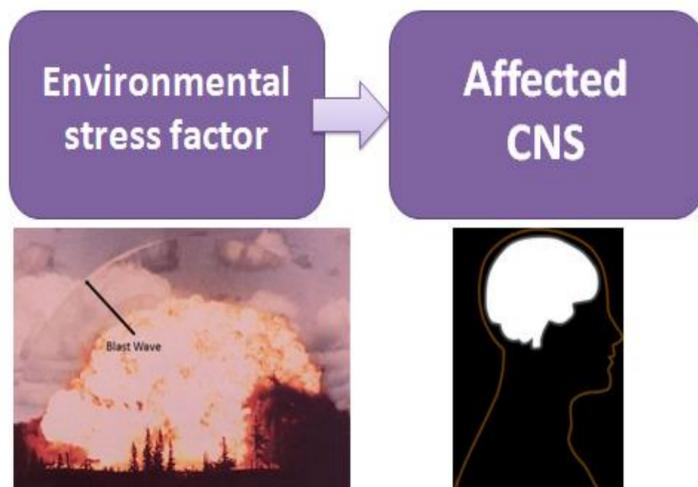


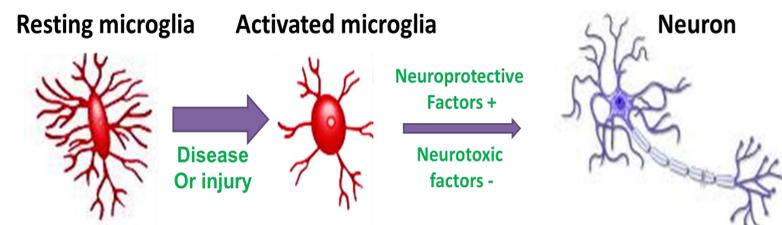
Background

Noise blast, due to high intense pressure waves, not only damages peripheral sensory organs such as the ears and eye, but also induces dramatic central brain damage. Battlefield, sports and road accidents are major events through which the subject can be exposed to a brain trauma. Central brain injury from blast exposure may result from damage to the inner ear or direct damage to blood vessels and axons cause by shear stress from the concussive blast.

Blast wave noise exposure and its effects



Pervious studies showed that activated microglia, resident immune cells in the brain, may contribute to neurodegeneration. Prolonged activation of microglia may contribute to or may be indicative of sustained neural degeneration.



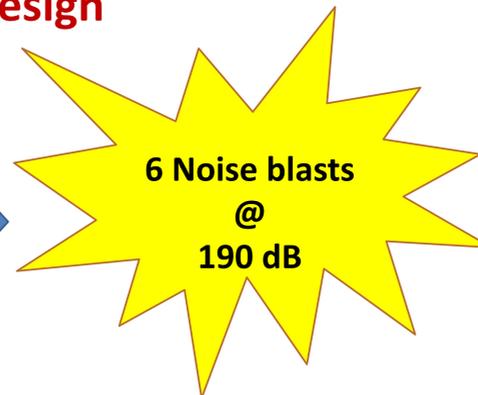
Given that activated microglia might be a marker of long term degeneration, we used immunohistochemistry to assess the expression of CD68, a protein expressed in activated microglia. CD68 immunolabeling was assessed in the auditory brainstem (cochlear nucleus) and the hippocampus, a region involved in emotion and spatial memory 6 months post-exposure.

Activate microglia markers



Experimental Design

Subjects:
3-4 month old male Sprague-Dawley rats.



Noise blast generator in the sound attenuating chamber

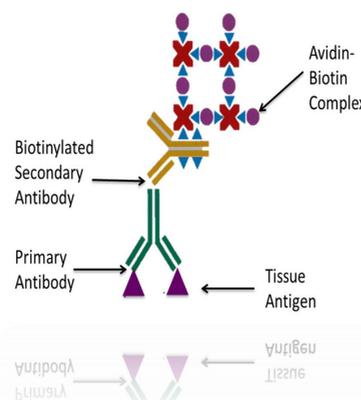


Sacrificed 6 months after noise blast exposure

Brains removed and cryoprotected in 30% sucrose solution

Obtain 40 micron sections from cochlear nucleus and hippocampus

Immunohistochemistry



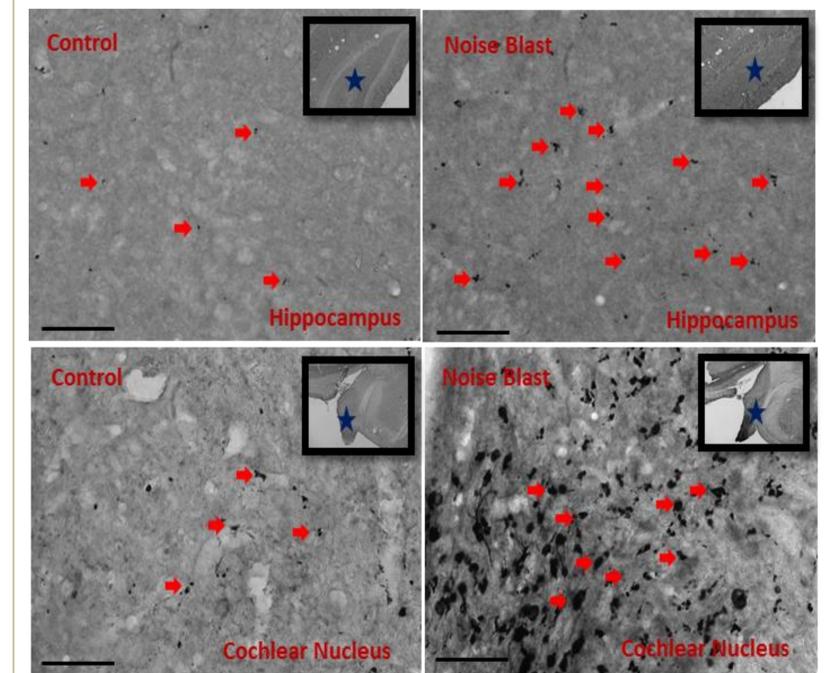
- Used to reveal the location of desired CD68 within a brain section
- Antibodies are linked to the molecules in order to visualize the location of the protein

Analysis/Results



Sections were examined under a microscope and they were assessed for the expression of the cd68 proteins in hippocampus and cochlear nucleus.

- Scattered CD68 immunolabeling present in hippocampus indicative of very mild degeneration in this non-auditory region (compare control to noise blast in upper 2 panels)
- Heavy CD immunolabeling in cochlear nucleus near the entry of the auditory nerve into the cochlear nucleus (compare control and noise blast in lowers panels)



Conclusion

•Our noise blast exposure induced persistent and heavy CD68 expression in the cochlear nucleus, a region that receives the auditory nerve fibers from the inner ear. These results suggests that noise-induced damage to the inner ear leads to very long term degeneration of auditory nerve fibers in the auditory brainstem.

•The noise blast caused a very modest increase of CD68 in the hippocampus suggesting that our blast had only a minor effect on the hippocampus.

References

- von Hehn, C. A., Baron, R., Woolf, C. J. (2012). Deconstructing the Neuropathic Pain Phenotype to Reveal Neural Mechanisms. *Neuron*; 73 638-651
- Perego, (2011). Temporal pattern of expression and colocalization of microglia/ macrophage phenotype markers following brain ischemic injury in mice; *J. Neuroinflam.* 8:174