Edward J. Hoffman, Ph.D.


Ed Hoffman

Today at about 5 AM our friend and colleague, Ed Hoffman, passed away. Ed's wife Carolyn was at his side.

Ed and I began as graduate students together in Chemistry at Washington University and when I joined the faculty of the Washington University School of Medicine in 1970, Ed was my first post doc. We had a wonderful time together as students and as colleagues over a 39-year time period.

As graduate students in chemistry, we solved the nuclear structures of 7 different isotopes working under Dr. Demetrios Sarantites, who was a young, bright and ambitious Assistant Professor in Chemistry, who had just arrived on the faculty from MIT. Demetrios was a great teacher to Ed and me and had a profound impact on both our lives.

At the Washington University School of Medicine, Ed and I started off our careers not really knowing where we were headed, other than believing, like all young academics, great things lie ahead that would change the world we live in. We enjoyed the benefit of what Dr. Michel Ter Pogossian had built with his introduction of cyclotrons into medicine and the unique radioisotopes produced from them. Dr. Michael Welch had been recruited to build a chemistry program that had never before existed in the Division.

I had a small group consisting of Ed, a graduate student, Henry Huang, who was getting his Ph.D. in Electrical Engineering with Dr. Jerry Cox; a circuit design engineer, Nizar Mullani; a programmer, Carol Coble; and a technician, Julius. From 1970 to 1975, Ed and I, with our little group, invented a series of technologies:

1. An X-ray fluorescence system for measuring blood volume in the brain *in vivo*.
2. Something called the 'Lead Chicken', which you would have to have seen to understand the name, that provided a way to measure blood flow, oxygen and glucose metabolism in the human brain.
3. Four different PET scanners – Since I only had a small grant from DOE, we had do things as simply as possible. The first prototype PET scanner was crafted out of plywood. We tore down the Lead Chicken and used the detectors and electronics to build the prototype PET scanner. Ed and I designed the system, Henry took care of the image reconstruction algorithm, Nizar designed and built the coincidence electronics from parts he 'borrowed' from the Biomedical Computer Lab and Carol wrote the software. Mike Welch provided us positron labeled compounds. From the prototype PET scanner, we developed the math, physics and electronic principles of PET. Then, we built a system for animals and then a human PET scanner. Each person did their part working day and night because we had such a passionate belief in what we were doing and we were having a hell of a lot of fun. The first PET scan on the PET scanner for humans was performed at 5 AM and not because we got up early to do it but because we worked through night. This was a common occurrence for us.

Of course, there is more to the story than this. When Ed and I were graduate students, we used a lot of nuclear instrumentation from a company in Oak Ridge, Tennessee, that had come out of the Oak Ridge National Lab - Ortec, Inc. Since we didn't have the money to build these PET scanners, Ed and I decided to drive my red Volkswagen Beetle from St. Louis to Oak Ridge in an attempt to convince the people at Ortec to believe in an idea we had named the Positron Emission Transaxial Tomograph (PETT) scanner (later I shortened the name to PET by dropping transaxial because images could be taken in any plane, not just transaxial).

There is something Ed and I never agreed on later but one of us calculated the amount of beer we had to take with us to make it from St. Louis to Oak Ridge. Whoever did the calculation – Ed says I did because I was better at math and I said Ed did because he was a better chemist – made a mistake and we ran out of beer halfway there.

When we arrived at Ortec, we met Ron Nutt, Kelly Milam and Terry Douglass and told them about our idea. To our complete amazement, they believed in us and provided us the electronics we needed for free; the only price we could afford. This also helped build Ed's and my confidence from the fact that someone else believed in us and what we thought we could achieve, with damn little evidence to support it.

When Ed and I built the first prototype PET scanners, it took about half a day to collect data for one image, and at a regular time schedule, we had to rotate the object being imaged by hand. After a month of this, we decided to automate the motion by using a motor driven turntable we found in the storage room of the

Radiology department. The next week the Chairman of Radiology, Dr. Ronald Evens, called a faculty meeting because things were missing from the storage room. Ironically, the example he used to make his point was that someone had taken a motor driven turntable used for angiography. He asked the faculty to be on the look out for people taking things from the storage room. Like the rest of the faculty, I agreed to help find the culprit. Then, Ed and I went back to work with our little group building our PET scanner.

The Biomedical Computer Lab at Washington University had developed the first laboratory computer, called the «Linc», that had been commerialized by a company, Digital Equipment Corporation (DEC). We used a Linc to collect the data from our PET scanner and stored it on magnetic tape. We then took the tape to the main campus computer, an IBM 360, to compute the tomographic PET image using a two-dimensional Fourier transform algorithm. Although a trival problem for today's computers, we had to break the computation up in to quarters and then assemble the solution. This data was put back onto tape and taken to the nuclear medicine clinic in the medical school where they had one of the first DEC computers. The DEC computer had a display screen (the Linc did not have a display) to be able to see the PET tomographic image. If we made any mistakes, which we made many, we had to repeat the process. For the more mathematically inclined readers, this involved solving a 32×32 or 64×64 matrix which can be done in a fraction of a second on your lap top today with fast Fourier Transforms or convolution. In the early 70s, however, this was a tough problem for a mainframe computer.

When we built the first human PET scanner we received a gift from the Women's Auxiliary Society in St. Louis that was arranged by Mrs. Morton D. May of the May Company, a good friend of my mother-in-law, Jean Emory. Things were moving so quickly that we didn't have time to wait to get a government grant. We did, however, apply for a grant to build the PET scanner for humans but by the time it was awarded, we had already built the system and had been using it for 6 months. We used the funds to pay back the people who we had borrowed things from, mainly Ortec.

No one knew or cared much about the PET scan at the time so when we did the first human studies we convinced a young nuclear medicine resident to help. His name is Dr. Edward Coleman. Today Ed is the head of the Division of Nuclear Medicine and the PET program at Duke. From the day he generously helped us do the first human PET scan till today, he has remained committed to fulfilling the promises we made at the beginning.

Because Ron, Terry and their colleagues at Ortec had trusted and believed in what Ed and I were doing, we provided the commercial rights for PET to Ortec and Ed and I helped them create commercial PET scanners that were supplied throughout the world. Terry and Ron then formed a new company, Computer Technology & Imaging (CTI), which was 110% committed to PET.

Ed and I both married Washington University students. Ed married Carolyn and I married Patty. In 1975, Ed, Carolyn, Patty and I moved to the University of Pennsylvania to once again build a new program. Nine months later, Ed, Carolyn, Tony Ricci and his wife Adelene, Joann Carson, David Kuhl, Patty and I moved to UCLA and started again to build a new program. We have been building new programs ever since.

Henry Huang had gone off to work for a medical imaging company called Picker Corporation in Cleveland. So Ed and I called Henry to tell him we had a great opportunity for him at UCLA. Henry and his wife Caroline then came to LA and we were all together again, as we had begun.

Ed was a wonderful scientist with a great mind and a good heart. He was devoted to the many students that learned to do science in his lab and have themselves gone out in the world to create their own successes, never forgetting the precious present given to them by Ed.

Ed devoted his life to the Biomedical Physics graduate program at UCLA. He was the program's passionate leader of its faculty, students and staff, as well as its defender before and after becoming the Program Director. In the later part of Ed's career, the Biomedical Physics graduate program became the most important part of his academic life. It also became an intimate part of Carolyn's life as she opened her home and her heart to the faculty and students to help Ed with the program in a personal way.

Ed has academic colleagues all over the world that he engaged in science and in the leadership role he assumed in the imaging portion of IEEE society. Much like his efforts to build, lead and defend the Biomedical Physics graduate program here at UCLA, he did the same in an international context for imaging in IEEE. Of all Ed's colleagues, none will miss him more and value what he was and what he accomplished than those here at UCLA and none more than me.

There is an Irish saying that «You should never regret what never was but cherish what time you had together».

Because of Ed's devotion to the Biomedical Physics Graduate program, Carolyn, Michael McNitt-Gray, Terry Moore and I have decided to establish the Edward J. Hoffman Graduate Fellowship Fund for the support of the students in the program he loved so dearly. My wife Patty and I will make a personal contribution as will the Department of Molecular & Medical Pharmacology. Anyone wishing to contribute to this fund can do so by contacting Ms. Terry Moore. Please make checks payable to the «UCLA Foundation» and reference

Edward Hoffman in the memo section. Checks should be sent to Terry's attention, c/o UCLA Biomedical Physics Interdepartmental Graduate Program, 1V-*365* CHS, 10*833* Le Conte Avenue, Box *951721*, Los Angeles (CA) 90095-1721. Should you have any questions, Debbie can be reached at 310-825-7811, or at tlmoore@mednet.ucla.edu

As Jorge Barrio said today, Ed is in God's hands now. I will remember Ed in all the things we accomplished together over so many years. We were together from the beginning of our academic lives. Carolyn is dealing with Ed's passing in the same way as before, in a loving and caring way but the sorrow of it all weighs heavy on her heart.

With warmest regards, Mike

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