A Life in Nuclear Medicine in Israel

A Conversation Between Ora Israel and Johannes Czernin

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Johannes Czernin, MD, editor in chief of *The Journal of Nuclear Medicine*, talked with Ora Israel, MD, Emeritus Professor of Imaging at the Rappaport School of Medicine, the Technion (Haifa, Israel). In 2018, she retired from clinical duties and from her 18 y as Director of Nuclear Medicine at the Rambam Health Care Campus. She also served as Deputy Director for Research at Rambam for 4 y. For more than 4 decades, her main scientific interests included multimodality tumor imaging, in vivo radionuclide quantitation, and imaging of infection and inflammation. She has been involved in the development of hybrid imaging, including SPECT/CT and PET/CT (since its beginnings in the late 1990s), and, in recent decades, in developing guidelines for clinical implementation of these technologies. She is the author of 3 textbooks on hybrid imaging, more than 200 scientific articles, and more than 30 book chapters.

Dr. Israel has led the training of physicians and scientists in Israel and throughout the international nuclear medicine community. She was a long-time visiting professor in the Harvard Joint Program in Nuclear Medicine, on the faculty of the Johns Hopkins Nuclear Medicine course in Baltimore, MD, served as faculty in the PET/CT course of the Royal Society of Medicine (London, UK), and was a participant in educational programs organized by the International Atomic Energy Agency. She serves as an associate editor of *The Journal of Nuclear Medicine* (*JNM*) and the *European Journal of Nuclear Medicine and Molecular Imaging*. She is a consultant for molecular imaging for GE Healthcare. Dr. Israel is a fellow of SNMMI and an honorary member of the European Association of Nuclear Medicine. She also received the Life Achievement Award from the SNMMI General Imaging Council and the Barry Siegel Lectureship award from the SNMMI Correlative Imaging Council. She is a founding member of the Israeli Academy of Medicine.

Dr. Czernin: *Thank you, Ora, for taking the time to speak with me. Can you provide our readers with a little bit of background on your life and career?*

Dr. Israel: I was born, raised, and educated in Romania, in a German-speaking family. My grandmother came from Austria. I completed my medical studies at the Institute for Medicine and Pharmacy in Bucharest. After I married my husband of 50 y, Stefan, and graduated, we immigrated to Israel. We have two accomplished children and four beautiful grandchildren. Having completed medical school and internship, I had to choose a residency. My first choices had been either intensive care or nephrology. But when we came to Israel I was offered a position in nuclear medicine—and immediately said no! When they asked why, I said "Because I'm afraid of radiation." But then they told me that they had just recruited a very promising new chief of nuclear medicine at Rambam, Dov Front, and that it could be a lot of fun. So, I changed my mind. Until today, most people who come out of medical school don't really know what nuclear medicine is all about.

Ora Israel, MD

Dr. Czernin: *How many years of training did you have in Israel?*

Dr. Israel: It was 4-and-a-half years of training, as it is now. But some of the components have changed over the years. At present, residency consists of 2 y in nuclear medicine, 6 mo of PET/CT, 1 y in diagnostic radiology, 6 mo of clinical rotations, and also 6 mo of basic research, which I consider to be very important.

Dr. Czernin: *Is nuclear medicine an independent department in Israel or is it part of radiology?*

Dr. Israel: It is independent. There was a letter to the editor in *JNM* in 1993, signed by Dov Front and me, with the title "Nuclear medicine in Israel: independent, alive and well" (*J Nucl Med.* 1993;34[10]:1826). I am happy to say it still is like that!

Dr. Czernin: *Looking at your bibliography, your SPECT/CT work is an important contribution to nuclear medicine.*

Dr. Israel: We also had the privilege to work with the first PET/CT that was manufactured in Haifa and published quite a few important studies on the subject. With that being said, I always considered SPECT/CT as an important modality.

Dr. Czernin: In 2020, *you published with Van den Wyngaert and other authors a very nice review article in* JNM *(2020;61[9]: 1284–1291), in which you listed accomplishments of but also barriers and challenges to SPECT/CT in clinical practice. You mentioned subpar CT resolution. How do you see development of the CT component in SPECT/CT? What do you foresee as the standard of care in SPECT/CT from a technology point of view?*

Dr. Israel: First, the clinical indications for SPECT/CT are often not in oncology, and studies are often done in younger patients. Therefore, radiation exposure is a concern. There are very few clinical indications for which we have to do a whole-body SPECT/CT. Most often we need to do a limited field-of-view study. We also have to inject as little tracer activity as possible. We have to look at SPECT/CT technology from both sides: SPECT has seen major advances in detector technology, such as the advent of cadmium–zinc–telluride detectors. We can inject lower doses while obtaining high image quality. With respect to the CT part, it depends on the clinical indication. Do we need a diagnostic CT, or do we need to increase the specificity of our SPECT images? We have to be

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able—and we are able with the new technology— to juggle and to find the best way to use this modality.

Dr. Czernin: *If you say that you want to increase the specificity, then often a low dose is good enough. But optimized device design has to be versatile to meet any clinical scenario. What would a device like this look like?*

Dr. Israel: Actually, I think that there are 2 devices that look like this that are available today. Both come from Israel. But first, we, the physicians, need to switch mentally from planar to tomographic imaging using single-photon emitting agents. And here we have 2 challenges. One is in our mind: to forget planar imaging of bone, lung, or kidneys. The other major impediment is the lack of development of new tracers. I know of very few developments and trials for new SPECT tracers, and this is a major problem.

Dr. Czernin: *If the industry doesn't buy in and if tracers are handled just like drugs for regulatory purposes but not reimbursed at a reasonable level, then a huge section of the market drops out, because there's no money in it. There's not enough money in diagnostics. The same used to be true for PET tracers if they were not linked to a therapeutic, like in theranostics.*

Dr. Israel: I see a chance to overcome these challenges when we talk about treatment, about the need for dosimetry. I do believe that SPECT/CT can play a very important role here.

Dr. Czernin: *But you need to commercialize imaging probes, and the return on investment for diagnostics is much worse than for therapeutics. Business translation is a really important aspect, because if you cannot monetize it, it will not happen in large sections of the world.*

Dr. Czernin: *There is a major SNMMI initiative called the Dosimetry Challenge. This aims at simplifying data acquisition without compromising data robustness. When you look at radiation oncology, they have dosimetrists who do nothing but dosimetry-based radiation planning. We believe that the annual number of theranostic cycles in the United States will be very high. To manage the volume we will need well-trained nuclear medicine dosimetrists in addition to nursing and well-trained physicians to accommodate these high patient volumes.*

Dr. Israel: I agree, but there is also a lot of work being done by industry; there is new software, and this will make the work of physicists and dosimetrists much easier.

Dr. Czernin: *Do you do dosimetry for your PSMA-targeted therapies?*

Dr. Israel: Not clinically. As I said before, the studies documenting beneficial dosimetry impact on outcomes need to be well-designed. The new therapies are what will keep us alive and well in the future. But we have to do it right, based on a lot of research.

Dr. Czernin: *I agree that this is the future, because we are the only discipline that can achieve whole-body precision medicine.*

Dr. Israel: Exactly. You can first identify patients who are likely to respond to therapy and then optimize the administered activity to achieve further improvements in outcome.

Dr. Czernin: *How do you best promote the concept that we do precision oncology, and what are the best examples for you?*

Dr. Israel: We have to have the best partnerships with oncologists, both clinical and radiation oncologists. We need to understand their unmet needs and what we can provide them.

¨[Y]ou have to love what you do.˝

Dr. Israel: I understand that. But it really saddens me. It shouldn't be like this; it should not be like this at all!

Dr. Czernin: *This would be an interesting political and economic discussion. You mentioned new tracers. Can you give examples of what specifically you would want to see?*

Dr. Israel: I thought about ^{99}Tc-labeled somatostatin receptor– or prostate-specific membrane antigen (PSMA)–targeted tracers. These studies are absolutely beautiful, mainly when used with SPECT/CT. The problem is that there are very few, if any, well-designed big studies. We are shooting ourselves in the foot if there are no good studies.

Dr. Czernin: *You mentioned dosimetry as a key potential application for SPECT/CT, and I completely agree, because it's irrational to administer the same activity to each patient. I believe that we often "underdose" patients. In the United Stated we need to get solid reimbursement for doing dosimetry, as this is very labor intensive. Can you do sequential early, 24-, 48-, 72-h dosimetry scans in Israel? And what does it mean for workflow?*

Dr. Israel: Workflow can be one of the problems. If you rearrange your workflow to add SPECT/CT to standalone SPECT or planar, imaging, everybody gets mad at you. But if you plan your schedule well, you can do it. For the moment we cannot and should not do these studies in a nonresearch environment. It would not be ethical to do it, because we have not proven yet that dosimetry calculations based on SPECT/CT lead to improved outcomes. So we are not there yet, but I do believe that this is the main direction to take.

Dr. Czernin: *That's exactly true. I call it the integrated independence of nuclear medicine.*

Dr. Israel: I have always advocated for independent nuclear medicine. You can teach radiologists to read PET/CT studies and which radiotracer to use. But FDG is not just another contrast agent. I have witnessed in more than 40 y of my career that only people who are 100% dedicated to nuclear medicine can move this field forward. Nothing that has ever moved nuclear medicine forward has come from somebody who was not 100% dedicated to the field There is no other way unless you are completely dedicated to this specialty, which I think is beautiful. I love it. I've loved it for my whole career.

Dr. Czernin: *Different topic: Do you produce therapeutic compounds onsite? How is this done in Israel? Do you produce onsite or compound?*

Dr. Israel: We have 3 centralized radiopharmacies that supply demand for the whole country.

Dr. Czernin: *Are they private or government run?*

Dr. Israel: Two are private, and 1 is government run. Some centers, are also very active in research with respect to new radiotracers and new ways of production.

Dr. Czernin: *We're coming to the final portions of this discussion. I am always interested in different health care systems. Can you provide us with brief insights into the Israeli system? Is it a mixed, private, or government-funded health care environment?*

Dr. Israel: Health care in Israel is socialized. We have mandatory health care insurance.

Dr. Czernin: *It's a European-style system?*

Dr. Israel: There are 4 health care funds, and we are all members of one of them. And everything is very well documented and monitored.

Dr. Czernin: *Is there additional private insurance that one can buy on top of the government-managed system?*

Dr. Israel: Yes. This can help in choosing a surgeon and perhaps getting into a private care facility. This could also help a patient go overseas for surgery or for some forms of treatment that cannot be done yet in Israel. But the basic health care system is very good. Life expectancy is high, and infant mortality rates are very low.

Dr. Czernin: *Is there societal agreement that health care is a right for everyone—that health care is a human right?*

Dr. Israel: There is no such thing as an ideal place. But, yes, everybody has the right and access to, in my opinion, high-level health care.

Dr. Czernin: *What about the future of nuclear medicine?*

Ora Israel: There was a dry spell 10–15 y ago when we really had problems here recruiting talented young people. But over the last few years most of the centers have had waiting lists for acceptance into nuclear medicine residency. And there is also a new trend: double-certified imaging physicians. They spend 7–7.5 y in training through both diagnostic radiology and nuclear medicine (some periods of training overlap, thus the shorter total number of months or years). No cutting corners! The right way to go!

Dr. Czernin: *Do you think that is why more people are interested in joining the field?*

Dr. Israel: I think that hybrid imaging, PET/CT and SPECT/CT, had an impact, as well as theranostics.

Dr. Czernin: *What about therapeutics?*

Dr. Israel: There are new opportunities in therapeutics. The next generation of nuclear medicine physicians will finally be able to treat patients in addition to precisely diagnosing their disease! Therapeutics will make a change. If I were still in charge of a department today, I would see as my main job for the next 2 or 3 y to find the right person to take charge of therapies. Everybody has to know and do everything, but someone should be in charge of establishing a strong therapy unit. This is also important in order to have a key point person to interact and communicate with the clinicians and patients.

Dr. Czernin: *We have reached the end of this discussion. Can you provide a word of wisdom or advice for the young people joining the field?*

Dr. Israel: First, you have to love what you do. You have to always try and do whatever your task is at the highest level. And although not everybody can, I think that doing research just brightens your mind. It gives you a different perspective on life and a lot of excitement. The moment you get the galley proofs of a paper accepted by *JNM* is something you will always cherish.

Dr. Czernin: *I like the* JNM *angle! Ora, your insights are going to be very much appreciated by our readers and, of course, by me. Thank you so much for taking the time.*