

## Editorial

### **A Plea for More Mechanistic Patient Centered Research in Otology**

In the last decades, several great forces have been shaping clinical medicine, and research in clinical medicine, including otology. These are Evidence Based Medicine, and clinical trials, Personalized Medicine, and Qualitative Medicine. Personalized Medicine arose out of the explosion in knowledge about genetic and molecular mechanisms of disease in the last 20 years. It attempts to characterize individual patients at the biologic level so that therapies can be tailored specifically to the patient's biology. Qualitative research most often seeks a deeper understanding of the subjective experience of the patient, and their environment. Clinical trials, and evidence based on their analyses such as meta-analyses have come to increasingly dominate thinking and research in medicine. Systematic reviews in otology are increasing exponentially.

EBM and qualitative research have been very useful, and are based on sound principles and allow us to evaluate interventions much more rigorously than we did in the past. As such these types of research deserve great respect. Outcomes research is quite heavily promoted by health care systems that must make difficult decisions regarding how to spend finite resources on health.

However, none of these types of research can really tell us much about the underlying mechanisms of disease. Nor do they result in generation of new hypotheses as to the causes or mechanisms of how disease in otology manifests. For that, we need to continue to develop research into the mechanisms behind why things happen the way they do, how they interact with other systems, and what causes normal mechanisms to go awry. Often there is a push to develop new treatments, and this is easier to raise funds for, as of course the goal of all research is cure of disease. However, this can be at the expense of understanding first the mechanisms involved in disease and its progression. Only then can treatments be rationally devised.

It seems that many young trainees in otology increasingly seem to be shying away from mechanistic research, favoring instead evidence based research methodologies, educational research or advanced administrative degrees. It seems to be that we are going backwards in the role of the academic clinician as part of a scientific team.

In otology, our diagnostics are often very crude. There are diagnoses in our field, such as sudden sensorineural hearing loss, or chronic subjective dizziness, that are just descriptors of symptoms or signs. They say nothing about the underlying mechanisms. For instance, sudden sensorineural hearing loss could be from vascular, infectious, ototoxic, traumatic, metabolic or autoimmune causes. Even our common tests, such as the audiogram, sample only a crude part of the hearing ability. In many centers even speech testing in quiet is not routinely performed.

How about temporal processing, speech in noise, ability to understand with degraded signals, fine frequency hearing etc etc.? These would map better onto patient symptoms.

A fundamental problem is that otologic disorders and their mechanisms are evaluated in silos. These silos include otologists, basic scientists, audiologists, vestibular therapists, electrophysiologists, neurologists and neurosurgeons. They often do not communicate at all, and are all immersed in their own research or clinical "bubbles".

While many clinicians are not able to take time to develop expertise in bench research at the cellular or molecular level, I would urge academic clinicians to build the engines of mechanistic research in otology in their centers. The patient is the common denominator between the clinician and the researcher. Each patient is potentially a learning opportunity for research, if we could build collaborations between otologists, engineers, basic scientists, in order to apply current in-vivo interrogation tools, such as electrophysiology, acoustic probes and responses, imaging, psychoacoustics, genetic testing, biological markers, vestibular testing tools, and advanced audiometry including simulated environments to patients as they pass through the clinical flow. This would require them to be co-located with the clinic areas. I am advocating a push to build these types of centers in academic institutions.

Better understanding of the mechanisms behind disease would lead to better diagnostics, and hence better profiling of patients for clinical trials. It would lead to new therapeutics, and better guided therapeutics for therapies already existent.

It is important for academic leaders to continue to stress the need for mechanistic research in otology disorders in the next generation of otologists. While we need otologists trained in evidence based medicine, this cannot become the sum total of our research efforts in the coming decades!

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