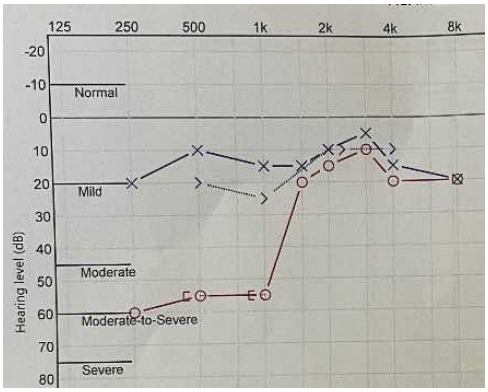
CIST Protocol Level 1

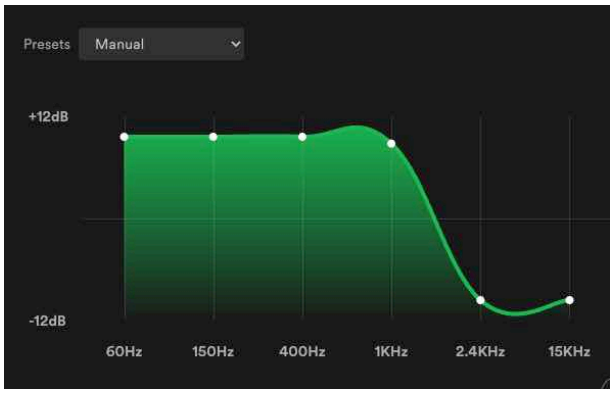
This is a home adaptation of the Constraint Induced Sound Therapy with some modifications.

CIST

1. Make a playlist of music that has a wide spectrum of frequencies, especially the ones that are missing from your audiogram. Choose music that has frequencies that that you can't hear properly yet. e.g. If your Audiogram shows you cannot hear 100Hz, choose music with a lot of bass.
2. Choose music that is very familiar to you. If it's from your childhood even better. The more familiar it is the easier the brain will be able to recognise it.
3. EQ your Spotify App to be the opposite shape to the audiogram of your bad ear. e.g. If your audiogram shows loss below 2kHz. EQ everything below 2kHz up in Spotify, and EQ everything above 2Khz down. Here's an example:



Audiogram - red drops below 1



Spotify - 'mirror'

4. Pan the audio on your phone or music player 100% to your bad ear and 0% to your good ear, so that you only hear the music in your bad ear.
5. If you use in-ear buds, only only use one bud - in your bad ear.
6. Set the sound level to a comfortable level using your good ear, by placing the working headphone over your good ear. Make sure it is not too loud, then swap the headphones to the bad ear.
7. Block your 'good' ear using Macks silicone ear plugs or equivalent.
8. (Optional) Fine tune the Spotify EQ to what sounds best and most realistic. Move the dots up and down a little bit to try and make the music sound how it should.
9. Listen to music using headphones for 2-6 hours a day. Try to space it out throughout the day.
10. Do this for 28 days.
11. Be careful of your safety when you are listening to music and cannot hear.
12. When you are not listening to music, leave your noise blocking plug in your good ear and try to use your bad ear for normal situations.

CIST Protocol Level 2

Do everything above under "CIST" plus:

Focused Listening (20 min)

Intensely focus on the music you are listening to. Notice things like various instruments, what each instrument is playing. Pick one instrument and listen to it for the entire song. Try to follow along with the lyrics. Focusing can help the brain rewire.

Frequency Discrimination Learning (10 min)

Use an app to test your frequency discrimination. https://plasticity.szynalski.com/

Or play yourself scales on the edges of where you can hear. Do this 10 min a day.

AFSG is a good iPhone app for this, it has a simple keyboard that plays pure tones.

There are links to these apps on *http://cist.blog*

Learn a new Musical Skill (10 min)

The idea is to learn something new. If you can't read music, learn to read music.

Learn a new musical instrument. (Not just continuing on one you already learn).
iPhone app: Music Tutor ($5)

Learn a new skill (10 min)

Learn any other new skill over the same month. Do at least 10 min per day on this new skill. e.g. learn a new language on Duolingo, ride a unicycle, juggling, tai chi, Slacklining, dancing, chess. The idea here is to be helping your brain to make new neural connections.

Future visualisation exercise and slight exposure challenge (5 min x4 times a day)

Recall a happy memory to give yourself a strong positive emotion. While you are listing to music, look at a photo of a past good time, pat a dog, go for a nice walk, remember a time when you could hear well and it brought you pleasure.

Now do a future visualisation - visualise something is the future that you enjoy with good hearing. (e.g. laughing and chatting with your daughter.) The more senses in the visualisation the better. Where are you? What can you see? What can you hear? What can you smell. What can you feel? Think about how great it is to have perfect hearing again in both ears! Associate strong positive emotions with listening to music or immediately after.

Change it up (habits)

Try to change-up everything in your life that is a habit. Do everything with the opposite hand if you can. Eat left handed. Clean your teeth with the opposite hand. Dress yourself using the opposite foot first. Drive a different way to work. Sit on the opposite side of the bus/train. Watch

completely different TV shows. Change as many things as you can to give your brain the message that things are changing so that it needs to re-learn everything.

Levels of exposure.

Find a baseline of what your ear can tolerate without going backwards. (e.g. 1/2 hr of conversation). Stay there 2+ weeks. Then gradually and deliberately increase exposure. Each step up keep it there 2+ weeks. Don't push and crash.

Exercise

Do some exercise daily. Maybe it's a walk with music playing in your ear. Maybe it's an exercise bike. Maybe a run. The aim to to get the blood flowing into your ear and small blood vessels around the ear and brain.

Good to bad ear tone learning

If you are hearing notes at the wrong frequency, add this exercise. Play a pure tone through one side of the headphones into your good ear. Slowly move the headphones around to your bad ear until your bad ear can hear the tone and hear it correctly. Concentrate on the pure tone as it should sound. Go back slowly towards the good ear and make sure it's still the right tone you are hearing. Then to the bad ear and repeat this trying to 'learn' the proper tone.

DNRS

There may be benefit doing DNRS alongside the above. It is based on rehabilitation of stroke patients, and while not aimed at hearing loss, there are lots of parallels. DNRS is a commercial product available here: https://retrainingthebrain.com/

References

Constraint-induced sound therapy for sudden sensorineural hearing loss – behavioral and neurophysiological outcomes

Published online 2014 Jan 29. doi: 10.1038/srep03927

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Neuroplasticity-targeted Intervention for Idiopathic Sudden Sensorineural Hearing Loss: A New Therapeutic Direction

Neurology and Neuroscience Research. 2017;1(1):1

https://www.scitemed.com/article/70/scitemed-nnr-2017-00014

Brain Structural and Functional Reorganization in Tinnitus Patients Without Hearing Loss After Sound Therapy: A Preliminary Longitudinal Study

Front Neurosci. 2021;

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7991098/

Auditory Training: Evidence for Neural Plasticity in Older Adults

PMC 2014 Dec 4

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Music Training for Children With Sensorineural Hearing Loss Improves Speech-in-Noise Perception

June 2020 Journal of Speech Language and Hearing Research

https://www.researchgate.net/publication/342219391_Music_Training_for_Children_With_Sensorineural_Hearing_Loss_Improves_Speech-in-Noise_Perception

Terapia sonora en sordera súbita (Sound therapy in sudden deafness)

Modulatory Effects of Spectral Energy Contrasts on Lateral Inhibition in the Human Auditory Cortex: An MEG Study

December 9, 2013 PLOS ONE

https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0080899

Dynamic Neural Retraining System

https://retrainingthebrain.com/

CIST

In the present study, patients with sudden hearing loss were treated with medication (corticosteroids, piracetam, and antioxidants) or with the same medication plus sound therapy. The medication consisted of deflazacort, piracetam, and alpha-tocopherol. The music therapy consisted of listening to music or radio for 12 hours per day for 30 days.

It is important to start sound therapy from the very beginning of sudden hearing loss to achieve better hearing recovery.

There is a theoretical-computational model for the application of sounds in hearing loss. This model is based on neuronal hyperactivity and homeostatic plasticity after hearing loss. In this model, sounds are applied to cover the entire hearing loss, as would an hearing aid. Because a sound greater than 80 dB could cause acoustic trauma, the sounds would be applied with a limit between 60-70 dB, and only to the area affected by the hearing loss.

Tinnitus:

Then, we applied narrow band noise (that was used for treatment) to treat tinnitus for 6 months, 20 min each time, three times per day. The loudness of sound we applied for each patient was set as 5 dB over the tinnitus loudness. The frequency was set as a 1 kHz narrow band while setting the tinnitus frequency as the middle point of the delivered sound (i.e., tinnitus frequency ± 0.5 kHz, for example, tinnitus frequency = 3 kHz, low sound cut = 2.5 kHz, high sound cut = 3.5 kHz).

The study suggests that amplifying the energy around the edges of the pure tone within a specific range, known as the Edge Frequency Band (EFB), can have modulatory effects on lateral inhibition in the auditory cortex. Specifically, in this study, the optimal parameter for EFB amplification was found to be 3/8 octave on each side of the notch.

In simpler terms, boosting the energy in the background noise around the edges of the target frequency (pure tone) within a range of approximately 3/8 octave on each side was identified as the most effective for modulating neural responses in the auditory cortex.