In September, 2014, the *American Journal of Audiology* published the results of this multi-center study comparing the relative benefits of S-Tones vs. broadband noise in reducing the loudness of one’s tinnitus. The following is a summary of the key points of the paper, with a link to the online abstract provided at the end of the summary.

“Amplitude Modulated “S-Tones” Can Be Superior to Noise for Tinnitus Reduction”

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**Purpose:** A previous study (Reavis et al., 2012) showed that S-Tones were four times more likely to suppress tinnitus than broadband noise when presented at volume just below the patient’s tinnitus perception. This new study sought to answer the question, “Can S-Tones be effective at even softer levels?”

This study compared broadband noise, which is commonly used as a masker in sound therapy, with S-Tones, which are pitch-matched to the patient’s tinnitus and are amplitude-modulated at a specific rate (40Hz.)

- 56 subjects at three university / research sites completed the study. All were aged 18-75, with chronic non-pulsatile tinnitus and some hearing loss.
- Each subject listened to 2 stimuli (S-Tones and Broadband Noise), at 3 soft levels, for 2 minutes each (presented randomly, double blind.) Subjects reported loudness on a 0-10 scale. Data were analyzed for the amount of tinnitus loudness reduction while listening to the sound stimulus.
- The sounds were presented at volumes the patient deemed soft as determined by a Loudness Growth Function. This was done in order to study the benefit provided even when sound therapy was provided at low volumes. Because loud tinnitus can be bothersome, soft treatment sounds are desirable as they help to minimize the patient’s “sound burden”. They may enable effective treatment when played “in the background” thus enabling easier integration into the patient’s lifestyle.

**Highlights:**

- This was a multi-center, randomized, double-blind, controlled trial at three leading university and research audiology centers.
- Purpose was to compare Serenade’s S-Tones vs. broadband (white) Noise in reducing tinnitus loudness at softer levels.
- A statistically significant benefit (p<0.01) was observed for S-Tone tinnitus perception reduction vs. Noise.
- This reduction occurred with patients listening to treatment sounds that they deemed soft, or low volume (more than 50% below the patient’s tinnitus.)
- 2.7 times (270%) more patients had a better tinnitus reduction for S-Tones vs. Noise of those experiencing an effect.
- S-Tones provided an average of 1.9 times (190%) the amount of tinnitus reduction as Noise within 120 seconds of sound presentation of those experiencing an effect.

**Results:** Of the subjects who experienced a reduction in their tinnitus loudness:

- 2.7 times (or 270)% more patients had a better tinnitus reduction for S-Tones vs. Noise
  - 54.3% (19 of 35) showed a greater reduction with S-Tones.
- 25.7% (9 of 35) showed a similar reaction with both types of sounds.
- 20% (7 of 35) showed a greater reduction with noise.
- S-Tones provided an average of 1.9 times (190%) the amount of tinnitus reduction as Noise within 120 seconds of sound presentation.
  - Average tinnitus reduction was 28% for S-Tones vs. 15% for broadband noise within 120 seconds at soft volumes.

About a third of the patients (21 of 56) reported no significant effect of any sound stimuli. This was expected, since the sounds were a very soft volume, and were played for only 2 minutes each as this was a study of the acute effect.

**Conclusion:** S-Tones “are superior for more tinnitus sufferers than broadband noise”, even when played more than 50% softer than the patient’s tinnitus. S-Tones “are effective in more patients than traditional broadband noise maskers at reducing tinnitus loudness, and therefore have the potential to be beneficial to a large segment of the tinnitus population.”


Selected figures from clinical paper:

![Tinnitus Reduction Averaged Across Subjects who Demonstrated an Effect](image-url)
Figure 2. Average tinnitus reduction \(\left(\frac{\text{Tinnitus Baseline} - \text{Tinnitus Level During Stimulus}}{\text{Tinnitus Baseline}}\right)\) average across subjects, excluding those who showed no effect on all conditions. S-Tones have an average effect of 1.9 times greater than that of Noise for reducing the perception of tinnitus within 120 seconds while listening to the sounds much lower than the perceived tinnitus perception.

![Percentage of Subject Population with Better Performance with a Particular Stimulus](chart.png)

- Figure 3. About \(\frac{1}{4}\) of subjects had comparable performance on either stimulus. Of those remaining, 2.7 times (270%) more patients had a better tinnitus reduction for S-Tones vs. Noise. (S-Tones: 54%; Noise: 20%. Note: 54/20 = 2.7)
Figure 4. The relative benefit of S-Tones and Noise for each individual. The dashed lines represent +/- 10% from the diagonal.

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