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Membrane protein synthesized with natural folding pattern for the first time – a breakthrough in the search for the active agent

- The Peter and Traudl Engelhorn Foundation promotes biotechnology and gene technology
- Research prize for 2007 awarded to a young scientist during the "Klosters Winter Symposium"
- Excellent research brings great advances in the search for the active agent

Klosters, Switzerland, January 16, 2007 - **The Peter and Traudl Engelhorn Foundation awarded the 2007 research prize for the promotion of biotechnology and gene technology to a scientific breakthrough on the functional synthesis and integration of GPCR proteins in a lipid membrane. The new procedure makes it possible for the first time to examine the natural functions of such a membrane protein in vitro.**

For this research¹⁾ the "Peter and Traudl Engelhorn Foundation for the Promotion of Biotechnology and Gene Technology" awarded Dr. Eva-Kathrin Sinner (35), of the Max Planck Institute for Polymer Research in Mainz their research prize for 2007.

The research prize is worth ten thousand euros and is awarded for outstanding research by excellent young scientists consistent with the goals of the Peter and Traudl Engelhorn Foundation.

Prof. Dr. Herwig Brunner, spokesperson of the board of the Peter and Traudl Engelhorn Foundation, stated, "This procedure enables the incorporation of a G protein-coupled receptor membrane protein (GPCR) into an artificial planar membrane from a *statu nascendi*. A directed insertion of the protein into the lipid double layer in vitro is carried out."

Herwig Brunner continued, "It should be emphasized that the implementation of the membrane system used here enables other GPCRs and complex membrane proteins to be analyzed that were not previously accessible for a detailed examination."

"The award-winner, Eva-Kathrin Sinner, born in 1971, is an outstanding example of an excellent scientist and an incentive for the upcoming generation of researchers," according to Prof. Brunner.

In vitro synthesis of G proteins in a lipid membrane

The characterization of membrane proteins while maintaining their natural and biophysical functions places high demands on biophysical measurement techniques. While soluble proteins are usually easy to identify and produce in larger amounts, membrane proteins quickly lose their native folding and thus their function when they are not in a hydrophobic environment.

The membrane protein is the "gatekeeper" of the cell. It determines which proteins or substances can penetrate the cell or leave it. Another function is that of a "watchman"– if a protein, for example an endogenous antibody, docks on the free ends of a membrane protein outside of the cell, this releases a signaling cascade. This is the trigger for a broad spectrum of physiological processes in the cell. In particular, the group of G protein-coupled receptors (GPCRs) are the main targets of the research on active agents.

The most difficult task in the study of GPCRs is isolating them in their natural form, without changing their properties. In a watery solution they would clump immediately. That significantly reduces recognition of the ligands.

Eva-Kathrin Sinner at the Max Planck Institute for Polymer Research in Mainz successfully developed a technique that made it possible to identify the structure and properties of one of the most important GPCRs. She demonstrated this on the example of the smell receptor OR5 of the rat (*Rattus norvegicus*). Its isolation and examination in a functional protein conformation was not previously possible.

Sinner, using cDNA as a source material, incorporated in vitro synthesized GPCR into an artificial lipid membrane. The two-layered lipid membrane was placed onto a gold sensor. The synthetic lipid membrane imitated the properties of a natural membrane. And indeed, a directed insertion of the smell receptor protein into the peptide-fixed lipid membrane took place. This allowed difficult purification or isolation processes to be avoided.

Award presentation in Klosters

On January 16, 2007, the official award ceremony for the research prize of the Peter and Traudl Engelhorn Foundation will be held during the renowned "Klosters Winter Symposium" in Klosters, Switzerland, originated by Nobel laureate Prof. Dr. Manfred Eigen.

Following the presentation of the award, the young scientist will present a paper on her research to an illustrious scientific committee in which several Nobel Prize winners will be present.

Sign: 4.298

About the research prize:

The Peter and Traudl Engelhorn Foundation promotes research in the form of scholarships for specially designated young scientists. This most often occurs by granting two-year scholarships for post-doctoral research. In addition, a research prize is offered every two years.

More information for applicants at www.engelhorn-stiftung.de

About the foundation:

The goal of the Peter and Traudl Engelhorn Foundation is the promotion of the next generation of scientists in biotechnology and gene technology. It is a foundation under Bavarian law.

It was established in memory of Peter Engelhorn. He was a partner of the former pharmaceutical company Boehringer Mannheim. In 1998, Boehringer Mannheim was taken over by Roche, which then became the world number 1 company in diagnostics.²⁾

The Board of Trustees of the Peter and Traudl Engelhorn Foundation:
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The members of the foundation prize committee are:
Prof. Dr. Manfred Eigen, Göttingen; Dr. Ruthild Winkler-Oswatitsch, Göttingen; Prof. Dr. Dieter Oesterhelt, Munich; Prof. Dr. Robert Huber, Munich; patent attorney Bernd Huber, Munich; Prof. Dr. Eberhard Neumann, Bielefeld; Prof. Dr. Walter Neupert, Munich; Prof. Dr. Herwig Brunner, Stuttgart.

Further information for the press at www.engelhorn-stiftung.de
and:

¹⁾ Published under the title "Inkorporation von in vitro synthetisierten G-Protein-gekoppelten Rezeptoren in ein peptidfixiertes artifizielles Membransystem" in *Angewandte Chemie*, 4 June 2006, Wiley-VCH, DOI: 10.1002/ange.200602231, Abstract at <http://www3.interscience.wiley.com/cgi-bin/abstract/113508983/ABSTRACT>

²⁾ <http://www.roche.de/diagnostics/information.htm>

Visual material: Inquire at <http://www.mpip-mainz.mpg.de/~sinner/> or at the foundation.

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