Q: How did you get in the MRI field? What was your educational background?

Felix Wehrli: I graduated with my PhD in physical organic chemistry from ETH in 1970, and I did nuclear magnetic resonance research at that time. I wanted to do carbon-13, because proton was widely used in NMR but carbon was not and there was evidence that it would provide a powerful tool for structure analysis. This was really just about the time when Fourier transform NMR was invented. The instrument I had during my thesis project was a brand-new multi-nuclear continuous-wave spectrometer made by Bruker-Spectrospin. It turned out, however, that it was very difficult to do natural-abundance C13 by continuous-wave NMR (my instrument was CW), so I developed a method for indirect detection, essentially sitting with an oscillator on a C13 satellite in the proton spectrum and sweeping the C13 resonance frequency, and you then get a response which is called a transient nutation. So that was how I could detect C13 natural abundance in small molecules without even signal averaging.

I subsequently spent 8 years after graduation at Varian Associates, which was the leading NMR instrumentation company located in Palo Alto, California, but I was at their European headquarters in Zug, Switzerland, working as an application scientist. I was already academically oriented at that time publishing papers, mostly just under my name because I was pretty much by myself. In 1979, I attended the annual Experimental NMR conference in Asilomar, California, and I got approached by Bruker management there. They were looking for someone to lead their US subsidiary in Massachusetts. They hired me, but I was not really there for a long time, and it was less than three years after which we decided to part. Nineteen ninety-two happened to be the year when GE decided to enter the MRI field. At that time, there were two leading NMR imaging (as MRI was called) companies. One was a California based company by the name of Diasonics, which was associated with UCSF (and later got absorbed by Toshiba). They had a 3.5 kilogauss (0.35T) system, which was already a mult-slice clinical imaging system. The other company was called Technicare (later acquired by GE). The company initially had a 0.15T system. MGH had such a system, for example. I joined GE that year (referred to a head hunter by Paul Lauterbur) as an application scientist. I was with them from 1982 to 1988 in Wisconsin, and one of my responsibilities was to develop clinical applications and work with the early academic sites that had GE instruments. At that time, GE did what most experts said would not be possible, to build what was called a “high field” system operating at 1.5T (the highest field strength at that time was 0.5T). In 1988, finally, I joined the University of Pennsylvania as a full professor. Initially I was more involved in teaching, because at that time physicians who got into MRI did not really understand the technology. I was very involved with SMRM (predecessor of ISMRM) pretty much

from the society's inception and served as Editor in Chief of MRM from 1991 to 2004. I built a laboratory at Penn and have since been funded continuously with several R01 grants. I also have a T32 training grant, which is still active now. So, I am still active here at Penn.

Q: When was your first SMRM/SMRI/ISMRM Annual Meeting? What is your memory of it?

Felix Wehrli: There were about 200 people at the 1982 SMRM meeting in Boston. The SMRM meeting in 1983 was in New York, and at that time, there were many more attendees. Initially the meeting was held at the Hilton Hotel and the meeting alternated betweenSan Francisco, New York and off-shore (referring to a location outside the US). There was another society called SMRI, which was more clinically focused. The two societies eventually merged as each grew, and the meeting could no longer be held at hotels and had to move convention centers. Anyway, I think I attended almost all meetings during the past 30 years.

Q: Have you ever thought about other jobs outside MR field during your career?

Felix Wehrli: Never. I really liked nuclear magnetic resonance in the beginning and later magnetic resonance imaging because it's so incredibly rich with almost infinite potential. So, I have done magnetic resonance all professional life long.

Q: You were in industry for so many years. Why did you choose to move to academia?

Felix Wehrli: I think that is an interesting question. I was not the only one who made that transition. In industry, particularly a company like GE, you cannot really stay at a level for too long, and the next level typically requires transition to management and leadership, but I really did not want to do that because I enjoyed what I was doing. That was the main reason I looked around. I did not really actively look for an academic position at that time, and this just happened naturally. There were not many people with experience in the MRI field, and academia needed such people. I never interviewed at other institutions.

Q: Did you present at your first SMRM meeting?

Felix Wehrli: No, because that was 1982 and I had just joined GE. After that, we had many posters, presentations and lectures at every meeting. In 1982, I was just there to see what was going on.

Q: Were there many trainees at early SMRM meetings and did they provide any educational program?

Felix Wehrli: I do not remember that but there should have been some, and they did not provide educational programs at the time. It took many years before educational programs were included.

Q: What was the ratio between technical versus clinical ISMRM abstracts at that time?

Felix Wehrli: In 1982, there were clinicians who attended the meeting. I would say maybe one third or 20% of the papers were more of a translational nature, showing that MRI and MRS can benefit patients, but I would say that the bulk was not necessarily technical, but rather focused on understanding relaxation times, biophysical processes such as diffusion, chemical shift etc. Of course, technical development of RF and gradient systems, and exploring other field strength were also part of the program. The highest field strength in 1982 was 1.5T, reached maybe around the end of 1982, quickly after I joined the company.

Q: What were the challenges 30/40 years ago versus challenges today in doing MRI research?

Felix Wehrli: Well, the challenges in the olden days were that what investigators wanted to do was difficult to achieve with commercial instrumentation, such as new pulse sequences. Initially, I don't think industry want to provide an open system, allowing you to design your own sequences or even make modifications. When I was at GE, we recognized that MRI was totally different from CT, because there are millions of ways to excite and detect spins. That is why MRI proliferated in so many directions. Initially, no one would have thought that MRI can provide markers to be quantified, but nowadays quantitative MRI is a hot topic.

Q: Would you give some advice to young/new MRI researchers on how they could potentially make new ground-breaking work today?

Felix Wehrli: Well, I think my advice would be "be persistent". First of all, you have to get funded, otherwise you would not be successful in academia. The other thing is that you have to always ask yourself what is new. When you look at innovation, there is always something called antecedent. There is always something you can go back to and build upon. So, few things are really radically new. If you have an idea as an early-stage researcher, pursue it and really work on the problem and demonstrate its feasibility. Once you have done that, I think you are likely to be successfully. I think solid understanding of the basics is important. Of course, connection with practical world to learn how to conduct experiments, interpret and analysis data. I think the way to conduct research has not been fundamentally changed during my career as a scientist. In our field, you can propose a new technique, but you have to quickly show that it is going to be useful or have some potential, and can address a practical biomedical problem. I think that is important and probably a recipe for success.