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m-phasys GmbH in Tübingen receives Euro 1.4 million from the BMBF for protein structure analysis

A molecular locksmith for pharmaceutical companies

(Stuttgart/Tübingen) – Founded in 1999 in Tübingen, m-phasys GmbH has just received Euro 1.4 million from the German Federal Ministry of Education and Research (BMBF) for researching into protein structures which contribute to the discovery of new drugs. According to biochemist Dr. Hans Kiefer, Managing

5 Director of m-phasys, “Many of the top-selling drugs have a direct effect on ion channels in human cells. In other cases, however, undesirable interactions between drugs and ion channels can also be responsible for dangerous side-effects.

Consequently, investigating these interactions plays a major role in drug research.

10 The project will concentrate on ion channels because we know that pharmaceutical companies are very interested in detailed information on this class of proteins.”

The core skill of the 20-strong m-phasys R&D team is the manufacture, crystallisation and structural analysis of human membrane proteins, or receptors, which ensure that signals are transmitted in the cell. These proteins are enormously important when it comes to the effectiveness of drugs. For example, beta-blockers

15 work by attaching themselves to a certain type of receptor – the beta-adrenergic receptor – and suppressing the effect of the adrenaline hormone, lowering blood pressure. Two-thirds of all drugs currently available work according to this principle, controlling very specific receptors. Consequently, in order to discover new drugs, it is very useful to be able to carry out in-vitro experiments with the receptors supplied

20 by m-phasys.

To date, m-phasys has focussed primarily on structural analysis, with researchers investigating the three-dimensional structure of proteins. In order to do so, they manufacture large quantities of the proteins in their pure form and allow them to crystallise. The crystals are used to deflect x-rays in a specific way and the

25 deflection pattern can ultimately be used to calculate the protein structure. “The important thing is to have sufficient homogeneous protein, otherwise the crystals formed are not of a high enough quality,” states Dr. Kiefer. The Tübingen-based

researchers are the only ones in the world who are able to crystallise membrane-based proteins using M-FOLD technology.

30 It is very useful for pharmaceutical companies to know the three-dimensional structure of a target protein. The effect of a drug can be compared to a key being inserted in a lock. In order to work, the drug – the key – must fit the target protein – the lock – exactly. “Our aim is to show pharmaceutical manufacturers what the lock looks like so that they can make exactly the right key rather than
35 trying out all possible keys at random. This makes us a kind of molecular locksmith,” says Dr. Kiefer.

The m-phasys customer base is made up entirely of large pharmaceutical companies ordering structural analyses to develop drugs – for example for pain therapy, cardiovascular applications or to treat mental illnesses. “With many of
40 these illnesses, it can help to activate or block a specific receptor because this counteracts the cause of the problem,” explains Dr. Kiefer.

The application approved by the BMBF for Euro 1.4 million of funding over three years from the BioChancePLUS programme is for the structural analysis of a class of membrane proteins new to m-phasys – ion channels. The body needs
45 these, for example, to transmit nerve signals. Like receptors, however, they are often also used as a target protein for drugs. m-phasys has been working on ion channels for almost two years, albeit just in the form of a pilot project until now. The funds released mean that this area can now be greatly expanded. The main reason for funding being approved was the rapid progress made by the current pilot project.
50 It is being carried out in cooperation with the Electrophysiology Department of the NMI (the University of Tübingen’s Natural and Medical Sciences Institute) in Reutlingen, under the supervision of Professor Elke Günther. The institute carries out quality controls on the ion channels produced by m-phasys.

Dr. Klaus Eichenberg, Managing Director of BioRegio STERN Management
55 GmbH, considers it nothing short of a technical and scientific miracle to be able to manufacture membrane proteins of different classes, stating “This enables m-phasys to produce receptors and ion channels with the necessary binding

properties and the biological activity and selectivity required in a pure form – no-one has succeeded in doing this until now.”

60 In addition to structural analysis, m-phasys has recently launched a new area of business – the manufacture of antibodies which act against membrane proteins and can even be used as drugs. “In the past, many attempts to produce antibodies against membrane proteins failed because it wasn’t possible to create the antigen in a sufficiently pure and stable form,” explains Dr. Kiefer in reference to the vain attempts of many competitors. “We achieved the break-through in the past few months working in tandem with research and industry partners. Success ultimately came thanks to the patented M-FOLD technology which was used to produce membrane protein antigens.” m-phasys is now specifically looking for customers and strategic partners wanting to advance the development of such antibodies to create drugs.

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About BioRegio STERN:

BioRegio STERN Management GmbH is a skill-sharing network, providing a help and advice centre for founders of new businesses, entrepreneurs and researchers in the biotechnology sector in the region comprising Stuttgart, Tübingen, Esslingen, Reutlingen and Neckar-Alb in Germany. BioRegio STERN promotes cooperation between different disciplines such as medicine, process engineering, sensor technology, dietetics, biochemical analysis and bioinformatics. Regeneration biology is a key area of focus.

BioRegio STERN represents the interests of founders of new businesses, entrepreneurs and researchers when dealing with the political sector, the media and associations, bundles economic promotional activities and marketing and provides advice for grant applications and corporate financing, all backed up with efficient press and public relations work.

BioRegio STERN is supported by the German Federal Ministry of Education and Research (BMBF) as part of its "BioProfile" promotional programme, the Stuttgart and Neckar-Alb regional authorities and the municipal authorities of Stuttgart, Tübingen, Esslingen and Reutlingen. The Managing Director, Dr. Klaus Eichenberg, is a molecular and cell biologist and investment analyst.

About m-phasys:

m-phasys GmbH was founded in 1999 by Dr. Hans Kiefer, Dr. Wolfgang Vogt, Marc Lohrmann and i.con. innovation GmbH. Today, a 20-strong research team is working on the continued development of the patented M-FOLD™ technology. The company specialises in the production of high-purity, biologically active G protein-coupled receptors (GPCRs) and ion channels from a bacterial expression system.

TechnoStart Ventures, Gradus Ventures, Heidelberg Innovation, Grazia Equity, the KfW banking group and private investors have all invested in m-phasys.

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