

Regulation of muscle microvascular flow and metabolism: an overview

M.A. Keske and S. Rattigan, Menzies Institute for Medical Research, University of Tasmania, Hobart, TAS 7001, Australia.

Skeletal muscle is the major site for insulin-mediated glucose storage and is thereby a key influence on postprandial blood glucose levels. Insulin stimulates muscle glucose uptake in two ways. Firstly, insulin improves the delivery of glucose to muscle cells by increasing blood flow to the microvasculature in contact with the myocyte. Secondly, insulin increases glucose uptake across the muscle cell membrane via activation of the insulin signalling pathway leading to the recruitment of glucose transporter 4 to the cell membrane. Insulin-stimulated microvascular blood flow improves the delivery of insulin and glucose to the myocyte to augment insulin's metabolic action, and this vascular action of insulin is lost during insulin resistance. Microvascular insulin responses can be lost prior to and independently of the development of myocyte insulin resistance. Understanding the mechanisms involved in the loss of microvascular function in muscle has the potential to identify novel treatment strategies to prevent or delay progression of insulin resistance and type 2 diabetes.