

Cover Story:

Rosalyn S. Yalow: “Opening New Vistas”

In Rosalyn S. Yalow's (1978) acceptance speech for the Nobel Prize in Physiology or Medicine, she stated that:

The first telescope opened the heavens; the first microscope opened the world of the microbes; radioisotopic methodology, as exemplified by RIA, has shown the potential for opening new vistas in science and medicine.

Yalow and the late Solomon Berson invented radioimmunoassay (RIA) in the early fifties. The invention has had a remarkable impact well beyond earning her the Nobel Prize. With RIA it is now possible to measure the concentration of peptides, including small volumes of low molecular weight hormones, in minute concentrations. While scientists felt that measuring micromolar (10^{-6}) amounts was extremely sensitive in the 1950s, RIA allows the routine measurement at a 10^{-8} greater sensitivity with accuracy. Interestingly, their precision was so great that several journals initially rejected their revolutionary paper, which reported their invention, because Yalow and Berson had employed the tool to illustrate that antibodies were formed to insulin provided exogenously to diabetic patients. Many studies since then have confirmed their early work.

Amazingly, Yalow has been able to show that antibodies are formed which can differentiate between pig, dog, and whale insulin even though they all have identical amino acid sequences (Yalow 1979). She believes that the antibodies are produced to the different three dimensional structures of the phylogenetically diverse insulins; the different three dimensional structures seem to be a product of the very different proinsulin sequence which is cleaved out to release insulin. Once a conformation is constructed *in vivo* it does not equilibrate with the structures formed from identical sequences.

It is difficult to imagine a macroscopic equivalent of being able to measure 5×10^{-14} molar amounts. Stone (1978) states it thus: “They were able to measure a substance never before measura-

ble—the body's own circulating insulin. This was like identifying a teaspoon of sugar [dissolved] in a lake 62 miles long, 62 miles wide and 30 feet deep.” No little accomplishment. The medical consequences of her invention are enormous. For example, some of the accomplishments of RIA are:

- The ability to measure the presence and titer of hepatitis virus in a drop of blood. The Red Cross and other blood banks use RIA to prevent the spread of this infectious disease which was a considerable problem due to transfusion transmitted hepatitis.
- RIA was used to measure a tuberculin constituent which allowed more rapid diagnosis of the growth of *Mycobacterium tuberculosis*.
- RIA has also been used in early cancer detection. For example, intact murine leukemia virus has been detected in patients with viral-induced or spontaneous leukemia.
- Yalow shared the Nobel prize with two men, Andrew V. Schally and Roger Guillemin, who employed RIA to discover and measure a number of hormones which are released by the hypothalamus such as LRF (lutening – hormone – releasing – factor), TRF (thyrotropin – releasing factor), and somatostatin, “which regulates the secretion of growth hormone from the pituitary gland and also of insulin and glucagon from the pancreas.” (Anonymous 1977).
- Adults, unlike children with early onset diabetes, do have some insulin which circulates in their blood. Nonetheless, their sugar metabolism is still out of control.

Although Yalow has received many awards for her scientific achievements, she has eschewed “women's awards” such as the Federal Women's Award in 1961 and the 1978 Ladies' Home Journal “Woman of the Year” because “she does not believe in women's awards unless the accomplishment is gender-related” (Anonymous 1978). Yalow clearly states that prejudice does exist, which makes it more difficult for women to succeed; however, her approach is:

I think one must decide very early in one's professional life the extent of dedication and commitment one is prepared to make for a successful career. We have all heard that as Edison once said, ‘Genius is one per cent inspiration, ninety per cent perspiration . . .’ For the lesser among us to have an impact the per cent of perspiration may even be higher—and whether we like it or not women, even now, must exert greater total effort than men for the same degree of success (Opfell 1978).

She works about 100 hours a week.

Yalow does note the effect that teachers and role models had on her early professional career. For example, she wrote, “In 1938, *Madame Curie*, Eve Curie's book about her mother, Marie, came out. Every woman scientist read that book twenty thousand times. We were all going to be like Madame

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