MedicalXpress

Scientists determine 3-dimensional structure of cell's 'fuel gauge'

February 8 2007

Researchers at Columbia University Medical Center have uncovered the complex structure of a protein that serves as a central energy gauge for cells, providing crucial details about the molecule necessary for developing useful new therapies for diabetes and possibly obesity. A paper published online today in the journal *Science* details this structure, helping to explain one of the cell's most basic and critical processes.

"Understanding this important protein's molecular structure and mechanism provides a major step forward for the rational design of new drugs to target diabetes and obesity," said Lawrence Shapiro, Ph.D., associate professor of Biochemistry and Jules and Doris Stein Professor of Research to Prevent Blindness at Columbia University Medical Center, and senior author of the paper.

The protein, known as AMP-activated protein kinase or AMPK, controls metabolic decisions of cells. For example, it controls the decision regarding whether fat is stored or burned, based on the amount of energy in the cell. When the energy level of a cell is high, meaning that the cell contains high amounts of an energy-carrying molecule known as ATP, AMPK directs cells toward "anabolic" activities like storing the extra energy as fat. When ATP is low, AMPK turns off anabolic activities, and activates "catabolic" functions, like burning fat to make energy.

AMPK provides an especially promising drug target for people with type 2 diabetes. These patients are insulin-resistant, meaning that their cells are not responsive to insulin which normally helps glucose get out of the

bloodstream, where it does damage, and into cells. When AMPK detects low levels of ATP in the cell, it works through a different mechanism to increase how much glucose the cell takes in and uses to create ATP. Research in rodent models has shown that AMPK activators can lessen the pathologies associated with diabetes, including problems that diabetics have regulating blood sugar.

Dr. Shapiro explained that researchers do not yet know how to activate AMPK without activating other proteins and causing potentially toxic side effects. However, he notes that this development in understanding the atomic resolution structure of the protein provides researchers a powerful new tool for the design of useful therapeutics.

Source: Columbia University Medical Center

Citation: Scientists determine 3-dimensional structure of cell's 'fuel gauge' (2007, February 8) retrieved 1 May 2024 from https://medicalxpress.com/news/2007-02-scientists-dimensional-cell-fuel-gauge.html

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.