Biophysical method may help to recover hearing

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Scientists based in Switzerland and South Africa have created a biophysical methodology that may help to overcome hearing deficits, and potentially remedy even substantial hearing loss. The authors propose a method of retuning functioning regions of the ear to recognize frequencies originally associated with damaged areas. Details are published August 29th in the open-access journal *PLoS Computational Biology*.

Hearing loss is an increasingly important problem in societies of growing average age. The conventional hearing-aid and cochlear implant technology have only been partially successful in recreating the experience of the fully functioning ear.

A possible reason for the lack of success could be because the cochlea – the hearing sensor – must be fully embedded into the corto-cochlear feedback loop. While recent artificial cochleas have been developed that are extremely close to the performance of the biological one, the integration of artificial cochleas into this loop is an extremely difficult micro-surgical task.

In an attempt to circumvent this problem, the authors investigated the biophysics and bio-mechanics of the natural sensor. They have identified modifications that would enable the remapping of frequencies where the cochlea malfunctions to neighboring intact cochlear areas. This remapping is performed in such a way that no auditory information is lost and the tuning capabilities of the cochlea can be fully utilized.

Their findings indicate that biophysically realistic modifications could remedy even substantial hearing loss. Moreover, with a recently designed electronic cochlea at hand, the changes in the perception of hearing could be predicted.

The surgical procedures needed to establish the authors' suggested biophysical corrections have not yet been developed. Recently developed lasers could play a prominent role in these surgical procedures, similar to their role in correcting deficits for another important human sensor, the eye.

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