

New approach to foveal holes: Light, sound and nutraceuticals

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Dr Roberto Pinelli

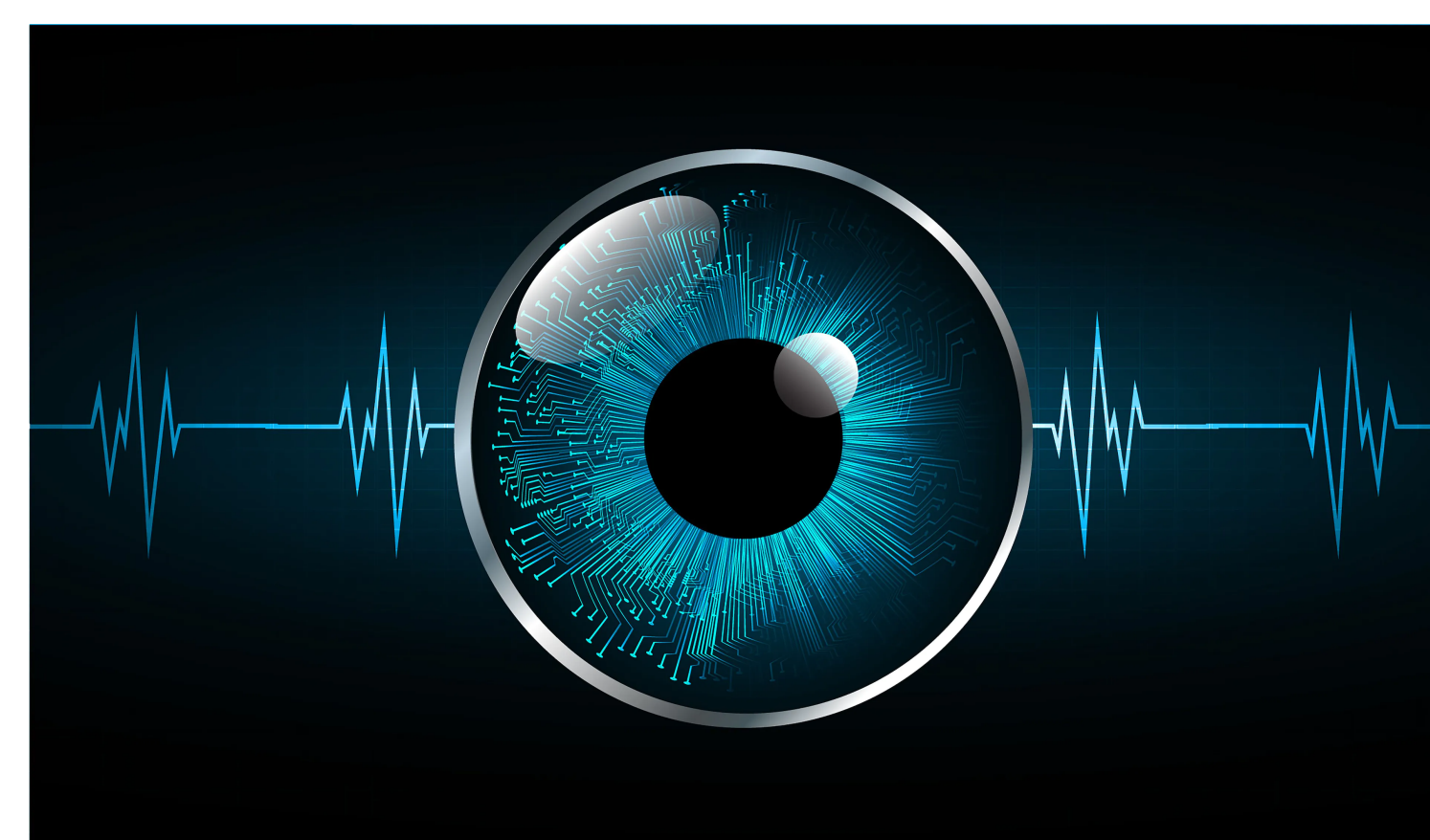
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Novel treatment results in macular hole closure.

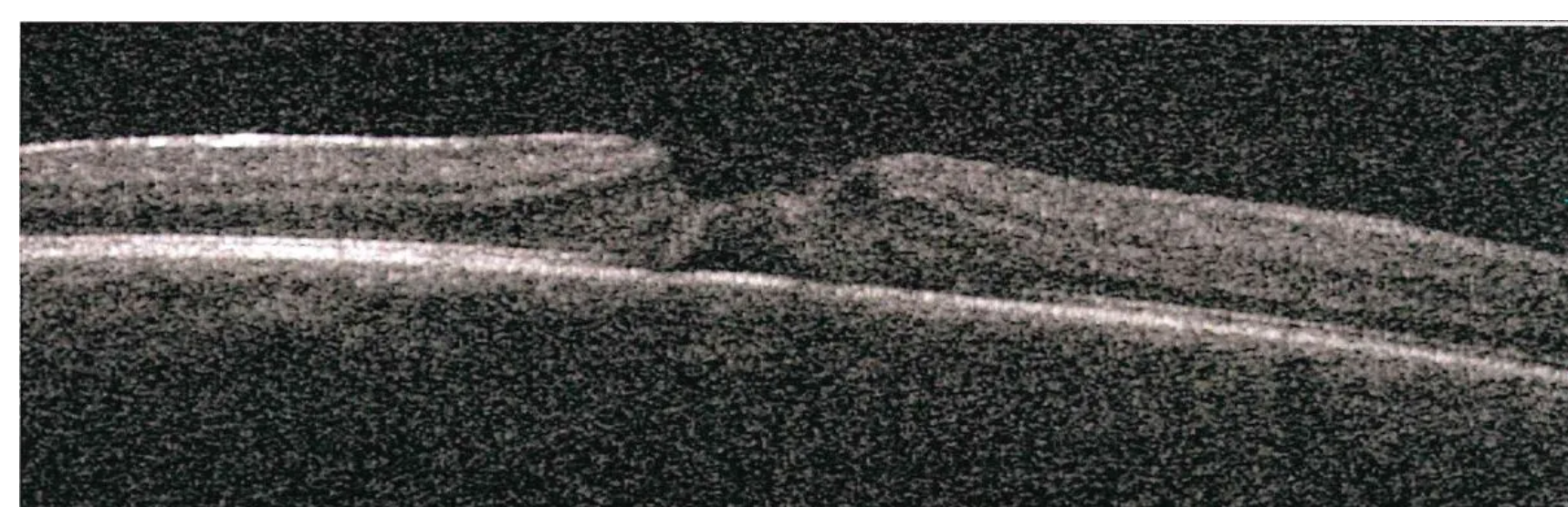
The combined administration of light and sound with nutraceuticals to the retina of a patient with a macular hole had a remarkable effect on the retinal anatomic architecture affected by the macular hole, according to Dr Roberto Pinelli, founder of the Switzerland Eye Research Institute in Lugano, Switzerland.



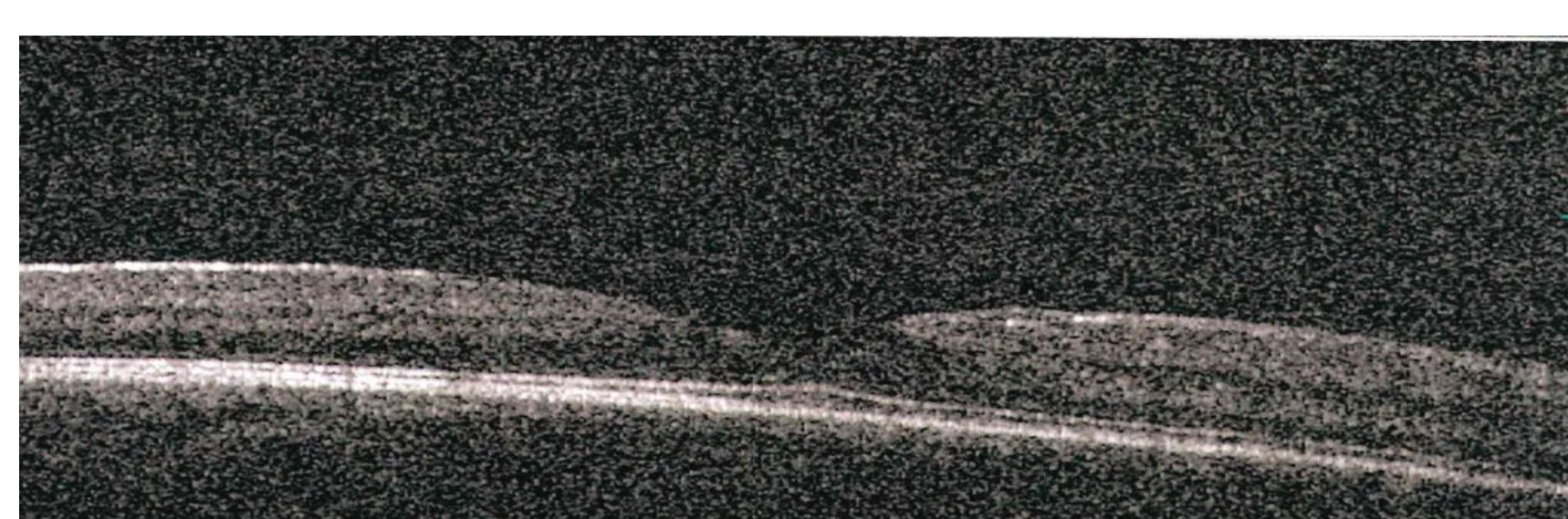
Case report

A 79-year-old healthy woman presented for an eye examination in January 2021, when she received a diagnosis of an idiopathic macular hole. At diagnosis, the uncorrected decimal visual acuity (VA) was 1/10 and the best-corrected VA was 4/10. At the diagnosis, the patient had a slight central metamorphopsia. The idiopathic macular hole was caused by vitreal degeneration with traction on the fovea.

Following a detailed explanation, she consented to a noninvasive treatment with pulsatile stimulation with sound and light (photobiomodulation) with oral intake of phytochemicals.



Optical coherence tomography (OCT) before treatment. (Image courtesy of Dr Roberto Pinelli)



OCT at 15 months following treatment. The OCT shows a steady recovery without any relapse from the macular hole. The combined treatment of sound, PBM and nutraceuticals produced a full and steady recovery at the macular hole. Such an anatomical recovery was accompanied by a remarkable recovery in visual acuity. (Image courtesy of Dr Roberto Pinelli)

During and after treatment, she received follow-up using optical coherence tomography (OCT) imaging to assess the time course of the volume and integrity of the surrounding or inner tissue replacement of the macular hole. Retinal topography calculated the thickness of the various retinal layers and the empty area in the hole. She also underwent subjective visual tests, including the Jaeger chart test and Snellen chart test to measure the best-corrected VA for near and far, the Amsler grid test to detect visual distortion and the Pelli-Robson chart test to measure contrast sensitivity, he said.

While reclining on a chair, the patient underwent a session of low-sound, near-infrasound frequency acoustic stimulation consisting of soundwaves in a range between 20 and 174 MHz, which were applied at progressively increasing frequency up to 174 MHz, at which point the stimulation was continued and the frequency remained steady. The sound stimulation periods lasted 90 seconds.

The periodic stimulations were repeated during the same day, that is to say, ie, 7 periods of acoustic stimulation delivered at 30-second intervals with intervals of acoustic silence, for a total duration of 15 minutes. The subjective intensity (decibels [dB]) of the acoustic stimulus depended on the frequency and was delivered at between 20 and 30 dB through commercial Beats headphones. Two months after the end of the acoustic stimulation, OCT was carried out along and the VA measured.

Dr Pinelli explained that because partial results were obtained with sound stimulation, he added photobiomodulation in the same single session and added phytochemicals, which were administered for 6 months, as natural nutraceutical waves. ¹

The anatomic recovery was almost complete at about 1 year after the diagnosis and the beginning of treatment. The structural healing of the macular hole was concomitant with a strong VA improvement and resolution of the metamorphopsia.



Roberto Pinelli, MD

Treatment rationale

Dr Pinelli explained that there is evidence that specific wavelengths activate the autophagy pathway in the retina, prompting the recovery from traumatic neuronal damage.

He said, “Among numerous biochemical cascades that regulate neuronal integrity in the retina, the autophagy machinery plays a seminal role in maintaining cell survival and sustaining retinal anatomy, including plasticity. This is in line with the involvement of impaired autophagy in producing a variety of retinal disorders.” ²⁻⁴

In this report, he capitalised on those effects that elicit autophagy using light therapy with autophagy-activating phytochemicals to address the foveal damage produced by the vitreal mechanical traction that generated the foveal hole.

“The study was implemented by pulsatile sound stimulation based on the recent evidence that autophagy and retinal stem cells stimulation induced by light exposure is amplified by acoustic biofeedback therapy. In fact, the pulses of sounds of various wavelengths stimulate tissue regeneration. ⁵⁻⁷ Such an effect is largely grounded on the stimulation of stem cell via upregulation of autophagy. ⁸ Altogether this evidence tempted us to probe the efficacy of a non-invasive multimodal physicochemical approach to promote substance recovery and anatomical reorganisation in a case of idiopathic macular hole which was treated according to the advanced Lugano protocol,” he commented.

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Roberto Pinelli, MD, is founder of the Switzerland Eye Research Institute in Lugano, Switzerland.

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