



SOLEMNE INVESTIDURA COMO DOCTOR HONORIS CAUSA DE BLAKE S. WILSON

DISCURSO DE BLAKE S. WILSON, HONORIS CAUSA

Universidad de Salamanca, 11 de mayo de 2015.

Rector of the University of Salamanca; Distinguished Authorities; Members of the Doctors' Senate; Doctors from other universities honoring us today with your presence here; Members of the University Community; Colleagues and Friends; and Ladies and Gentlemen:

Today is among the happiest and proudest in my life. To receive an honorary doctorate from the magnificent and venerated University of Salamanca is not only a supreme honor but is especially meaningful to me as an affirmation of the wonderful connections I am privileged to have with the University. I have spectacular friends in the Neuroscience Institute and the Department of Surgery, and as you have heard from Professor Lopez-Poveda, he and I have been the best of friends and have worked together for well over a decade.

I understand that the nomination for me to be considered as an honorary doctor was submitted jointly by the Department of Surgery and the Neuroscience Institute, and further that the nomination was supported by the School of Medicine and the Biomedical Institute. The nomination itself was a tremendous honor, coming from these internationally renowned sources. Thank you!

And I am most grateful indeed to the Faculty of Medicine, the Governing Council, and the Doctors' Senate for endorsing, ratifying, and approving the nomination, respectively. I will cherish their judgment forever, and I am thrilled to now be an Honorary Doctor of the University. You have given me the greatest gift, a wonderful bond between you and me, and between me and this great place, bonds that will become even stronger and continue for the rest of my life.

As you have seen in the video, and as Professor Lopez-Poveda so kindly indicated, I have been involved with the development of the modern cochlear implant, a surgically

implanted device that restores or produces for the first time highly useful hearing for deaf and severely hearing impaired persons. Today, the great majority of cochlear implant users can understand speech with their hearing alone and without the aid of visual cues such as those provided with lipreading. In fact, most of today's users communicate routinely with cell and landline phones, even with unfamiliar persons and even with changing and unpredictable topics. That ability is a long trip indeed from total or nearly-total deafness!

I have been working in the fields of cochlear implants, neural prostheses, and remediation of hearing loss for more than three decades. When I started, fewer than 50 persons worldwide had received a cochlear implant. We didn't know whether speech understanding could be supported with a cochlear implant. Indeed, many of the experts in ear surgery and auditory science at the time thought that the goal to provide speech understanding was a fool's dream. They in essence asked: "How could anyone have the hubris to think that speech could be conveyed with crude and pervasive electrical stimulation of the auditory nerve?" They pointed to the exquisite machinery of the inner ear and the complex patterns of neural excitation found in normal hearing.

In retrospect, what those experts and all of the rest of us missed is the enormous power of the brain to utilize a sparse input and to make progressively better sense of it over time, usually up to a year or so following the first use of the device. We had to exceed a threshold of quality and quantity of information presented through the implant, and then the brain could take over and do the rest, which was by far the largest part of the job.

But reaching the threshold was not easy. It required unwavering perseverance by the pioneers, even in the face of vociferous criticism, and it required teamwork and contributions from many disciplines, including but certainly not limited to otology, engineering, neuroscience, auditory psychophysics, speech science, and audiology.

Today, the cochlear implant is widely acclaimed as one of the great advances in medicine. What was once regarded as a miracle, the curing of a deaf man by Jesus as described in the Gospel of Mark, is now the standard of clinical care for deaf and severely hearing impaired persons.

I am happy to note that the University of Salamanca has been and continues to be a world leader in the application of cochlear implants. The program developed here included a multidisciplinary approach that is essential to producing the best outcomes, just as the multidisciplinary approach was essential to the development of cochlear implants. The teams here have included ear surgeons, audiologists, speech therapists, and psychologists,

among others. And the program here rapidly became a foremost model for programs that followed in Spain, South America, and many other parts of the world.

Another source of great pride for the University is the new diploma program in Audiology, which I hope will be the progenitor of a full discipline here. The present program is the first of its type anywhere and it and the anticipated program are sorely needed. Indeed, audiologists are key members of the healthcare team for hearing impaired persons, and audiologists are exceedingly scarce in Spain. The audiologists emerging from the innovative program here at the University will have received the very best instruction from basic physiology and anatomy to state-of-the-art diagnoses and treatments.

The full magnitude of hearing loss as a societal and personal problem is often underappreciated. According to the World Health Organization, more than 360 million persons suffer from debilitating hearing loss. That number is greater than 5 percent of the world's population. The negative impacts of hearing loss are immense, not only for those affected and their families, but also for national economies due to sharply increased costs for education and lost productivity.

Quite recently, a significant association has been demonstrated between dementia and hearing loss in elderly persons. If the relationship proves to be causal, then highly effective treatments of age-related hearing loss will be even more important than before.

Continued research to develop better prevention, diagnoses, and treatments is vital. The results could well enable opportunities that were not previously available to hearing impaired persons; prevent feelings of profound social isolation; prevent depression resulting from those feelings; and boost national economies.

Along those lines, Professor Lopez-Poveda, I, and many others are continuing our work to improve treatments. The treatments range from cochlear implants for persons with severe or total losses to better hearing aids for persons with less severe but still debilitating losses. Professor Lopez-Poveda is a world expert in normal and abnormal processing in the inner ear and how to reinstate at least partially the normal processing in the impaired ear. This biological approach goes way beyond the mere amplification provided by most hearing aids and can address the impairments at their root causes. The approach is highly promising for persons with moderate-to-severe losses in hearing.

For persons with even worse losses, our combined team of investigators here in Salamanca and my laboratory in the USA is developing new processing strategies for cochlear implants that provide a closer mimicking of the normal processing, including the

feedback control of the cochlea by the efferent neural pathways in the hearing parts of the brain. This ongoing collaboration has produced some nice improvements in performance. We expect to continue our work together for many years to come and anticipate further improvements.

I am additionally passionate about making the marvelous treatments we have today available to everyone who could benefit from them. Thus far for example, approximately 450 thousand persons have received a cochlear implant on one side or a pair of cochlear implants, one for each side. But various estimates indicate that at least 25 million people could benefit from a cochlear implant or bilateral cochlear implants. Thus, less than 2 percent of the people who could benefit actually have benefitted.

In many parts of the world, cost is a barrier to widespread applications of the technology, even though the benefits ultimately far outweigh the cost. The principal expenses are in providing the appropriate medical infrastructure and care. The cost of the device also plays a role, but that cost is coming down and is not the dominant factor for most countries. I and others are working to reduce or remove the cost barrier, and to improve hearing health care worldwide, which includes prevention, screening for hearing loss, and treatments in addition to cochlear implants.

We as a field now have happy problems to solve. Although the present-day devices are great, they are not perfect. A variability in outcomes remains, and even the top-performing patients experience difficulties in understanding speech in adverse acoustic environments such as noisy restaurants or workplaces. In addition, reception of sounds more complex than speech - such as symphonic music - is less than satisfying for most patients. Research is underway to address these remaining problems, including the research by our combined team in Salamanca and my laboratory in the USA. Many of the fundamental problems have been solved, and now we are working to make something that is great even better.

Although I have been working in the fields of cochlear implants and neural prostheses for nearly forty years, I am as excited as ever about the possibilities for the future. The work has been one incredible ride and among the great adventures of my life. The best parts for me have been friendships with spectacular colleagues and my interactions with patients and seeing them flourish with their restored hearing.

Thank you for the singular honor you have so kindly given me, and thank you for your kind attention.