

# Insulin Skin Reaction and Subcutaneous Insulin Resistance solved by CSII in a 63-year-old female with Type 2 Diabetes Mellitus (T2D)

P. Massucco<sup>1</sup>, L. Spadafora<sup>2</sup>, K. Bonomo<sup>1</sup>, A. Guerrasio<sup>1</sup>, O. Cohen<sup>3</sup>, F. Cavalot<sup>1</sup>



<sup>1</sup>Metabolic Disease and Diabetes Unit, Department of Internal Medicine and Oncology, S. Luigi Gonzaga University Hospital, Orbassano (Turin) Italy; <sup>2</sup>Internal Medicine School of the University of Turin, Italy; <sup>3</sup>Institute of Endocrinology, Ch. Sheba Medical Center, Tel Hashomer, Israel.

## Background

While insulin-induced skin reactions have become less common, since the advent of recombinant insulin, the use of modified insulins may still causes adverse local/systemic reactions (<1% insulin-treated patients) (1,2) In several case reports continuous subcutaneous insulin infusion (CSII) has shown many beneficial effects, therefore, becoming a recommended therapeutic option. The following describes the effect intervention with an insulin pump on T2D patient's skin reaction and glycaemic control

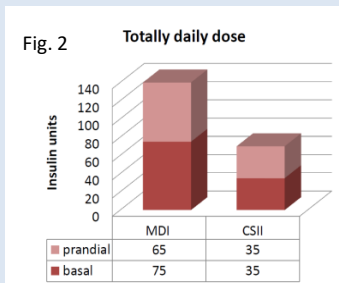
## Case report



Fig. 1

Local cutaneous reactions at insulin injection sites with concurrent central necrosis (fig 1) are described in a 63-year-old female with poorly controlled T2D (HbA1c 92 mmol/mol) despite high daily insulin doses and on several concomitant treatment for atrial fibrillation (warfarin, digoxin), heart failure (furosemide) hypertension (valsartan), and dyslipidemia (atorvastatin). Her cutaneous lesions, insulin resistance and the associated poor metabolic control subsided after switching from multiple daily injections (MDI) to continuous subcutaneous insulin injection (CSII) (*Medtronic MiniMed Paradigm VEO-754®*).

The total daily dose reduced from 140 U at 70 U/per day (fig. 2) Concurrently the skin lesions disappeared after three months



## Results

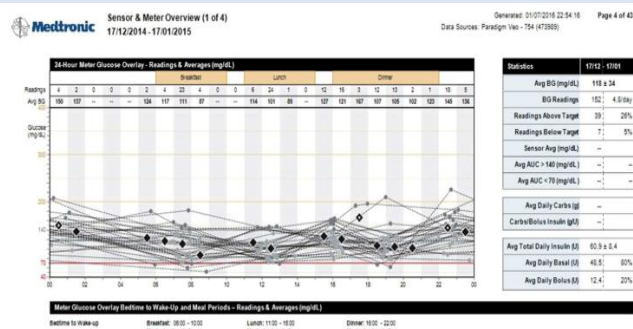
In the subsequent years, the glycaemic control improved persistently (Fig 3) despite several hospitalizations for acute medical condition such as sepsis in spondylodiscitis, endocarditis and heart failure

Fig 3

| Year/month      | 2009/9 | 2014/4 | 2014/9 | 2015/1 |
|-----------------|--------|--------|--------|--------|
| HbA1c(mmol/mol) | 58     | 61     | 58     | 62     |

Furthermore, her daily insulin dose remained unchanged in the following years (Fig 4) and no new skin lesions appeared.

Fig. 4



## Discussion

While the mechanisms are not fully understood, this case report findings suggest that CSII, by delivering smaller intermittent boluses of insulin, may be more rapidly and continuously absorbed increasing efficiency of the insulin and decreasing the allergic skin reaction (3) Another plausible explanation is that pump therapy might decrease insulin degradation at the inflamed site, decreasing subcutaneous insulin resistance (4)

## Conclusions

In our case, we reported a **dramatic and persistent reduction in HbA1c**, which is far beyond the expected improvement deriving only from **switching to CSII**, thus indicating that this injection modality with lower doses in continuous injections may induce insulin tolerance and decreased insulin refractoriness

## References

- Richardson T, Kerr D. Skin-related complications of insulin therapy: epidemiology and emerging management strategies. *Am J Clin Dermatol.* 2003; 4(10):661-667.
- Heinzerling, L., Raile, K., Rochlitz, H., Zuberbier, T. and Worm, M. Insulin allergy: clinical manifestations and management strategies. *Allergy*, 2008; 63: 148–155
- Pickup JC. The evidence base for diabetes technology: appropriate and inappropriate meta-analysis. *J Diabetes Sci Tech* 2013;7:1567–1574
- Ken-ichi Nemoto, Satoshi Ugi, Seiichiro Ogaku, Nobuhiko Nakaizumi, Takeshi Kato, Keiko Fuse, et al. A case of local delayed-type allergy to zinc-containing insulin as a cause of diabetic ketoacidosis in a patient with type 1 diabetes mellitus undergoing continuous subcutaneous insulin infusion, *Diabetology International*, 2016, p.1-4