

Insulin pumps do not allow a better control than insulin injections in childhood type 1 diabetes: results from the multicentric ISIS-Diab cohort.

AL.Castell, The ISIS-DIAB network, P Lucchini, C.Bibal, B Abumrad, S.Le Fur, P. Bougnères ¹

¹ Department of Pediatric Endocrinology, Bicêtre Hospital, Paris Sud University, AP-HP, Le Kremlin Bicêtre, France;

BACKGROUND

The use of insulin pumps spreads rapidly within the paediatric type 1 diabetes (T1D) community.

Several small studies have promoted pump usage, while large registries or multicentric studies have shown almost no advantage of this treatment over multi-injections of insulin or even or 2- daily injections of a free-mix insulin solution.

OBJECTIVES

Compare the results of treatment with insulin pump ("Pump") with those of insulin injections ("Inj") in a large cohort of children with T1D in field conditions.

PATIENTS

We studied 3137 children with ≥ 1 yr of T1D duration among the **ISIS-DIAB COHORT** recruited since 2007 by 99 diabetes centers of various size covering all French regions.

HbA1c, severe hypoglycemia, ketoacidosis, and body weight over the 6 last months were compared between "Pump" (N=694) and "Inj" (N=2443) groups of children.

The cohort was supported by the Programme Hospitalier de Recherche Clinique (PHRC) (2006) and by an institutional joint fund "ALLIANCE" generously fueled by NovoNordisk France and Inserm (2006-2016) and by an institutional grant from Eli-Lilly France (2016).

RESULTS

The ratio of "Pump"/"Inj" varied in the Isis centers from 0 to 65% of patients.

"Pump" and "Inj" children were comparable for age (9.2 ± 3.9 yrs vs 10.6 ± 3.4 yrs, $p=2.10^{-6}$), sex (20% of boys were in "Pump", vs 24% of girls, $p=0.006$), socioeconomic and educational level of families.

Mean HbA1c was 7.79 ± 1.00 % in "Pump" and 7.90 ± 1.20 % in "Inj" ($p=0.1$)

Severe hypoglycaemia occurred in 3.5% of "Pump" and 5.4% of "Inj" ($p=0.055$)

Ketoacidosis occurred in 2.7% of "Pump" and 2.7% of "Inj".

Overweight was present in 10.7% of "Pump" and 10.4% of "Inj".

Proportions of well-controlled (HbA1c < 7.5 %) and poorly controlled (HbA1c > 9 %) patients were comparable in "Pump" and in "Inj" groups

Insulin dosage was 0.82 ± 0.28 U/k.d in "Pump" and 0.95 ± 0.29 U/k.d in "Inj" ($p < 2.10^{-16}$).

Large expert centers had the same pump results than small centers (HbA1c 7.77 ± 0.99 % vs 7.84 ± 1.05 %, NS).

Children (20%) from Maghreb families had slightly better results with pump (HbA1c 7.9%) than with injections (HbA1c 8.2%, $p=0.27$, NS).

CONCLUSIONS

In field conditions, insulin pump shows no superiority. The choice of this costly and more demanding mode of treatment should thus be balanced at the individual and public health level.

While France has a generalized social security system reimbursing all expenses related to pump usage, results may differ in countries where the cost of pumps is supported by the parents, leading to a socioeconomic selection of pump users

References

de Beaufort, C. E., Lange, K., Swift, P. G., Aman, J., Cameron, F., Castano, L., ... & Kocova, M. (2013). Metabolic outcomes in young children with type 1 diabetes differ between treatment centers: the Hvidoere Study in Young Children 2009. *Pediatric diabetes*, *14*(6), 422-428.

Ingeholm, I. O., Svensson, J., Olsen, B., Lyngsøe, L., Thomsen, J., & Johannesen, J. (2015). Characterization of metabolic responders on CSII treatment amongst children and adolescents in Denmark from 2007 to 2013. *Diabetes research and clinical practice*, *109*(2), 279-286.

Blackman, S. M., Raghinaru, D., Adi, S., Simmons, J. H., Ebner-Lyon, L., Chase, H. P., ... & Raman, V. (2014). Insulin pump use in young children in the T1D Exchange clinic registry is associated with lower hemoglobin A1c levels than injection therapy. *Pediatric diabetes*, *15*(8), 564-572.

