

Rosalyn S. Yalow: A Personal and Scientific Memoir

Editor's note: Stanley J. Goldsmith, MD, a former Newsline editor and director of the Division of Nuclear Medicine at the New York Presbyterian Hospital and Professor of Radiology and Medicine at the Weill Medical College of Cornell University (New York, NY), will be speaking at a memorial symposium honoring Rosalyn S. Yalow, PhD, at the annual meeting of the American Association of Physicists in Medicine in Charlotte, NC, in July. He agreed to share with Newsline both his personal memories and an overview of Dr. Yalow's life and accomplishments.

From July 1, 1968, to June 30, 1969, I worked on a daily basis for approximately 12 hours a day, 5 days a week, with Rosalyn S. Yalow, PhD. Prior to meeting her, I had a great appreciation for her work and publications with Solomon A. Berson, MD, dealing with radioimmunoassay. Berson had taken on the appointment as chair of the Department of Medicine at the new Mt. Sinai School of Medicine, and the 2 of them agreed that it would be worthwhile to recruit a young physician to work alongside Roz and assist in carrying out clinical studies. I had completed my residency in internal medicine at the State University of New York Downstate and was then a fellow in endocrinology at the Mt. Sinai Medical Center. During a brief elective in my residency, I had worked with a former Yalow-Berson trainee, Seymour Glick, MD, learned the principle and practice of radioimmunoassay, and published a paper on the diurnal secretion pattern of human growth hormone. While doing so, I read the early radioimmunoassay literature and came to revere the team of Yalow and Berson. When I was offered the opportunity to work with Dr. Yalow, I declined other positions that had been offered and accepted. In the following year I was able to observe Dr. Yalow on a daily basis and develop a more informed opinion about this person whose publications I had viewed with awe and respect.

Frankly, she was wonderful: a brilliant scientist who was dedicated to finding truth regardless of the personal sacrifice it demanded and at the same time a warm human being who was intensely dedicated to her teenage son and daughter—as well as the occasional young physician who was invited to work in the lab or, as it came to be known, the “Radioisotope Service.” I have benefited greatly from my interaction with her throughout my career, not only because of the resulting assets on my curriculum vitae but because she remains a guiding example of how to deal with challenges that require intense intellectual focus and conscientious effort beyond what some might consider reasonable. I remain intensely grateful to her for serving as a beacon of excellence in all things.

Dedication and Discovery

Rosalyn Sussman was the child of an immigrant from Germany and a first-generation American. She was a good student who developed an early interest in mathematics and science. She graduated from Hunter College with a major in physics, an unusual area of interest for a woman at that time.

After overcoming several obstacles, she was accepted as a graduate student in physics at the University of Illinois, where she met and married another physics student, Aaron Yalow. After receiving their PhDs in 1945, they returned to New York, where Aaron became a medical physicist at the Montefiore Hospital while Roz volunteered to work with Edith Quimby at the Columbia College of Physicians and Surgeons. Quimby introduced Roz to Gioacchino Failla, DSc, who has been characterized as the dean of American medical physicists. Failla recommended that Bernard Roswit, MD, chief of radiation oncology at the Bronx VA Hospital, hire Roz as a part-time medical physicist to start a radioisotope service. This job would soon evolve into a full-time position. She was joined early on by Solomon Berson, MD, who had completed his residency in internal medicine. Their initial investigations were in the application of radionuclides in blood volume determination and the kinetics of iodine metabolism.

Yalow and Berson were soon recognized as outstanding investigators, and their early manuscripts are classics in clinical investigation. They turned their attention to understanding insulin physiology by labeling insulin and studying plasma kinetics in a variety of subjects. They observed that radiolabeled insulin was cleared from the blood more slowly in individuals who had received insulin injections previously. They deduced that the slower clearance was related to insulin antibodies, an idea that was considered to be heresy at the time. Moreover, they quantified the binding phenomenon. Yalow and Berson recognized that the quantitative competition of a radiolabeled antigen and an unlabeled antigen molecule for a limited number of binding sites on an antibody provided a basis for quantitation of an unknown amount of a similar molecule in a sample of plasma or other biological fluid. This brilliant insight, the basis of competitive binding assays, was subsequently investigated and validated. In 1960, they published “Immunoassay of Endogenous Plasma Insulin in Man” in the *Journal of Clinical Investigation*. Using the same principle but identifying unique characteristics of other peptide hormones, the duo went on to develop assays for human growth hormone and other materials of biologic interest. Most remarkably, they could detect with great sensitivity and precision the amount of such substances in less than a drop of plasma. Working together, with only an occasional junior associate, they characterized the role of heretofore unmeasurable substances in health and disease.

In recognition of these contributions, the Nobel Prize in Medicine and Physiology was awarded to Yalow in 1977. It is not possible in the limited space available to review the impact that the development of radioimmunoassay has had on virtually every field of medical science, but the reader is encouraged to review the early publications on this subject and to share the excitement and awe that they created at the time of publication and continue to create for this observer.

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