

NEW CONCEPTS IN WOUND HEALING AND BEYOND

Jesse Ross, D.Sci.

The Space Age has rocketed medicine into new technologies. Unlimited vistas have opened in genetics, diagnostics, and therapies. Although since 1799 there has been medical experimentation with electricity, only recently has electromagnetic energy been identified as the basis of life itself. For centuries the medical profession relatively ignored the electricity of the body for therapeutic purposes, although it was accepted for diagnostic purposes, i.e. EEG, EKG, etc.

Medical equipment is indicative of the advances in medicine. Lasers of all types, MRI, Sonograms, etc. have become household words.

A micro-pipette developed by NASA opened a new world, that of measurements of electrical and electromagnetic potentials in living tissue. Studies have revealed the membrane potentials on cells; it is possible to accurately substantiate the differences between damaged cells and normal cells.

It must be emphasized that this discussion concerns non-thermal, non-invasive high frequency high peak power electromagnetic energy (Diapulse Wound Treatment System), which is in the safe range of the Spectrum, with NO contraindications following years of research.

How Does the Body Respond to Trauma?

The first reaction to stress is electrical, the second is electro-chemical, and the third is chemical.

The first can be illustrated by placing both hands behind your back, having a colleague prick one finger with a needle. You will immediately identify the intrusion because the brain received instantaneous information through nerve endings. The brain, by electrical transmission, orders all responses that are required by the traumatized tissue to restore normal function, including blood flow, antibody requirement, enzymes, proteins, etc.

The electro-chemical reaction is a local defense response to maintain stability in the area, to block infection, assist in containment of excessive bleeding, and initiate the healing process.

The chemical response is the final healing phase, with the return of normal electrical, metabolic, enzymatic balances, re-establishment of blood flow and formation of new tissue.

What Is Involved in the Healing Process?

Edema

When a cell is damaged due to burn, laceration, contusion, abrasion, or surgical intervention, there is a depolarization of tissue. When this occurs, there is a slowing down of the RNA, DNA synthesis and sodium pump. Due to the increased cell permeability, sodium and water enter the cell creating edema. The cell membrane changes polarity. The reason for this reaction is that the body seeks to repolarize tissue. Sodium and water are excellent electrical conductors, and by the creation of edema, cause pressure against the cell walls of healthy cells. This creates a piezoelectric response and allows the healthy cell to transfer negative ions, thus causing restoration of the negative charge on damaged cells. Once the damaged cell is repolarized, by re-establishing its negative potential, sodium and water leave,

and potassium is allowed to pass freely through the cell membrane and the polarization of tissue returns to proper balance. At this time, healing can proceed.

By placing damaged tissue in Diapulse's electromagnetic field immediately following injury, the body repolarizes damaged cells rapidly. The elimination of edema is most dramatic in cases of acute traumatic injury. Edema creates pressure on capillary and micro-circulation in the area of involvement, retarding healing. Elimination of edema is necessary for the healing process and to prevent development of a chronic problem.

Hematoma

When trauma is induced in any area of the body, hematoma develops. Due to damage there is disruption of capillary and micro-circulation (as well as major blood vessels, with deep trauma), mast cells in that area produce histamine which inhibits leukocytic reaction. When the body has produced sufficient platelet and prothrombin reaction, the same mast cell will produce heparin, which accelerates the activity of the leukocytes in phagocytosis of the hematoma. Delay in removal of the hematoma results in formation of fibrinogen, which creates scar tissue.

Diapulse therapy increases platelet production and prothrombin reaction, causing the mast cell to bypass the histamine stage and heparin is produced immediately to accelerate leukocytic activity in the absorption of hematoma. Therefore, very little or no scar tissue is formed in the wound area.

Blood Flow

Injury or pressure cause interruption of blood flow, which must be re-established as quickly as possible. Blood flow — not blood volume — increases oxygenation of tissue, vitally necessary for healing. The Diapulse parameters of high frequency high peak power electromagnetic energy increase blood velocity. When exposed to this energy, the various constituents of the blood align in chains, like cells with like cells. It can be compared with traffic on a multi-lane highway that moves slowly when vehicles continually change lanes, and with traffic that stays in specific lanes. The latter can move at a greater speed. Research at the University of Pennsylvania proved that the speed of the blood is increased by 1.75 times the testing pulse, with no hyperpyrexia, increase in temperature, or contraindications, with the use of Diapulse.

Additional Physiologic Responses in Healing

Diapulse, with its specific parameters, has been reported to increase:

Fibronectin	Connective tissue which gives strength to tissue healing in the wound; synthesized in the liver
Mitochondria	Energy levels within the cells
Enzymes	Required in healing
Hepatocyte reparatory processes	Increase conclusively without necrosis or damage to the hepatocyte structure

Animal Studies

Baylor University, Houston TX, using Diapulse, reported acceleration of wound healing by more than 50% when compared with untreated controls:

Measure	Treated	Untreated
Transverse alignment	3 days	8 days
Collagen formation	6 days	Did not appear within 10 days
WBC infiltration	24 hours	3 days
Phagocytosis	24 hours	4 days
Histiocytic activity	48 hours	4 days
Fat activity	48 hours	5 days
Hematoma canalization	3 days	7 days

Accelerated nerve tissue regeneration was reported by Britain's Royal College of Surgeons, Leeds University, and New York University. Extensive additional animal research published on Diapulse technology demonstrates its safety and effectiveness and pre-dated human studies.

Clinical Applications — Peer-Reviewed Published Studies

Double blind and controlled studies as well as case reviews, all from leading medical institutions and published in peer-review journals, demonstrate the value of utilizing this non-invasive, safe technology.

Head Trauma and Coma

Medical College Hospital, Trivandrum. Controlled study of 200 cases (100 treated, 100 control). Rapid resolution of brain edema without side effects; patients brought out of coma within ten days. Treated group showed marked improvement on the Glasgow Coma Scale. CT scans confirmed elimination of cranial edema in treated cases with no change in controls. Published: Neurology India.

Spinal Cord Injury

Medical Academy, Warsaw University. 97 patients with crush injuries of the spine, admitted within 24 hours post-injury. All patients improved; 40% recovered completely. Results exceeded those obtained previously with other methods.

Burns

Clinic of Plastic Reconstructive Surgery, Post Graduate Medical School, Bucharest. Over 2,000 patients with traumatic lesions before and after surgery. Deep burns of face and hands, smoke inhalation burns, severe extensive burns, and radionecrosis. Enzyme studies confirmed objective healing benefit. Conclusion: data demonstrated beneficial effect of Diapulse on traumatized tissues.

Hand Injury

Guy's Hospital, London (Accident & Emergency). 230 patients, half treated half controls. Improvement in treated group in swelling, disability, and pain was more than three times that of controls. Randomized trial with statistically significant results.

Foot Surgery

Civic Hospital, Detroit. Double-blind study of 100 patients. Statistically significant reduction in postoperative edema, erythema, and pain. Treatment administered safely through surgical dressings and plaster casts. Published: Journal American Podiatry Association.

Orchidopexy (Pediatric)

Queen Mary's Hospital for Children, Carshalton. Double-blind trial, 50 boys aged 18 months to 12.5 years. Statistically significant increase in bruise resolution and healing rate. No side effects. Published: Zeitschrift Fur Kinderchirurgie.

Donor Sites

Wordsley Hospital, Stourbridge. Randomized double-blind study, ages 15-65. Approximately twice as many patients healed in 7 days with active treatment vs. placebo. 30-minute treatments applied every 6 hours for 7 days. Conclusion: reparative processes clearly accelerated.

Pressure Ulcers — Stages II and III

Veterans Administration Hospital, Castle Point NY. Randomized double-blind study, 30 spinal cord patients, 12-week follow-up over 2 years. 30-minute treatments twice daily. Conclusion: Diapulse safe and accelerates wound healing in SCI patients with Stage II and III decubitus ulcers. Published: Wounds journal. Goldwater Memorial Hospital, NY. 22 patients with non-healing Stage II (mean 8.22 weeks) and Stage III (mean 34.62 weeks) pressure ulcers. All ulcers completely healed: Stage II mean 2.33 weeks; Stage III mean 8.85 weeks. Economic evaluation showed cost savings of more than \$65,000 for these 22 ulcers in a 9-month study.

Diabetic Ulcers — Stage IV

Gouverneur Hospital, NY. Total healing of Stage IV diabetic ulcers allowing limb salvage. Therapy can be unattended; no electrodes or accessories needed; energy penetrates surgical dressings — all reducing nursing time.

Traumatic Injuries — Sprained Ankles

Brooke Army Medical Center, Fort Sam Houston TX. Randomized prospective double-blind study, 50 Grade I and II sprained ankles. Reduction in swelling 4-fold greater than placebo after one treatment. Twice as many treated patients reported pain reduction. No change in tissue temperature or skin sensation — patients could not determine if receiving active treatment. Published: Military Medicine. Leeds General Infirmary. 20 placebo and 20 treated, severe ankle inversion injury within 36 hours. Diapulse statistically significant vs. placebo on swelling, disability, pain, and total scores.

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