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Nota di contenuto	Introduction -- Physiology and Factors Affecting Blood Glucose Concentration -- Components of an Artificial Pancreas -- Modeling Glucose Concentration Dynamics -- Hypoglycemia Alarm Systems -- Hyperglycemia Alarm Systems -- Various Control Philosophies and Algorithms -- Multivariable Control of Glucose Concentration -- Dual Hormone Techniques for AP Systems -- Integrated Hypo-/Hyperglycemia Alarm and Control Systems -- Future Developments.
Sommario/riassunto	This brief introduces recursive modeling techniques that take account of variations in blood glucose concentration within and between individuals. It describes their use in developing multivariable models in early-warning systems for hypo- and hyperglycemia; these models are more accurate than those solely reliant on glucose and insulin concentrations because they can accommodate other relevant influences like physical activity, stress and sleep. Such factors also contribute to the accuracy of the adaptive control systems present in the artificial pancreas which is the focus of the brief, as their presence is indicated before they have an apparent effect on the glucose

concentration and so can be more easily compensated. The adaptive controller is based on generalized predictive control techniques and also includes rules for changing controller parameters or structure based on the values of physiological variables. Simulation studies and clinical studies are reported to illustrate the performance of the techniques presented.