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CTI Success Story

## Brewers' Yeast Shows the Way to New Drugs

Two molecular biologists at Zurich University have set up their own company to market worldwide their innovative screening system for the identification of protein interactions in cell membranes.



The DUALmembrane system detects interactions between integral membrane proteins in situ.

It was the ancient Egyptians who first used yeast to make beer, bread and wine. But it wasn't until centuries later that Louis Pasteur discovered that these tiny micro-organisms known to the scientific world as *Saccharomyces cerevisiae* were responsible for the process of fermentation. As yeast cells are closely related to human cells, they have been used since the early 19th century as a "laboratory" for biochemical experimentation and, more recently, for research focusing on genetics and molecular biology.

## In Search of New Drugs

Using the yeast two-hybrid system, Professor Stagljär, a molecular biologist at Zurich University, developed an innovative process for identifying interactions between proteins in cell membranes. In 2000, he and a fellow researcher, Professor Michael Hottiger, set up Dualsystems Biotech AG with support from Professor Ulrich Hübscher at the Institute of Veterinary Biochemistry and the CTI Start-up Initiative.

This novel screening system allows the precursors of new drugs and disease pathogens to be identified. The advantage is that it does not rely on rapid evaluation of substance libraries but takes a specific, targeted approach. There is a good reason why the system is based on proteins: now that the human genome has been almost fully decoded, scientists are able to read some three billion gene building blocks. The human genome probably contains the blueprints for between 30,000 and 50,000 proteins. Scientists assume that each cell contains up to 10,000 different proteins, with each one fulfilling a specific function in a defined location. These proteins are the real workhorses and tools in our cells. It is vital for the way they work and their "logistics" to be studied since disrupted intracellular protein transport, for example, can trigger incurable diseases.

## A Small Test with a Big Impact

"If we want to understand the function of a certain protein in detail, we first need to identify the proteins that interact with our target. This is how we reconstruct the puzzle on the protein level", Igor Stagljär explains. "This shows us whether known or newly identified proteins are involved in certain biological processes, and we need this information to elucidate the function of a protein." The clever yeast method is the ideal tool for this work.

"A large number of human proteins can be produced in this yeast, where they take on their original structure", Michael Hottiger explains. "This interchangeability and the unique opportunities for genetic manipulation that yeast cells offer mean that human membrane proteins involved in diseases can be identified and investigated at the molecular level."

Today, Dualsystems Biotech is the leader in customized yeast-based screening. The first fruit of the company's efforts, DUALhybrid technology, is a powerful genetic test for the functional identification of protein-protein interactions in vivo. This is something that is of interest to both basic and medical research. Screening technologies designed to answer specific questions allow interactions between proteins to be identified in practically any environment. The team has also designed a DUALmembrane technology which targets integral membrane proteins or membrane-associated proteins which are difficult to characterize using other methods. DUALmembrane technology allows proteins to be analyzed in their natural interactive setting.

These products are aimed at private companies, public institutions and academic research groups who want customized yeast two-hybrid systems, licences for genetic screening platforms or to collaborate on protein screening projects. There is lively demand for these sophisticated screening methods all over the world because of the prospects they offer for identifying ways of treating disorders such as tumours, Alzheimer's disease, arthritis, depression and genetic diseases.



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