

Harnessing electromagnetic energy for healing

Dr Gordon Atherley examines electromagnetic energy for its risks and benefits to patients, and its implications for pharmacists

MEDICAL SCIENCE IS CONSTANTLY ON THE ALERT FOR harm from the things relied on in the care of patients, and always looking for more and better ways of delivering the benefits of these things. One of those things is electromagnetic energy, and one of its benefits is in the healing of wounds and ulcers.

Electromagnetic energy brings so much benefit in the form of everyday things that it supports and that healthcare depends on. But it is also the agent of harm. Through painful experience and meticulous research extending over a century and more, healthcare learned how to avoid the harm so the benefits could be delivered safely and effectively.

Once the things of harm and safety are understood, medical science turns to the best of modern technology to deliver safe and effective electromagnetic energy devices to healthcare. And, thanks to the technology, the devices get smaller and more convenient for use not just by health professionals, but also by patients themselves.

Enabling patients to administer their own treatment is now part of one of healthcare's most important strategies – enabling patients to take charge of their own healthcare. For that strategy to succeed, patients must have very good reason to trust the devices they use.

Which is why healthcare's safety legislation is so important, why sound product information is crucial, and why health professionals like pharmacists have such an important responsibility to advise patients in search of help with their health problems.

In giving advice to patients, terminology is a challenge because, on the one hand, electromagnetic energy is a complex topic in a major field of physics and therefore highly dependent on advanced mathematics and, on the other, is the subject of the sometimes arcane nomenclature of the clinical world.

Electromagnetic energy is radiation that travels and spreads out as it goes. It includes visible light from a light bulb or the sun, radio waves from a radio station, microwaves from a microwave cooker, infrared rays from

hot objects, ultraviolet (UV) light from devices and the sun, and X-rays and gamma-rays from complex, powerful machines.

An *electromagnetic field* is the zone through which electromagnetic radiation is passing. In the zone, the radiation can pass steadily or as a series of pulses.

Scientists describe electromagnetic radiation as a stream of *photons*, weightless particles each travelling in a wave-like pattern and moving at the speed of light, and each containing a certain amount of energy.

The amount of *energy* in the photons is what differentiates the various types of electromagnetic radiation. Radio waves have photons with low energies, microwaves have a little more energy than radio waves, infrared has more, and UV still more, while X-rays and gamma-rays are the most energetic of all.

The energy determines the effects of electromagnetic radiation on living tissue. Radio waves have almost no effect; microwaves, infrared, visible and UV radiation cause heating that, in excess, burns the tissues. At the highly energetic end of the spectrum, X-rays and gamma-rays cause damage to living cells because their energies are powerful enough to break chemical bonds in the substances of the cells. The damage interferes with the cells' ability to perform their normal activities and to reproduce themselves.

Alongside the harm springs the benefit. Take that most natural of things, sunlight. Laden with UV energy, too much sunlight causes severe skin burns and tanning that turns to an especially malignant cancer, melanoma.

But sunlight stimulates production of vitamin D (actually vitamin D₃) and too little sunlight is associated with vitamin D deficiency. The dynamics of the vitamin's relation with sunlight demonstrates that, through its beneficial effects on living cells, electromagnetic radiation brings clear and demonstrable benefits to health.

Take, too, the highly energetic radiations. X-rays gave medicine one of its most important diagnostic tools, and some of its most sinister threats. One of these was

discovered in the 1960s by Oxford epidemiologist Dr Alice Stewart. Her research showed that a single X-ray during the first three months of pregnancy doubled the rate of childhood leukemia. Medicine quickly abandoned X-rays during early pregnancy and ultimately at any time during pregnancy.

Initially, researchers attributed the beneficial effects of electromagnetic radiations to heating of the tissues. But in the late 1930s, researchers discovered that, though pulsing of the radiation allowed the heat to dissipate in the tissue, the beneficial effects persisted.

Over the years, pulsing became the method of choice for applications for wound and ulcer healing. Now the beneficial effects are attributed chiefly to the tiny electrical currents that the electromagnetic radiation induces in the cells. But the possibility remains that heating locally in the tissues may also stimulate blood flow, with beneficial effects.

One particularly important application of pulsed fields of electromagnetic energy, termed *pulsed electromagnetic field (PEMF) therapy*, is for the healing of wounds and ulcers. Research shows positive results¹ in many careful studies.

Ulcers are effectively wounds that will not heal. Venous ulcers, diabetic foot ulcers and pressure sores (bed sores) fall into this category. Trophic ulcers, which result specifically from the loss of the small nerves of the skin and that occur with diabetes, have also been researched in various studies^{2,3} with encouraging results. Chronic furunculosis, a staphylococcal skin infection involving hair follicles, also responded well⁴.

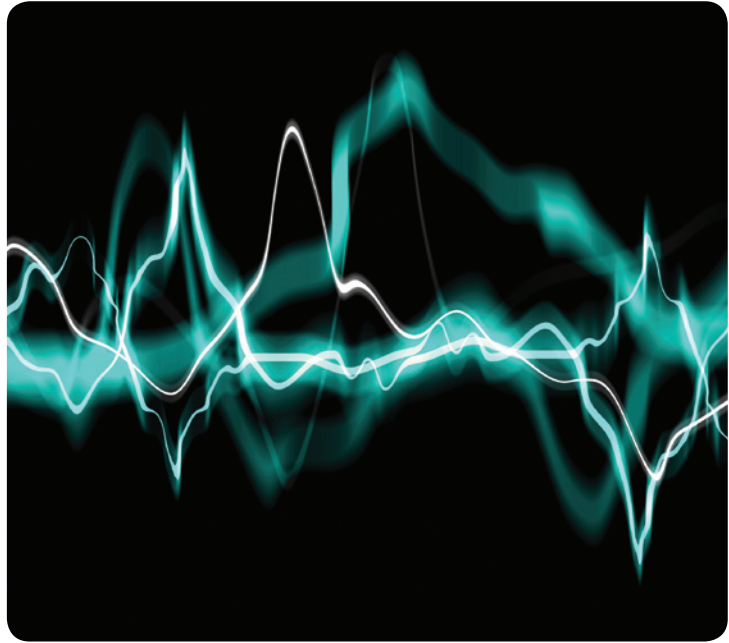
Pulsed electromagnetic field therapy appears to have beneficial effects on physiological processes as well as specific conditions, including lower limb disease⁵, general venous insufficiency⁶ and venous insufficiency of extremities⁷, where malfunction of physiological process and such diseases may exacerbate the challenge to effective wound management.

Pressure sores are one of the most common problems experienced by carers of long-term patients. Extensive research into pulsed electromagnetic field therapy⁸ shows that great relief can be delivered without the need for painful and embarrassing dressing regimes.

Recognition of the benefits became official in the US in 2004 when Medicare, the US government-funded healthcare plan for some citizens, approved electromagnetic therapy for Stage III and Stage IV ulcers. Not yet recognised by the National Health Service, it is prescribed by specialist GPs in Britain.

But there's another equally important form of recognition. In the UK and many other countries, safety legislation requires medical devices to be licensed. Those that deliver pulsed electromagnetic field therapy are generally licensed as a Class IIa Medical Device.

Healthcare as a whole and, therefore, patients and healthcare personnel rely on the Medical Devices Directive 93/42/EEC to assure them that the devices depended on for assistance in diagnoses and provision of care can be



sold only when these have successfully passed review to assess their safety, efficacy and quality, and that any such products that prove dangerous in use are restricted or withdrawn.

And healthcare and its patients depend on the professionalism of its professionals. Pharmacists who offer medical devices as well as drugs in their practice bear the particular professional responsibility of helping patients decide between drug-based and drugless therapies.

In advising their patients, pharmacists and, of course, all healthcare professionals should be familiar with the warnings to patients given in the instructions that accompany the device. They should check carefully to be sure that precautions are clearly spelled out and that the patient is able to understand and follow them.

In pharmacists' discussions with patients, cost is often one factor to be explored. In the short-run, prescription and OTC medications will likely be less costly to the patient than medical devices. But the question of cost must be examined in the long-run context of the adverse effects of medications, especially the more powerful ones – in other words, a safety issue. In such matters, the duty of the pharmacist as a healthcare professional is clear: the best interest of the patient, which includes safety, reign supreme. □

Full references are available with this article at www.thepharmacist.co.uk

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