Scientists take part in an EU project on the modeling of signaling pathways in tumor cells

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A group of scientists at Helmholtz Zentrum München will engage in a new project promoted by the EU. The scientists in the team of Dr. Jan Hasenauer, head of the young investigator group 'Data-driven Computational Modeling' work as part of CanPathPro. The new project receives funding from the European framework program Horizon 2020. The project goal is the development of models, which help to predict characteristics and the behavior of cancer cells. The funding for the five-year project exceeds one million Euros.

Thanks to early detection methods and innovative therapies, medical science controls cancer better than ever before. However, as the treatment modalities improved, the cancer incidence rose and scientists discovered more and more specific forms of cancer. This and the complex molecular nature of cancer create huge challenges for medical science.

Predicting the Characteristics of Complex Signaling Pathways

Scientists pull out all stops in their quest of untangling the complex regulatory networks in cancer cells. They refer to a variety of new research approaches among them new methods known as "omics." The name refers to methods such as exome and transcriptome sequencing as well as proteomics. The challenge is to integrate the tremendous amount

of generated data to arrive at a coherent overall picture. Armed with these obtained data, the scientists want to demonstrate the impact of mutations and changes of expression levels. This may also help to understand not yet identified mechanisms or to predict cell activities using computational approaches.

The EU-funded research consortium CanPathPro should achieve significant progress regarding these challenges: Scientists from six nations come together to bundle the necessary expertise for the analysis of signaling pathways associated with cancer. The scientists use a combination of experimental cancer research and systems biology methods to formulate and test their hypotheses. The Horizon 2020 initiative promotes the research by providing 11 million Euros for the entire five-year project.

Dynamic Models for Big Data

The young investigator group of Dr. Jan Hasenauer at the Institute of Computational Biology (ICB) of the Helmholtz Zentrum München receives about one million Euros of the total funding. While the other involved scientists gather huge data volumes, the Helmholtz group of scientists will mainly work on making these data manageable. "Big Data is certainly an always present concern in modern cancer research", explains Jan Hasenauer. "We will provide mechanistic dynamical models to organize and interpret the tremendous amounts of data provided by new experimental approaches".

The data collected in the CanPathPro project will be used to predict the behavior of cancer-associated signaling pathways and to reconcile the predictions with patient data. This will assist in selecting optimal therapies and in discovering new drug targets. The developed models allow for the incorporation of patient-specific data. This may render the models also a valuable tool for the study of other diseases.