signaling, being the method of all other intracellular communication, would seem to be a more logical answer.

It matters little whether we are discussing simply the plasma membrane calcium-ATPase pump being voltage gated, or the allosteric protein changing shape and therefore its absorption spectrum, we can now discuss all biochemical functions as a change in the electrical potential. We know we can change the shape and function of any cell by altering the pressure ⁽²¹⁾ or through the piezoelectric effect, the electrical potential ⁽³²⁾.

The interaction of 660 nm light with the skin (and subcutaneous collagen) at specific areas causes specific, reproducible systemic effects in the body. Collagen is becoming progressively recognized as being of extreme electro-physiological significance. Collagen is made up of primarily three amino acids: proline, hydroxyproline, and glycine. It is made up of a triple helix of three left hand strands woven into a right hand "rope" ⁽³¹⁾. It is bi-refrangent, piezo-electric, and pyro-electric. This unique structure of amino acids allows the collagen to change shape allosterically as different pressure or electromagnetic energy is applied to it, or conversely as it releases energy. It may be helpful to think of the collagen as a spring that can coil and uncoil in response to these stimuli.

The interaction of light with metallic side chains of the porphyrins in the wall of the mitochondria directly stimulates cyclic-AMP production ^{(9) (26)}, and causes nerve de-polarization by opening sodium gates ⁽⁹⁾. This impulse is then routed to the thalamus and hypothalamus, where the brain releases chemicals to travel to a specific area of the body via the blood stream. The relationship of various somatotopic maps in the brain (particularly in the thalamus and hypothalamus) as they relate to the anatomically identified nuclei is well known, as are the particular chemicals released from specific parts of the brain e.g. the middle or anterior pituitary, under the control of the hypothalamus. It is easily demonstrated that stimulation of specific areas of the skin cause the release of neuro-chemicals such as dopamine, nitric oxide, or the precursor of adreno-corticotrophic hormone and β -endorphin.

Discussion

In my (T.W.) practice, my technicians routinely treat pain and bleeding points prior to surgery, and points to wake the pets and control nausea post-operatively. In ignorance, it was not known that acupuncture wasn't supposed to work on a sedated or anesthetized animal. That myth has been disproven, as when the light is applied to surgical cases prior to or after they are sedated and or anesthetized, the same results are obtained. This demonstrates that the skin and subcutaneous collagen convey electrical messages when nerves do not. Numerous pets that have presented with symptoms of a cerebro-vascular accident have been treated, using photonic therapy. Any bleeding or intra-cranial pressure is able to be controlled and reduced virtually immediately.

A partial list of maladies that have been treated in small animals include hip dysplasia, facial paralysis, irritable bowel disorders, cervical and thoraco-lumbar inter-vertebral disc disease, non-specific vomiting and diarrhea, "hit-by-cars" and other traumas, caesarian sections, progressive myelopathy, strained or torn anterior cruxiate ligaments, parvo-viral gastroenteritis, feline hypertrophic cardiomyopathy with saddle thrombus, cystitis, thrombo-ischemic accidents and strokes, and feline urinary syndrome (atonic urinary bladders).

The skin is the largest organ in the body and has three main functions; protective, sensory and thermoregulatory. The last two functions are controlled by the Thalamus and Hypothalamus. Stimulate the skin in a given pattern and you stimulate the various (somatosensory related) nuclei in the hypothalamus. Underlying the skin is the subcutaneous collagen (the largest protein type in the body) which happens to be both piezo and pyroelectric. Touch the skin and it is the collagen, which transduces the pressure into an electrical potential change, to initiate

the message transfer to the brain.

In Piezo and pyroelectric crystals, pressure or heat cause distortion, and cause a separation of electrical charges, which is not a one way reaction, but a continuum in both directions. In all cases, tissue under tension is positively charged while it is negatively charged under compression. Therefore when you touch your arm with a finger the bottom of the depression produced is negative, while the skin stretched down on the sides of the "well" becomes positively charged, thus increasing the differential relationships.

As light is nothing more than visible electromagnetic radiation, from Einstein's equation ($E=MC^2$) we can see that light has mass as well as velocity, and when incident on the skin, light produces a "pressure"⁽¹²⁾, as well as changing the electrical potential of the surrounding tissue and subcutaneous collagen, and thus the function of the thalamus and hypothalamus.

We can measure with absolute accuracy our position on the earth's surface, via geo-positioning satellites, using invisible, imaginary lines of latitude, and longitude (that do not exist any more than the equator exists). The Chinese concept of acupuncture used meridians in the same way to map the body with areas of similar conceptual (non-factual) function⁽²⁷⁾. The mistake people make is they want to believe these meridians or channels actually exist.

We have measured the electrical potential of the skin at the site of injury. Our preliminary results show up to a half volt increase in the electrical field potential at the site of injury in the untreated injured animals, compared to the treated animals.

I can attest how photonic therapy and thinking in electrophysiological terms have revolutionized my practice. I learned early in surgery about the three T's of Time, Trauma, and Technique. I would like to propose a fourth T, the Torch. The first practice I worked in following graduation "covered" all of their elective surgeries with an injection of penicillin procaine G. I have since learned that is not necessarily a wise practice. However, they were very successful in spite of themselves because time and trauma were minimized and technique was maximized.

With over 20 years of continuous practice experience since graduation, to compare the results of using, or not using the torch, it is this change in experience that makes me now not perform any surgical procedure without using photonic therapy. The fact that bleeding and pain can be reduced, seromas prevented and post operative infections reduced as well as seeing a profound difference in the animals recovery, is strengthened by the fact that they are usually sedated when treated. Even if awake, animals don't know they're supposed to get better by having a 660 nm light shone on various points of their body.

In a recent article written by a Harvard trained M.D., PhD. Board certified neurologist, performed a retrospective study comparing time of recovery with varying levels of diagnostic imaging: office visit, office visit and X-Rays, pain relievers and muscle relaxants, MRI scans, and CAT scans, and surgery. He expected to find that higher levels of diagnostic imaging would result in quicker recovery. To his surprise, the patients that recovered the quickest received the lowest level of electromagnetic diagnostic imaging and treatment.

In America, coronary heart disease affects some 7 million people and causes 1.5 million heart attacks and 500,000 deaths per year. Approximately 300,000 coronary artery bypass graft operations are performed at a cost of about \$30,000 each or \$9 Billion total. Yet this surgery prevents premature deaths in only a few patients with the most serious heart disease ⁽⁵⁾.

While conventional “allopathic” medicine is extremely effective in treating infectious diseases and traumatic injuries, it is often ill equipped to handle complex, multifaceted chronic conditions. Such complex conditions require equally multifaceted treatment approaches. Photonic therapy allows a much higher level of practice of medicine and surgery without a huge financial outlay.

Studies report that some 42 – 67% of human patients seeking medical care either use or would like to try complimentary treatments if offered ⁽¹¹⁾⁽¹⁵⁾⁽²²⁾. These same people want complimentary medicine for their pets. It is important to ensure the client knows they are part of the team, and the common goal is to get their pet well, and not just to dispense medication that may have dangerous side effects, but has a great retail mark-up.

Conclusion

There can be no question that specific, repeatable physiologic responses occur when red (660nm) light is applied to the skin of an animal. A proposal has been offered to explain the mechanism of action. An argument detailing the claim of evidence based medicine has been proposed. Specific, documented case histories have been shared. The results, both expected and unexpected, have been documented.

The core message of this paper is that photonic therapy allows veterinarians concrete way of fusing their conventional skills with a set of complementary skills. Neither modality has all the answers, yet it helps practicing veterinarians render the highest quality service, while staying true to the first rule of medicine—“First, do no harm”.

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Corresponding Author – Dr. Terry R. Wood, D.V.M., Mustang Veterinary Hospital, 400/402 West Ste. Hwy. 152 Oklahoma 73064 Phone (405) 376 1320 email mustangvet@cox.net



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