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Effect and Mechanism of Quercetin on Ameliorate Diabetic Insulin Resistance in db/db Mice with Spontaneous Type 2 Diabetes Mellitus

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SUMMARY. The aim was to investigate the efficacy and underlying mechanisms of action of quercetin on glucose metabolism and insulin resistance in C57BLKS/J spontaneous obesity type 2 diabetes mellitus db/db mice by the IRS/PI3K/Glut4-mediated insulin pathway.Thirty C57BLKS db/db mice were randomly allocated to three groups (n= 10 per group): high-dose quercetin group(HQUE), low-dose quercetin group (LQUE), and db/db model control group (MC). Meanwhile, ten nondiabetic db/m mice were the normal control group (NC). The changes in fasting blood glucose (FBG), fasting serum insulin (FINS) were detected before and after quercetin administration, and the homeostasis model assessment-β (HOMA-β) was calculated. The pancreatic tissues histological structure changes were observed under light microscope after the H&E staining and Masson staining, and the ultrastructural changes were observed under transmission electron microscope. Hepatic glycogen were assessed with periodic acid-Schiff (PAS) staining. The protein expression of insulin receptor substrate 2 (IRS2), phosphatidylinositol 3 kinase (PI3K), and glucose transporter 4 (Glut4) in pancreatic tissues and hepatic tissues were detected by Immunohistochemical method staining and Western blotting.

RESUMEN. El objetivo fue investigar la eficacia y los mecanismos de acción subyacentes de la quercetina sobre el metabolismo de la glucosa y la resistencia a la insulina en ratones C57BLKS/J con obesidad espontánea y diabetes mellitus tipo 2 db/db mediante la vía de insulina mediada por IRS/PI3K/Glut4. Se estudiaron treinta ratones C57BLKS db/db. asignados aleatoriamente a tres grupos (n = 10 por grupo): grupo de quercetina en dosis altas (HQUE), grupo de quercetina en dosis bajas (LQUE) y grupo de control del modelo db/db (MC). Mientras tanto, diez ratones db/m no diabéticos formaron el grupo de control normal (NC). Los cambios en la glucosa en sangre en ayunas (FBG) y la insulina sérica en ayunas (FINS) se detectaron antes y después de la administración de quercetina, y se calculó la evaluación del modelo de homeostasis-β (HOMA-β). Los cambios en la estructura histológica de los tejidos pancreáticos se observaron bajo un microscopio óptico después de la tinción H&E y la tinción de Masson, y los cambios ultraestructurales se observaron bajo un microscopio electrónico de transmisión. El glucógeno hepático se evaluó con tinción con ácido periódico de Schiff (PAS). La expresión de proteínas del sustrato 2 del receptor de insulina (IRS2), la fosfatidilinositol 3 quinasa (PI3K) y el transportador de glucosa 4 (Glut4) en tejidos pancreáticos y hepáticos se detectó mediante tinción por método inmunohistoquímico y transferencia Western.

KEYWORDS: Glut4, IRS2, PI3K, quercetin, T2DM.

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