

Emerging issues - impact of digitally treated sound (compressed intensity)

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compression, a widespread tool

- natural, in the cochlea
- hearing aids and neuroprostheses (cochlear implants)
- processed music and speech (broadcast sound, videoconferences)

WHY ?

- to make target sound salient, all the time, relative to background 'noise'
- goal = cancel quiet windows in which noise might emerge and take over

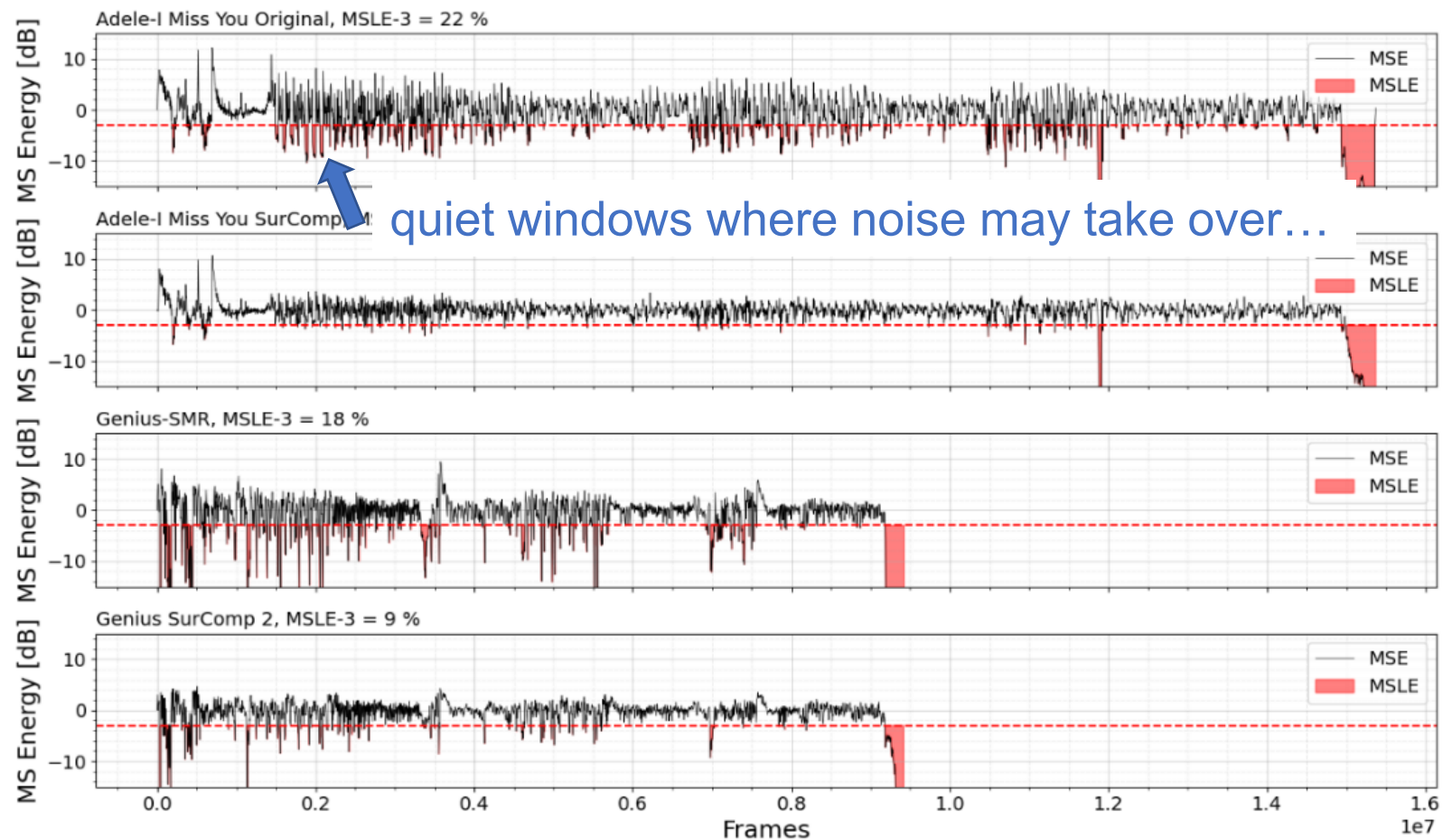
CONSEQUENCES

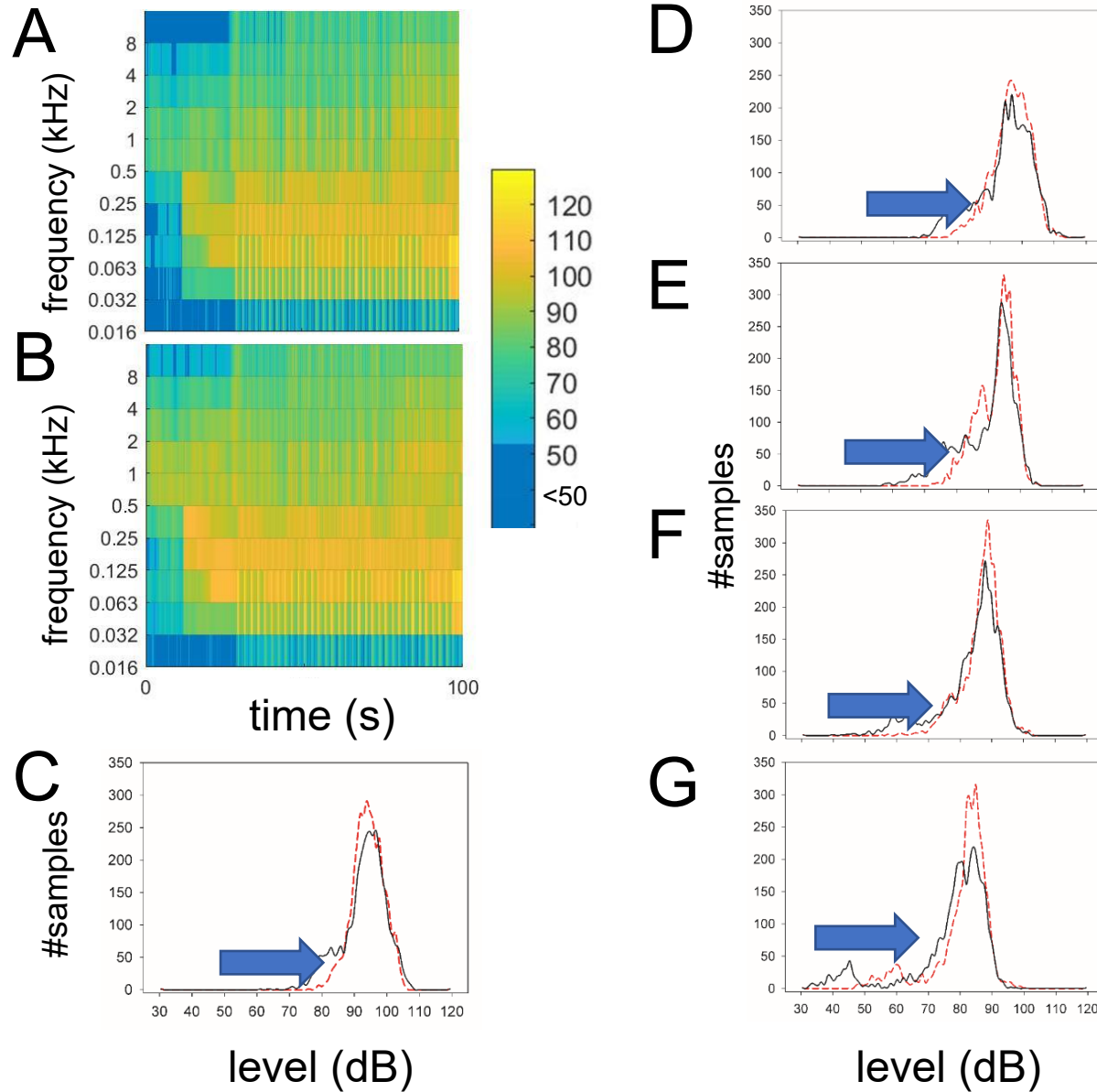
- quiet windows no longer exist...
- auditory fatigue enhanced?

how ?

MSLE-3 - Low Energy Detection

LowEnergyThreshold : -3dB, *ShortFrame* : 3000ms, *MomentaryFrame* : 100ms





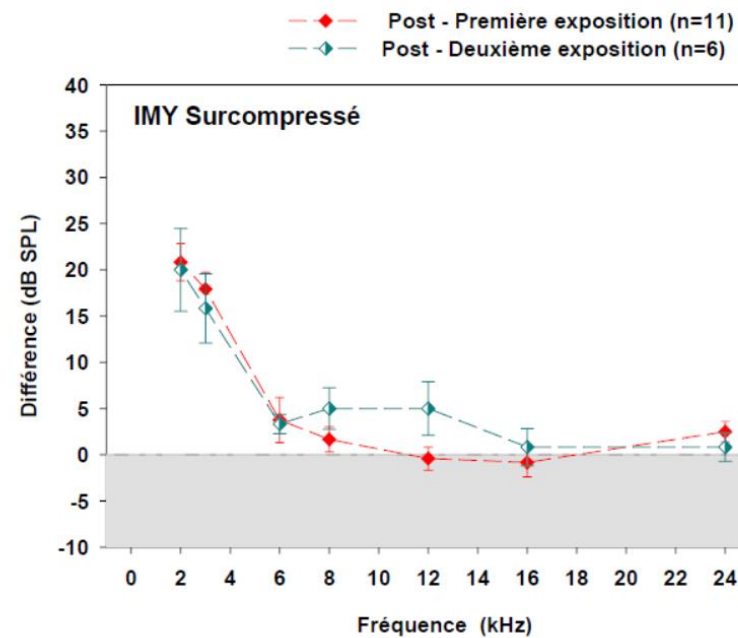
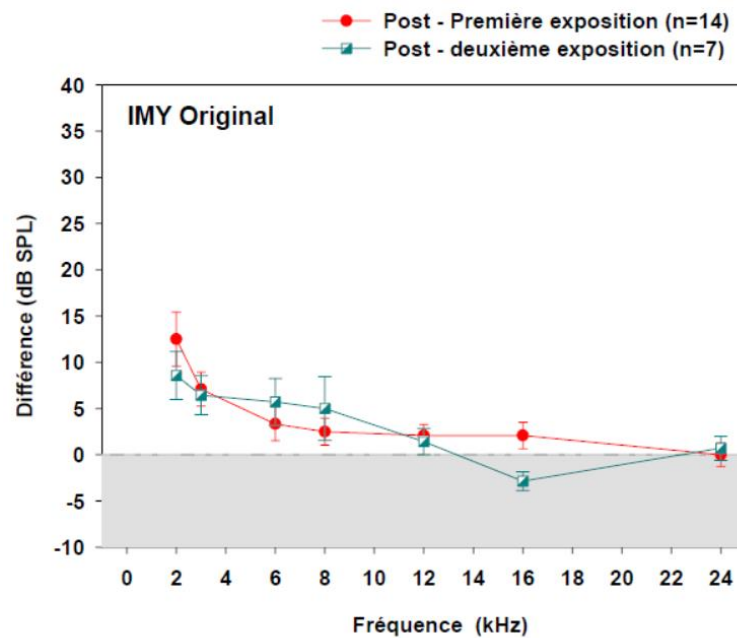
Dos Santos et al, Hearing Res.2024
doi: 10.1016/j.heares.2024.109120

a single 4h-exposure to amplified
music @ 102 dBA, compressed vs
non compressed

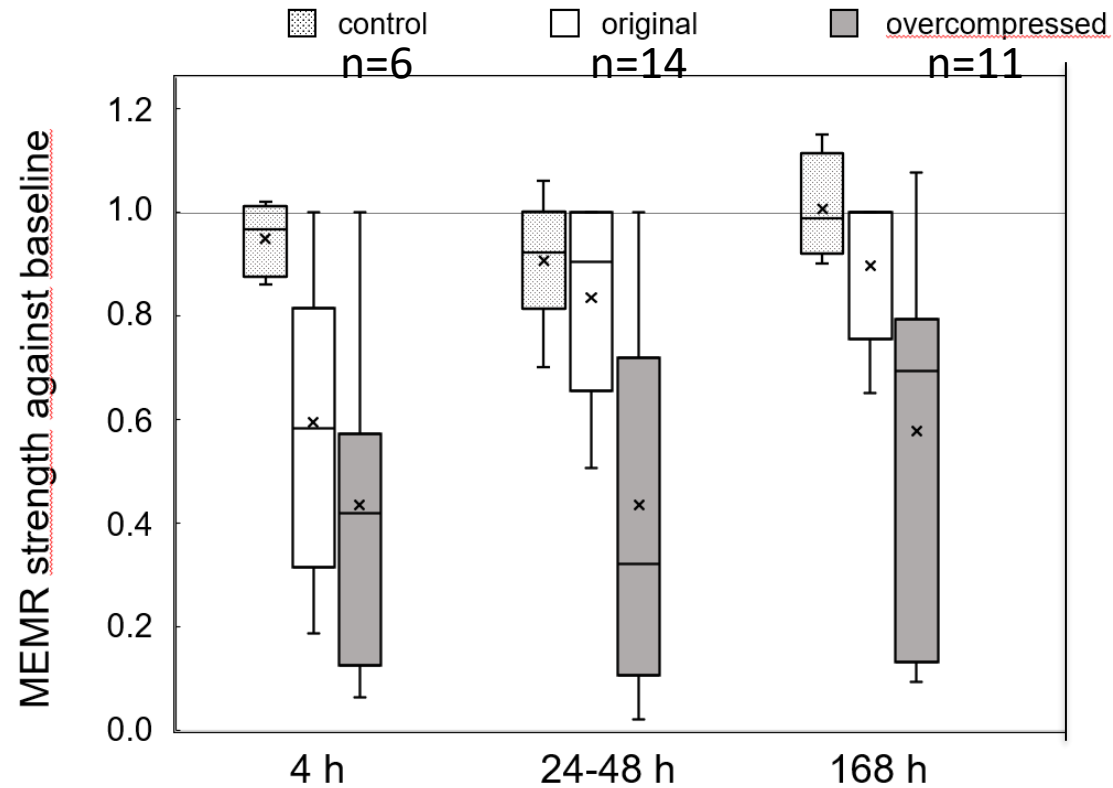
choice of a preliminary model for a proof of concept

- guinea pig
 - same frequency range as humans
 - can be tested awake
 - easy noninvasive monitoring
 - cochlea
 - part of the auditory brainstem
 - otoacoustic emissions for both purposes, tested at D0, D0 post exposure, D1-2, D7

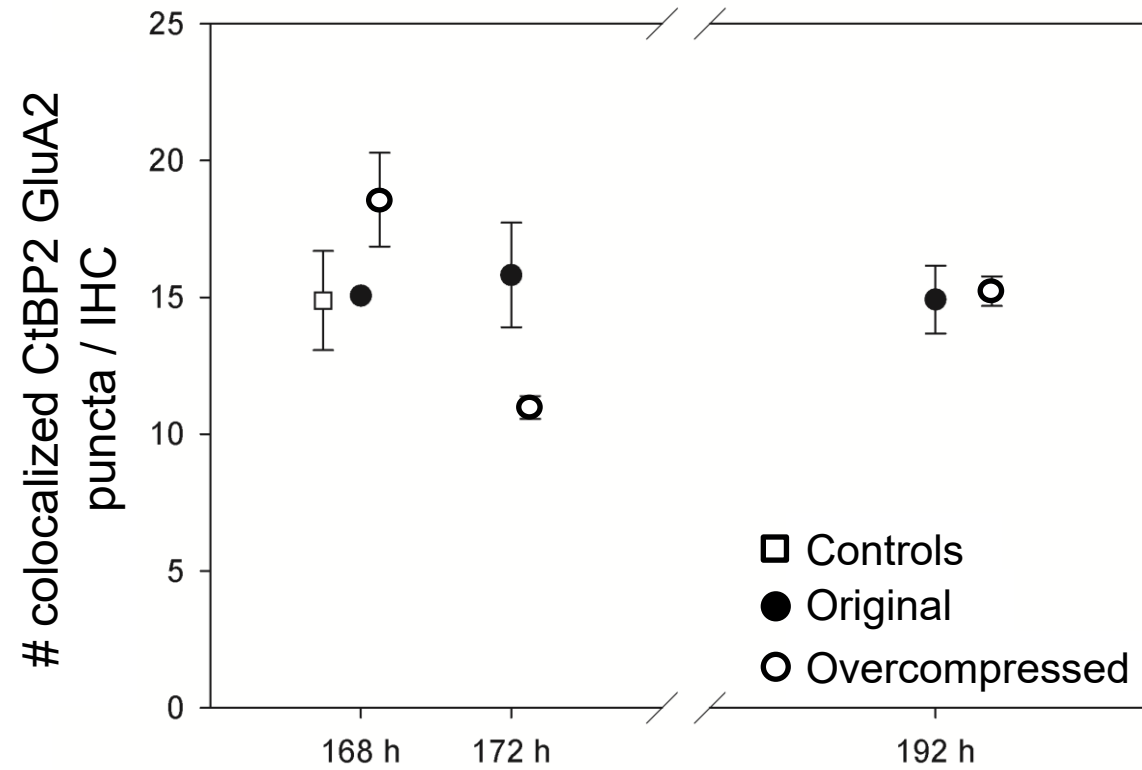
cochlea unaffected



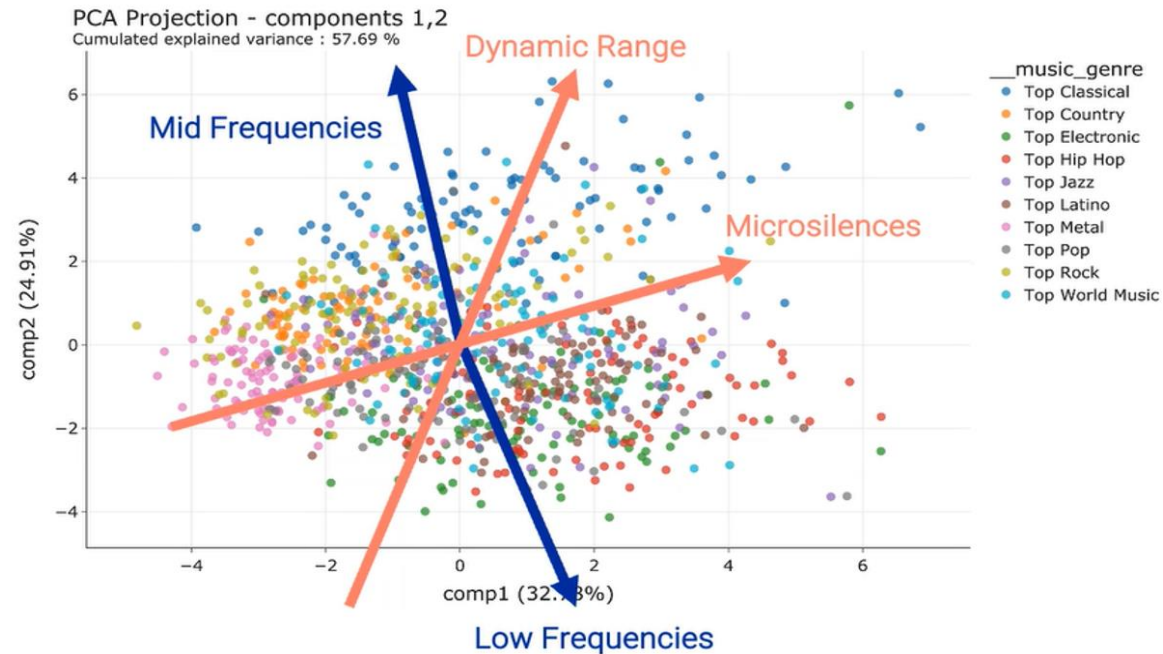
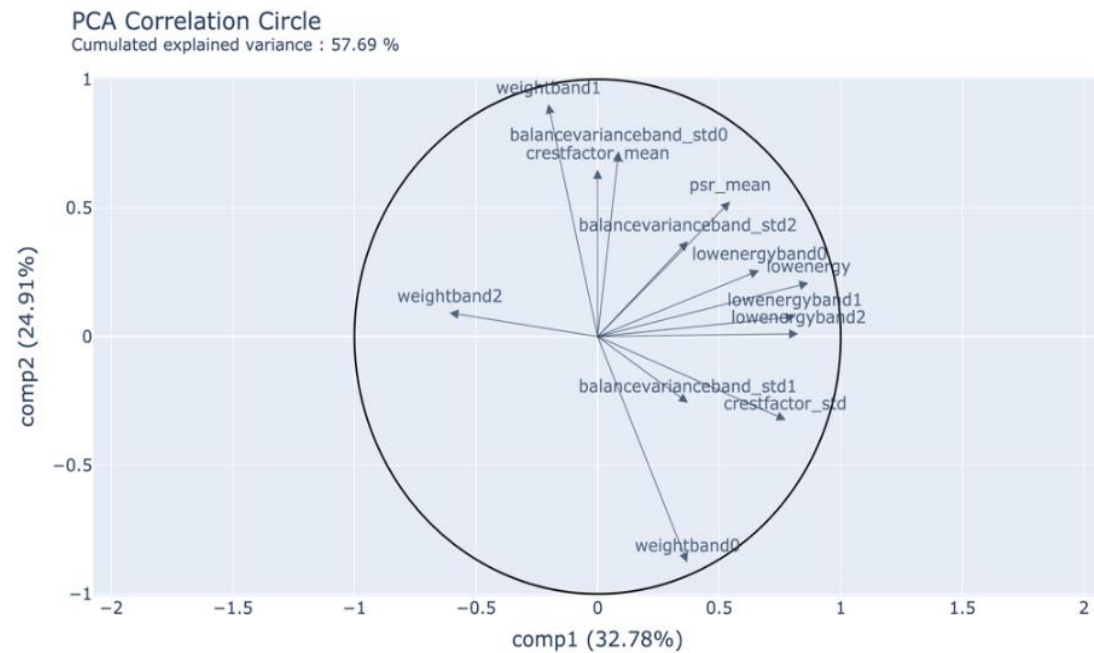
middle-ear muscle protective reflex
protracted and strong decrease
after compressed exposure only



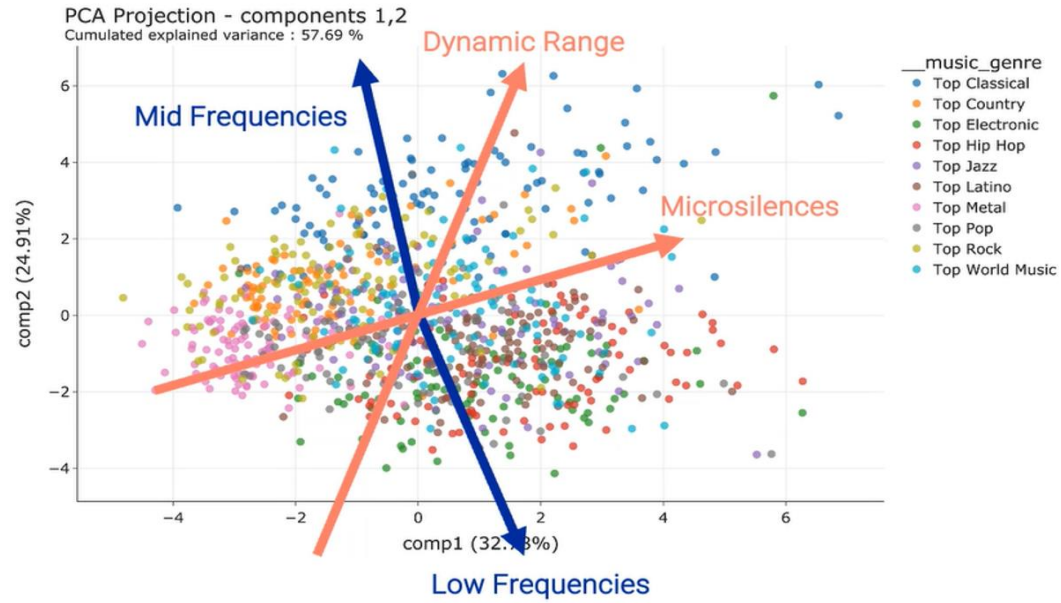
no hint of 'hidden' synaptopathy : another entity?



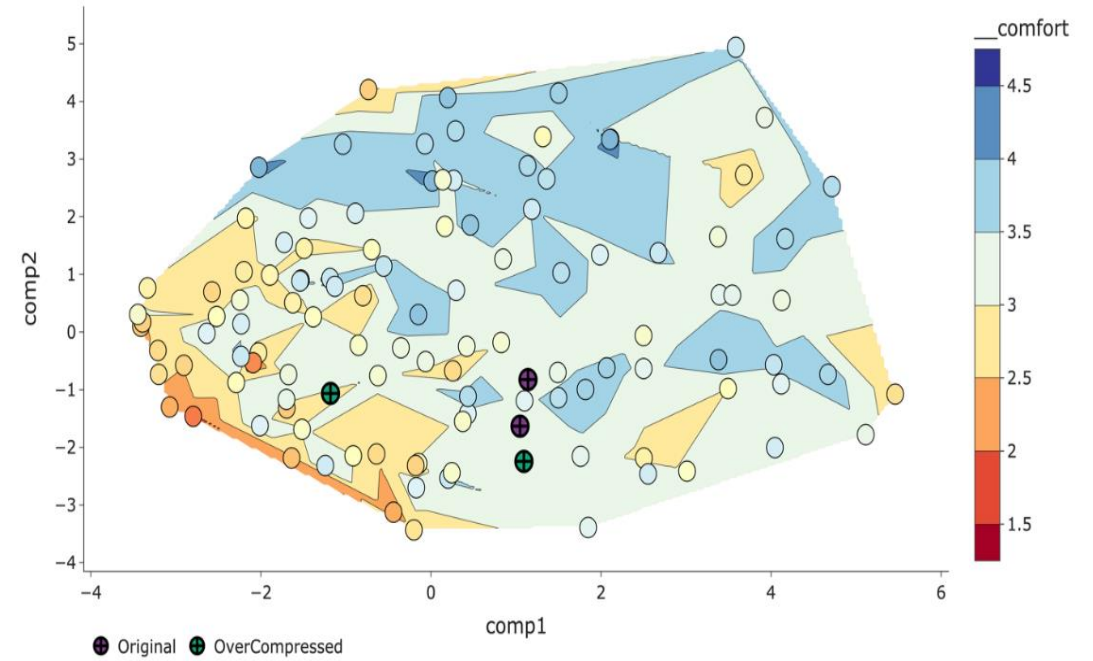
Looking at repositories of digital files / music



Influence on subjective evaluation ?



Heatmap of __comfort for DB1000-drop10s-stereo, 120 comfort songs and SemaineDuSon song



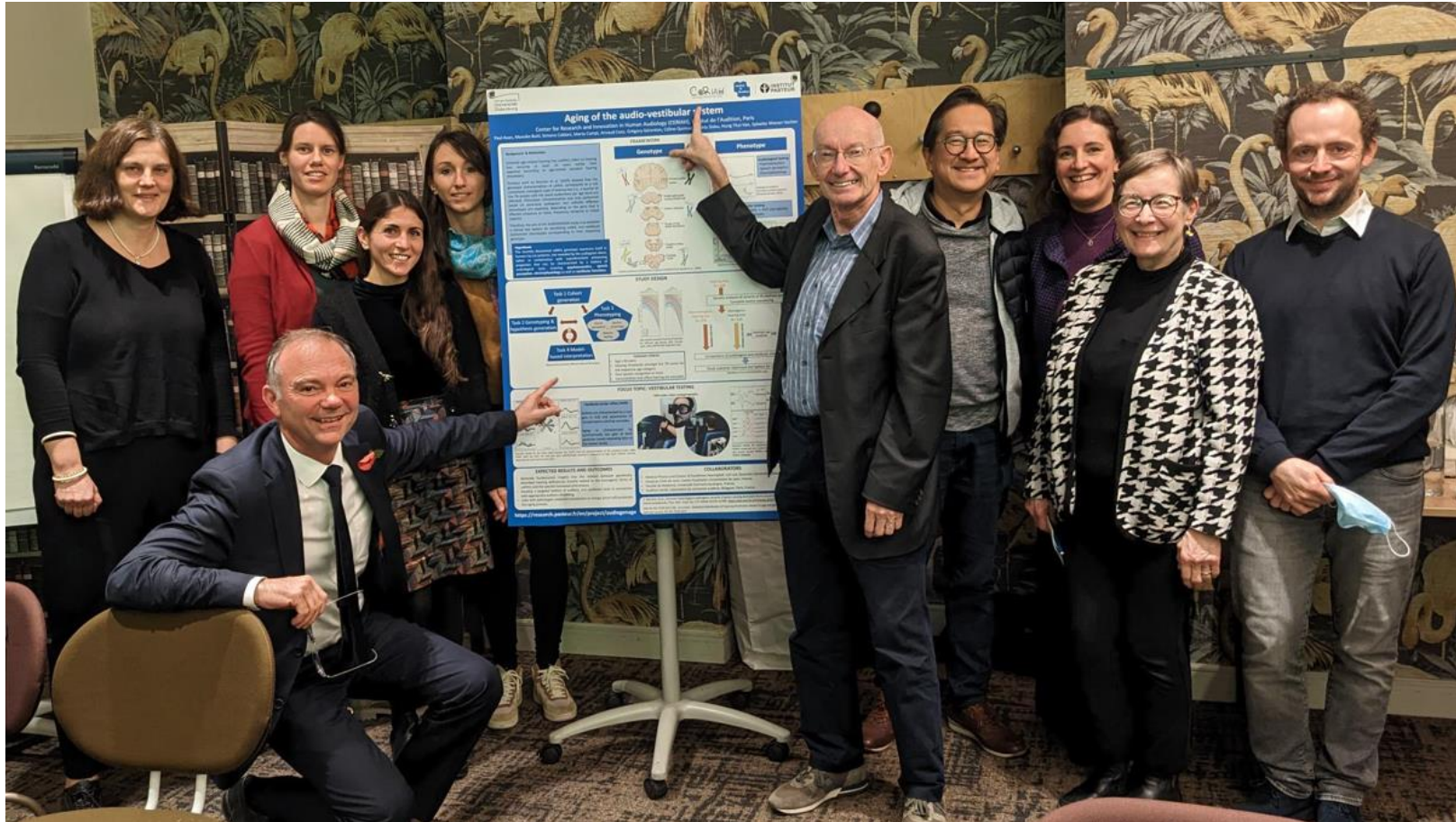
mild and not direct

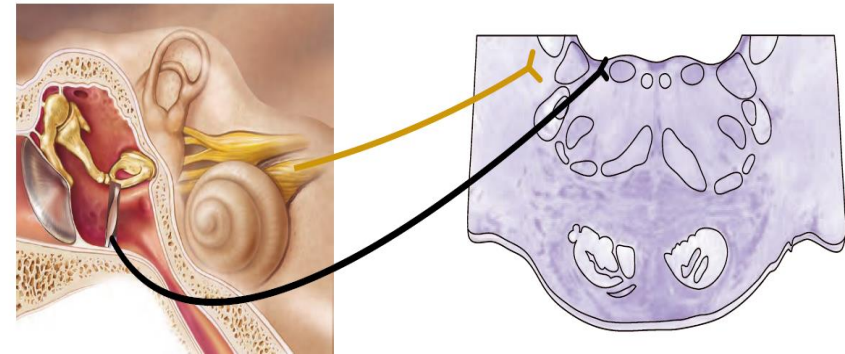
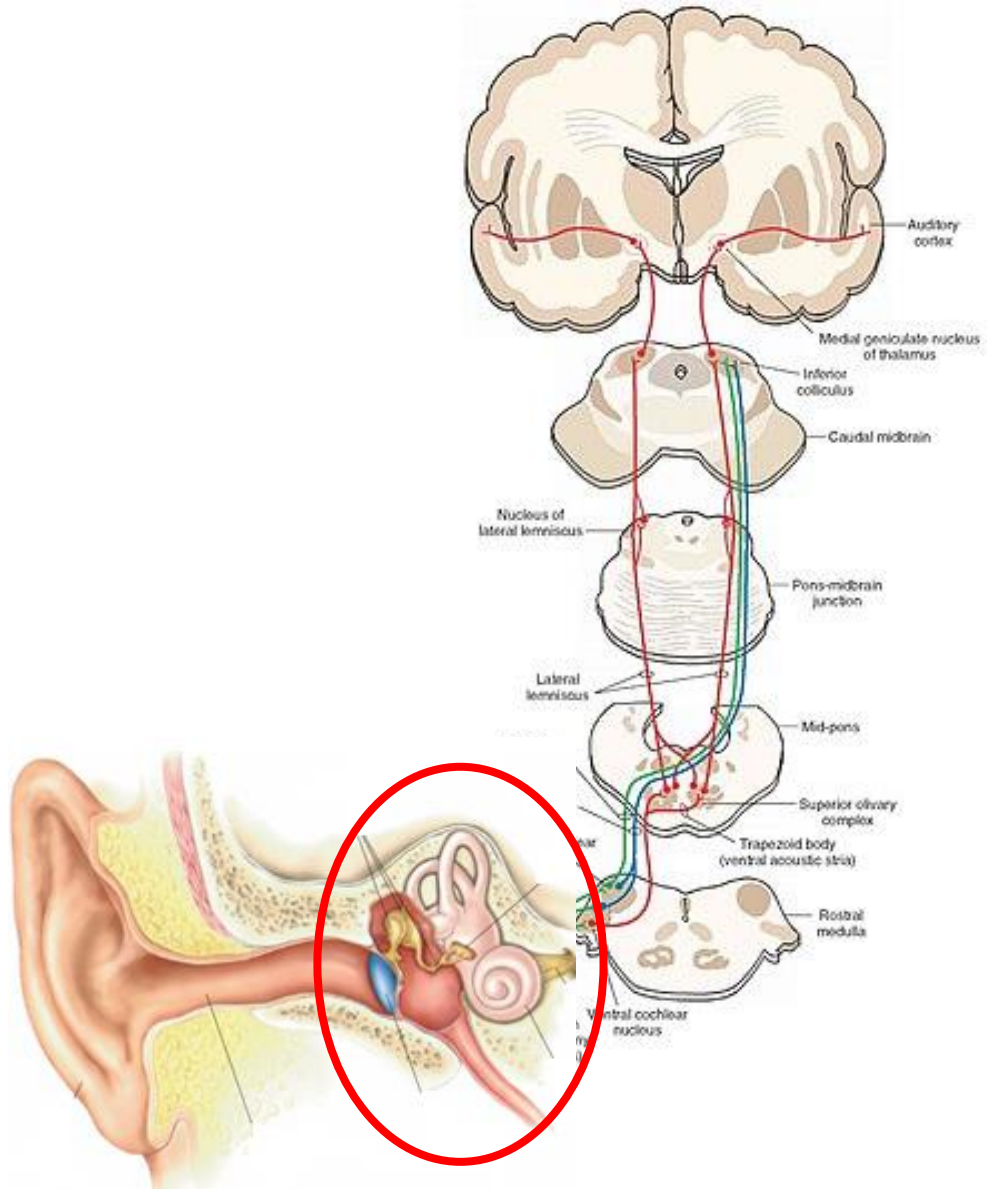
conclusions

- the effects of digitally manipulated sound do not follow standard rules
- likely, the (deliberate) cancellation of short periods of rest generates fatigability
- the resulting disorder is 'hidden' to standard audiometry
- caveat : fatigue does not mean damage
- what new standards ? how long, how loud, how often ?

remerciements: collaborateurs '*AUDIOGENAGE*'

CeRIAH





effets sur une boucle réflexe protectrice (audition plus centrale)

