



"Tinnitus: A Treatable Disease"

BY BERTHOLD LANGGUTH, M.D., PH.D.

This year's Tinnitus Research Initiative (TRI) meeting was hosted in Valencia, Spain by Professor Jose Miguel Lainez, Ph.D., one of the founders of TRI. The special atmosphere of this Mediterranean city with its combination of a long historic tradition and a futuristic character represented a unique venue. The dream-like progressive architecture of Santiago Calatrava's city of arts and science represented an inspiring environment for the opening talk, "The Dream to Cure Tinnitus" by Dirk De Ridder, M.D., Ph.D., who gave those words a manifold meaning. Just like Dr. Martin Luther-King Jr. had a dream – what was once a dream – became reality later. But it is not only that dreams may help to overcome obstacles, which seem to be insurmountable. It is also that many scientific breakthroughs have appeared in dreams. The discovery of the *benzene ring* by August Kekule, Ph.D., is just one of many examples. Finally the dream-state itself is proof of principle that a tinnitus cure is achievable. The vast majority of tinnitus patients have no tinnitus when they dream. Thus a better understanding of the dream state itself may provide a hint in the search for efficient targets to cure tinnitus.

Following the title, "Tinnitus: A Treatable Disease," this year's meeting was clinically oriented, starting with a session in which the need for multidisciplinary work was stressed. Collaboration of audiologists, otologists, neuro-otologists, neurologists, neurosurgeons, psychiatrists and psychotherapists is required for efficient diagnostic and therapeutic tinnitus management. Other talks focused on psychotherapy and sound therapy. While important progress has been made in these "traditional" treatments and they can be extremely useful in some patients, we also must acknowledge their limitations.

In order to overcome these limitations, a deeper understanding of the involved mechanisms is needed. Advances in animal research, electrophysiology and

neuroimaging enable an increasingly deeper understanding of the *neuronal* mechanisms underlying tinnitus. Recent basic scientific research has demonstrated the complexity of dynamic changes of brain structure and function after hearing loss. Most important is the differentiation between changes related to hearing loss and those related to tinnitus. Other concepts like spike timing dependent *plasticity* are increasingly recognized as relevant for tinnitus and its treatment. Of importance is that the advances in the understanding of the neuronal mechanisms are translated into innovative treatment approaches. Examples are the development of new pharmacologic compounds targeting potassium channels or combined electrical and *auditory* stimulation for inducing therapeutic *neuroplastic* changes in the auditory system.

Also highlighted was that in addition to basic science, other approaches may prove beneficial to overcome current limitations. Variability may be such an approach. We must continue to develop and test new ideas – aware that the vast majority of them might fail. By continuing to try and learn from failures, progress will be made analogous to what evolution does in nature. As Thomas Kuhn, Ph.D., stated in *The Structure of Scientific Revolutions*, "...also in science the fittest idea, the fittest concept, the fittest treatment will survive." Progress is based on failure, if we draw the right conclusions. As an example, large scale analysis of drug target and side effect databases enables the identification of neuronal targets involved in the development of tinnitus as a side effect of drug treatment. Inversing this approach may provide guidance for identification of potential targets for treatment.

As important as the creativity and open-mindedness are, application of proper methodology and research structure is needed. This will prevent rejection of efficient approaches because of false negative results and not lead us down the wrong path because of false

Calatrava's City of Arts and Sciences, Valencia, Spain. (Photo credit Bela Benedek / Belabenedek.com)



positive results. The relevance of *epidemiological* studies has been made clear, identifying the need for activities to prevent tinnitus and hearing loss, but also to demonstrate how emotional factors and tinnitus interact. For example there is evidence that depression is not only a potential consequence of tinnitus, but also represents a risk factor for its development.

Additional sessions discussed progress in animal research, the interaction between the *auditory* and the non-auditory system in tinnitus. Neuroimaging becomes increasingly successful in order to disentangle *neuronal* effects related to the various aspects and comorbidities of tinnitus. This knowledge can be directly implemented in brain stimulation approaches for modulating tinnitus-related brain activity. Similarly, advances in animal models offer more possibilities to develop and test new treatment approaches, whether pharmacological or specific stimulation approaches.

Let's use the momentum built up in Valencia to foster our inspiration and motivation and to drive our efforts. These efforts will decide whether the meeting was a success, and whether the dream of a cure for tinnitus will come true. Next year's meeting, will be held in Auckland, New Zealand from March 10-13, 2014 and the title will be "Beyond the Horizon". ☺☺

Letters to the Editor

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the doctors could not say what the outcome would be.

I think the electrical stimulation of the auditory nerve by the implant may be the reason. When I take the implant off, I still do hear sounds but they are much quieter and do not bother me. I am able to fall asleep for the first time without listening to my ocean surf CD. I encourage anyone with severe hearing loss and tinnitus to explore this option.

Faith Sokol
ATA Member since 1999

Editors note: Electrical stimulation of the brain and auditory nerve are very promising areas of research that are being explored worldwide for tinnitus alleviation. You can read more on all the latest tinnitus research from around the globe in our annual Research Round-Up on Page 16.

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