'Roadmap' of human metabolism offers new understanding of cancer, obesity, more

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(Medical Xpress)—An international consortium of researchers has created the largest computer model of human metabolism to date, an astonishingly detailed roadmap that points the way to better understanding of cancer, obesity, diabetes, heart disease and a host of other conditions. It's a powerful new tool that will speed the development of new drugs and treatments and, eventually, may allow doctors to tailor medicine to each patient's personal biology.

The model, called Recon 2, details thousands of metabolic functions that occur within humans' cells. By understanding these functions, their interactions and how they influence cellular activity, scientists can get the big picture of the microscopic cellular universe.

"Metabolism is central to much of our body's function, and this model captures thousands of different metabolic processes," explained Jason Papin, a researcher at the University of Virginia School of Medicine involved in the project. "We start with the human genome. This modeling effort is a way to functionalize the genome, a way to make value out of that sequence information.

"With the genome, you have a parts list, the components. What this model does is take the functions associated with those components and put them together in a mathematical way so that you can start to predict how it will behave."

The model is by far the most complete computer representation of

metabolism yet, incorporating several previous models and more than 1,000 papers. It represents a collaborative effort of a substantial percentage of the top metabolism researchers from around the globe. By bringing together so much of science's understanding of metabolism, the researchers have created a way to better understand the metabolic mistakes that cause disease – and to speed future breakthroughs to battle those diseases.

Take cancer, for example. "The idea would be that if a patient's tumor becomes resistant to existing therapies, these models of metabolism can help point to new therapies or new pathways that we can target with drugs to help stop growth," Papin said. "Cancer growth is a function of metabolism. Metabolism is there to help it grow. And we're hoping this modeling effort will help us know how to inhibit some of those key processes."

The researchers describe the model in a paper in the May issue of the journal *Nature Biotechnology*. They have made the model freely available online, at www.humanmetabolism.org , and they're already at work making it even more comprehensive.

"This is really a starting point," Papin said. "The model has much, much to be improved, for sure. But in the end what we want to be able to do is have a computer model of the whole cell, and with that computer model hopefully be able to make all kinds of useful predictions and guide new experiments and help interpret new data that's generated. So while this is a first step, I think it's an important, big first step."

Provided by University of Virginia

metabolism-cancer-obesity.html