

Assessment of Insulin Distribution in Subcutaneous Adipose Tissue when using Novel Insulin Infusion Catheters

CONTACT

¹ JOANNEUM RESEARCH
Forschungsgesellschaft mbH

HEALTH
Institute for Biomedicine
and Health Sciences

Neue Stiftingtalstrasse 2
8010 Graz, Austria

Phone +43 316 876-40 00
Fax +43 316 876 9-40 00

health@joanneum.at
www.joanneum.at/health



Unomedical
A ConvaTec Company

²Unomedical a/s
A ConvaTec Company
Aaholmvej 1-3
Osted, DK-4320 Lejre
Denmark

Thomas Altendorfer-Kroath¹, Pernelle Kruse Schøndorff², Rasmus Juliussen², Matthias Heschel², Frank Sinner¹, Thomas Birngruber¹

Introduction

- Insulin distribution and insulin depot formation in subcutaneous tissue are important parameters for insulin absorption immediately after insulin injection (Mader et al.).
- Kinking and subsequent clogging of the catheter tip is a major issue in the daily use of insulin infusion catheters.
- A novel infusion catheter with additional openings in the catheter wall (lantern design) ensures functionality of insulin infusion in case of kinking/clogging of the catheter tip.

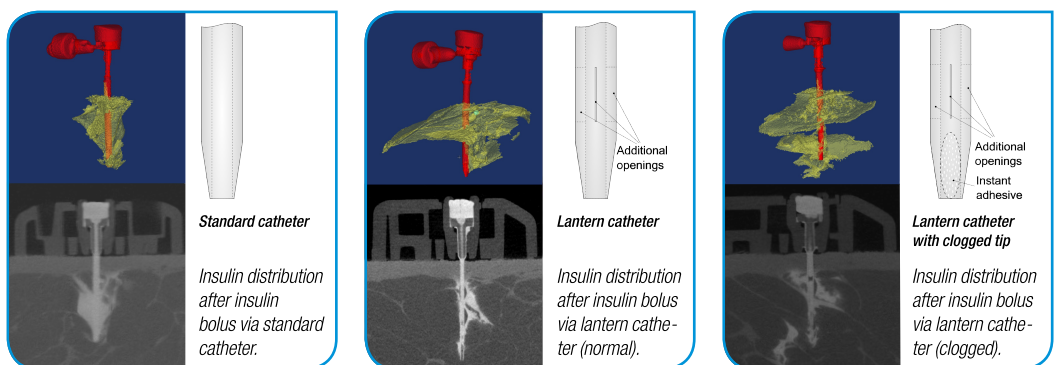
Aim

The aim of this study was to investigate the effect of different insulin infusion catheter designs on the formation of subcutaneous insulin depots.

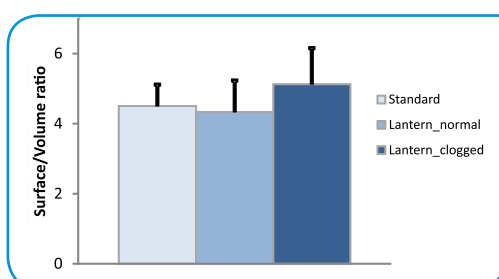
Materials and Methods

- Novel lantern infusion catheter (normal, clogged) compared to standard infusion catheter
- Fresh human adipose tissue explants (with skin)
- 100 IU/ml insulin solution (ActRapid[®], Novo Nordisk) incl. 10% contrast agent (Xenetix[®] 350, Guerbet) to enhance contrast between tissue and insulin solution
- 6 IU bolus via an Animas[®] Vibe[®] insulin infusion pump at 1 IU/s bolus infusion rate (max. bolus rate).
- Images were taken by using a μ CT scanner (Inveon Multimodality System, Siemens, Germany).

Results



- Surface to volume ratio appeared increased when the lantern infusion catheter was used compared to a standard infusion catheter.
- This effect was more pronounced when the lantern catheter was clogged by an adhesive.



Mean surface/volume ratio per catheter type (N=7 each type). Catheter types were grouped to avoid bias due to different tissue donors.

Reference

Mader, J.K., Birngruber, T. et al., 2013. Enhanced absorption of insulin aspart as the result of a dispersed injection strategy tested in a randomized trial in type 1 diabetic patients. Diabetes Care 36, 7805. doi:10.2337/dc12-1319

Conclusion

- Successful insulin delivery by novel lantern insulin infusion catheter even when clogged.
- Additional openings are influencing insulin depot formation especially when clogged.
- Some insulin backflow along the catheter track but no insulin leakage through the skin.