

Insulin Pump Therapy: What Is the Evidence for Using Different Types of Boluses for Coverage of Prandial Insulin Requirements?

Lutz Heinemann, Ph.D.

Abstract

Bolus infusion of insulin along with a meal is a standard procedure with continuous subcutaneous insulin infusion. Modern insulin pumps allow applying this bolus in four different ways: infusion of the total dose at once or splitting the dose into two boluses, infusion of a part of the bolus in the usual manner plus infusion of the other part over a prolonged period of time (with a higher infusion rate than the basal rate), or infusion of the total dose in the form of an elevated basal rate. Depending on the composition of the given meal and its glycemic index, this is an attempt to match the circulating insulin levels to the rate of glucose absorption from the gut in order to minimize postprandial glycemic excursions. However, in the framework of evidence-based medicine, the benefits of this approach should be proven in appropriately designed clinical studies. Performance of meal-related studies requires careful attention to many aspects in order to allow meaningful evaluation of a given intervention (i.e., type of bolus). Critical evaluation of the clinical experimental studies and the one clinical study published about the impact of different types of boluses on postprandial metabolic control revealed fundamental shortcomings in study design and performance in these studies. Insufficient establishment of comparable preprandial glycemia and insulinemia on the different study days within and between the patients studied is one key aspect. Therefore, the recommendation made in most of these studies (i.e., use of dual-wave bolus) has to be accepted with care, until we have better evidence.

J Diabetes Sci Technol 2009;3(6):1490-1500

Author Affiliation: Profil Institut für Stoffwechselforschung, GmbH, Neuss, Germany

Abbreviations: (CGMS) continuous glucose monitoring system, (CSII) continuous subcutaneous insulin infusion, (DW) dual wave, (GI) glycemic index, (IV) intravenous, (sc) subcutaneous, (SD) standard deviation, (SW) square wave

Keywords: insulin pumps, insulin therapy, prandial insulin

Corresponding Author: Prof. Dr. rer. nat. Lutz Heinemann, Profil Institut für Stoffwechselforschung, GmbH, Hellersbergstr. 9, D-41460 Neuss, Germany; email address lutz.heinemann@profil-research.de