

Oran Erster

Weizmann Institute of Science, Rehovot, ISRAEL

Honey, could you please switch off the PROTEIN?

Scientists at the Weizmann Institute of Science have developed a general method to control the activity of virtually any given protein. This method could have various applications in research, industry, and medicine.

Proteins are the fundamental components in every living organism. When proteins are not functioning as they should, diseases occur. A great effort is dedicated to elucidate the functions of uncharacterized proteins as well as controlling the activity of proteins that are involved in the onset of cancer and other diseases. Most of the approaches that are being used today are complicated and could be applied to a limited number of proteins. Recently, M. Liscovitch and colleagues developed a general method involving a unique biological “switch”, that could control the activity of a given protein.

The switch comprises the combination of a short amino acid sequence (amino acids are the building blocks of proteins) and a small molecule. These two components have the capacity of binding tightly and specifically to one another, like a magnet and a piece of metal. During the procedure of this method, the sequence is genetically inserted into different locations of the investigated protein to generate a “library” of engineered proteins. All proteins are then screened to identify those which are switched “on” or “off” by the addition of the small molecule. These could be regarded as “switchable” proteins. With the use of different concentrations of the small molecule, the effect could be gradual, such as adjusting the volume in a stereo system.

The use of such a “tunable” protein could enable researchers to study the biological function of newly discovered proteins that have no specific inhibitor, or could not be controlled in other ways. This method could also be implemental in activating and de-activating proteins in industrial facilities or bio-sensing systems.

In the future, these engineered proteins may also be used to cure diseases and “fix” the problems caused by malfunctioning “natural” proteins.

Contact information:

Oran Erster, Dep. of Biological regulation, Weizmann Institute of Science
POB 26, Rehovot, Israel