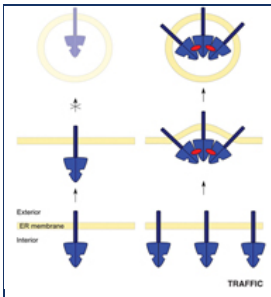
Jacobs University Professor publishes joint study with Nobel laureate for Medicine



The study is published in the online edition of the "Traffic" journal. Study: "Regulated oligomerization induces uptake of a membrane protein into COPII vesicles independent of its cytosolic tail", Sebastian Springer, Per Malkus, Britta Borchert, Ursula Wellbrock, Rainer Duden, Randy Schekman

Sebastian Springer, Professor of Biochemistry and Cell Biology at Jacobs University, and Randy Schekman, winner of the Nobel Prize for Physiology or Medicine 2013 and Professor of Cell and Molecular Biology at UC Berkeley, have published a joint study on the mechanisms of intercellular protein transport. The publication in the journal 'Traffic' continues a long-term cooperation between the scientists. During his time as a postdoctoral researcher in the US, Prof. Springer worked with Prof. Schekman at UC Berkeley. Their latest study shows how cells master the distribution of protein in the cell body.

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Every cell in the human body has to produce a large number of new proteins every day in order to survive. During their synthesis, proteins with different destinations are first made inside the so-called Endoplasmic Reticulum (ER), a membrane network on the inside of a cell. In this way, for example, protein hormones such as insulin are transferred from the cell to the circulatory system. But how exactly can a protein molecule from the inside of a cell get to its surface or into the bloodstream?

Once they are made in the ER, the proteins are collected in small membrane vesicles. The proteins use these vesicles like humans would use busses. They 'hop on' and travel to the next 'bus stop', the Golgi apparatus. This cell organelle works similar to a logistics center: the different proteins get sorted and proceed to their respective destinations.

The special mechanisms that control the transport of proteins through the cell to ensure that every protein is heading in the right destination have been Randy Schekman's research focus for three decades. For his discoveries, Prof Schekman, along with Prof. James Rothman (Yale University) and Prof. Thomas Südhof (Stanford University), was awarded the Nobel Prize 2013 in Physiology or Medicine.

Prof. Schekman's Nobel Prize winning study identified for the first time the processes that control the creation, loading, and movement of the vesicle 'busses' and that ensure that all protein 'passengers' arrive at their correct destinations.

Up to now, it was thought that protein 'passengers' always contain a transport signal that can connect itself to the vesicle, like a 'ticket' to get onto the correct vesicle 'bus'.

In their new study, Profs. Springer and Schekman have added an important piece of new information. They showed that a protein can use the transport vesicles even without a 'ticket', as long as it stays together in a close group of similar proteins. The amount of protein collected in the vesicle then depends on how many protein molecules are in that group. They showed this with a specially designed protein that groups together when a chemical substance is added to the cells, and they found that once the substance was present, the uptake of the protein into the transport vesicles increased greatly.

The simplest explanation for these results is that the grouping of the proteins causes the membrane of the Endoplasmic Reticulum to bend, and that this membrane bending makes it easier for transport vesicles to form. .

Prof. Springer explains: "Intracellular protein transportation is a vital process that is regulated by a very complex network of biochemical reactions and physical-mechanic forces. Malfunctions in the identification and transportation of proteins can lead to the death of cells and to serious diseases such as Alzheimer's disease or embryonic malformations, for example neural tube defects. The more we know about the mechanisms behind the transportation of proteins, the greater the chance that we can understand these diseases and defects much better in the future."

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Sebastian Springer gives a short summary to the greatly acknowledged work of Nobel Prize winners Randy Schekman, James Rothman and Thomas Südhof on: http://www.youtube.com/watch?feature=player_embedded&v=0E6K0bAj2A8

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(pictured above are Dr. Sebastian Springer, left, Dr. Randy Schekman, right)

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