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June 6, 2005 - Casting A New Light on Healing

(Low-level laser therapy shows potential in repairing damaged organs and tissues.)

By David Kohn, Baltimore Sun

If a researcher were to say she could repair an injured spinal cord by shining a light on it, you might understandably be skeptical.

But neuroscientist Juanita Anders thinks she has the science to change your mind. Over the last seven years, Anders has been studying the healing powers of low-level lasers. She has found that in rats, laser therapy can repair severed spinal cords, allowing once-injured animals to walk again.

"It's remarkable," said Georgetown University researcher Kimberly Byrnes, who collaborated with Anders on the research. It was conducted in Bethesda, Md., at Anders' lab at the Uniformed Services University, the U.S. military's medical school. "We got significant growth across the injury," Byrnes adds.

Anders and Byrnes aren't the only ones coming up with promising laser results. Small groups of researchers scattered across the globe are testing the lasers on a range of ailments, including heart attacks, nerve injuries and internal wounds.

"This has the potential to change medicine," said Dr. Harry Whelan, a neurology professor at the Medical College of Wisconsin who experiments with lasers in treating serious eye injuries.

But most scientists — and funding organizations — remain skeptical. Among the doubters was Janis Eells, a neurotoxicologist at the University of Wisconsin, Milwaukee. For more than two decades she had been looking for ways to treat severe retinal injury.

Whelan approached her about collaborating on a retina study using low-level lasers. She was skeptical, but she agreed to work with him. "I never thought it would work," she said.

Using chemicals, the researchers damaged the retinas of rats and monkeys. They then shone laser light into the injured eyes, three times a day for two minutes. The animals' vision returned.

"It worked remarkably well," Eells said. "I was stunned."

Whelan sees the lasers as a potential "paradigm shift." He says that almost all medical treatments rely on drugs, which have side effects, or surgery, which is invasive. He argues that laser therapy, by contrast, works through a completely different mechanism: It boosts the body's ability to repair itself.

Low-level laser therapy has been around since the 1960s, when it was discovered by a Hungarian doctor. It has a variety of names, including phototherapy and cold laser (to differentiate it from the "hot" lasers used in surgery).

Since then, doctors and physical therapists, most of them outside the United States, have employed it, mostly to speed wound healing. But over the past decade, other scientists have found that lasers may have far wider medical potential.

The laser devices, which sell for $2,000 to $12,000, are about the size of a shoebox. The light is typically delivered to the body with a pointer or a small probe.

Like all lasers, low-level lasers send out a directed beam of light that is limited to a specific wavelength. (Sunlight and light from artificial sources are made up of a range of wavelengths.) Cold lasers are less than 1% as powerful as hot lasers, which produce heat to cut through tissue. As a result, low-level laser treatment is painless and typically produces no sensation at all.

Most phototherapy researchers experiment with light wavelengths between 400 and 900 nanometers (a nanometer is a millionth of a meter). Most of these wavelengths are in the visible light spectrum. (Above 800 nanometers, light becomes infrared.)

No one fully understands how phototherapy works. Certain wavelengths of light seem to have the ability to pass through living tissue, reaching deep into the body. Once inside the body, this light seems to rejuvenate injured cells, perhaps by boosting their ability to produce a molecule called adenosine triphosphate, which is the main cellular energy source.

"The laser energizes the body's own enzyme system. The infusion of energy allows cells to repair themselves," said Dr. Paul Bradley, an oral and maxillofacial surgeon at Nova University in Fort Lauderdale, Fla. He has been studying laser therapy as a way to treat severe jaw pain.

In the United States, the Food and Drug Administration has approved cold lasers for three purposes: neck and shoulder pain, wrist pain related to carpal tunnel syndrome, and to break up fat before liposuction. But some practitioners use lasers "off-label" for other ailments.

Anders and others worry that unregulated use could tarnish the treatment's reputation. Some of those who use cold lasers don't really understand the devices, she said. And precisely controlling the laser is essential, she says. Her research has shown that, depending on the wavelength and length of treatment, phototherapy can inhibit healing.

"It's a real concern of mine," she said. "People get the treatment and it doesn't work, and it's because the parameters aren't right." Only through carefully controlled studies will the approach win wide acceptance, she said.

When the therapy is conducted properly, she added, it can produce amazing results.

She points to two Israeli researchers who have had success using lasers to repair injured nerves and the limbs of gunshot victims and wounded soldiers.

Anders thinks lasers can go even further. She suspects phototherapy might help with neurodegenerative diseases such as Alzheimer's and Parkinson's.

"We have to keep doing the best work possible," she said. "We're just starting to appreciate the effect that light has on our bodies."