Gene expression profiles in the peripheral leukocytes as indices of insulin resistance and postprandial hyperglycemia

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Postprandial hyperglycemia is thought to cause not only augmented insulin secretion, but also inflammation in peripheral tissues including blood vessels. We have been conducting a systematic approach to seek effective biomarkers that should indicate a sign of insulin resistance and related subnormal metabolic/health status using peripheral leukocytes. Comprehensive search for postprandial hyperglycemia-related biomarkers by microarray analyses of blood cell transcriptomes in rodent models of diabetes and obesity revealed that postprandial hyperglycemia was closely associated with the increases in the expression of the genes coding proinflammatory cytokines and chemokines, such as IL-1β, IL-6 and S100 proteins. The induction of the cytokine gene expression occurred within 3h after the oral glucose or sucrose dose. A clinical study in type 2 diabetic patients showed that a continuous inhibition of postprandial hyperglycemia by administration of an α-glucosidase inhibitor with each meal was accompanied by a reduction in the expression of the genes coding the proinflammatory cytokines and chemokines. A cross sectional study conducted in collaboration of community health check-up programs and a health evaluation/promotion center showed that both IL-1β and IL-6 levels in the plasma are good indices of subnormal blood glucose and insulin resistance, while plasma adiponectin level is a good predictor of obesity and hyperinsulinemia in middle-aged men. The validity of the indices for postprandial hyperglycemia and/or insulin resistance should be further investigated by comprehensive clinical researches which take into account the individual variations of health-related profiles including diet history, eating behavior, physical activities, and genetic polymorphisms.