



# DCC Ticker

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## DCC Karlsburg

### Your partner on the way to near-normal glycemia

Since more than 70 years Karlsburg has been an internationally distinguished place for diabetes research and treatment. The Karlsburg Diabetes Management System (KADIS®) is the result of an intensive research work performed over almost two decades. In combination with the telemedicine-based communication system TeleDIAB®, KADIS® supports the general practitioner effectively and evidence-based in her/his daily efforts to optimize the patients` glycemie control. Using KADIS®, the number of fingerstick glucose readings can be reduced and insulin therapy becomes easier, often associated with lower insulin requirement. Hence, the general practitioner saves time and gains competence as well. The KADIS®-supported service offered by the DCC® Karlsburg is structured and ready for use in the ambulatory practice. KADIS® integrates current knowledge of diabetes research and most recent clinical developments. The

general practitioner, thus, gains access to expert knowledge and receives support in evidence-based therapeutic decision-making. The DCC® Karlsburg with its service represents a reliable and competent partner on the way to near-normal glycemia. The DCC® supports doctors and patients in performing save and painless blood glucose monitoring. For this, the DCC® preferably recommends continuous glucose monitoring, using glucose sensors. From the monitoring data, either obtained by continuous glucose readings or conventional fingerstick readings, and self-control data, the DCC® generates a patient-specific, characteristic 24-h glucose profile (CTP). Like an individual DNA finger-print, the CTP represents an individual indicator of the patients` metabolic control. This enables the doctor to recognize quickly and reliably so-called "weak points" in the patients` glycemie control. The highly skilled staff personnel at the DCC® generates, by means of KA-

DIS®, treatment recommendations to eliminate these "weak points". The analytical outcome will be documented in a conceivable format and compiled in the KADIS® Report. The DCC® telecommunication system TeleDiab® makes it possible for the doctor, via protected, individual data channels, to get access to the KADIS® Report and the patients` self-control data and allows downloading around the clock. So, all the data are available for the next patients` visit.



Telemicine-Operators, DCC Karlsburg



CGMS™ - Monitor and sensor for continuous glucose measurements

*The personal characteristic glucose profile (CTP) shows the individual features and „weak points“ of the patient's glycemic control.*

## Glucose- Monitoring

The Karlsburg Diabetes Management System KADIS® is especially useful for general practitioners to optimize glycemic control of their patients. In order to generate an evidence-based patient-specific decision support, KADIS® needs to be adapted to both the acute metabolic situation and subject characteristics. A prerequisite in order to do so is estimation of the "Characteristic 24-h Glucose Profile (CTP)".

Estimation of the CTP requires - except of baseline data such as age, gender, type of diabetes, body height and weight - a few home-monitored self-control data including blood glucose, antidiabetic drugs, timing and dosage of insulin and food intake.

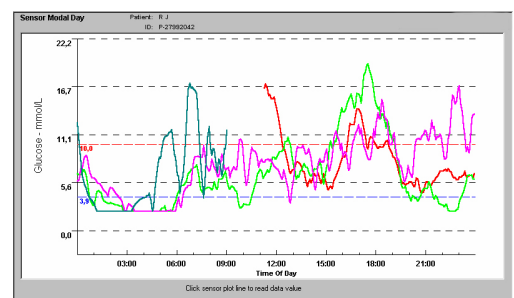
Glucose measurements may be performed by either hand-held blood glucose meters or by continuous glucose monitoring systems. Estimation of the CTP by conventional fingerstick glucose readings requires 80 -100 glucose measurements, i.e. 10 -12 glucose profiles

each with 6-8 glucose measurements a day within a period of 6-10 weeks.

In case glucose monitoring is going to be performed by automatic recording, a tiny glucose sensor is inserted usually beneath the skin of the patients' abdomen and connected to a monitor. Such a continuous glucose monitoring system is able to record glucose measurements every 5 min for up to 72 h. Every 6-8 h fingerstick glucose readings need to be entered into the monitor for calibration.

Even if the methods of glucose measurements may be different, dependent on the conditions in the general practice, monitoring of the self-control data

(administration of insulin, antidiabetic drugs, food intake) including the baseline data (age, gender, type of diabetes, body height and weight) should preferably be done by using the DCC's interactive self-control data collection sheet (SK-Datenerfassungsbogen®). Making use of the telecommunication system TeleDIAB®, patients can easily transfer their self-control data to the DCC® via a protected individual data channel and the doctor, on the other hand, can download the patients' data compiled and formatted by the DCC® to his practice computer.



Continuous recording of glucose measurements by CGMS™ over 72 h

## Characteristic glucose profile- the 24h- profile (CTP)

The CTP is comparable to a DNA finger-print and represents an individual indicator of the patients'

glycemic control. For its glucose readings or estimation, glucose conventional capillary glucose measurements either measurements, including the obtained from continuous patients' self-control and

baseline data will be transferred to the DCC®. Experts at the DCC® have developed unique, computerized methods for evaluation and graphic display of the data transferred either by the patient or the general practitioner.

If glucose monitoring is continuously performed, the glucose readings stored in the CGMS™ monitor will be downloaded to a computer at the DCC®, where the monitor and the self-control data of the individual patient will be evaluated and displayed in graphic format.

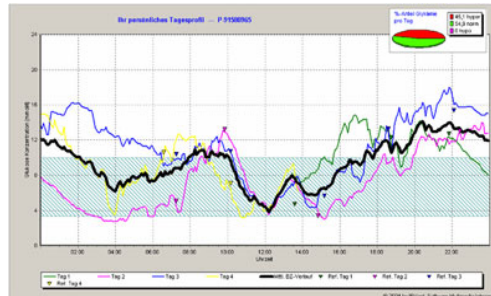
In the case that glucose readings have been performed by conventional blood glucose meters, glucose measurements can either be entered by the patient directly into a DCC-computer via protected online access or, alternatively, the data may

be entered by skilled staff personnel at the DCC®, following data transfer. For this purpose, the DCC® provides a specified self-control data collection sheet (SK-Datenerfassungsbogen®) developed solely for collection and processing of these data which enables for the first time world-wide, graphics-based reliable and save registering and processing of glucose measurements and self-control data. Using a specific computerized procedure for analysis and evaluation of the data, the individual CTP can be

generated.

Individual CTP's will be stored in the DCC-data base and become available on request for both patients and their doctors via protected online access in the format of an electronic logbook.

In order to get an impression of the quality of the patients' metabolic control at a glance, an estimation of the percentage of hypo- and hyperglycemic excursions in the CTP is carried out and displayed in form of a pie chart, a so called "eye of quality".



Individual CTP after evaluation of the glucose monitoring.

## KADIS®- based „weak point“ analysis

To reveal deficits in metabolic control of an individual diabetic patient KADIS®- based "weak point" analysis is carried out at the DCC® by a comprehensive computerized tracking system, analyzing and displaying graphically in a quantitative as well as qualitative fashion the daily

course of glycemia in relation to the patients' 24-h insulin action profile and food intake pattern. Prior to this analysis, KADIS® need to be adapted to the acute metabolic situation of the individual patient. KADIS® is as yet world-wide the first, clinically proved computer decision support system or

diabetes management program able to adapt to the acute metabolic control of a specific patient under ambulatory conditions on the basis of blood glucose measurements and self-control data.

For adequate glyceimic control glucose levels should stay in the range between



*Reduction of the HbA<sub>1c</sub> value by 1 % is associated with a reduction of about 30 % of the risk for development of microangio- and neuropathic complications.*



KADIS® Client at the DCC Karlsburg

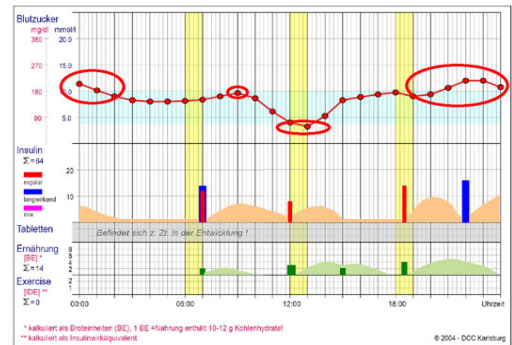


## KADIS®- based „weak point analysis“ (continuation)

3.3 mmol/l (60 mg/dl) and 10 mmol/l (180 mg/dl) throughout the whole day. In patients whose glycemic control is inadequate, glucose levels fall below the lower or exceed the upper limit of this target range. KADIS®-based analysis enables to enumerate these excursions, called “weak points”, and to display them in a graphic format of the glycemic profiles characteristic for the specific patient. By simultaneous calculation of both the individual 24-h insulin action profile and 24-h food intake pattern in association to the 24-h

glucose profile, KADIS® offers the unique opportunity for general practitioners and patients to gain quick insight into the causal relationship between “weak points” in the characteristic 24-h glycemic profiles and overall quality of metabolic control.

This interactive decision support system KADIS® has the potential to improve evidence-based parameters of metabolic control known to lead directly to reduced morbidity and mortality in diabetes.



KADIS®- based „weak point“ analysis

## KADIS®- based treatment recommendations for optimal glycemic control: The KADIS®- Report

If the individual characteristic 24-h glucose profile of a patient has been once established and weak points in her/his present glycemic control were recognized by means of KADIS®, the KADIS® simulation program implemented at the DCC® Karlsburg offers the unique opportunity of therapeutic decision-making to eliminate weak points in the glucose patterns and, thus, improve glycemic control. The KADIS® simulation program is able

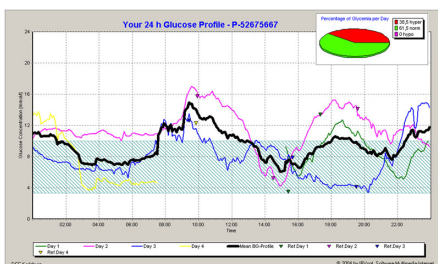
to display trended and real-time electronic laboratory data interactively linked to evidence-based treatment recommendations and displays patient-specific, 24-h glucose profiles in response to various therapeutic measures tested. Thus, upon variation and modification, various therapeutic measures to be taken can evidence-based be probed to finally result in an optimized metabolic control. This allows to find out, in an appropriate time, those

therapeutic interventions which are most effective in improving metabolic control, most beneficial for the patient and cost-effective. Time-consuming trials and/or the number of clinical visits for metabolic control, often necessary in patients with poor metabolic control, can effectively be reduced, thereby saving time and health care budgets for patient and doctor. Generation of the KADIS®-based treatment recommendations for optimizing

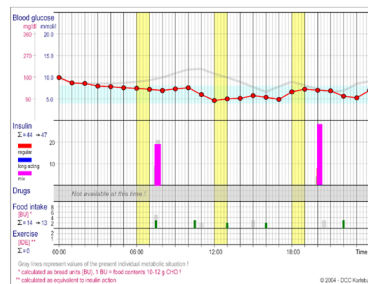
metabolic control of individual patients will be done at the DCC® by an interactive data processing which is carried out by qualified and highly skilled staff personnel. Modification of insulin administration (dosing, timing, insulin formulation), food intake (amount of BU, timing) and physical activity (timing, intensity) are probed by this computerized decision support system. The KADIS®-simulation program evaluates patient-specific, the 24-h glucose profiles to be expected. Comparison of

the various predicted glucose profiles in response to therapeutic modifications leads immediately to the selection of those intervention measures having the greatest potential to overcome the "weak points" in the patients' metabolic control. Those KADIS®-based treatment recommendations, having the greatest improvement potential will finally compiled in the KADIS® report and can every time be provided by the DCC® to the patients and their corresponding physicians. Several clinical trials have

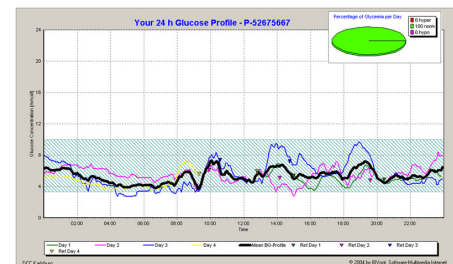
clearly shown that in poorly controlled diabetic patients, as judged by HbA1c values, metabolic control could significantly be improved within 3 months if KADIS®-based treatment recommendations became an integrated part of diabetes care. Not the number of fingerstick readings could be reduced only, but insulin therapy became easier, and most importantly, the quality of life and well-being was improved.



**April 2004 - CTP without KADIS®**  
Diabetes-Type-1, 20 years, ♀  
HbA<sub>1c</sub> = 9,2 %



**April 2004**  
KADIS®- based recommendations to improve metabolic control by optimizing daily diabetes management



**Juli 2004 - CTP with KADIS®**  
HbA<sub>1c</sub> = 7,2 %

## Access to the DCC®

All services provided by the DCC® Karlsburg are easily available via the DCC® Access CD, which connects patients and doctors online with the

DCC®. Additionally, the DCC® can be contacted 24 h every day by the DCC® telephone hotline 09001 433 244.

**HOTLINE - 09001 433 244**



DCC® Access-CD for doctors and patients

## Impressum

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