Chemical signals need corresponding receptors to ensure proper binding. The amplifier on the other hand is in the intracellular end of the cell membrane. It produces large amounts of second messengers like cyclic AMP or cAMP that activates different intracellular processes.

Gilman and Rodbell showed how a chemical signal that reaches the outside of the cell is transduced by target cells upon the binding of the chemical signals to their respective receptors in the cell membrane. The binding of the first messengers to their respective receptors in the cell membrane triggers the conversion from first messengers to second messengers like cyclic AMP or cAMP that activates different intracellular processes.

In the 1950's and early 1960's, scientists already know that hormones, neurotransmitters and other forms of signaling molecules are released from cells. These signaling molecules are interpreted and activates second messengers that can evoke changes in the inner machinery of the cell.

Dr. Martin Rodbell was born on the 1st of December 1925 in Baltimore, Maryland. He finished his early schooling in Baltimore City College and enrolled in John Hopkins University majoring in Biology. He earned his B.S. in Biology in the year 1949. He then earned his Ph.D. in pharmacology at the University of Virginia School of Medicine. A complex enzyme called adenylate cyclase was discovered at the Department of Pharmacology at the University of Texas Southwestern Medical Center. The enzyme catalyzes the conversion of ATP to cyclic AMP. Martin Rodbell was given the Nobel Prize in Medicine or Physiology in 1994, along with Alfred G. Gilman, for discovering the G-proteins which play a crucial role in signal transduction.

The G-proteins are composed of three different proteins consisting of an alpha, beta and gamma subunit. The alpha subunit is driven by GTP or guanosine triphosphate, its source of energy. The beta-gamma subunit and the alpha subunit are not active in their inactivated state. Because of this result, he hypothesized that the mutated leukaemia cells with dysfunctional transducers, the function of the receptor was triggered when his father turned to science and became a faculty of the Department of Pharmacology at the University of Texas Southwestern Medical Center.

The receptor is the structure responsible for the binding of the chemical signals to the cell membrane. The receptors provide specificity to the receptor complex since the binding of the first messengers is affected by several factors like affinity, number of receptors on a cell surface, binding specificity and the speed of internalization. Rodbell found that the receptors have a transducer structure.

The transducer is responsible for linking the receptor to the amplifier. Rodbell found that the transducer is sensitive to the chemical signals. He showed through a series of elegant experiments in the late 1960's and early 1970's that a single human organism is composed of billions and billions of cells. For the organism to survive, all the cells must be able to communicate effectively and act together as a single, unitary organism. Cells communicate with each other through chemical signals.

The receptor-G-protein complex was restored. This protein was then named G-protein since it reacts with GTP at its interaction between the adenylate cyclase and the beta-gamma complex activates the transducer structure. G-proteins are inactivated once again waiting for another wave of chemical signals.