Interview with Dean Goldschmidt and Dr. Balkany
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Goldschmidt: It gives me great pleasure to introduce our leader for the department of ENT, Ear, Nose and Throat, also known as otolaryngology, Dr. Tom Balkany, who is the chair of otolaryngology and a world leader in the area of hearing and hearing restoration. Tom.

Dr. Balkany: Thank you very much.

Goldschmidt: So, the opportunity that brings us together has to do with the recent publication of the ranking of best hospitals across the U.S., and more specifically the ranking of disciplines that make great hospitals across the country and one of them is otolaryngology, which turns out to be one of less than 20 disciplines that are being ranked as the most significant disciplines in the field of medicine. This year, the University of Miami and its affiliation with Jackson Memorial Hospital has been ranked within the top 20 for otolaryngology, which is extraordinary as an accomplishment. I thought it would be a good idea to have an interview with the chair of the department so that the world can understand what it actually takes to get to that milestone. Interestingly, the two departments that ranked highest at the Miller School are those that focus on disciplines attached to the senses that make humans human, hearing and vision. Both are ranked in the top 20 of the U.S. hospitals, and the other discipline is the Bascom Palmer Eye Institute which is actually ranked number one in the country. So these two departments, ranking in the very top group in the U.S., signify the importance of these disciplines in South Florida. I am eager to ask you the question, when did you decide to focus on hearing as a medical discipline, and was there a reason for it?

Balkany: Personally, I knew by the time I was 13 that I wanted to be a physician, but I did not know I wanted to be a surgeon. All through medical school I was trying to decide between internal medicine and psychiatry and then I saw an operation done through a microscope and I knew that was what I had to do, so it was microsurgery that got my attention. Soon after that, my wife, who is a psychologist, was running a school for developmentally disabled children and she recognized that one of the teenagers just did not fit. There was something different about him. She kept working with him and finally she came to me one day and she asked, "Could we get his hearing tested?" He had been sent by the state of Louisiana down to Florida to get the care that her center was providing. We had no resources, so on a weekend we brought him in when I was a medical student to the audiology department at the University of Miami and tested his hearing and it turned out he was not developmentally disabled or retarded in any way, except by deafness. He was in fact a very highly intelligent child. By putting hearing aids on this child, we were able to make a difference in his life and he eventually did learn how to read and did become self sustained. It had a huge impact on me. Since that time, I have been, in my own personal career, devoted to hearing problems. Otolaryngology as a discipline has five areas of

subspecialties of interest and in our department we do have people at the leading edge of all of those areas, and that includes rhinology and laryngology, the nose and the throat, facial plastic and reconstructive surgery, head and neck cancer surgery, and pediatric otolaryngology. One of the things that this U.S. News honor recognizes is excellence across the whole field of otolaryngology.

Goldschmidt: I realize that and I understand that hearing is a sub-discipline or one of the disciplines of otolaryngology. However, it is such a fundamental part of otolaryngology. It is a fundamental part of the discipline because to some degree it is such a visible part. We certainly can appreciate the difference your expertise makes for someone who had a terrible car accident and gets reconstruction that allows them to recover a normal life, but the opportunity to, for example, hear something for the first time – to hear the voice of a parent for the first time – for a kid who never had any ear capacity, that has a huge impact and it is amazing that your discipline has been able to accomplish such miracles. Can you tell us a little bit about the progress that you have witnessed and contributed to and even in many ways helped create?

Balkany: Absolutely. In 1979, the field of cochlear implantation was just beginning and I was very fortunate to be involved with it at that time. Today cochlear implants are very complex, computerized, multi-channeled devices, but in those days, we used to make cochlear implants in the back room of a hospital in Los Angeles by winding copper wire around a plastic bobbin, dipping it in liquid silicone by hand and letting it dry and then flame tipping two ball electrodes on that, sterilizing it, and putting it in people and hoping for the best. The best was quite good, they had some awareness of sound at that time and that was the first time that deaf people really had the opportunity to hear something, but they did not hear enough. They could not understand language, they could not recognize people's voices; all they got was elements of speech such as the loudness and the rhythm of it. It was important because it helped with lip reading, but it did not provide real speech understanding until the predecessor of the modern cochlear implants came along in the early 1980s. Cochlear implants were possible because of a confluence of computer technology. Microsurgical techniques allowed us to work on the inside of the ear, and better antibiotics meant that if a patient got an inner ear infection, we could control it before it became lethal. Those three elements (computers, microsurgery and better antibiotics) all started happening together in the middle of the 1980s. Since that time, over 100,000 people in the world received cochlear implants. Here, at the University of Miami we have done over a thousand. And you are right, it is one of the most gratifying things that you could imagine for a young mother to hear her child's voice for the first time.

Goldschmidt: So, for the folks that are not experts in the field, can we just define a couple of the words that you use? Basically, to somebody who was a medical student a long time ago, and remembers the ear as one of the most amazing organs of the human body, it was very clear that there was such a "machine" called the middle ear and then the inner ear and that essentially it was a bio-mechanical structure that was capable of receiving sounds in terms of the mechanics of air waves that are associated with sounds and then processing into an electrical signal, and stop

me if it is incorrect, the sound wave is then transformed to some degree into electronic energy and that is transferred to a cranial nerve itself connected to a formidable brain processor that allows cognition of the hearing material that is organized into parts of the brain that are exquisitely sensitive in a way that you can distinguish a very fine difference through the interpretation of a piece of concerto of Johan Sebastian Bach versus, Antonio Vivaldi. It is a remarkably sophisticated processing, but really what the cochlear implant is, is the replacement of the mechanic sound wave detector all the way the electronic connection to the hearing nerve. Is that correct?

Balkany: That is correct. 99 plus percent of people with nerve deafness actually have deafness of their cochlea. It is their receptor cells called the hair cells in the cochlea that are not working in over 99 percent of people with nerve deafness. Interestingly, these are the same nerve receptors that begin to fail as people age and that becomes a serious problem with our baby boomer population coming along. The hair cells inside the cochlea, these receptor cells, are transducers and as you said, what a transducer does is take the mechanical energy of sound which is vibrating atoms in the air and transduce them into electrical energy that travels down the hearing nerve to the brain. That is what they are supposed to do. When people have nerve damage, they do not do that and that is what a cochlear implant replaces. Another name for cochlear implant is cochlear prosthesis and it is basically a transducer and an encoder. The cochlear implant has to be able to take the mechanical energy, turn it into electrical energy and make it into signals that are sophisticated enough and enough like the normal signals that the brain understands them and can interpret these signals as music or language or any other kind of hearing. Today the system is sophisticated enough that about 80 percent of people who get a cochlear implant can understand fully. So for a child, under the age of one especially, they will develop normal language once they get a cochlear implant and have appropriate therapy, so long as they get that therapy and have normal brain function. If they are an adult, a typical adult will be able to understand about 80 percent of what is said and be able to talk on a telephone, for example. It is important for older people who may need to communicate for emergency purposes by telephone or with family members who are far away. Today, development is aimed at improving speech understanding, but also improving the appreciation of music. Music is a different function than hearing. So far all of the efforts have been made in a software program and help people understand language. Now that that is pretty much there, we are focusing on music.

Goldschmidt: That is amazing. You know, people are saying the goal of musical instruments is to reproduce the human voice and that is the reason why instruments, like the trumpet or a clarinet or even the violin, are so soothing to some because that is the way they recognize, to some degree, the human voice, so there must be some parallels between the two.

Balkany: Well, there is. The sophistication of the ear and the brain in appreciating music is something truly amazing. Today, even though we can have people understand 80 percent of the spoken word, we cannot come close to that in having them understand or recognize the timber of

a musical instrument. The voice and the beauty of the different instruments you discussed have a lot more to do than simply their pitch and their amplitude, their timing, their harmonics, there is more to it. Timber is something that is very difficult, even for musicologists, to describe except to say that it is that indescribable quality that makes music beautiful.

Goldschmidt: That is very true. So you mentioned the kid who was "retarded" and turned out to be simply unable to hear. Can you tell us about the patient who left the greatest impact on you of all?

Balkany: You know, if I could, let me tell you about three, because I cannot tell you only about one. One of them was a wonderful man, Mike, who enlisted in the 10th Army Corps, the Mountain Armed Corps from Colorado when he was 17 years old. He pretended to be 18 at the time so he could fight in World War II. During his training, he had dinner one night and went to bed and he woke up six weeks later in a hospital. He had developed meningitis and became totally deaf from it. He remained under medical care throughout World War II. When the war was over, he decided to visit Europe as a deaf person. While he was there, he went skiing and he met the woman, Claire, who would become his wife. Although he had never heard her voice, she was one person whose lips he could read. He told me he paid a lot of attention to her lips. They came back to the U.S. together and they attended Yale University without an interpreter. He was a classmate of George Bush Sr. at Yale and went on to become the editor of the Wyoming Gazette and the chairman of the Wyoming Democratic Party, all as a man who could not talk on the telephone or read lips of most people. So Claire was always by his side, whether it was to interpret a telephone conversation or to tell him what people at a meeting were saying. They were inseparable. He decided that he would try a cochlear implant while they were still quite experimental. When he came to see me in Denver, where I was practicing at the time, he said that he was going to keep a journal and publish it in the Wyoming Gazette to let people know what this was all about, for better or for worse. And as I said, it was experimental at the time. We did his implant, the surgery went well but afterwards, he did not hear very much. It helped him with lip reading, but he could not talk on the telephone or hold an editorial board meeting without Claire. So he was disappointed and he wrote about it in the newspaper. Not a year later, I got a telephone call from Mike and I was in the middle of just chatting with him – How are you? How are your daughters? How is Claire? – and I realized that she was not interpreting. I said, Are you hearing what I'm saying? He said, Yes. I said, Is your wife telling you what I'm saying? He said, No, she is not here. He was doing it as his way of surprising me and thanking me and it was amazing. He went on to tell me how he heard her voice for the first time and understood her. They had been married now for 25 years. He had two beautiful daughters and he was able to hear their wedding and that made him very happy. They both got married on the same day to different families and he was able to hear all that, which is a wonderful story, but with a sad ending. He called up again several years later and was trying to talk to me and I could not understand him. He gave the phone to Claire, and she said we have got to come to see you because the cochlear implant is not working any longer. When they

came, it turned out that he was hearing perfectly, but this man for whom communication was his whole life as an editor and writer for a newspaper and the leader of a political party had lost the ability to talk. We scanned his brain and it turned out that he had a brain tumor in the expressive language areas, so receptively he was fine. He went from a guy who for his entire adult life could not hear what people were saying, to one who could hear fine but now could not express himself, and it was in the cognitive expressive areas so that he could not write either. It was not a matter of motor function at the time; it was a matter of word finding. Eventually, he passed away from that, but of all the patients I have seen I think that story was the one that has struck me the most. The fragility of life and the irony that people live through.

Another woman came to Colorado from Chicago to have the operation done in the early days; her name was Sally. At that time it took about 6 months before the brain got used to the cochlear implant and people could hear with it. Sally had the implant, she flew back home to Chicago and a month later when it was time to turn on the cochlear implant she came back to see us and she asked if it would be okay, her husband was going to call her to see how she was doing with the device. I said yes, of course. Right after we turned on the cochlear implant, her husband called and the secretary came in and said, it is her husband on the telephone, would you mind telling him how things are going? She said, I heard that, can I talk to him? So she put the phone up to her cochlear implant, in those days it did not have a telephone receiver, she just had to hold it right up there and she just broke out in tears and said, "He said he loved me! I have never heard him say that before!"

Goldschmidt: Did she like his voice?

Balkany: Yes, she liked his voice. She was so happy. Of course all of us broke out in tears also at the same time.

Finally, I will tell you about a family. There were the mother, father, two sisters and grandparents all tucked into a room which we have here; it is about 8'x6' with the audiologists and all of us . Their child had never heard before and as we turned on the device after programming it, the child's eyes just opened up as wide as you can imagine, like a Keane painting. He started to clap and danced around in a circle and the whole family was just so ecstatic. It is one of those moments that we have repeated many times that you just cannot forget.

Goldschmidt: It is an amazing victory. It reminds me of my youngest boy, Dylan, who is 4. Last night we were playing one of these board games, Candy Land, and he won against the entire family. Let me tell you, it took about half an hour for the boy to quit jumping and clapping.

All these are fascinating stories and I know that there are many more similar to the one that was recently related in the press about the young girl from Iraq that was discovered by a soldier and brought to your attention. She had never heard either, and thanks to you she was able to hear her parents for the first time. And I am sure that there are so many stories now that are part of this

amazing collection of memories of creating an opportunity that is bigger than anything that money can buy. That is really the story of heroes of medicine, of heroes of our world. It always amazes me how complex just restoring one sense in one human being can be as opposed to, in the context of a war, for example, how easy it is to destroy human life. I mean it takes an army of extraordinary people working together, whether it is scientists who discovered the device, nurses and technicians who are part of the team to prepare the patients to identify which technology they need to recognize their deficit, etc. Then, like the conductor of an orchestra you are basically delivering that opportunity that we call hearing and will change people forever in their life. How do you get the team to be engaged? How do you get the team to be fully committed, because that is what it takes to become a top center in the world? You have to make sure that you can rally everybody behind their contribution.

Balkany: You know, I think the greater the mission the less important the leader. To be able to instill passion in people for something like hearing does not require that great of an orchestra director because the rewards are so palpable. They come so immediately and so regularly that once people see that, they really want to be part of it. Once they are part of it, their passion extends to other people. I think it is the passion that is so easy to lose. It seems in some ways, the medical training process can erode the passion that young people who want to become doctors have and it is our job to keep it there. The long hours and the harshness and difficulty of medical training make it easy for students to lose the passion and become more involved with technical aspects of what they are doing and not see the people that are at the receiving end of what we do. That is what we have to keep doing as a medical school.

Goldschmidt: That is so true. I also remember somebody told me that, I do not know if it is true or not, that laughing, the laugh, comes as an evolution of a relationship between a child and the primary care provider whether it be the mother, the father, or someone else more often the mother of course and that to some degree it is an attempt to imitate the cry, but in a context where the child expresses that he knows that that person will be good to the child and therefore there is no need for crying and that laughing is a good substitute. I have always wondered, if you have never heard anything, how can you cry and laugh?

Balkany: The normal sounds of a deaf child that we expect out of deaf children are very similar to the normal sounds created by hearing children up through about 6 months. That is a random babbling that children do. By 6 to 8 months, hearing children begin to have canonical babbling as in a musical cannon that is repetitive phrasing of the same babbling sounds, and deaf children begin to lose all babbling at that time and yet the cry and the laugh remain. So, those sounds even though they are considered part of language are really more of a primal sound then the kind of learned language. The laugh and the cry in different languages from Asian multi-tonal languages to African “click” languages to Western languages, the laugh and the cry remain very similar in spite of the difference in the actual communicative language.

Goldschmidt: That is amazing. So it is really true that the ability to hear is part of what makes humans human.

Balkany: That is really the words of Anne Frank, you have almost quoted it, "Hearing is the humanizing sense that allows us to participate in the company of mankind."

Goldschmidt: So true. Well, it is difficult to express the gratitude we have for what you do for the Miller School of Medicine, for the University of Miami and for all of these individuals who have entrusted us to bring them solutions for their difficulty with hearing, but also with all other disciplines of your wonderful specialty of otolaryngology, and this is a good opportunity for me to say thank you. For years to come, people will be able to listen to this interview and know that it was a remarkable contribution to medicine in the history of this school. To Tom Balkany and his team, to all who contribute to what we accomplish collectively, thank you!

Balkany: Thank you.