

The seamlessly integrated and synchronized sound beat and light flash technology, in a self-contained, affordable bedside unit was the result of an inquiry from a Doctor on the East Coast intrigued by the promise of 40 Hz gamma therapy.

Dr. R tells the story of SOUND+THERAPY's development like this:

The use of 40 Hz gamma sound therapy for insomnia is a story of serendipity and unexpected observations. Rewind the clock a few years to a lecture by an MIT researcher about medical uses of these very low-frequency notes. The theme was how many societies and cultures over millennia have had the commonality of using deep tones from musical instruments (e.g., bells), chanting, or hymns for meditation or to induce a calming effect. Sound analyses demonstrated they shared the 40 Hz frequency, which is in the "gamma" range.

There have now been many research studies in mice showing that this precise frequency has unique effects on nerve cells in the laboratory, and improves brain function in animals which are used as models of human Alzheimer's disease. The mechanism by which that works is still not clear. Interestingly, rather than sound wave energy at 40 times a second ("Hz"), administering flashing light at that same frequency has a similar and seemingly additive benefit.

A big attraction to this general approach is that sound machines are already widely in use as consumer devices and available without prescriptions: producing white, pink, or brown noise; digital fans; or sounds from nature. From the perspective of my being a physician faculty member and professor at a prominent medical school with many research studies and publications, it was particularly important that consumer over-the-counter devices not make unproven medical claims and "do no harm".

Fast forward to a few years ago when my 94-year-old, bedridden, family member was becoming cognitively impaired. Since there was no downside, we decided to give gamma therapy a try. The goal was to find a commercial sound machine that was very pleasant and could be left on all night long on a bedside nightstand for a fragile elderly person and could be set up for the night by a caregiver.

After hours on the web, we could not find any such consumer device. The machines being sold appeared unsuitable: questionable comfort; not ideal for elderly people with cognitive problems; needed recharging of batteries that lasted less than an hour; were of concern that they might drift out of calibration for the required precise 40.0 Hz; and had steep price tags typically over \$400. On a lark, it seemed like a good idea to simply call the manufacturer of the most popular consumer sound machines (ASTI). Did they make a device in which the selection knob for white noise, rainfall, ocean waves, forest sounds, etc. also had the option for gamma sound?

Customer service didn't know of one being made but promised to pass the question along to supervisors. We had very limited expectations that anyone would call back. Lo and behold, the president of the company responded. With his background as a microchip designer and sound engineer, Sam Nicolino was very interested. He got back to us a few months later with his novel design: a specially ordered large-diameter speaker capable of accurate consistent 40 Hz sound production; circuitry that maintained calibration without drift; sound spectral analysis proving calibration; the option to turn on LED lights blinking in precise synchrony with the sound; and, most importantly, sound that was so pleasant that it could be listened to all day. He sent a sample machine to make sure all the buttons and options were easily used by an elderly person or set up by a health aide to be left on all night.

Before letting our frail family member use it, we thought that a couple of us would "give it a try" for a few nights to make sure it was as pleasant and tolerable and that it wasn't disruptive in any way. Here's where serendipity comes in: completely unexpectedly, not only was the sound pleasant but it improved sleep in longstanding (decades) insomnia! This was a total surprise.

Sam has subsequently gifted these sound machines to multiple people with insomnia not due to obstructive sleep apnea (they need their CPAP machines). It's unscientific, but anecdotally there have been many rave reviews. That even includes nonmedical testimonials from people with insomnia thought due to autism spectrum disorder, PTSD, and a couple who have even come off their sleep medications. Our unproven

impression is that the long-lasting benefit is not a placebo effect. We also don't understand the biologic mechanism or whether it is related to the purported benefit to cognitive problems. We hope that this digital version of millennia's use of 'healing sound' will lead to carefully designed research studies confirming the benefit, elucidating the mechanisms, and exploring which people will benefit the most from this simple natural approach to treating insomnia.