

Research - The Therapy for the 21st Century-Available Now!

By Fred Kahn, MD, FRCS(C)

An Overview

Currently the key word in therapeutic solutions is "managed" care. This term, lauded by politicians and the corporate sector with equal enthusiasm, purports to maximize efficacy in health care delivery for the consumer with limited cost to the provider. Administered by legions of managers, sales personnel, and financial institutions, in essence it siphons off an ever-growing segment of the health care dollar, which due to financial constraints is already diminished. Where will it all lead? Of two things we can be certain: restricted access and erosion of quality. Still, there is hope on the horizon with emerging technologies such as low intensity laser therapy, particularly in the treatment of arthritis and musculoskeletal pathologies. This therapy is highly effective, totally safe, non-toxic, and easy to administer. If it is not the ideal therapeutic resolution, it certainly is a leading candidate for that title.

Multiple advances with regard to the technology have been achieved in recent years. This has been stimulated by improved basic scientific research as conducted by Professor Tiina Karu at the Laser Institute of the University of Moscow; research in application such as conducted by Dr. David Baxter, Professor of Rehabilitative Science at the University of Ulster, Northern Ireland; and the development of advanced therapeutic systems.

The availability of superior, inexpensive laser and superluminous diodes and synergies molded by companies, combining clinical concepts with the appropriate engineering, have been an additional and significant component of the advance.

Mechanism of Action -- How Does It Work?

A range of laser therapy-mediated biological and physical effects have been reported which explain the observed clinical effects of these devices. These effects include: modulation of various cellular events in vitro¹ (e.g., increased cellular proliferation, altered respiratory burst, and apparent modulation of growth factor release); a variety of physiological effects in vitro and in vivo ranging from altered synaptic activity and nerve conduction to modulation in limb blood flow. Controlled laboratory pain studies in both humans and in animals have indicated significant hypoalgesic effects of laser therapy and combined photo therapy/laser therapy when applied at appropriate irradiation parameters.² Evidence from animal studies would further indicate that such pain relieving effects are, at least in part, opiate-mediated. Finally, while nerve conduction studies (in vivo and in vitro) would indicate that direct stimulation of large diameter fibres at therapeutic intensities is unlikely, suppression of activity in smaller diameter might represent an important antinociceptive mechanism underlying the pain relieving effects of these devices.³

The photon bombardment of cellular molecules results in energy absorption by cytochromes and chromatophores in tissue. In essence, light energy is converted into biochemical energy.

Current Applications

Laser therapy has found applications in physiotherapy/ physical medicine for the management of musculoskeletal conditions (including acute and chronic pathologies, i.e., lateral epicondylitis, tendiopathies, and muscle tears), in patient and community nursing for the management of wounds (particularly chronic ulceration, e.g., venous ulcers and pressure sores), and in veterinary medicine and dentistry. While in many cases good evidence to support such applications from well-designed and executed clinical trials is somewhat lacking, controlled clinical research is underway at several international centres. It is hoped that these studies will help to definitively establish the indications for and efficacy of this promising modality. Current evidence in support of the modality finds it superior to most other currently employed electrophysical agents, e.g., ultrasound and electrical stimulation.

Current Situation

The term "laser therapy" is commonly used to describe the therapeutic application of laser and monochromatic light sources at relatively low output powers (usually in the 10-1000 milliwatt range), principally for therapy of multiple tissue pathologies, including those in the musculoskeletal field and for healing wounds and other tissue dysfunctions. Such therapy is based upon the observations of Endre Mester. In the early 1970s he first reported photobiostimulation of wounds as a result of helium neon laser irradiation, first in experimental animals and then in humans. Since these early reports, the therapy has become a popular treatment choice for a variety of clinicians: physiotherapists, dentists and physicians, most notably in the countries of the former Soviet Union and in a number of centres in Europe.⁴ In these intervening years, the technology has progressed somewhat from "first generation" treatment devices (based upon gaseous media such as helium neon), through the use of diode-based "second generation" units, to the currently popular "third generation" multi-diode arrays. To date, however, no laser therapy device has received FDA approval for a single application.

A new system is scheduled to be available to the market by April 1997, and represents the fourth generation of treatment devices. Apart from its exceptionally high standard of design, the three principal advantages it offers are:

- 1)** The flexible diode array offers for the first time a treatment head which can be molded to the contours of the target tissue, ensuring optimum levels of irradiance, dosage and (ultimately) clinical effects and benefit. Because of the contour of certain areas of the body (e.g., the malleolus), clinicians using the currently available rigid "cluster" arrays find that they must resort to the use of single diode probes to provide treatment; such treatment is labourious, time consuming and is obviously less standardized.
- 2)** For the first time in any commercial system, the output of the unit is continually monitored, and other treatment parameters adjusted to ensure standardized dosages. This will also represent an important feature for the machine in complying with European and other regulations.

3) The unit is PC controlled providing the operator with recommended protocols for a variety of conditions, plus packaged "standard" protocols" for those conditions not covered. These protocols will represent a significant innovation, not least because of current criticisms (by skeptics and users alike) of the lack of established or recommended protocols in users' manuals. It is planned that such protocols will be regularly updated by incorporation of research findings and users' feedback.

Low energy laser therapy can be used alone or combined with other therapy such as manipulation, massage, active, or passive exercise.

On the basis of recent developments, it is certainly the contender for the title of "ideal therapy for the 21st century."

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