Confounders and magicians

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In advertising you will frequently find claims that a product is described as "optimal" or "ideal". This is strange, because too often a previous product from the same manufacturer was optimal, too. So how could it then be improved? Advertising is filled with meaningless words such as "technology", "recent", "proven". This is all part of the advertising jargon and since it is not illegal, we will have to live with it. Now and then sheer lies are used. A classical example is the beauty products tested by "The Swiss Vitamin Institute". There never was such an institute…

It is natural that a salesman wants to promote and ultimately sell his product and we cannot as a customer expect full objectivity. But pushing ones luck too hard will in the end be contra productive. The laser therapy market is no different from the cosmetic market; there are all kinds of salesmen ranging from the earnest ones to the sheer liars.

Let us look at some examples.

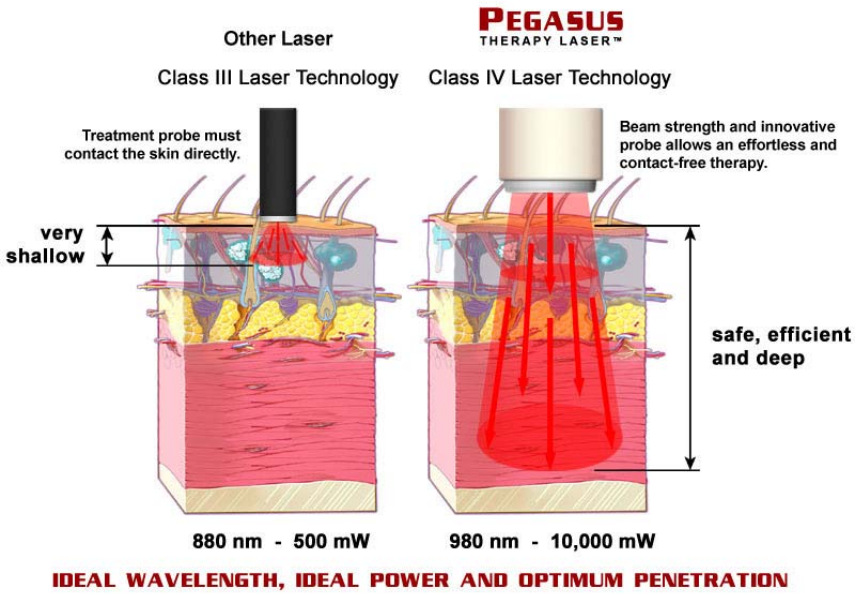
On "ChiroWeb.com" there is an article where Daniel Murphy, DC discusses an article by Dr. Wertz (associated with Avicenna Laser Technology Inc). That article it says: *World renowned Laser Therapy Experts, Jan Tunér and Lars Hode have indicated the advantages of high power laser therapy; "The (research) literature supports the hypothesis that higher power density yields better clinical results.* The Murphy article argues, however, that high energies are not necessary in laser therapy, and most effects are systemic, so low energies on one side of a body would also make the other side benefit. Well, the fact that we do have systemic effects could not be argued, but the extent of it could. The said article goes on:

Several times in his article, Dr. Wertz referenced Tunér and Hode in his support of using lasers with higher power and dosage, yet he fails to note that Tunér and Hode also make the following points: "Treatment with laser therapy is not based on heat development but on photochemical and photo biological effects in cells and tissues. [Lasers] cannot penetrate the tissue more than a fraction of a millimeter, so there is no other primary responding tissue other than the outer part of the dermis."

It is obvious that the Wertz article pleads for higher doses and energies in laser therapy but Dr Murhpy now tries to argue for the opposite. And so something odd happens! The sentence *"[Lasers] cannot penetrate*...indicates that a part of the original sentence has been edited. And quite some editing, too! Because the original sentence is "CO_2 lasers cannot penetrate…" This is something quite different. Some "[lasers]" can penetrate several cm into tissue depending on wavelength, type of tissue, power density and treatment technique. By removing "CO_2" the entire meaning of the sentence has been changed 180 degrees. Someone is manipulating the truth.

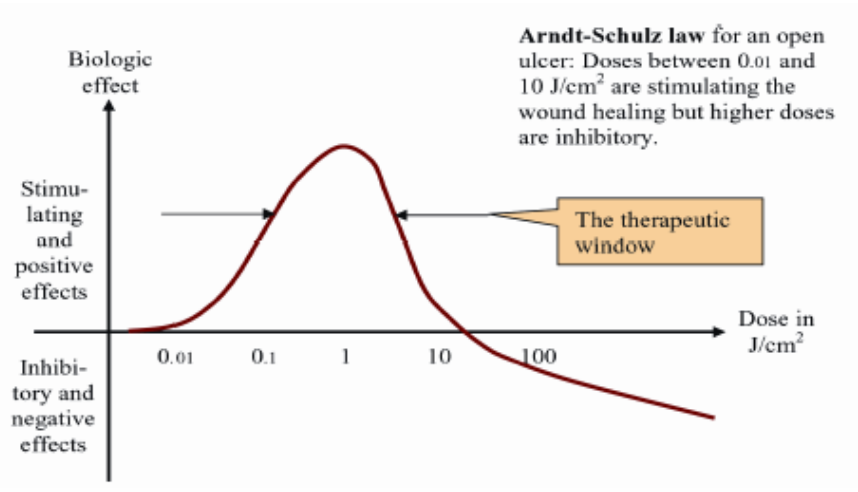
Now, let us have a look at the web site of the Pegasus laser. This is a 10 Watt "Low level laser", arguing the very opposite than the above proponent of very low doses. The advantages and disadvantages of Class IV lasers in phototherapy can be discussed, but certainly it cannot be fairly stated that lasers in the watt range generally are superior to those in the milliwatt range. Each may have a place, given the right conditions and application mode. But there is

something much worse in that web site. According to the web site the 980 nm wavelength has a superior penetration rate as compared to an 880 nm laser (which probably is supposed to be an 808 nm laser – one of the most common types, while 880 nm lasers are rare). And further to that, a 500 mW 808 nm laser is supposed reach only halfway through the skin. The truth is that the human body is much more transparent at 808 nm than at 980 nm, and even 880 nm has a greater optical penetration than 980 nm. Because the 980 nm has a lower penetration capacity, more energy is absorbed in the upper part of the skin and the risk for overheating is greater. So again, facts are turned around to adapt to sales strategies. The customer is supposed to be uneducated enough the swallow the bait.



Another company that uses the limited knowledge of their potential customers is Avicenna. The company claims that a Class 4 laser is much better than a class 3B laser. This is just non-sense. The classification is only regarding the possible risk for eye injuries and has nothing to do with the efficiency in treatment. It was a similar tendency in Europe in the eighties between lasers in class 3A and 3B. The classification is not only a question of output power; it has to do with wavelength, divergence of the beam, emission area, pulsing etc.

Regarding high power lasers: it is not so that high power simply is better than low power. Looking at e.g. the dose, there is a dose window, described by Arndt-Schulz diagram, within which the positive biological effects occur. See figure beside. With the stronger lasers it is easier to give in-optimal doses and also a greater risk to burn people on pigmented skin, dark hair follicles, tattoos etc. Let us say that you want to give a surface of 1 cm^2 a dose of 10 joules/cm^2 (quite high dose). With a 10 watt laser this takes one second in treatment time. If you want to give 2 joules to the same are (typical dose), it takes 0.2 seconds.



This is a dose (energy density) response curve and there is a similar one for the power density.

A certain power is of course necessary, but too much costs just more money and does not give better results. For most of the about 100 laser producing companies in the world, it is easy to make strong laser (we regard lasers with output power exceeding 1 watt as unnecessary strong lasers). Most of them have much more experience in this field than Avicenna and produce more optimal lasers. Class 4 lasers for phototherapy is not new and not innovative, such lasers have been on the market for years but used for other indications. Avicenna claims that their laser reaches down up to 10 cm (four inches) and that not correct.

The above criticism is directed towards the gross generalisations of vendors of Class 4 lasers, not necessarily against Class 4 laser per se. These lasers in themselves have advantages and limitations and future research will hopefully pinpoint them.

Our last example can be found on the Erchonia web page. A video demonstrates how a frozen shoulder is "fixed" within seconds, using a 10 mW diode laser with expanded beam of red light. Not only that the power density of the beam is very low, the optical penetration through skin is also low and the dose in J/cm^2 is homeopathic. But even worse: the therapy is performed through the clothes! So in fact, practically no photons reach the skin over the target area and certainly no photons ever meet the target. Whatever the "magic trick" is, it is not performed by the laser. The Erchonia Company should contact James Randi and claim his 1 million USD prize. It´s magic!

Laser therapy has been working against the wind for decades. A major reason for the first rise and fall of laser therapy was the laser hype in the 80ies, when HeNe lasers in the <1 mW range were marketed. Slowly the positive clinical effects seen have been confirmed in high quality research and the therapy is gaining scientific credibility. It now appears that another hype is hitting the United States and it could very well send laser therapy back to the backyards of the medical clinics, once again. We urge manufacturers and salesmen to stick to physical facts and scientifically proven claims. This is good enough for selling the medicine of the future. And to remain on the market even in that future.