

Author of the *New York Times* bestseller

THE BRAIN THAT CHANGES ITSELF

The Brain's Way of Healing

REMARKABLE DISCOVERIES
and RECOVERIES from the FRONTIERS
of NEUROPLASTICITY

**NORMAN
DOIDGE** MD

The Brain's Way of Healing

Remarkable Discoveries and Recoveries from the Frontiers of Neuroplasticity

Norman Doidge, MD
2015

Chapter 4

"Rewiring the Brain With Light" "Using Light to Reawaken Dormant Neural Circuits"

"We require light to flourish." Laser light is used to treat:

Alzheimer's
Angiogenesis
Autoimmune diseases (all of them, including rheumatoid arthritis and lupus)
Bell's Palsy
Bone repair
Brain Injury / Concussion
Burns
Cancer
Cardiac disease
Circulation improvement
Collagen fiber growth
Degenerative osteoarthritis: "cartilage has been regenerated by laser therapy"
Depression
Diabetic ulcers
Eczema
Herniated discs
Herpes
Immune system
Migraines
Neonatal Jaundice
Neurological Problems
Nerve injuries
Psoriasis
Psychological Problems
Rheumatoid arthritis (28 visits)
Scar tissue (abdominal) and postsurgical adhesions
Shingles
Stroke
Tinnitus
Traumatic brain injury
Wound Healing

“Our bodies are filled with numerous light-sensitive chemical switches and amplifiers.” “Light turns on chemical reactions within living organisms.”

“We think of our skin and skull as absolute barriers to light, but that is wrong.” “Human encounters with light are more than skin deep.” “Our bony skulls are not sealed vaults and the brain evolved to constantly appraise and interact with light.” The energy from light needs only to get into the blood to influence physiology.

Neonatal Jaundice is caused by excess bilirubin. The excess bilirubin is broken down by the “wavelengths of visible blue light—passing through the babies’ skin and blood and perhaps the liver too—had caused this marvelous curative effect.”

“Full spectrum light could be as effective as medication for some depressed patients, with fewer side effects.” “And if sunlight influences mood, it influences the brain.”

A 2-year chronic shoulder problem was cured. “The laser was a low-intensity laser, not the ‘hot’ high intensity kind that can burn.”

By 1965 it was known that low-intensity lasers could heal and promote the growth of collagen fibers.

Low intensity lasers (also called soft lasers or cold lasers), “promote healing.” “They give off little or no heat and work by producing changes in cells, mostly by helping sick cells to energize and heal themselves.”

“Einstein showed that the color of light is a measure of how much energy it contains.” The violet wavelength “contains the most energy.”

A 1-watt laser is thousands of times more intense than a 100-watt light bulb because the photons are coherent (of single direction) and monochromatic (of one wavelength/color).

“A laser probe can deliver much more power than LEDs.” [light emitting diodes]

“The frequency most often used for laser healing is red light.”

“Unsightly scars called keloids could also be improved, as could the normal sagging wrinkles of aging, because lasers trigger the development of collagen tissue.”

“Low-intensity lasers can help scar tissue heal normally.”

The body cannot heal without adequate blood supply. “Improving circulation is only one of the many ways lasers help.”

Michael Hamblin (Harvard) is a world leader in understanding how laser works at a cellular level. He “specializes in the use of light to activate the immune system in treating cancer and cardiac disease; he is now branching out into its use for brain injuries.” He recommends applying the light at the top of the head (transcranial laser therapy).

“Patients paralyzed by stroke made significant improvements in their movement when lasers were used to stimulate acupuncture points on the face and other areas.”

Laser Physics

“If an electron is in a close orbit to the nucleus, it has a low amount of energy; if it is farther away from the nucleus, it has higher amount of energy. (These high-energy electrons are said to be in an ‘excited’ state.)”

Normally, most of an atom’s electrons are in the lower-energy orbit. By using lasers one can bombard the atoms so that more of its electrons are in the excited high-energy state. This is called an “inversion.” When an electron falls from a higher-energy orbit to a lower-energy orbit, a photon of light is given off, stimulating nearby atoms to release more photons, creating a cascade of additional photon release.

When living tissue absorbs photons, they trigger chemical reactions in light-sensitive molecules. We tend to think that light-sensitive molecules exist only in the eyes. However, cytochrome is the most important of our light-sensitive molecules, and it exists in all cells. “Cytochrome is the marvel that explains how lasers can heal so many different conditions, because it converts light energy into energy for the cells.”

“Most of the photons are absorbed by the energy powerhouses within the cells, the mitochondria” because the mitochondria are “stuffed with light-sensitive cytochrome.”

“Laser light triggers ATP production which is why it can initiate and accelerate the repair and growth of healthy new cells, including those that make up cartilage (chondrocytes), bone (osteocytes), and connective tissue (fibroblasts).” This ATP can also be used by the “immune system for cell repair.”

Lasers also “increase the use of oxygen, improving blood circulation, and stimulate the growth of new blood vessels, bringing oxygen and nutrients to the tissues—especially important in healing.”

Laser Physiology

“So many modern diseases, including heart disease, depression, cancer, Alzheimer’s, and all autoimmune diseases (such as rheumatoid arthritis and lupus), occur in part because our body’s immune system stays stuck on too long.” In chronic inflammation, the immune system stays on too long. The causes of chronic inflammation include diet and “countless chemical toxins that become embedded in the body.” “Laser light can unblock the stalled process and quickly move it to a normal resolution, leading to decreased inflammation, swelling, and pain.”

“Chronically inflamed bodies produce chemicals, called pro-inflammatory cytokines, which contribute to pain and inflammation.” [**IL-6, TNF-alpha**, etc.] “Laser light fights excess inflammation by increasing anti-inflammatory cytokines that bring chronic inflammation to an end.” [**IL-10**]

Pro-inflammatory cytokines are primarily produced by neutrophils. Laser light lowers the number of neutrophils.

Macrophages [the primary player of the innate immune response] remove foreign invaders and damaged cells. Laser light increase the number of macrophages.

Oxygen free radicals “cause damage to cells and can bring on degenerative disease.” Lasers decrease the stress on tissues caused by oxygen free radicals.

A “unique aspect of lasers is that they preferentially affect damaged cells, or cells that are struggling to function and need energy the most.” “Lasers have a good effect where they are most needed.”

Laser light releases serotonin.

“Laser light affects the cerebrospinal fluid.” “Cerebral spinal fluid and the blood vessels carry the photons into the brain, where they influence the brain cells.”

Michael Hamblin from the Harvard group states, “lower doses are actually more beneficial than higher doses.”

Precancerous skin lesions called actinic keratosis, instead of being burned off, with the use of low-intensity laser the “skin normalized itself in several sessions.” “Some basal cell cancers can also be healed by low-intensity laser light.”

Lasers can rapidly heal “all sorts of things that should not be healed—cartilage, badly torn tendons, ligaments, and muscles.”

A case of traumatic brain injury responded excellently to laser, applied “over the top of the head for short periods.” Some such patients may “need to treat herself with light for ten minutes a day for the rest of her life.”

Brain injured patients may respond best to laser light positioned “over the skull areas closest to [the] brain stem and cerebellum.”

Treating the higher part of the neck may improve the central nervous system of brain problems, as the “brain’s cerebrospinal fluid, which flows around the spinal cord, was probably flowing back to the brain after being irritated by the light.”

“His [Fred Kahn] review of the literature had proved to him that lower doses of light, over longer periods, were effective for regenerating tissue and reducing pathological inflammation, as well as increasing the general circulation of blood in the brain—something that he, as a vascular surgeon, knew was essential to healing.”

Vascular surgeon Fred “Kahn had helped people who had brain and other nerve-related problems such as headaches from concussions, vascular dementia (dementia caused by blood vessel problems in the brain), migraines, Bell’s palsy, and tinnitus.”

“Applying low-intensity lasers to peripheral nerves can help them heal.” “Low-intensity lasers helped damaged nerves stop degenerating and start regenerating themselves.” Cranial nerves can also be healed.

“To my mind [Doidge], every emergency room should have low-intensity laser for people with stroke or head trauma. This would be especially important for head injuries, because there is no effective drug therapy for traumatic brain injury.” “Hospitals often seem recklessly indifferent to the role of light in healing.”

“Low-intensity laser can reduce scar formation in animals that have had heart attacks; perhaps lasers should be used in emergency rooms for cardiac events as well.” Lasers “has helped many patients with coronary artery disease, and that symptoms often disappear after six months to several years.”

In patients with traumatic brain injuries, “all were disabled and not recovering, in most cases for years, until they were treated with lasers. Almost all improved and resumed everyday activities, and those who were not yet 100 percent better said, ‘I got my life back’.”

In cases of depression, the “brain is chronically inflamed, it makes sense that treatment that unblocks chronic inflammation could help.”

The Alzheimer’s brain is inflamed, and the mitochondria have difficulty functioning and show signs of aging called oxidative stress. Laser light “can improve all three conditions—inflammation, mitochondrial problems, and oxidative stress.”

Animal studies [2014] show that the laser lights “lowered both the pathological tau proteins and amyloid plaques by 70 percent in key brain areas that Alzheimer’s affects.”

"Light therapy improves damaged connections between neurons in Alzheimer's by increasing brain-derived neurotrophic factor (BDNF)."



Portable Neuromodulation Stimulator
PoNS

"As low-level laser light passes through the skull, it bathes all the *individual cells* in its path and has effects on individual cells. Light unblocks chronic inflammation and energizes injured tissues preferentially."

PoNS "chiefly improves the *specific network functions* of neurons."

"It makes sense to try low-level lasers first, to normalize the brain's environment, and then the PoNS to normalize the network."



Thoughts, memories, perceptions, and skills, are "the cumulative electrical wave patterns that are a result of all the neurons firing together," like an orchestral musical piece. **[this is the goal of chiropractic mechanical integrity]**