

## Insulin Delivery Route for the Artificial Pancreas: Subcutaneous, Intraperitoneal, or Intravenous? Pros and Cons

Eric Renard, M.D., Ph.D.

### Abstract

Insulin delivery is a crucial component of a closed-loop system aiming at the development of an artificial pancreas. The intravenous route, which has been used in the bedside artificial pancreas model for 30 years, has clear advantages in terms of pharmacokinetics and pharmacodynamics, but cannot be used in any ambulatory system so far. Subcutaneous (SC) insulin infusion benefits from the broad expansion of insulin pump therapy that promoted the availability of constantly improving technology and fast-acting insulin analog use. However, persistent delays of insulin absorption and action, variability and shortterm stability of insulin infusion from SC-inserted catheters generate effectiveness and safety issues in view of an ambulatory, automated, glucose-controlled, artificial beta cell. Intraperitoneal insulin delivery, although still marginally used in diabetes care, may offer an interesting alternative because of its more-physiological plasma insulin profiles and sustained stability and reliability of insulin delivery.

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**Author Affiliation:** Endocrinology Department, Lapeyronie Hospital, CHU Montpellier, Université Montpellier 1, Montpellier, France; and CNRS UMR 5232, Montpellier, France

**Abbreviations:** (CSII) continuous subcutaneous insulin infusion, (IP) intraperitoneal, (IV) intravenous, (MPC) model predictive control, (PID) proportional-integral-derivative, (SC) subcutaneous

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**Corresponding Author:** Professor Eric Renard, M.D., Ph.D., Endocrinology Department, Lapeyronie Hospital, F34295 Montpellier cedex 5, France; email address [e-renard@chu-montpellier.fr](mailto:e-renard@chu-montpellier.fr)