

# **Jet Injection Results in More Consistent Glycemic Control and Lower Daily Dose of Insulin in a Young, Active Woman with Type I Diabetes**

## **Patient Profile**

The patient is an 18-year-old woman who was diagnosed with type I diabetes 18 months ago. Given her young age and active lifestyle, she has a clinical need, as well as a strong desire, to achieve glycemic control with minimal injections of insulin. Already within 18 months of initiating insulin therapy with a needle and syringe, blood glucose control has become problematic for her, likely indicating that an increase in dose or dosing frequency may be required.

The patient is a senior in high school with demanding academic and extracurricular responsibilities. By keeping insulin injections to a minimum she is better able to comply with class schedules and after-school commitments. She also is concerned about the clinical implications associated with increasingly greater doses of insulin, given her life-long obligation to insulin therapy.

## **Assessment**

Early on, the patient experienced good glycemic control with combination Humalog® and Humulin® N injections twice daily with a needle and syringe. Self-monitoring of blood glucose was done 4 – 6 times a day to ensure adequate insulin dosing was maintained.

Within 10 months, however, the patient began experiencing hyperglycemic episodes near dinnertime. She would experience dizziness and sweating, followed by a severe headache. In order to achieve better glycemic control, the addition of a third injection was considered.

*“Early on, control with a needle and syringe was fine, but then it was getting hard to control the blood sugars before dinner—they were just too high. That’s why they wanted me to begin taking another shot of insulin.”*

The patient is 5'6" and weighs 150 lbs. (BMI = 24). Daily average blood glucose reading was 124 mg/dl, however, too often the patient would have blood glucose readings in the hyperglycemic range at dinnertime (Table I).

**Table I.** Eight days of blood glucose test results with needle and syringe.

<b>Day</b>	<b>Breakfast</b>	<b>Dinnertime</b>	<b>Bedtime</b>
Thursday	123	<b>392</b>	155
Friday	89	56	171
Saturday	143	80	63
Sunday	118	<b>427</b>	80
Monday	149	<b>270</b>	209
Tuesday	127	<b>197</b>	141
Wednesday	148	157	126
Thursday	143	<b>243</b>	82

### **Treatment**

The patient was recommended for entry into a trial using the Medi-Jector VISION® for insulin delivery. The patient was asked to keep a dietary journal and to monitor blood glucose levels as required during baseline needle and syringe administration of insulin, during the transition from needle and syringe to the Medi-Jector VISION, and then during administration of insulin with the Medi-Jector VISION.

She continued treatment with Humalog® and Humulin® N, and dosing-frequency was increased to three times daily.

### **Clinical Outcome**

***Glycemic control with less insulin.*** Within days of transitioning from the needle and syringe to the Medi-Jector VISION, the patient realized that glycemic control was being achieved with less insulin. There was a documented 10% decrease in the total dose of insulin required to maintain glycemic control (Table II).

The clinical relevance of the reduced insulin requirement for this patient is important. High insulin levels have been implicated in the pathogenesis of atherosclerosis.<sup>1</sup> By maintaining lower circulating levels of insulin, the tendency for plaque to form in the arteries is diminished.

**Table II.** Comparative use of insulin units.

Needle and Syringe			Medi-Jector VISION		
Insulin type	Humalog	Humulin N		Humalog	Humulin N
Avg. daily units of insulin	11	37	Avg. daily units of insulin	13	30
Total avg. units/day	48		Total avg. units/day	43	
10% decrease in the total dose of insulin was required with the Medi-Jector VISION to maintain glycemic control.					

Physically, the patient also realized the benefit of her glucose control, as overall she felt better, and the previous fluctuations in blood sugars she was experiencing at dinnertime were eliminated (Table III). With the pressure injection of the Medi-Jector VISION, insulin is widely dispersed subcutaneously and becomes more readily available.<sup>2,3</sup>

**Table III.** Eight days of blood glucose test results with the Medi-Jector VISION.

Day	Breakfast	Dinnertime	Bedtime
Thursday	170	109	136
Friday	206	150	166
Saturday	194	125	64
Sunday	120	150	58
Monday	199	88	116
Tuesday	146	66	104
Wednesday	140	98	188
Thursday	177	140	57

For this patient with diabetes, the more consistent glycemic control, as well as the lower insulin requirement that was achieved with the Medi-Jector VISION and switching from a BID to TID dosing schedule, may reduce the risk of long-term complications associated with diabetes.

**Self-assessment of Jet Injection**

For this patient, the convenience associated with needle-free insulin delivery experienced with the Medi-Jector VISION was also beneficial. She was able to attend after school activities without the risk of injury or embarrassment associated with carrying a needle in her backpack. Also, because her blood glucose profile was more predictable, she had fewer abrupt absences from the classroom in search of food.

*“I was on the prom committee last year and carrying around the Medi-Jector VISION was less embarrassing—people didn’t see it as a needle. Also, with needles I have to pack them in my bag, carry them with me the whole day, and then bring them back home.”*

*“It’s really nice when my blood sugars are in control, because when I’m in school it’s really inconvenient to leave the classroom and go get sugar. Before the Medi-Jector VISION, that happened a lot.”*

### **Clinical Implication**

Achieving and maintaining such intensive glucose control is especially meaningful for patients with type I diabetes and generally younger, as it may well improve productivity and quality of life long-term. As seen with this patient, having treatment options such as the Medi-Jector VISION to choose from in their diabetes management is critical, as they have the opportunity to tailor it to their lifestyle, greatly impacting a successful long-term outcome.

This patient was part of a study: “Evaluation of blood glucose profile using a MiniMed continuous glucose monitoring system (CGMS™): Comparison of Medi-Jector VISION® to a standard subcutaneous needle and syringe” conducted by Syed W. H. Rizvi, M.D., Dakota Clinic, LTD., and Heartland Hospital, Fargo, ND, and Odyssey Research in April/May, 2001.

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### **References**

1. Wilson PW, Coupples LA, Kannel WB. Is hyperglycemia associated with cardiovascular disease. The Framingham Study. *Am Heart J* 1991; 121: 586-590.
2. Chiasson JL, Ducros F, Poliquin-Hamet M, et al. Continuous subcutaneous insulin infusion (Mill-Hill Infuser) versus multiple injections (Medi-Jector) in the treatment of insulin-dependent diabetes mellitus and the effect of metabolic control on microangiopathy. *Diabetes Care* 1984; 7: 331-337.
3. Pehling GB, Gerich JE. Comparison of plasma insulin profiles after subcutaneous administration of insulin by jet spray and conventional needle injection in patients with insulin-dependent diabetes mellitus. *Mayo Clin Proc* 1984; 59: 751-754.