Embargoed until April 1st, 2010, 2.00 p.m. EST

Joining forces to unveil cell division

A European team led by scientists in Vienna presents a database for cell cycle control

The EU-funded project MitoCheck, which started in 2004, has now been successfully rounded off. Eleven European research teams and companies, coordinated by the Research Institute of Molecular Pathology (IMP) in Vienna, studied the genetic basis of cell division. The findings are published today in the scientific journals Science and Nature.

How does one cell become two, two cells become four, and finally develop into an entire organism? This question has puzzled biologists for the past 150 years, ever since they knew that living beings are made up of cells produced by repeated divisions, all originating from one fertilized egg. How exactly this process is controlled has remained a mystery. Researchers led by Jan-Michael Peters at the IMP have now come much closer to solving the puzzle.

Although it has long been possible to watch dividing cells under a microscope, scientists did not know exactly which genes are involved in the process and how. They knew even less about the role of the proteins encoded by these genes. To fill the gaps, eleven European research teams and companies joined forces to reveal the molecular basis of human cell division. The project "MitoCheck" was coordinated by the IMP and received 8.6 Million Euros of funding from the European Commission. The results of the combined effort have now been published.

In order to find out which genes are involved in cell division, the group of Jan Ellenberg at EMBL (European Molecular Biology Laboratory, Heidelberg) had to systematically inactivate each and every human gene – in total 22 000 – in cultured cells. Using video microscopy, the scientists then made movies of the cells to find out whether and how these gene inactivations affected cell division. As a next step, the group of Jan-Michael Peters then analyzed how the proteins encoded by these genes assembled to form molecular machines that control the different steps of cell division.

The result of this international teamwork is the first catalogue of all human genes required for cell division. The researchers have also come up with the blueprint for many of the molecular machines which carry out the instructions laid down in the genes. All data are now made available for public use by means of a database of the human genome (www.mitocheck.org). At the same time, the MitoCheck-team has published the most relevant results in the two journals Science and Nature. [1) 2)]

"Our database is going to be an important source of information for many areas of biomedical research. It is also a good example of how the complex and ambitious issues in science can only be addressed in a joint international effort", says project coordinator Jan-Michael Peters. MitoCheck represents not only a milestone for understanding cell division, but will prove very useful for other disciplines in the life sciences. The work of MitoCheck has spurred the development of many new techniques, such as automated video microscopy.

In the long run, scientists want to fully understand how cell division works and to use this knowledge for the development of causal therapies for cancer. This ambitious goal will require a lot more basic research in the near future. A first step has already been made: the European Union is going to fund a follow-up project over the next five years. "MitoSys", as it is called, will also be coordinated by the IMP and will start later this year.

* * * * * * * * * * * * * * * * * * * *

[1)] The paper "Systematic Characterization of Human Protein Complexes Identifies Chromosome Segregation Proteins" by the IMP team (Hutchins *et al.*) will be published online in *Science* on April 1st, 2010.

[2)] The paper "Phenotypic profiling of the human genome by time-lapse microscopy reveals cell division genes" by the EMBL team (Neumann *et al.*) will be published in *Nature* on April 1st, 2010.

Contact:
Mag. Evelyn Missbach, MAS
IMP-IMBA Communications
Tel: +43 1 79730 3626
evelyn.missbach@imba.oeaw.ac.at

Dr. Yan Sun
Project-Coordinator
Tel: +43 1 79730 3254
Yan.sun@imp.ac.at

Scientific Contact:
Dr. Jan-Michael Peters
Jan-Michael.Peters@imp.ac.at

EU-Project MitoCheck:
www.mitocheck.org

An illustration to accompany this press release can be downloaded from the IMP Website:
http://www.imp.ac.at/pressefoto-mitocheck