
1986 PROGRAM

- A.M.**
10:00 Coffee—Chemistry-Physics, Rm. 137
10:30 Welcome and Introduction, Rm. 139
10:35 Introductory Remarks
Dr. Rosalyn S. Yalow
10:45 CYCLOTRONS, LABELED
COMPOUNDS, AND PROBING HUMAN BIO-
CHEMISTRY

Dr. Alfred P. Wolf

Gyorgy von Hevesy laid the foundation for the tracer method in 1913. In 1935 he was the first to apply it to animal studies, curiously enough to a problem in metabolism. The tracer method has evolved as one of the most powerful techniques in basic chemical and biomedical research. Positron Emission Tomography is a sophisticated application of the tracer method used to probe and quantitate human biochemistry. A key issue is the nature of the tracer used as the probe. Today, tracers for glucose metabolism, oxygen utilization, neuroreceptor ligands, protein synthesis, neoplastic cell turnover, and general pharmacokinetic studies are being prepared and studied in humans to assess both normal and pathological states. The compounds used are labeled with positron emitters: mainly carbon, fluorine and oxygen and to a lesser extent nitrogen. They are prepared in place using a cyclotron and converted to precursors, i.e., substances which can be used in synthesis of higher molecular weight materials. The presentation will trace the preparation of the radionuclides and the labeled compounds placed in the context of the concomitant biological methods used to allow determination and quantitation of a particular physiological or biochemical process in humans. Recent research in synthesis and application of antipsychotic drugs and tumor probes will be highlighted.

- P.M.**
12:15 Buffet Lunch, Alumni House
(Cost \$5.00, Pay at Registration.) Please
return card for reservation.
1:30 NEW IMAGES OF THE BRAIN

Dr. Henry N. Wagner

We can now measure how chemicals affect different regions of the living human brain. One area involves the study of drugs—in-vivo neuropharmacology; another involves the study of toxic chemical effects—in-vivo neurotoxicology. Two and one half years ago we were able to achieve the first quantitative imaging of the

distribution of neuroreceptors in a living human brain. The technique is called positron emission tomography, a powerful imaging technique capable of providing an unprecedented look at chemistry of the living, working brain. Since the first successful study, we have developed methods for the study of five different neuroreceptor systems—dopamine, serotonin, opiate, benzodiazepine, and acetylcholine—and have performed over 300 studies. Among our findings to date are that dopamine receptors decline almost 50% between the ages of 20 and 70 years in normal men and to a lesser degree in women, that drugs used to treat schizophrenic patients effect a nearly complete blockade of dopamine receptors in the caudate nucleus and putamen, that vitamin B6 is an important co-factor in the synthesis of dopamine receptors, and that the total quantity of dopamine receptors is reduced in patients with Huntington's disease while the concentration per unit volume of caudate nucleus is normal or even increased.

Coffee Break

3:00 RADIOIMMUNOASSAY: 1986

Dr. Rosalyn S. Yalow

Radioimmunoassay (RIA) came into being not by directed design but as a fall-out from investigations into another, apparently unrelated, problem, namely, studies of the distribution and metabolism of radioactively labeled insulin. We observed that virtually all insulin-treated subjects develop insulin-binding antibodies. We appreciated that the methods developed for quantifying circulating antibody to insulin could be adapted to the measurement of insulin itself in plasma and other fluids. The concentration of the unknown is determined simply by comparing its inhibition of the binding of labeled antigen to antibody with that of known standards. RIA is a test-tube method now used in thousands of laboratories throughout the world, even in scientifically less-developed countries, to measure the concentrations of hundreds of substances of biologic interest. It was first used in endocrinologic research and clinical diagnosis. Its applications now cover a much broader spectrum. Gastro-enterology, neuroendocrinology, pharmacology and toxicology, biochemistry, bacteriology, virology, enzymology—all have felt the impact of RIA. Radioisotopic methodology, as exemplified by RIA, has shown the potential for opening new vistas in biology and medicine.

Informal social hour

Department of Chemistry
University of Kentucky
Lexington, Ky. 40506-0055

Twelfth Annual Symposium on

Chemistry and Molecular Biology

established in the memory of
Anna S. Naff

RADIONUCLIDES IN CHEMISTRY AND MEDICINE

Speakers

ROSALYN S. YALOW
HENRY N. WAGNER, JR.
ALFRED P. WOLF

Monday, April 7, 1986
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