INSULIN DELIVERY WITH PATCH PUMPS: BASAL RATE ACCURACY

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BACKGROUND AND AIMS

Recently, a new tubeless pump was released for continuous subcutaneous insulin infusion. In this study, data obtained on the basal rate accuracy of the new pump were compared to data obtained with a previously tested established patch pump.[1]

METHOD

In an experimental setting following procedures of EN 60601-2-24, basal rate accuracy of the Accu-Chek® Solo micropump [ACS] was evaluated. Basal rates of 0.1 U/h and 1 U/h, relevant in the therapy of young children, respectively adolescents and adults, were tested in 9 repetitions and accuracy was determined based on weight increases over 72 h. In addition, delivery during each hour was assessed, applying limits of ±15% from target.

RESULTS

Over the whole 72 h of the experiment, the deviation from the expected target weight was -5.3% at a basal rate of 0.1 U/h (table 1, figure 1). The pump showed a slightly lower mean weight increase (-1.9%) than expected with a preset basal rate of 1 U/h. Larger deviations were observed during the first 24 h (figure 2). Of individual 1-h windows, 51% (0.1 U/h) and 98% (1 U/h) were within ±15% of target (table 1).

CONCLUSION

The new tubeless pump delivered insulin more accurately with the larger basal rate than at the small basal rate. Compared to the previously tested OmniPod® [OP], mean deviation at the larger basal rate was similar, but precision was higher for the ACS, especially at the low basal rate.

Table 1: Insulin pump accuracy at a basal rate of 1 U/h and 0.1 U/h: Total deviation and accuracy of 1-h windows. †Specifications in the respective manuals refer to normative testing. *Results from previous tests.[1]

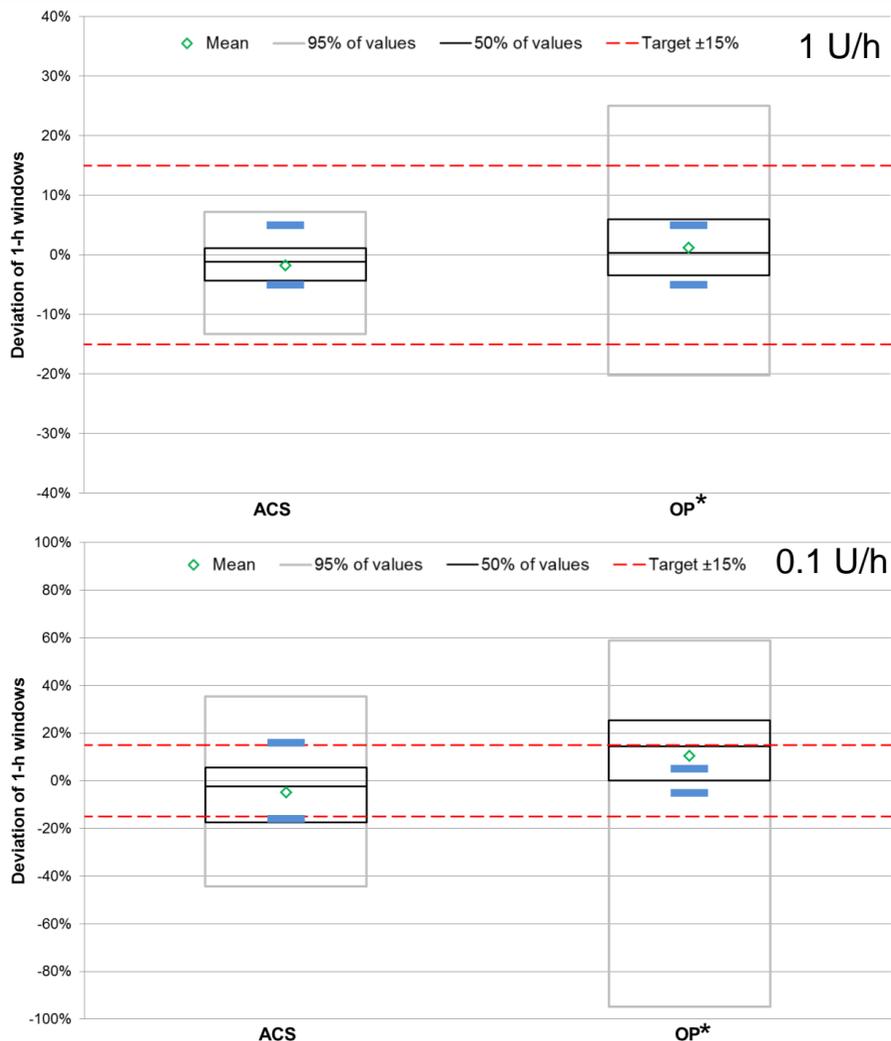| Basal rate	Insulin pump	Total deviation			1-h windows within			Manual†
		0-24 h	24-72 h	0-72 h	±15%	±10%	±5%	
1 U/h	ACS	-3.3%	-1.2%	-1.9%	98.0%	92.3%	68.2%	±5%
	OP*	2.4%	0.9%	1.4%	81.2%	71.2%	46.6%	±5%
0.1 U/h	ACS	-10.9%	-2.5%	-5.3%	50.5%	36.5%	19.4%	±16%
	OP*	26.2%	4.1%	11.7%	31.6%	21.8%	10.5%	±5%

Figure 1: Percentage deviation of 1-hour windows over 72 h at a basal rate of 1 U/h (above) and 0.1 U/h (below). Blue bars show maximum deviation as specified in the respective user manual. *Results from previous tests.[1]
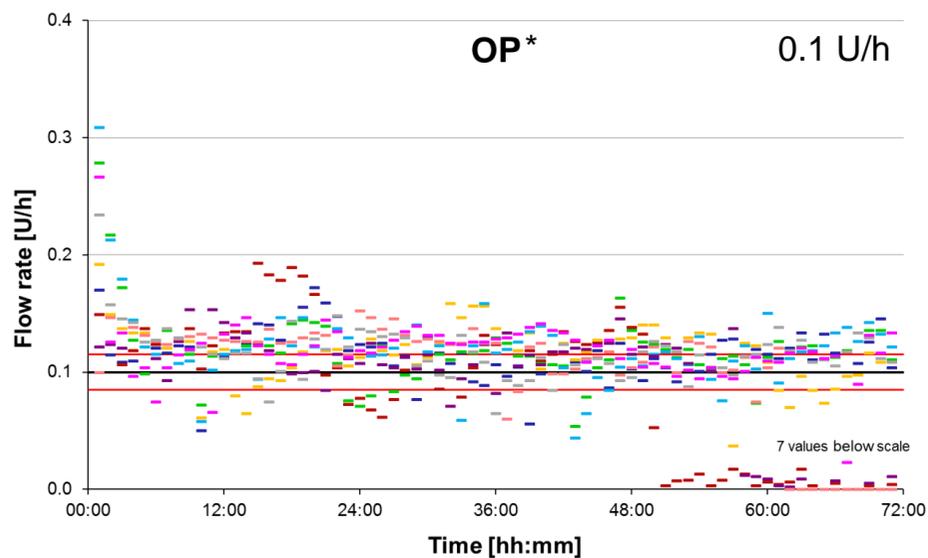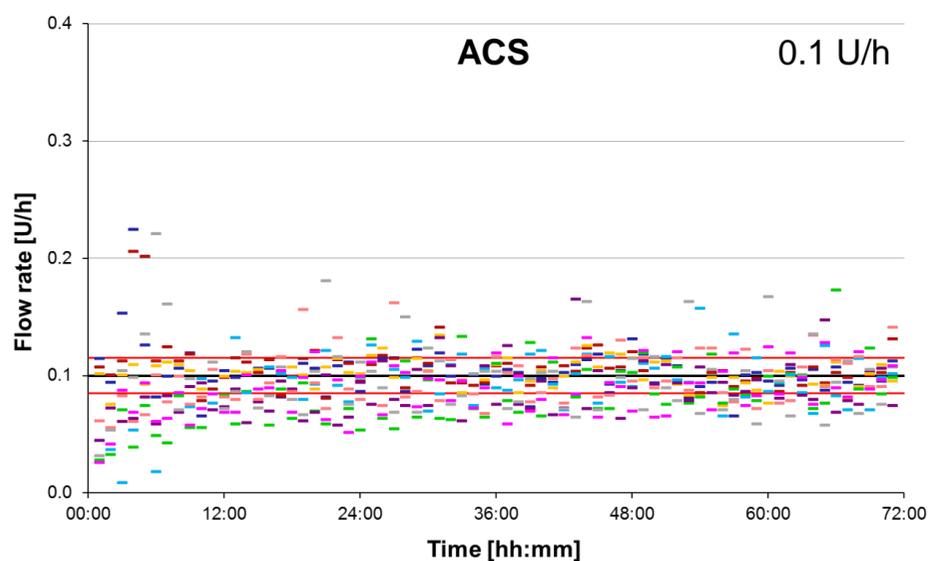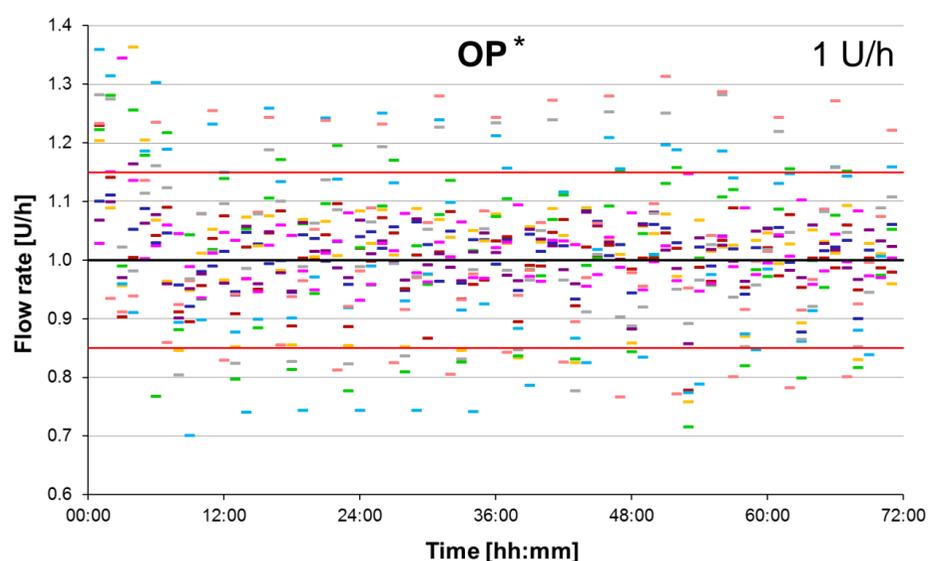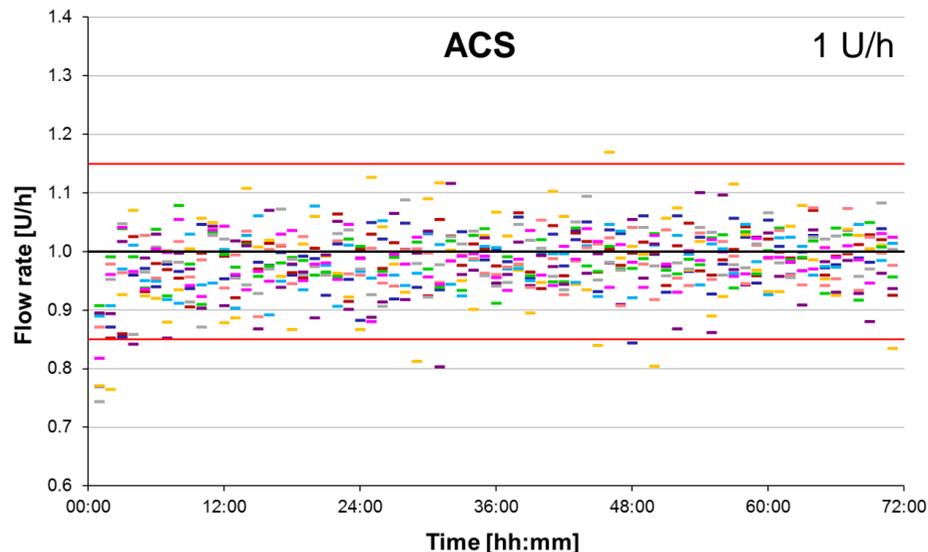

Figure 3: Mean delivery over 1-h windows in course of time; for ACS and OP. Set rate: 1 U/h (above) and 0.1 U/h (below). Black line represents target delivery, red lines represent target delivery ±15%, colored dashes represent the individual measurements. Each color represents one of the 9 repetitions. *Results from previous tests.[1]