Scientists find cellular mechanism for how the body regulates glucose transport

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Senior author Dr. Richard Wang, Assistant Professor of Dermatology and a member of UT Southwestern's Harold C. Simmons Comprehensive Cancer Center. Credit: Courtesy of UT Southwestern Medical Center

UT Southwestern Medical Center scientists have gleaned a key cellular mechanism of how the body adjusts glucose levels, an important process that when abnormal can promote diabetes, cancer, and rare genetic diseases.

The researchers determined that an enzyme called Protein Kinase C (PKC) can regulate whether more or less glucose should be transported into cells, serving as a kind of thermostat to ensure that proper levels are maintained.

'Precisely controlling glucose transport is critical to health,' said senior author Dr. Richard Wang, assistant professor of dermatology and a member of UT Southwestern's Harold C. Simmons Comprehensive Cancer Center. 'This process is defective in a variety of diseases including diabetes and cancer.'

Scientists have known how glucose is transported across cells, but had not previously understood in detail how the body controls the amount of glucose that is transported.

'Glucose transporter type 1, called GLUT1, transports glucose across the cell membrane of most cells in the body and is especially important in the uptake of glucose by the brain and blood vessels,' Wang explained. 'But how GLUT1 might quickly adjust the rate of uptake was not fully understood.'

The findings appear in the journal *Molecular Cell*. Researchers found that GLUT1 is modified by the addition of a phosphate group by the PKC enzyme. This addition, called phosphorylation, increases the amount of GLUT1 present in the cell membrane and thereby increases the rate of glucose transport.

The researchers further found that the regulation of GLUT1 by PKC was impaired in some patients with a genetic disease called GLUT1 Deficiency Syndrome (G1D). Patients with G1D have seizures, movement disorders, speech disorders, and developmental delays as infants because insufficient glucose is transported to the brain.

'With our ongoing studies on the regulation of GLUT1 by phosphorylation, we hope to identify pathways that may improve the diagnosis and treatment of diseases, including G1D, diabetes, and cancer,' said Wang, whose lab focus includes non-melanoma skin cancer, in which GLUT1 is highly expressed.

Provided by UT Southwestern Medical Center