TERMINOLOGY . . . AGAIN!

It would appear that all of the pleas contained in the Editorials for this journal are falling on deaf ears, or blind eyes, to be more precise. The author still hears at national and international congresses the incorrect application of hardware related terms to the treatment effect which the hardware produces in the target tissue. 'Soft laser' is perhaps one of the favourites, and we must look to the manufacturers here to lead the way: calling a system a 'soft laser' has all sorts of marketing connotations, which are designed to attract both customer, and the customer's patients. Can a 'soft' laser really be dangerous? By inference from the name, no. Can a 'cold' or 'cool' laser be harmful? Of course not, because there is no heat involved, and so the laser is safe, and easy to use. The 'low-power' laser is completely a misnomer, as is the 'mid' laser. To all manufacturers reading this, I ask simply that you look at the scientific basis behind each name, and ask yourself; 'What does the name refer to?' In all of the above cases, the name refers to the *laser system*: the hardware. It has nothing to do with the effect the energy beam produced by the system has when it is incident on target tissue. It is this effect, whether produced in living tissue *in vivo* or in living cell cultures *in vitro* which must concern researchers and clinicians alike. It must also concern manufacturers: this effect is what they base the claims for their systems on, not the nuts, bolts, tubes and diodes of the system itself. It is what comes out of the system, in the form of a beam of laser energy, and how the beam of light energy affects and interacts with the target tissue that is really important.

It is for that reason that we adopted the term 'Low reactive-Level Laser Therapy (LLLT)'. We have in fact heard other equally scientifically-acceptable terms, such as 'low incident energy laser irradiation (LELI)', and 'low level irradiation therapy (LLIT)'. In both those terms, the therapy is the important fact, not the laser generating the energy which is producing the effect in the target tissue. Please, even if you do not accept the semantics of our 'LLLT'—and I must say that in the aftermath of the Okinawa Congress, more and more researchers and clinicians are—do not confuse already muddled waters by using scientifically and logically unacceptable terminology. Please let us banish the soft, mid, cool, cold, low-power, mid and low energy lasers from our written and spoken reports and presentations.

Parameters—Again

Having banned these terms as the equivalent of the 'four-letter words' in our writing and oral reports, then let us accurately and concisely provide our fellow researchers, and most importantly, our sceptical fellow researchers, with the means to duplicate our experiment precisely. Without full, accurate and consistent reporting of parameters, the results obtained by different research groups will never be the same: having said that, I must also urge the groups who are doing the duplicating to follow religiously the materials and methods section of the experiment they are trying to prove or disprove. Adherence to this simple principle will help to avoid the confusion of results we hear. 'HeNe LLLT increases/decreases/does absolutely nothing to the evoked potential in an animal model sciatic nerve'. 'LLLT increases/decreases/has no effect on the production of ATPase in nerve tissue cells irradiated *in vivo*'. These are only two of the controversies currently raging. 'Laser is important/Laser is not important/polarization is important/wavelength is important' are also very common arguments heard at congresses and in papers: however, they are basics, and are fundamental to the correct understanding of what LLLT is or is not. Perhaps 'Low reactive-Level Laser Therapy' will become 'Low reactive-Level Light Therapy', fortunately they will share the same acronym!

In Vitro versus *In Vivo*

However, considering the difference in photon density between incident laser energy and incident incoherent but monochromatic light energy, the reader must surely see that although the laser beam is scattered and diffused in the first few layers of cells, all the photons were going in the same direction to start with, and were perfectly in phase, and of course there were more of them. It is reasonable to assume that more of them will get through to where they were originally targeted than the noncoherent but monochromatic light source. The argument that laser and nonlaser sources have the same effect in monolayer cell cultures, therefore coherence is not a factor in LLLT is of course undisputably true for the monolayer of cells in its homogeneous culture, but what about the multilayer, inhomogeneous mass which is tissue? Can results gained in *in vitro* experiments be extrapolated into *in vivo* work? Dr Tiina Karu of the USSR was asked this in Okinawa, and she answered with a flatly unequivocal 'No'. Does this mean that we

should abandon *in vitro* work? Of course not, but we should stop holding the results from *in vitro* work up as a perfect mirror for what happens *in vivo*. I am happy to say that I have stated the foregoing on a number of previous occasions in these editorials, and elsewhere. Let us please continue to study individual cellular reactions in an

in vitro environment, but please let us also remember that the brain as 'mother computer' controls, nurtures and nourishes these cells, and they may well behave quite differently in their *in vivo* environment.

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