



## Insulin injection

### What has changed?

**When it comes to injecting insulin, a patients top priority is for it to be as painless as possible. Injection practice plays an important part in this. Below, Dr Gerhard-W. Schmeisl summarises the results of a survey on insulin injection.**

The first edition of the VDBD guidelines on “Injection for diabetes mellitus” followed years of regular international meetings, attended by physicians, diabetes consultants and patients, that addressed the problems associated with injecting insulin (e.g. Third Injection Technique Workshop in Athens (TITAN) in 2009 sponsored by Becton Dickinson (BD)).

#### **VDBD guidelines**

After years of intensive preliminary work in 2011, the first ever set of guidelines and recommendations for safe and effective insulin injection were published by VDBD. The guidelines were published with intensive support by BD. Prior to this, the problems associated with insulin injection were largely underestimated and were often completely ignored.

**“Despite numerous attempts, there are still no real alternatives to insulin injection”.**

One reason for this was inadequate knowledge about the anatomy of skin (A. Frid), in particular, the subcutaneous fatty tissue, as well as the pathophysiology of the effect of insulin, the pathology of the skin and the processes during injection, and the effect of the insulin itself. Injection errors associated with lipohypertrophy and “unexplained glycaemic excursions” were published in the journal “Diabetes, Stoffwechsel & Herz” [“Diabetes, Metabolism & Heart”] in a study that I was privileged to supervise with Evelyn Dobrinski, which was supported by BD. The problems mentioned in the study continue to occur today in patients with both type 1 and type 2 diabetes, despite the fact that in recent years, numerous advancements have been made with respect to more effective and more reliable insulin injection.

However, the fact that despite numerous attempts there are still no real alternative forms of insulin application, means we must continue to work to find a more reliable, effective and practical insulin injection that is also less painful for the patients. Today, several companies continue to work with a high level of commitment to help improve the lives of affected patients.

#### **Correlations between injection technique, lipohypertrophy and blood glucose variations**

The aforementioned study, published in “Diabetes, Stoffwechsel & Herz” 2009, used a patient questionnaire to survey 500 insulin-dependent patients and evaluated the results. In addition, diabetes consultants assessed the patients’ injection sites. The study’s objective was to observe the insulin-dependent patients’ injection practice and identify the correlation between injection practice and the occurrence of complications such as lipohypertrophy and/or glycaemic variation. The results were as follows: patients reported that they used the same needle for injecting short-term insulin an average of 4.4 times and for injecting long-term insulin 3.2 times, before changing to a new pen needle.

35 % of participants confirmed the presence of lipohypertrophy in the past 12 months. Objective inspection by the diabetes consultant actually yielded a higher report of 41.2 %. 42 % of patients reported the occurrence of “unexplained glycaemic variability” within the past 4 weeks, with type 1 diabetics more frequently affected than type 2 diabetics (45.3 % vs 38 %). The data clearly showed that unexplained glycaemic variability occurred significantly more frequently in patients with lipohypertrophy than in patients without lipohypertrophy. A potential explanation for this phenomenon was this impact of lipohypertrophy on insulin uptake action. For current recommendations regarding insulin injection technique, please reference the aforementioned VDBD guidelines.

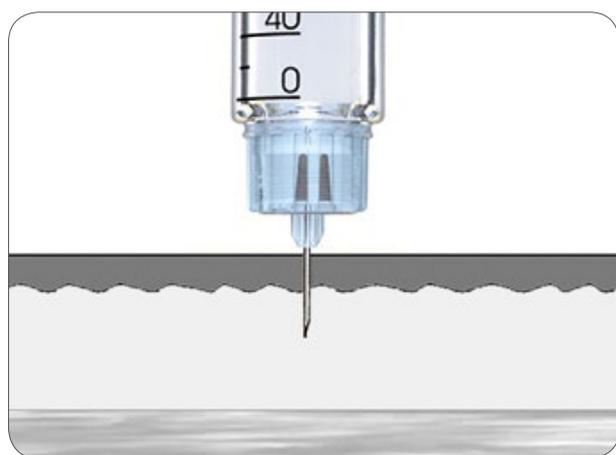
**“Study: The majority of the users (59 %) did not change needles after every injection”.**

### Current patient survey

Just recently, Ypsomed surveyed potential users of the new mylife™ Clickfine® DiamondTip pen needle using a survey carried out by ifak Institute that employed a questionnaire developed by Ypsomed. The surveys were conducted in Germany between June 2014 and June 2015. The aim of the survey was to evaluate the users’ experience with the new pen needle in order to obtain suggestions for optimising the needle itself and to generate new communication materials – had anything changed about the patient’s behaviour in the recent years?

### General information on the survey

A total of 150 individuals were surveyed, 53 % women and 47 % men. 61 % of the surveyed individuals were over the age of 50. 32 % were between the ages of 30 and 49 and only 7 % were between the ages of 18 and 29. 60 % were type 1 diabetics and 33 % were type 2 diabetics. The participants diabetes had been diagnosed for an average of 22 years and, with 76 % of the patients performing 6 injections per day and 23 % performing more than 6 injections per day. The most frequently used injection sites were the abdomen, at 60 %, and thigh, at 31 %. The upper arm and buttocks were rarely, if ever, used as injection sites.



The less painful the injection, the higher the patient compliance.

### The majority do not change needles after every injection

The majority of the users (59 %) did not change needles after every injection. 15 % of them reported that they used the same pen needle an average of 5 to 6 times, while half of the 59 % said they used the same pen needle 3 to 4 times. According to the participants, they did change injection sites for each injection (93 %); **however, it was not clear whether they actually used new injection sites. The majority of the surveyed patients (63%) were unable to detect any changes to the fatty tissue at the injection site themselves, however they were never asked to report whether these results were based simply on the appearance of the site in question, or from a thorough, manual check of the fatty tissue.** The patients were also asked about the type of needles they had used to date. 47 % had used BD Microfine pen needles, 29 % had used NovoFine needles and 18 % mylife™ Clickfine®. The needle length most frequently used, by nearly 2/3 of the patients surveyed, was an 8 mm needle (65 %), with 6 mm needles used by a much smaller number (28 %).

### Information about the new needle

In the test phase with the new mylife™ Clickfine® DiamondTip, a needle length of 8 mm was most frequently used (59 %), followed by 6 mm needles (31 %), followed then by 4 mm needles in third place (10 %). Whilst the participants reported that using the mylife™ Clickfine® DiamondTip 6-bevel needle made injection less painful, they did not report that it significantly improved their diabetes treatment. The patients tended to rate the practical advantages more highly, especially, for example, the universal application (needle fits on all conventional insulin pens) (83 %) and in particular, less painful injection thanks to the “thin wall technology” and less stress on the skin. Altogether, however, over 50 % of the surveyed patients reported that the technical innovations of this new pen needle could have a positive effect on their diabetes treatment. 23 % of the participants reported that it did not make any difference.

Although injection practice has changed in recent years and in particular, the use of longer needles such as 12 mm or 10 mm needles has been replaced by the use of 8 mm, 6 mm, 5 mm or 4 mm needles, there still appears to be a large number of patients who are not aware that injection sites and needle lengths are important factors in avoiding lipohypertrophy, and that needles are single use articles.

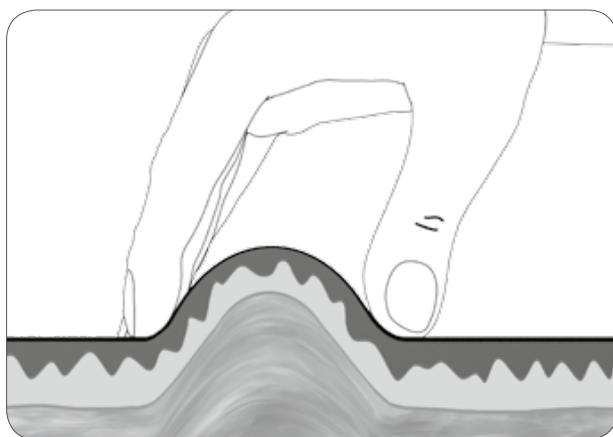
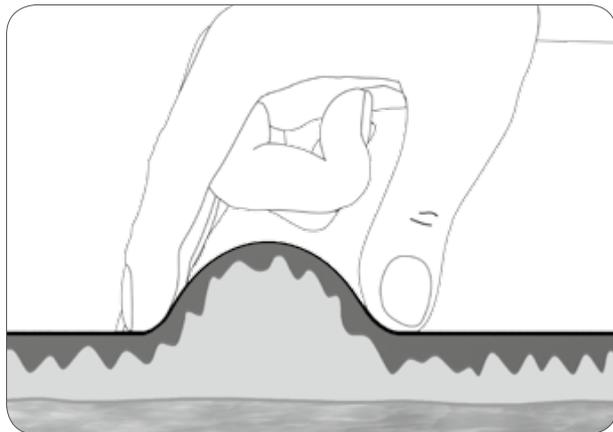


Re-using insulin pen needles is very problematic and may cause lipohypertrophy.

**“High-tech products” are in demand**

The newer, very short needles are “high-tech products” that are multibeveled and have a coating that is “scaled off” after the first injection. This means that injuries can occur during each additional injection with the same needle. This also explains the “unexplained glycaemic variability” and lipohypertrophy discussed earlier.

**“For the patients, the most important aspect is the universal applicability of the needles.”**



Patients need to learn how to perform injection properly. They need to have well-founded training (above: proper injection, below: improper injection).

**Source:** Forum for integrated diabetes management, Reprint from Diabetes Forum (2015) no 11, pp. 40-42, © Kirchheim-Verlag Mainz, Tel. (0 61 31) 9 60 70 0

**Conclusion: Smoother injection is appreciated by patients**

As the survey shows, while patients assess the technical effort with regard to needle production and the results of gentler insulin injection positively, they do not appreciate the benefits with regard to optimum blood glucose control with fewer glycaemic excursions and on the resulting long-term effects. In my opinion, this means that we urgently need to more strongly convey the knowledge about optimising insulin injection with the aim of improving diabetes treatment and reducing sequelae in the long term.

For this reason, we need to more intensively convey the need for better and more consistent control of blood glucose levels by means of further optimised diabetes treatment.

The survey shows that patients appreciate manufacturing efforts to produce a more high tech needle in order to make insulin injections smoother. However, they don't realise the impact these advancements in needle technology have on optimised blood glucose control and the resulting long term health effects.

In my opinion, we must focus our efforts on education patients on optimised insulin injection techniques to improve diabetes therapy in general and to reduce the risk of long term associated complications.

Therefore, we must intensely communicate this relationship between proper diabetes therapy technique and improved glycaemic control.

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