

**Journal/Article Review**  
**[self-directed learning]**

**Name:** XXXXXXXXXXXXX

**Title :** Tinnitus and Hyperacusis - Beyond the Ear

**Author(s):** Richard Salvi, PhD

**Journal/Publication:** Audiology On line

**Date of Publication:** Mar 2016

**Date of your review:** 12<sup>th</sup> Oct 16

**Summary of Article:**

The aim of the task was to be able to read this article and be able to explain how animal models are used in the study of pathophysiology of tinnitus and hyperacusis. It was to be able to describe the findings from the study and be able to explain how studies discussed support the current thinking that tinnitus and hyperacusis have a central origin involving multiple brain regions.

**Summary of Key Points Learnt:**

I was able to learn from the article that being an audiologist are main focus is mainly auditory focused and ignore most regions of the auditory pathway which receive inputs and send outputs to many non auditory centres involved with emotion , memory and body positions, vision and touch, all of this can have an impact on an individual's tinnitus. It is found that from research 70% of tinnitus patients can make their tinnitus louder or quieter by movements of the head, neck, jaw, tongue and shoulders. This tells us that there is more than just the auditory pathway that has an impact on a personal tinnitus. Now it is found that the medication lidocaine also known as xylocaine and lignocaine is used sometimes to numb tissue in specific areas its role is to block sodium channels which decrease the role of contractions of the heart an antiarrhythmic medication, it acts as a numbing agent and has been used widely in tinnitus research dating back to the 1980's. It was found that from vast publications lidocaine suppressed tinnitus. Based on this the drug was used In the PET study on patients with tinnitus. It was found that it made the tinnitus louder in some patients and quieter in others. Cardiology literature indicated that this drug induced tinnitus. What this did show was that increased tinnitus loudness showed increased neural activity and decrease in tinnitus loudness decreased tinnitus neural activity. The PET study with tinnitus induced in rats with high dose of salicylyde or nose exposure where the rats would press a bar if they heard a sound, was evident once the salicylyde was injected in the rats. It has been known for some time that high doses of salicylate are ototoxic. This is reflected as a reduction in distortion product otoacoustic emission, indicative of impaired outer hair cell function. It is where there is a substantial decrease in neural activity following from the cochlea to central auditory system. It was also hypothesised that a high dose of salicylyde will help induce hyperacusis. To test this hypothesis the reaction time-intensity functions in rats was measured A study showed high doses of salicylyde were also induced into rats which brought on results to show that high doses of this not only induced tinnitus but also hyperacusis. Ototoxic drugs or intense noise has a significant impact on the hearing system; it can reduce the neural output from the cochlea. This will then have a negative impact on certain parts of the brain.

### Your thoughts on the conclusions:

Was an interesting perspective and allowed me to start thinking beyond my routine practice. To conclude with it can be understood that we can just overlook the brain when we consider tinnitus or hyperacusis, hear with our brain, not just with the cochlea. Patients with debilitating tinnitus and hyperacusis can react to phantom sounds and real sounds in a complex manner involving many brain regions with different functions. Although the brain networks responsible for tinnitus and hyperacusis may have some common features, the components of the network and their relative weights would be expected to account for the unique characteristics of each patient. The rapid advances in functional and structural brain imaging may usher in a new era of individualised tinnitus and hyperacusis assessment.

### How will you apply this learning to my clinical practice:

Will help my explanations to patients presenting with questions on tinnitus

### How will this benefit patient care/service provision/delivery /service users

They will feel more informed and allow me to provide additional expertise

### Areas for further development or additional research/reading that you have identified:

I found this very interesting and will look up more information on this subject