***Hodgkin-Huxley model***

The **Hodgkin–Huxley model**, or **conductance-based model**, is a mathematical model that describes how action potentials in neurons are initiated and propagated. It is a set of nonlinear differential equations that approximates the electrical characteristics of excitable cells such as neurons and cardiac myocytes. It is a continuous-time dynamical system.

Alan Hodgkin and Andrew Huxley described the model in 1952 to explain the ionic mechanisms underlying the initiation and propagation of action potentials in the [squid giant axon](https://en.wikipedia.org/wiki/Squid_giant_axon).[[1]](https://en.wikipedia.org/wiki/Hodgkin%E2%80%93Huxley_model#cite_note-HH-1) They received the 1963 Nobel Prize in Physiology or Medicine for this work.

The typical Hodgkin–Huxley model treats each component of an excitable cell as an electrical element (as shown in the figure). The lipid bilayer is represented as a capacitance (Cm). Voltage-gated ion channels are represented by electrical conductances (*gn*, where *n* is the specific ion channel) that depend on both voltage and time. Leak channels are represented by linear conductances (*gL*). The electrochemical gradients driving the flow of ions are represented by voltage sources (*En*) whose voltages are determined by the ratio of the intra- and extracellular concentrations of the ionic species of interest. Finally, the membrane potential is denoted by *Vm*.