



# The Nobel Prize in Physiology or Medicine 1977

## Presentation Speech

Presentation Speech by Professor Rolf Luft of the [Karolinska Medico-Chirurgical Institute](#)

*Translation from the Swedish text*

Your Majesties, Your Royal Highnesses, Ladies and Gentlemen,

The word "hormones" and associated terms have always stimulated our fantasy. The mystery in connection with hormones has been, from the beginning, equally overwhelming to the researcher and the layman. It is easy to understand why. These were chemical substances with often very powerful actions at concentrations which for a long time seemed so low that they were impossible to measure. However, mystery and belief lead nowhere, at least not in scientific research and medicine. Once one learned to identify the active chemical substances - in this case hormones - and to measure their rate of synthesis, only then did one establish a firm basis for turning fantasy and mystery into reality.

This year's three Nobel laureates in medicine have all made contributions which are outstanding examples of this kind of activity. Rosalyn Yalow's name is for ever associated with her methodology of measuring the presence of hormones in the blood at concentrations as low as one thousand billionths of a gram per milliliter of blood. This was a necessity, since a great many hormones, primarily the so-called protein hormones, are present in the blood in such small quantities. Before Yalow, these hormones could not be determined quantitatively in the blood, and therefore, active research in this field had stagnated.

Rosalyn Yalow and Solomon Berson, her late coworker, discovered by chance that *one* small protein hormone, insulin, following injection into man resulted in a production of antibodies against insulin. All diabetics who receive insulin develop similar antibodies against the administered insulin. The discovery by Yalow and Berson was unacceptable at first - their first scientific paper concerning this observation was even refused publication - since it was commonly believed that proteins as small as these protein hormones were unable to stimulate antibody formation. However, Yalow and Berson did

not give up, and furthermore, after a couple of years of intensive work, they presented in 1960 a methodology for the determination of protein hormones in the blood, the fundamental principle of which utilized the ability of these hormones to stimulate antibody formation in man. This methodology, known as the Yalow-Berson method, is genial in all its simplicity, and can even be described in simple terms.

As a result of mixing in a test tube a known quantity of radioactive insulin with a known quantity of antibodies against insulin, a specific amount of the insulin becomes attached to these antibodies. Subsequently, if one adds to this mixture a small amount of blood which contains insulin, the insulin of the blood becomes similarly attached to the antibodies and a certain portion of the radioactive insulin is detached from the antibodies. The higher the concentration of insulin is in the blood sample, the larger is the amount of radioactive insulin that will be detached from the antibodies. The amount of radioactive insulin thus removed can easily be determined, providing an exact measure of the amount of insulin present in the blood sample.

The Yalow-Berson method which makes it possible to determine the exact amounts of all hormones present, represented a real revolution in the field of hormone research. A field where one refers to the time period before Yalow, and the new epoch which began with her achievement. Her methodology and the modifications thereof, subsequently made their triumphant journey far beyond her own field of research, reaching into vast territories of biology and medicine. It has been said that Yalow changed the life of a multitude of researchers within these fields. *Rarely have so many had so few to thank for so much.*

Roger Guillemin and Andrew Schally have also contributed greatly to this field of research, exploring protein hormones. It is justifiable to say that they have uncovered a substantial part of the link between body and soul.

For decades, one has talked about the indivisible homo sapiens, maintaining that our body and soul can not be separated since they form an entity. Emotional and psychic phenomena do influence our bodily functions. Let me give you an example. When American soldiers were sent to the European war scene, thousands of female companions who were left behind, stopped menstruation. They were completely healthy, but the emotional stress had an influence on certain body functions, causing these functions to cease. Through which mechanisms did the psyche thus influence the body?

Psychic phenomena as well as input from the entire body bring about electrical impulses in the brain. This is the language of the nervous system, the brain speaks "electrically". The brain informs some of its centers of what is going on, and these centers relay the message further. Those centers which pass on the information to the hormone producing organs of the body are situated in the midbrain, an area on the base of the brain. Delicate blood vessels in turn connect the midbrain with the pituitary, an important hormone producing gland, often referred to as the hypophysis. This sequence provides the pathway for transmission of information from the surroundings to the brain, to the midbrain, to the

pituitary, and thus to all those bodily functions which are influenced and controlled by hormones.

By the mid 1950's it was evident - also here through the contributions of Guillemin and Schally - that the midbrain produces chemical substances which are transported to the pituitary via the delicate blood vessels just mentioned. Once in the pituitary, they determine the exact quantities of the various hypophyseal hormones which must be produced at a given point in time. But which were these substances in the midbrain, evidently passing the information from soul to body?

Guillemin and Schally worked independently in different parts of the U.S.A. together with their large staff of coworkers, trying to isolate one of these chemical substances, and both researchers concentrated on the same substance. Each started with five million pieces taken from the midbrain of sheeps and pigs - half a ton - and in 1969, after years of arduous labor, they each came up with 1 milligram of the purified hormonal substance. *Rarely have so many gained so little from so much.*

Guillemin and Schally were the first to isolate several of the communicating chemical links between the brain and the pituitary, and they also determined their structure and succeeded in synthesizing them.

The discoveries by Guillemin and Schally brought on a revolution in their own field of research. Still other protein hormones have subsequently been isolated from the midbrain, this wondrous organ of control and guidance which today - more than ever - emerges as part of the link between the body (soma) and the soul (brain).

Rosalyn Yalow, Roger Guillemin, Andrew Schally: the road of every scientist is paved by frustration. But some reach the goal they have set up and enjoy the pleasure and excitement of having learned something that no one knew before, and for that enjoy imperishable honor in the learned world.

Few ever reach the point at which you have arrived: to undertake a formidable task and to come to a solution, which not only attracts the admiration of your scientific colleagues, but which - in the best spirit of Alfred Nobel - also contains a possibility to understand the structure of human life and human behaviour.

The Karolinska Institute is happy to be able to award you this year's Nobel Prize in Physiology or Medicine for your contributions and congratulates you. May I now ask you to receive the insignia of the Nobel Prize from His Majesty, the King.

From [\*Nobel Lectures, Physiology or Medicine 1971-1980\*](#), Editor Jan Lindsten, World Scientific Publishing Co., Singapore, 1992