

Abstract

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Vascular actions of insulin in health and disease.

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BACKGROUND: Insulin has well known metabolic effects. However, depending on the magnitude and duration of the insulin stimulus, this hormone can also produce vasodilation and vascular smooth muscle growth. The association of hyperinsulinemia with the metabolic disorders of obesity and non-insulin-dependent diabetes, as well as with the cardiovascular pathologies of hypertension and atherosclerosis, has led to suggestions that perhaps elevated insulin levels are causally related to these diseases. Alternatively, insulin resistance may develop following an increase in skeletal muscle vascular resistance, with or without hypertension, such that a reduction in skeletal muscle blood flow leads to an attenuated glucose delivery and uptake.

SUMMARY: These hypotheses are explored in this review by examining the effects of insulin on vascular smooth muscle tissue during both acute and prolonged exposure. An interaction among hyperinsulinemia, hyperglycemia, and hyperlipidemia associated with the insulin resistant state is described whereby insulin resistance can be both a cause and a result of elevated vascular resistance. The association between blood flow and insulin stimulated glucose uptake suggests that therapeutic intervention against the development of skeletal muscle vascular resistance should occur early in individuals generally predisposed to cardiovascular pathology in order to attenuate, or avoid, insulin resistance and its sequelae.

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