Tinnitus

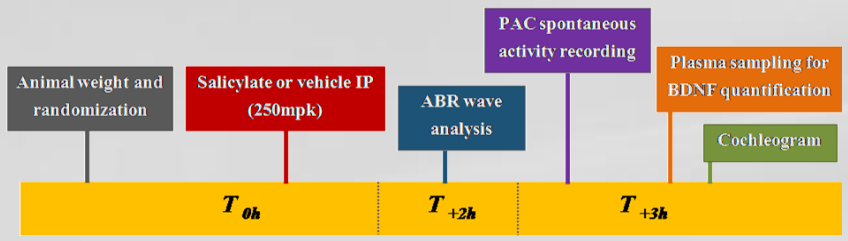
Tinnitus is the perception of a sound in the absence of external stimulation. Tinnitus is a common consequence of damage to the auditory periphery, affecting around 5-12% of the population and inducing intolerable discomfort. Today, no treatment exists to cure tinnitus.

In human and rodents, tinnitus leads to auditory brainstem responses wave modifications (Sawka and Wei 2014, Lowe and Walton 2015, Wood et al. 2019). Decrease of wave I amplitude and increase of wave I and V latency is observed in human and rats during tinnitus disorder.

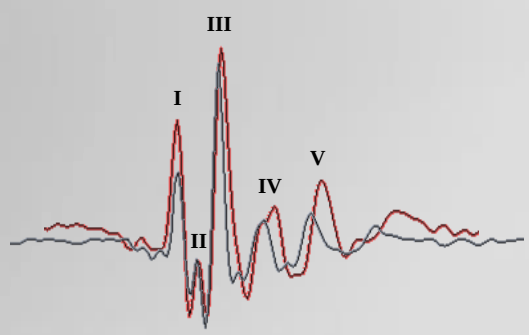
Importantly, increasing number of publications confirm that tinnitus disorder induces electrophysiological changes of primary auditory cortex. Modifications of the evoked response central frequency, Q_{10dB} value and significant increase of spontaneous spikes of pyramidal neurons of the auditory cortex have been reported in tinnitus human and mouse (Stolzber et al., 2011).

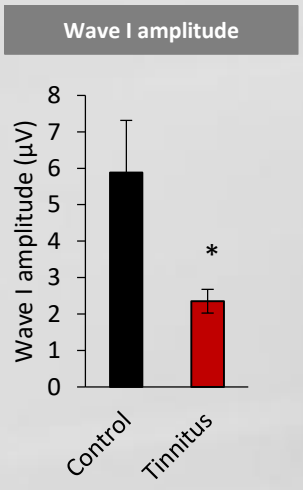
Finally, Goto and collaborators demonstrated that human plasma BDNF levels vary with the severity of tinnitus, suggesting that plasma BDNF level is a useful tool for objective evaluation of tinnitus. These results were confirmed by Yi and collaborators in rodent with tinnitus (Yi et al., 2018) showing an increase of BDNF level in salicylate-induced tinnitus mice.

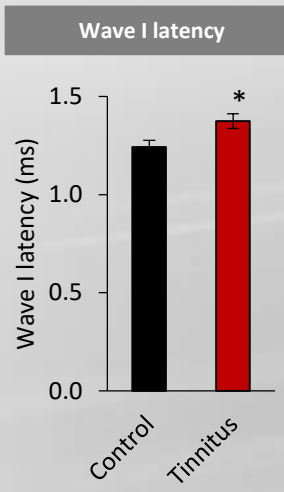
In mice, as observed in humans, salicylate administration induces temporary tinnitus leading to changes in ABR waves, increasing unicellular spontaneous activity of primary auditory cortex and increasing plasmatic BDNF inflammatory biomarker. This fast and robust model allows to determine the efficacy of new compound targeting tinnitus disorders.

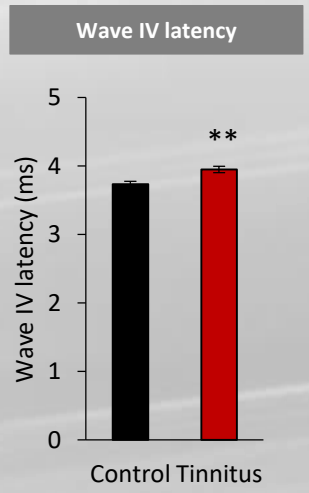


ABR wave analysis

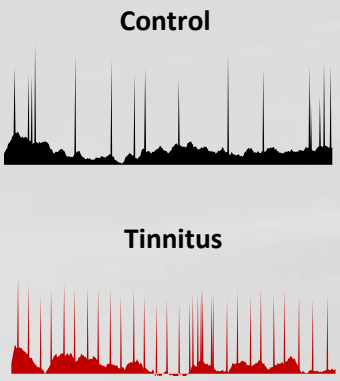


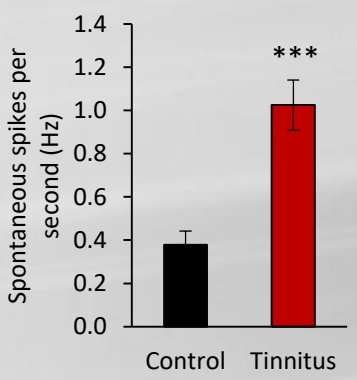




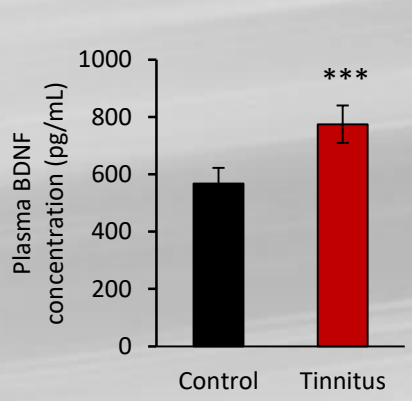


Auditory cortex spontaneous activity





Plasmatic BDNF quantification



Tinnitus phenotype characterized by the increase of ABR wave I amplitude and wave I and V latency, increase of spontaneous activity of the primary auditory cortex neurons, and increase of plasma BDNF biomarker observed 2 hours after salicylate administration. These readouts become a robust and reproducible method to determine the efficacy of new pharmacological candidates targeting tinnitus disorder.