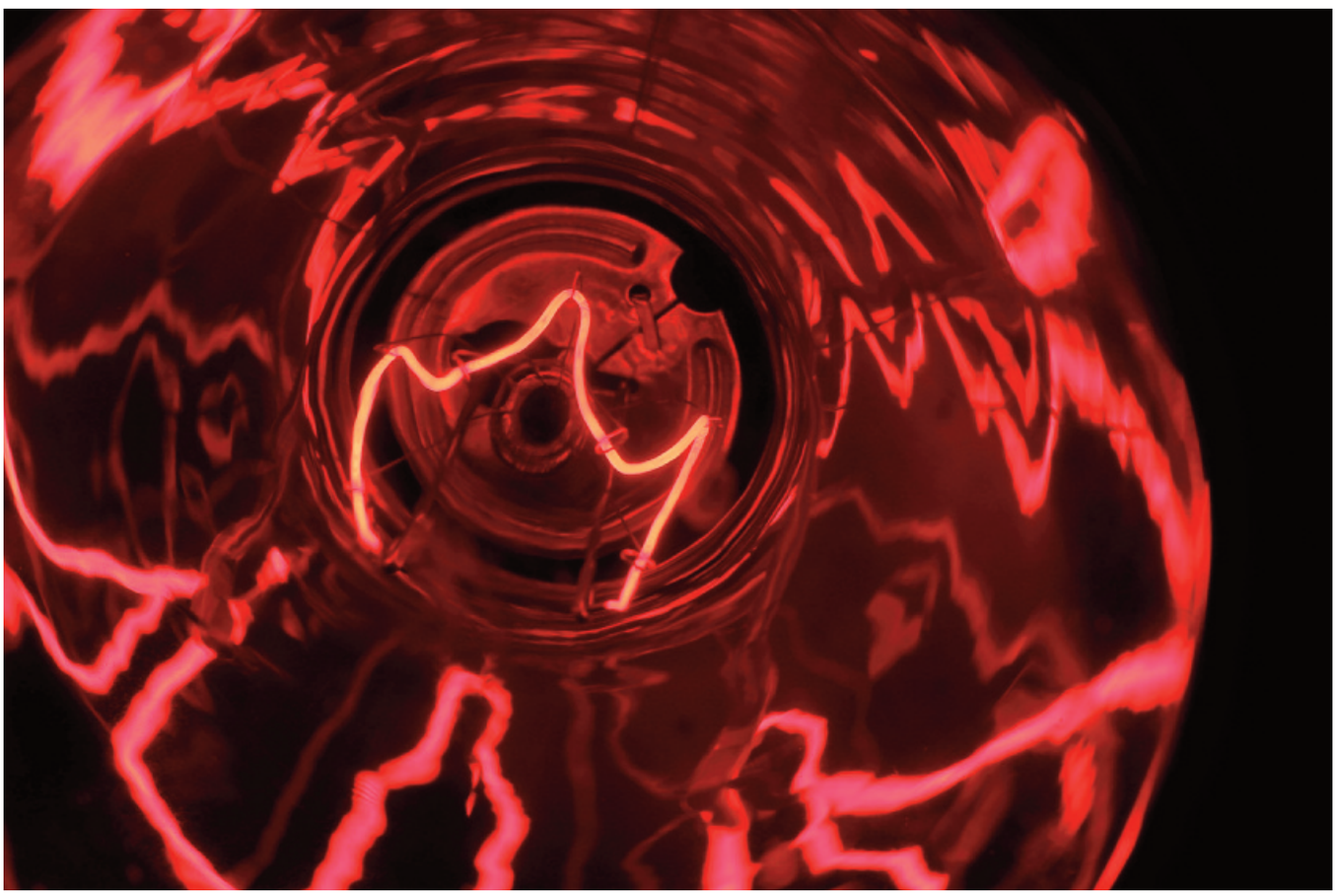
Light therapy for Parkinson's



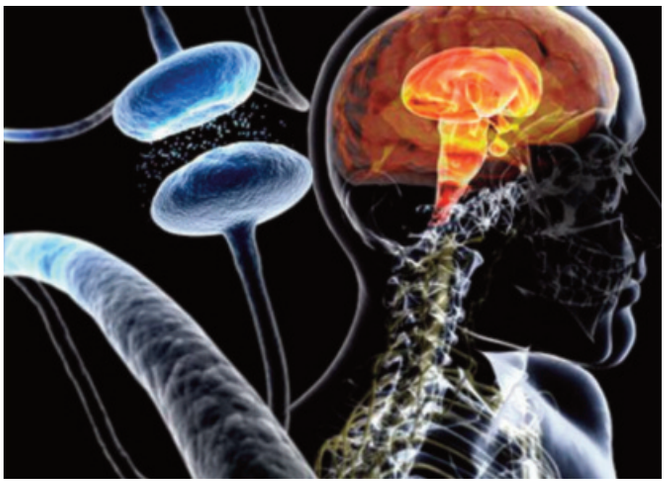
Sufferers of Parkinson's and other neurological conditions are reporting benefits using devices that emit red wavelengths.

by Suvi Mahonen © January 2018

Parkinson's disease—first described by an English surgeon, James Parkinson, in his 1817 work "An Essay on the Shaking Palsy"[1]—is a combination of movement disorders including tremor, muscle rigidity and impaired balance associated with neurological problems such as depression, poor sleep and confusion. It is estimated to affect approximately 70,000 people in Australia and to account for more than 1,700 deaths annually.[2] Its cause remains a mystery, but it is known to be associated with dopamine depletion and loss of neurons in the basal ganglia region of the brain.

The current mainstay of treatment involves physical therapy as well as medications—such as levodopa and dopamine agonists—which act to increase dopamine levels in the brain. These medications can provide significant improvements in the symptoms of Parkinson's disease, but their effectiveness tends to wear off with time and they can cause a number of side effects. In addition, they treat the symptoms only, without actually slowing, or reversing, the course of the disease.

One avenue of research that has shown unexpected promise in the quest for more effective treatment is light



Parkinson's disease is a fairly common age-related and progressive disease of brain cells (brain disorder), affecting movement and causing loss of muscle control and balance. Usually the first symptoms include a tremor (hand, foot or leg), also termed a "shaking palsy".

therapy using red and near-infrared light. Several studies have shown that exposure to these wavelengths of light may offer a level of neuroprotection and improvement in motor function in animal testing for Parkinson's.[3] Initially this effect was thought to be due to direct stimulation of the midbrain by infrared light; however, evidence has begun to accumulate that there are potential benefits even if infrared light is applied to elsewhere on the body.

In one experiment, Dr Daniel Johnstone, of The Bosch Institute at the University of Sydney, found that mice injected with MPTP, a potent neurotoxin that induces Parkinson's disease in animals, had increased neural cell loss in the substantia nigra compared to mice that had not been injected. But this loss was significantly reduced in mice exposed to infrared light, even if the exposure was to the body only and not directly to the brain.

This lent support to the theory that infrared light by therapy can work via direct stimulation as well as through the release of as yet unknown circulating protective factors.

"Similar findings are coming out from researchers all over the world," Johnstone told me in an interview.

Johnstone's supervisor at The Bosch Institute is the executive director, Professor Jonathan Stone. He first heard about infrared light therapy 13 years ago when he was presented with data from work NASA had done in the 1990s showing that it could be used not only to help grow plants in space but also to speed the healing of wounds. Since then, Stone has been researching light therapy in his own laboratory and has observed similar interest from other research centres across the globe.

"It is clear to me that the pace of studies on photobiomodulation is increasing," Stone told me. "Despite a lot of scepticism, people are being drawn into it by the fact that it works. There's growing evidence that it works against depression and stroke and in the cognitive aspects of Alzheimer's disease. And it's so blessedly free of side effects that you can use it without having to know down to the last molecular detail how it works."

Johnstone noted that they "also found that infrared light treatment offered really strong neuroprotection, and reduced clinical symptoms of Parkinsonism in the monkeys," commenting on studies conducted in France.[4]

Johnstone also told me about an additional experiment in 2015—three macaque monkeys injected with MPTP received external infrared light therapy to different areas of their bodies. The monkey that received light therapy to the legs remarkably showed no signs of Parkinsonism by the end of the three-week experimental period.

Max Burr's Experience

As Johnstone was writing up his research findings, retired Australian federal politician Max Burr was sitting in front of his computer at home in Launceston, Tasmania. Burr, a federal Liberal Member of Parliament from 1975 to 1993, had been diagnosed with Parkinson's disease in 2012 and required a steady increase in medication. To his dismay, he had recently been told by his geriatrician, Frank Nicklason, MD, that his condition was deteriorating and he needed to increase his dosage even further.

"I said to Frank, 'No, I'll find other methods'," Burr told me when we spoke on the phone.

With the tenacity of a seasoned politician, Burr, who is 78, opened his laptop and began to search. Before long, he found a research paper on the use of photobiomodulation—the term used for light's ability to modulate key biological processes at a cellular or even genetic level—in animal testing for Parkinson's disease, published by a colleague of Johnstone, Professor John Mitrofanis of the University of Sydney, who had also been involved

Orbital Technologies Corporation partnered with the Kennedy Space Center to create a plant-growth system known as Veggie, now used on the International Space Station. The system employs LEDs, which are highly efficient and long-lasting and radiate hardly any heat. (Photo: Orbital Technologies/NASA)

in the macaque monkey experiments.

"John's paper showed that the use of 670-nanometre red light was protective of neurons in Parkinson's," Burr told me. "So I sent him an email and said, 'Look, this is all very interesting; I wouldn't mind having a crack at it'."

Aware that his condition would not wait while scientists went through the long process of obtaining approval for human trials, Burr told Mitrofanis that he was going to try the light therapy anyway.

"John replied by email and said, 'Well, good luck; I'll keep my fingers crossed, but I hope you don't fry your brain'," Burr told me.

Burr went ahead, and with the help of two friends, Catherine and David Hamilton, he built a home-made device from an aluminium-foil-covered lampshade lined with strips of LED [light-emitting diode] bulbs that emitted red light at a wavelength of 670 nanometres.

Before he began to use it, Burr completed a baseline report for Nicklason in which he outlined the severity of his symptoms. By this stage, the disease had affected many aspects of Burr's life: his balance was uncertain, he could no longer write or play the piano, and he'd lost his sense of smell. "And my voice was very timid—imagine that for a politician," Burr said.

Once he started using the device—which rested on his head, for 20 minutes twice a day—he wrote a fortnightly report detailing the changes he was experiencing. Burr's description is remarkable. "I recovered my sense of smell, my writing is now firm and concise, my gait has improved and I can climb stairs," he said.

"From week to week, it might have only been a subtle change, but the cumulative effect over the months has been quite significant," he commented. "Now I regularly give public addresses, I play bowls, I do tai chi twice weekly. While I still have Parkinson's disease, it is little more than an inconvenience."

Benefits and Mechanism of Light Therapy

As far as sceptics are concerned, it is certainly possible that Burr's improvement was at least partially due to the placebo effect. This is especially the case in Parkinson's, where some placebo treatments have been shown to increase the release of dopamine in the brain.[5]

Burr, however, believes that there are more tangible physiological factors at work. "The benefits of the red light must be being transferred by a mechanism in the body—either by the vascular system or by the immune system," he said.

Johnstone agrees with Burr's reasoning and likens the beneficial effects of light therapy to a vaccine. "The exact mechanisms are still not totally known, but we do know that there's a key enzyme in the cells that absorbs light at certain wavelengths and triggers this intracellular cascade signalling that seems to collectively lead to a protective effect," he explained to me.

Nicklason became a geriatrician because of his passion

Max Burr, wearing his home-made LED-lined device. (Photo: Supplied)

for "whole body medicine". As a staff specialist at the Royal Hobart Hospital, he sees many patients who have Parkinson's disease and other neurological conditions. He advises prudence but sometimes provides research information about light therapy to his patients. To his knowledge, a dozen or so have given it a try.

One of his patients is Peter Cheatham, 58, a former mountaineer diagnosed with Parkinsonism following a series of strokes in his basal ganglia. Now a vocal light-therapy advocate, Cheatham is using one of several mobile infrared light devices produced and marketed by Vielight Inc., a company based in Canada.

"Within a couple of weeks of usage, my twitching stopped and I started remembering things I had forgotten," Cheatham told me. When I phoned him, he was out collecting donations for the Salvation Army. "I've come off a lot of my medications and everything around me is clearer."

Gold Coast general practitioner Mark Jeffery, MD, a clinician with over 30 years' experience, has a number of patients with Parkinson's who attend his practice. Although he believes that patients with Parkinson's as well as Alzheimer's could potentially benefit from infrared light therapy, he is cautious about recommending devices like those produced by Vielight due to the tricky nature of what he calls "off-label" prescribing.

"If you don't investigate a patient properly and they deteriorate, it would be hard to justify in court that you prescribed a device that wasn't proven to help," Jeffery told me. "The science behind light therapy is amazing, but it will not be part of mainstream medicine until we get conclusive, evidence-based studies."

Vielight founder and CEO Lew Lim, a self-described naturopathic doctor and engineer, is eager to argue that there is evidence behind his devices. He claims that his

company, which has sold more than 30,000 Vielight units, has undertaken studies showing their neuroprotective benefits.

"We've had some really dramatic, positive outcomes," Lim told me on his recent trip to Australia to meet researchers at The Bosch Institute. "People have told me that this has literally saved their lives."

Max Burr is aware of Vielight's infrared therapy units but he has no intention of giving up his own home-made device. He has been using light therapy for 18 months now, and has not needed any increase in his anti-Parkinson's medications. Meantime, his LED unit has received an upgrade.

"We've made it out of a bucket. We've also added 810-nanometre LED lights as well as 670-nanometre lights. Both LED wavelengths are in alternate rows, and each wavelength has its own switch. So I do 15 minutes on one wavelength and then 15 minutes on the other wavelength."

Always a fiscal conservative, Burr has another reason why he's stuck to his own device. "The Vielight can cost up to nearly two-and-a-half-thousand dollars. A plastic bucket from Bunnings costs three bucks," he said with a dry chuckle. "Which one would you use?"

Left: A Vielight NeURO transcranial photobiomodulation device with an intranasal applicator to target the underside of the brain.
(Photo: DominicLim90)

A View to the Future

Mitrofanis said that The Bosch Institute is collaborating with Lim for future clinical trials to test the Vielight unit's effectiveness against both Parkinson's and Alzheimer's diseases. "People have been using these devices and the company has published a study on the effectiveness against Alzheimer's disease. It's not a rigorous study, but it's positive nonetheless," Mitrofanis added.

Although most studies on photobiomodulation have been performed on animals, to date there have been nine human studies, as well as numerous case reports, published in peer-reviewed journals on the use of red and infrared light therapy for various neurological conditions including stroke, traumatic brain injury, Alzheimer's disease and depression. The only human trial on photobiomodulation for Parkinson's disease that's been reported so far is a small, non-randomised University of Arizona study where eight volunteers with Parkinson's received daily light therapy to the head. All subsequently reported an improvement in their symptoms.[6]

Unfortunately there is a major impediment behind commencing a large, scientifically rigorous study of red and infrared light therapy in humans and that is funding—or, more specifically, the lack of it.

"We are in the process of trying to get funds for the human trial, but it's difficult because a trial like this costs five to six million dollars," Mitrofanis said. ∞

About the Author:
Suvi Mahonen is a freelance writer based in Surfers Paradise on the Gold Coast of Queensland, Australia. Her nonfiction has appeared on a variety of platforms including The Huffington Post, *Weekend Australian Magazine* and The Establishment. Her fiction has been widely published in literary journals and anthologies such as *The Best Australian Stories* and *Griffith Review*. A portion of a longer work in progress was nominated for The Pushcart Prize. For more from Suvi, visit http://www.redbubble.com/people/suvimahonen. For instructions on how to make the light device used by Max Burr, see https://redlightsonthebrain.blog.

Endnotes

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