Lowering high blood pressure naturally through intranasal light therapy

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May 2010

Introduction

This paper discusses light therapy, in particular intranasal light therapy as an evidence-based modality for lowering high blood pressure (or hypertension). The discussion is based on scientific theories supported by published literature and relevant empirical studies. It is not intended for marketing the devices in discussion here nor is this intended To make recommendation for medical intervention.

There are commonly cited causes for high blood pressure or hypertension. These include being overweight, smoking, stress, inactivity, high sodium intake, low potassium, alcohol consumption, age and the intake of certain drugs. However MayoClinic.com states that in 90 to 95 % of the cases, there is no identifiable cause. [1] This type of high blood pressure, called essential high blood pressure or hypertension, tends to develop over many years.

High blood pressure associated with high blood viscosity and red blood cell aggregation

Notwithstanding the various cited causes (or the lack of them), the symptoms that are associated with high blood pressure are high whole blood and plasma viscosity and red blood cell (or erythrocyte) aggregation. Simpson added that the compromised deformability of red blood cells is also a contributor to high blood pressure.[2] As far back as 1930 Harris and McLoughlin measured blood viscosity of men with normal and high blood pressure and concluded that in many cases, blood viscosity was a causal or a contributing factor in high blood pressure.[3] Similar findings were reported in 1966 by Tibbin et al who reported that both whole blood and plasma viscosity were higher in hypertensive subjects than in normotensives.[4] In his 1976 book, Dintenfass wrote, “But approaching this problem (high blood pressure) from the viewpoint of blood rheology, one cannot dismiss the possibility that the “unknown aetiology” might comprise, or be a result of, increased blood viscosity, increased rigidity of red cells, etc.”[5]

Letcher et al confirmed that blood viscosity was higher in hypertensives than in normotensives, and reported that this was due to higher levels of fibrinogen, which increased plasma viscosity.[6] Subsequently they reported that in borderline hypertension, increased blood viscosity was associated with higher hematocrits and plasma viscosity and greater red blood cell (RBC) aggregation.[7]

More recent studies by leading blood rheology researchers such as Shu Chien are consistent in their findings that blood rheology in the form of viscosity and RBC aggregation play a significant role in high blood pressure.[8]

Despite the many published studies that identify high blood pressure with high blood viscosity and RBC aggregation, little attention has been given to developing a therapy that would result in the reversal of

blood viscosity and RBC aggregation. Simpson argued that the medical experts have been unwilling to accept this information or exhibit a lack of interest because of the premise that high blood pressure is a disease entity although the causes are not clearly identifiable and can be attributable to natural factors such as aging.[9]

Natural non-drug remedies

Various natural non-drug remedies commonly suggested are based on dietary supplements such as Coenzyme Q10, omega-3 fatty acids, garlic, gingko biloba extract and evening primrose oil. For years, Russia and some European countries have been using low level laser therapy (LLLT) as a successful alternative therapy to improve blood rheology that results in lowered high blood pressure.

The reason that this is not widely known in North America is probably due to the fact that it has never been cleared by the health regulators in USA and Canada. The intervention that has been used by the Russians is invasive and involves inserting a catheter intravenously into the vein. See Figure 1 below.

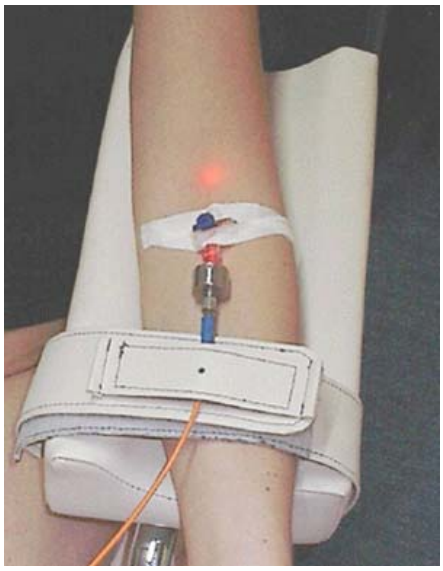


Figure 1: Original intravenous irradiation LLLT

Specific study on LLLT intravenous irradiation therapy on hypertension

A study that specifically used this method of therapy to test its effectiveness in reducing high blood pressure has found it to be effective. The method focused on reading the systolic blood pressure on 3 groups: normotensive (25 subjects with readings of less than 120 mmHg), pre-hypertensive (50 subjects with readings of 120-139 mmHg) and hypertensive stage 1 (50 subjects with readings of 140-159 mmHg). All groups were treated for 30 minutes with the intra-venous irradiation method described above deploying low level laser light with 630 nm wavelength continuously powered with 2.5 mW of energy at

the end of the intravenous fibre. Pulse rate, systolic, diastolic, and pulse pressures were measured before, after and 15 minutes after each treatment.[10]

The results were as follows: There was no statistical difference for the pulse rate, systolic rate, and diastolic blood pressure in the normotensive group. However, there was significant difference in the readings for the pulse rate, systolic and diastolic blood pressure in the pre-hypertensive group as well as for the hypertensive group.

In conclusion, the intravenous low level laser irradiation method as described above is effective in reducing arterial blood pressure. The authors suggested that it can be combined with anti-hypertensive drugs in pre-hypertensive and hypertensive patients as a modality of treatment. It is also a safe method for normotensive patients even though it appears not to improve the blood pressure readings.

The intranasal low level laser irradiation devices

It is remarkable that after thirty years since this method of therapy was first exposed to the public by the Russians there has been little change despite the period of rapid technological changes, and yet numerous Europeans get treated with this method every year.

Chinese scientists treated 100 patients with hyperviscosity with intranasal low level laser blood irradiation therapy for 30 min twice daily for five days, and found that blood viscosity, plasma viscosity, fibrinogen, erythrocyte aggregation index, erythrocyte deformability index and erythrocyte sedimentation rate decreased significantly. They concluded that the irradiated blood mediated the decrease in viscosity.[11] And as discussed above, this will bring down the high blood pressure.

The study was based on the same principles that MedicLights had based its invention on, going back 10 years earlier, the RadiantLife LT - http://www.radiant2life.com/specification.

The improvement that this device has made to the highly invasive original Russian based intravenous method in terms of user interface and convenience is game-changing. The principle is the same: illumination of the blood stream with low level laser of similar wavelength and dosage management. The theory is that the effect of these modality parameters is similar to the intravenous method. He major difference is that it fully leverages cutting edge semi-conductor technology to greatly miniaturize the needed equipment and the power, delivering the profound improvement in user experience. See Figures 2 and 3 below.

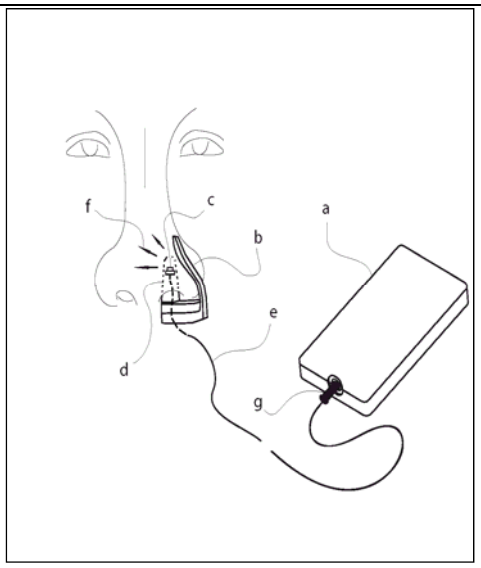


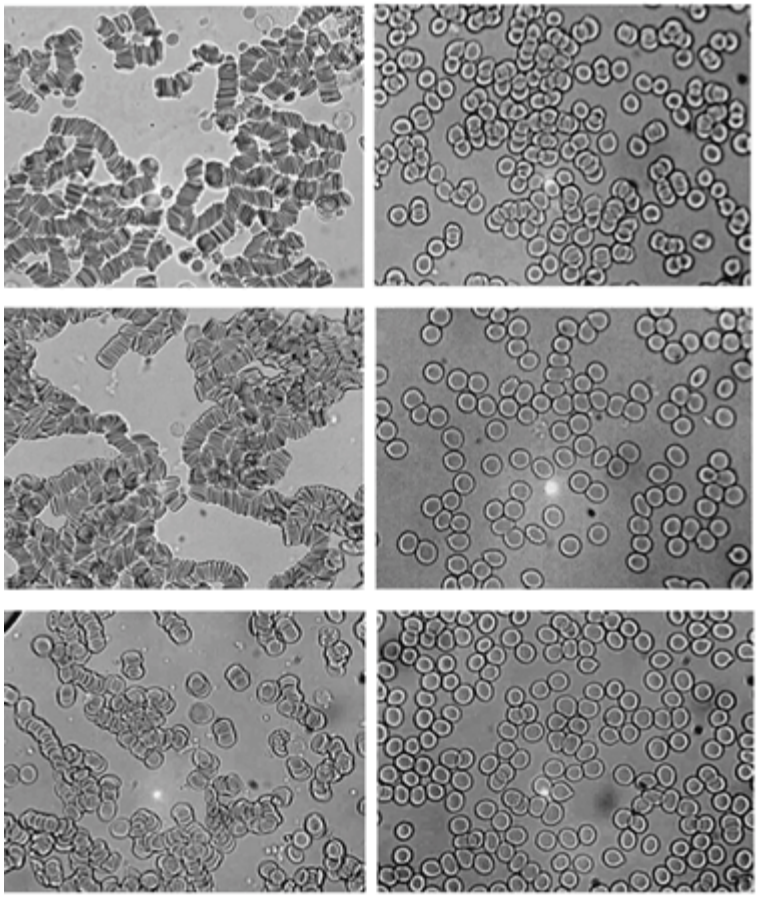
Figure 2: New LLLT device in use


Figure 3: Picture of new LLLT device

Explanations on how the device works

What are the explanations behind the reduction in high blood pressure from using these light therapy devices? A common factor among hypertension patients is high blood viscosity[12] and high RBC aggregation[13]. The LLLT irradiation reverses these abnormalities. Further, vascular walls also dilate (vasodilatation) to allow blood with these problems to maintain its rheological properties, addressing a common problem of aging - as we age, these walls lose their flexibility and the blood pressure increases, increasing the risk of cardiovascular problems. So based on studies, we know that LLLT treatment reduces blood plasma viscosity and disaggregates RBCs, reducing the pressure on the vascular walls. With these findings, LLLT should be a reliable treatment for high blood pressure.

The studies that are mentioned in this discussion show that high blood viscosity and RBC aggregation are often mentioned together as the elements of blood rheology that affect blood pressure, and RBC aggregation is seen as a cause of viscosity. Figure 4 below is typical of the impact that LLLT blood irradiation has on RBC aggregation.



Before 25 minute treatment After 25 minute treatment

Figure 4: Typical before- and- after pictures of aggregated RBC subjected to LLLT blood irradiation treatment.

From the visual evidence, it is apparent that RBC aggregation is reversed after the blood stream is illuminated with LLLT. That being the case, it can be concluded that the positive outcomes we obtain from this therapy come from its effect on aggregated RBC.

Empirical study

Based on an empirical study, the RadiantLife device is found to significantly reverse the aggregation of RBC with a single treatment, supported in 91 percent of the cases when some form of aggregation is present. In another 8 percent of the cases where it was observed that there was no change immediately after the 25-minute treatment, the blood samples do exhibit disaggregation when they were taken again following further waiting time of at least another 5 minutes. Therefore, we can say with sufficient confidence that disaggregation is achieved in 99 percent of the cases where RBC aggregation is present. Only in one percent of the cases did we observe the opposite effect.

The results between male and female subjects are very similar, suggesting statistical consistency and no gender bias.

With the above, we can establish that LLLT applied in this way lowers high blood pressure by its ability to disaggregate aggregated RBCs.

But what are scientific mechanisms behind this?

The theoretical explanations for LLLT disaggregation of RBC

The anti-inflammation theory

The presence of RBC aggregation is found to be due to the presence of macromolecular proteins such as fibrinogen and globulin.[14] Fibrinogen is the protein which is sensitive to inflammation and helps with the blood clotting function. It is a dominant factor in RBC aggregation.[15] Since inflammation is caused by an illness or disorder, one can attribute the presence of blood aggregation to the presence of an illness or a disorder. Therefore when RBC aggregation occurs, it means that the subject is at least not in perfect health.

When inflammation is reduced through LLLT, the level of fibrinogen in the blood will also be reduced. As the result RBCs will be visibly disaggregated.

Literature suggests that LLLT reduces inflammation through healing and regeneration actions, amongst which include stabilizing the cellular membranes[16], enhancing ATP production and synthesis which contribute to cellular healing[17], vasodilatation (dilation of blood vessels)[18], acceleration of leukocyte and lymphocyte activities to remove damaged cellular components and allowing for more rapid repair[19], and helps regenerate blood capillaries[20].

There is also a recent study suggesting that LLLT illumination "decreases the amount of inflammation and accelerates the wound healing process by changing the expression of genes responsible for the production of inflammatory cytokines." [21]

The photodissociation theory

Tests on rabbits established that hemoglobin is a primary photoacceptor absorbing low-intensity laser radiation of light of red and infra-red ("IR") wavelengths. The exposure of blood to this radiation causes clearly defined changes in the IR and visible absorption spectra of the blood and RBCs. These spectral changes arise as a result of partial photodissociation (breaking down of chemical compounds with light) of hemoglobin-ligand (substance to bind biomolecules) complexes in the process of absorption of laser radiation. It is suggested that photodissociation is a primary reaction that arises in blood exposed to a low-intensity laser radiation.[22] This result is the disaggregation of aggregated RBC.

The transient local heating hypothesis

Upon contact with blood, a substantial amount of absorbed red light energy is converted to heat, which causes a local transient increase in the temperature of absorbing chromophores (molecules responsible for their colours). This local transient heating of absorbing molecules is different from the general heating of the whole cell, tissue and organism as commonly imagined. The local transient increase in

temperature causes structural changes, and trigger biochemical activity that results in the disaggregation of RBC.[23]

The negative surface charge theory

Some researchers suggest that LLLT raises and restores the negative surface charge of the RBCs, rebalancing the play with electrolytes, and restoring their natural state of the RBCs repelling each other.[24]

Summary

In summary, there are several theories as to how LLLT would neutralise RBC aggregation. What matters is that LLLT is proven to succeed in disaggregating RBC.

Red light emitting diode (LED) as effective as LLLT

The key is in delivery of wavelength under controlled parameters. Although a large body of evidence supports low level laser in the red band of the light spectrum to deliver the above therapy, the key appears to lie in the wavelength of the light of around 633 nm as opposed to whether it is coherent (as in laser) combined with the energy dosage and time phase.

Renowned Russian LLLT scientist, Karu states that incoherent red LED is expected to perform the same way as LLLT as, "...the coherence of light is of no importance in low-power laser clinical effects and "the primary difference between lasers and LED's is that the laser's coherent beam produces "speckles" of relatively high power density which can cause local heating of inhomogeneous tissues".[25]

Although some proponents of LLLT argue that the coherent property of lasers is superior to the incoherent property of light from LED, initial testing by us with LED challenges this notion. We found that illumination of the nasal cavity using certain red LEDs with re-tuned dosage and time phase, appears to produce similar results of RBC disaggregation as with LLLT. This could be explained by the thin epidermal barrier and high sensitivity of the micro vascular networks in the nasal cavity which would accommodate a wide variation of light coherency.

Other studies

Other studies are not as directly relevant but provides additional support that LLLT has the effect of lowering high blood pressure. One study reports that an LLLT treatment on 42 men significantly lowered systolic, diastolic and mean arterial pressure. Total peripheral vascular resistance also decreased. A good hypotensive effect was achieved in 90.4% of the cases.[26] In another study, the effects of a low level laser on the control of blood pressure were tested via energy administered via the medulla oblongata. The results from a group of 30 patients suffering from hypertension were positive in 80% of the patients.[27]

Conclusion

In conclusion, credible scientific bases and evidence support LLLT and red LED irradiation of the blood for lowering high blood pressure. We can achieve this with the traditional intravenous irradiation of the

blood or through a more convenient modern method by illuminating the nasal cavity – the results are the same.

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