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DAKOTA DIABETES  
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*Friday.*



Dr. Johnson is a family practice doctor in Grand Forks with a special interest in diabetes -- and a special knack for writing. As a member of the Dakota Diabetes Coalition, he has generously made himself available to answer questions through our listserv. If you have comments, or questions for Dr. Johnson to address in future columns, please contact [gailhand@q.com](mailto:gailhand@q.com)

Visit the Coalition's website!

<http://www.ndhealth.gov/diabetescoalition/>

## The pump grows up Continuous Glucose Monitoring and Diabetes Management

Over the last three years, several different medical device companies have been developing continuous glucose monitoring systems to assist in the management of diabetes. These are effective for persons who inject insulin several times a day, and particularly for persons using insulin pumps, or as they are officially known, continuous subcutaneous insulin infusion systems. Currently, Medtronic Minimed, DexCom and Abbott all have commercially available continuous glucose monitoring systems. Medtronic Minimed has a system interfaced with a pump device.

Recently, the Juvenile Diabetes Research Foundation sponsored a study of continuous glucose monitoring utilizing all three of these systems in type 1 patients in different age groups: 8 to 14 years, 15 to 25 years, and older than 25 years. These results were published online in the New England Journal of Medicine in September 2008, and in-print October 2008. A total of 322 patients were randomized to either

a treatment group with a real-time continuous glucose monitor, or to the control group with traditional finger-stick blood glucose monitoring. Patients were then followed for 26 weeks. The resulting A1Cs were the primary outcome measurement.

The results varied by age group. The most significant reductions in A1C (a decrease of 0.53%) were in those older than 25. The youngest group (8-14 years old) showed A1C reductions of 0.13% vs. controls. No significant difference was noted in those between 15 and 25. Although the study was not designed to assess the effect that the number of days the sensor was worn had on outcomes, the middle wore the sensor the least. Those participants, teenagers from 15 to young adults of 25 years, wore them an average of 30% of the time, measured in days per week. The youngest test group wore them 50% of days per week, while those older than 25 wore them more than 80% of days per week.

At present, a conclusion could be drawn that continuous blood glucose monitoring systems may be very effective tools in the management of type 1 diabetes. The current systems are in their infancy, with the oldest having been commercially available for just three years. Certainly limitations exist, and they will need to be overcome. These systems currently measure interstitial fluid glucose. That measurement may be anywhere from 10 to 30 minutes older than measures from blood glucose. So, that delay needs to be addressed. Features that can increase the effectiveness of these devices include displays that show "trend" arrows, along with alarms that alert wearers to both highs and lows.

Future plans are exciting -- including electronic links to other handheld devices, such as smart phones or displays in cars or in different areas of the home.

This NEJM study, sponsored by the Juvenile Diabetes Research Foundation, provides the first real long-term data. As the designs of these devices develop, along with continuously improving pump technology, the vision of an artificial pancreas is a very real possibility in the coming years.

For more information, see the Juvenile Diabetes Research Foundation's webpage regarding artificial pancreas studies and technologies.

[www.jdrf.org](http://www.jdrf.org)

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[Continuous Glucose Monitoring, Dr. Johnson's Column #31, Oct. 3, 2008](#)