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Endocrine Rhythms: Roles of the Sleep-Wake Cycle, the Circadian Clock and the Environment

Diagnostic and Therapeutic Implications

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Paper

Temporal Profiles and Clinical Significance of Pulsatile Insulin Secretion

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Key Words

- Insulin secretion
- Pulses
- NIDDM
- C-peptide
- Ultradian oscillations



Abstract

In this article, recent experiments are reviewed which have addressed the role of

oscillatory insulin secretion in the pathophysiology of glucose intolerance and diabetes. The ultradian oscillations of insulin secretion appear to be an integral part of the feedback loop between glucose and insulin secretion and as a result are abnormal in states of glucose intolerance. Treatment of impaired glucose tolerance with troglitazone, a thiazolidinedione that improves insulin sensitivity, leads to an improvement in the ability of the β -cell to sense and respond to a glucose stimulus restoring the ability of glucose to entrain the ultradian oscillations. The rapid oscillations of insulin secretion appear to be an inherent feature of the cellular mechanisms of insulin secretion since they persist in the isolated perfused pancreas and in perfused islets. These oscillations are paralleled by changes in intracellular Ca^{2+} and are also abnormal in states of glucose intolerance and diabetes. Available evidence indicates that these alterations are due to decreased expression of voltage-dependent Ca^{2+} channels on the β -cell membrane.



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