

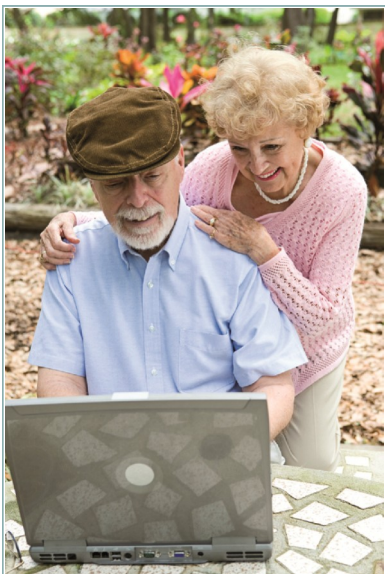
KADIS Projektmanagement und Beratungsagentur GmbH
(KADIS PMBA)

Personalized decision support and cost-effective diabetes care management



Avoid hospitalization · no „revolving door“ effect · optimization of metabolic control in the course of everyday living · increase doctors' medical skills · save on costs





Preamble

For each individual, the metabolic pathway is as characteristically different as a fingerprint and, as such, clearly indicates the distinctive rhythm of any particular patient's blood sugar profile. For the first time in the world, KADIS® (KArlsruBurger DIabetes-Management

System) has made available a practicable, *in silico* illustration of the individual metabolism of diabetic patients. The system is patented and could be published in high-ranking specialist professional magazines.

"Determine your own blood sugar level in the course of the day and find your own individual rhythm."



In order to provide an *in silico* illustration, that is to say a computer-aided model, of an individual's metabolism, the KADIS® System requires data that is easy to gather under normal everyday circumstances. This includes data such as blood sugar measurements taken either at selected times or by means of continuous glucose monitoring (CGM), self-managed data on therapy (insulin, tablets), food intake (BU, bread units) and physical activity (sport). Some further basic patient data (such as age, type of diabetes, how long the patient has had the illness, weight and height) complete the required database. Once the data has been up-loaded or inputted, the KADIS® system first generates new data relating to the patient's individual metabolic control measurements. This functionality, hitherto unique in the world and available only by means of KADIS®,

provides a model-based identification of a patient's existing insulin resources, also shown in the form of a daily profile. In a subsequent iterative process and on the basis of all available data, KADIS® then simulates 24-hour blood sugar profiles which are precisely matched to the measured blood sugar readings of a patient. The result of this patented iterative process is the *in silico* illustration of the individual metabolism of a patient on the PC, something that is also described as the personalized "metabolic fingerprint".

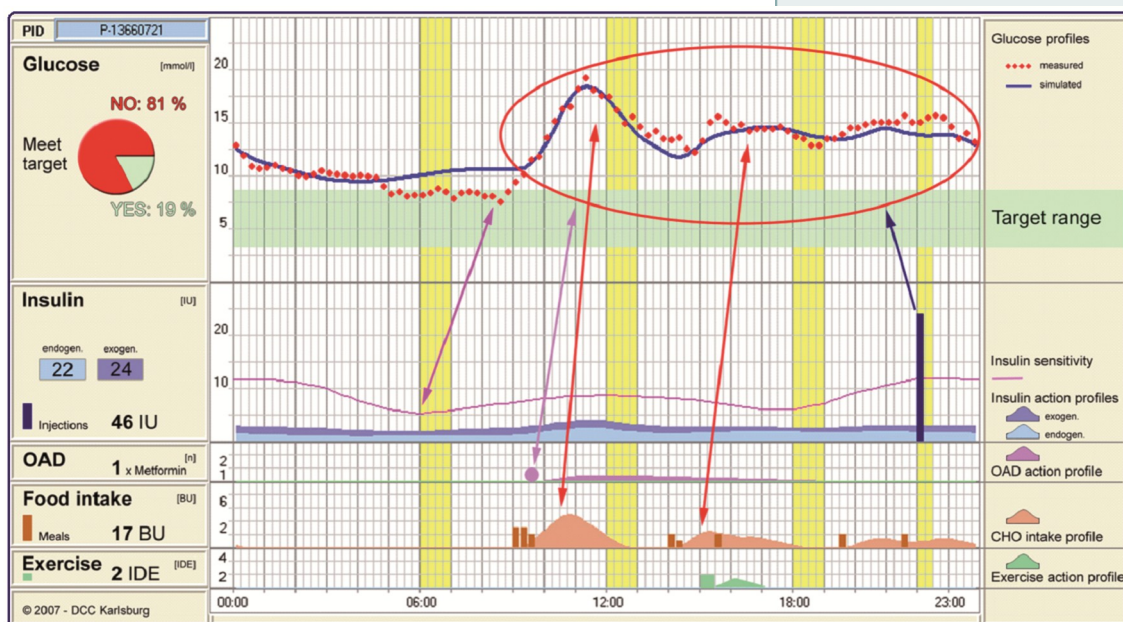


Weaknesses in a patient's metabolic control can be determined and analyzed using personal metabolic data.

KADIS®-based critical point analysis

Critical points, such as hypo- or hyperglycemia in the blood sugar, become apparent from the personalized "metabolic fingerprint". For the first time however, KADIS® makes possible a further analysis of critical points, an analysis which establishes, identifies and illustrates causal links between the diagnosed hypo- or hyperglycemia and the current therapy (tablets, insulin, food, physical activity), endogenous insulin reserves and individual insulin

responsiveness. For example, a marked rise in blood sugar in the morning, even before the first meal, can be causally explained by an individual, much reduced, insulin responsiveness at this time of day. This causally determined critical point analysis is a unique feature of KADIS®.



Personalized decision support



Based on the *in silico* illustration and the KADIS® critical point analysis, various model-based therapy options can now be quickly and reliably tested - in terms of their anticipated effects on blood sugar profiles - on the computer by means of an interactive KADIS®-based simulation process. Such therapy options, which would be expected to provide given patients with optimum therapy guidance, are then made available to the attending physician as a KADIS® report in the form of a personalized decision support. The physician can, in turn, use this, while

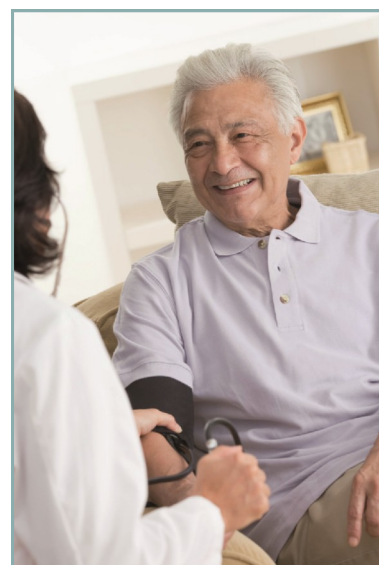
considering possible associated illnesses in his patients, thus avoiding boring and burdensome trial and error procedures. KADIS®-based decision support is currently being further developed at the Karlsburg Diabetes Service Centre by means of interactive dialogue among qualified medical personnel, under the leadership of highly experienced diabetes specialists and in accordance with the generally accepted treatment guidelines governing the professional associations.

"Optimized therapy control by means of evidence-based decision support for the attending physician."

Introducing the diabetic care practice

The KADIS®-based review of therapy options and the provision of recommendations for addressing shortcomings in metabolic control among diabetic patients has been operating, on an ongoing basis and using the personalized decision support rationale, for over 4 years in Germany, as part of an integrated care service agreement. It has been extremely successful under routine

conditions for about 300 general practitioners and/or medical specialists caring for about 800 diabetic patients.



Personalized decision support in diabetes mellitus diagnostics and therapy

CGM-Data

Continuously monitored glucose profiles

Self control-Data

Insulin, OHA, meals, exercise

Basic-Data

Age, gender, BMI, onset and type of diabetes

1 Measurement

Measuring and recording of the individual characteristic 24-h glucose profile (CTP)

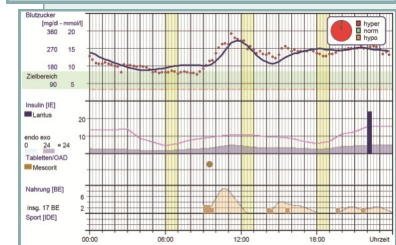
CTP



2 Visual illustration

KADIS®-based visual illustration of a patient's current, personal metabolic control, in which the measured CTP is correlated with the exogenous (prescribed therapy, meals, sports) and the computer-calculated endogenous (individual insulin secretion, insulin effect profiles, daily variations in insulin sensitivity, food absorption profile) influencing factors (personalized "metabolic fingerprint")

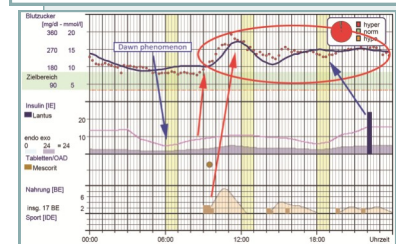
„Metabolic Fingerprint“



3 Identification

KADIS®-based analysis and identification of the causes of weaknesses in a patient's personal metabolic control (critical point analysis)

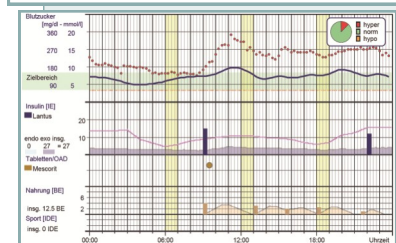
Critical point analysis



4 Advice

Computer-aided review of therapeutic options by means of interactive *in silico* simulation procedure in strategies for overcoming the identified weaknesses and combining them into patient-centered recommendations to support medical decision-making in the form of personalized decision support.

Prediction of outcome



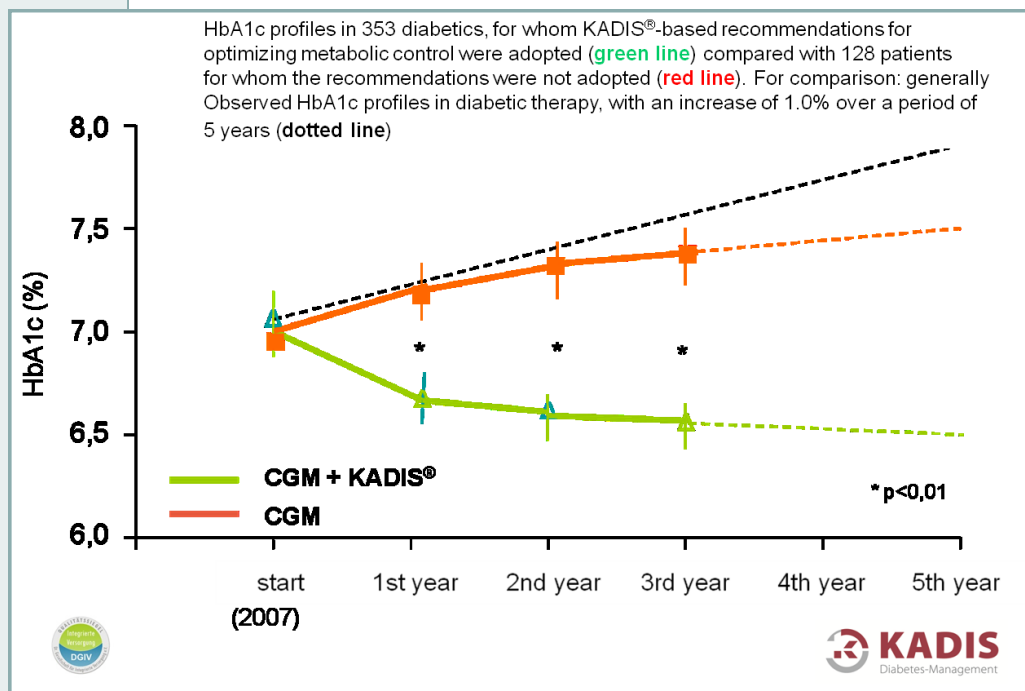
KADIS® Report: Personalized recommendations to support medical diagnostics and therapeutic decision-making in order to optimize individual metabolic control among patients.

Quality improvement in metabolic control by means of personalized advice

HbA1c profiles in 353 diabetics, for whom KADIS®-based recommendations for optimizing personal metabolic control were adopted (**green line**) compared with 128 patients for whom the recommendations were not adopted (**red line**). For comparison:

son: generally observed HbA1c profiles in diabetic therapy, with an increase of 1.0 % over a period of 5 years (**dotted line**).

"Using KADIS®, a review of therapy options quickly and reliably results in realistic therapies and actively raises the quality of care for each individual patient."

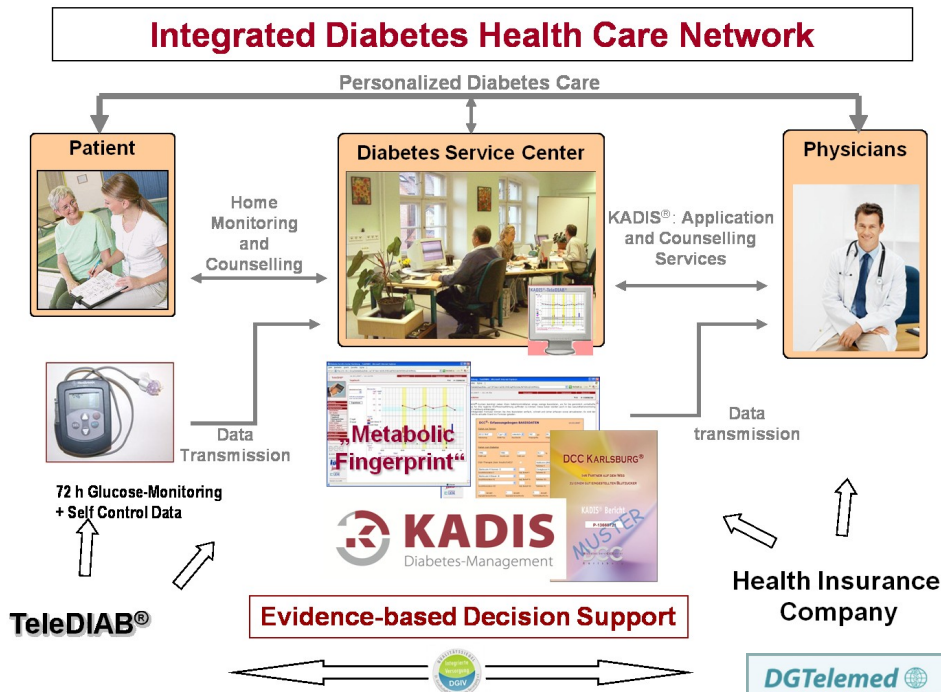


UKPDS study

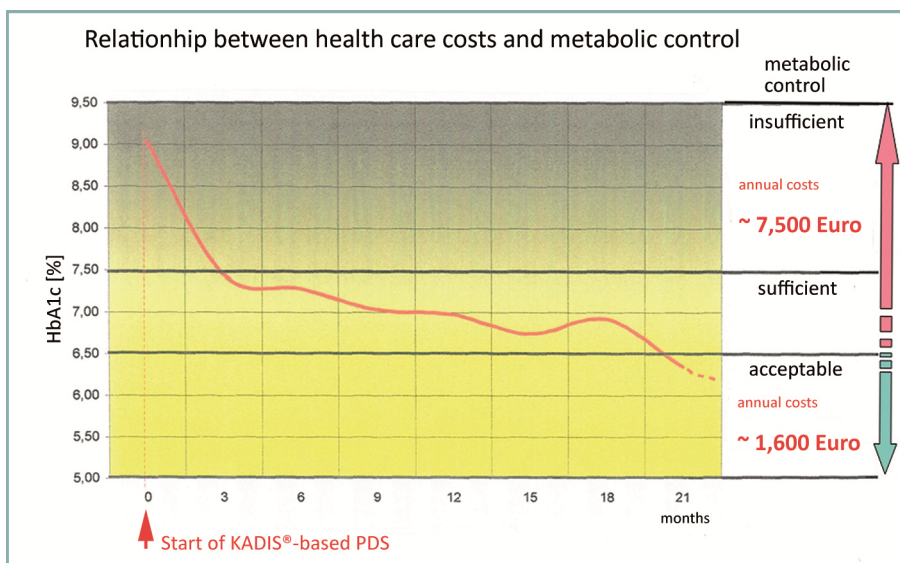
... „For the prognosis of type 2 patients, it was not the type of therapy but the lowering of blood sugar that was critical. There was no threshold value: each percentage point of the HbA1c that was closer to the normal glycemic value reduced the risk of microvascular complications by 35 %, diabetes-associated mortality by 25 %, overall mortality by 7 % and the rate of fatal and non-fatal myocardial infarction by 16%.“

Intensive blood-glucose control with sulphonylureas or insulin compared with conventional treatment and risk of complications in patients with type 2 diabetes (UKPDS 33). UK Prospective Diabetes Study (UKPDS) Group. *Lancet* 1998 Sep 12;352(9131):837-53.

Personalized Diabetes Management as part of an integrated care agreement



Cost-effective care management:
reduce costs through good meta-
bolic control



Advantages of out-patient optimization of metabolic control supported by KADIS®-based health service provision

- ➔ Unnecessary hospitalization is avoided
- ➔ The “revolving door” effect, often observed after in-patient metabolic control treatment, is excluded
- ➔ The patients concerned can achieve optimized metabolic control in their normal day-to-day living
- ➔ The attending physician’s skills are increased without incurring major additional expenditure
- ➔ Out-patient optimization of metabolic control is two to three times more cost-effective than in-patient treatment

Aktiver leben mit KADIS®
Durch Langzeit-Blutzuckeranalysen zum persönlichen Rhythmus finden!

- ✓ **ZUM RHYTHMUS FINDEN!**
Entdecken Sie Ihren **persönlichen Blutzuckerspiegel** im Tagesverlauf
- ✓ **RISIKEN VERMEIDEN!**
Anhand einer Risikoanalyse die **besten ausgewogenen Dosierungen** finden.
- ✓ **BELASTUNG MINIMIEREN!**
Nie mehr zu hoch dosiertes Insulin verwenden, ohne es wirklich zu brauchen.
- ✓ **AKTIVER LEBEN!**
Mehr Zeit für sich selbst, mehr Zeit für Familie und Freunde. Lassen Sie die Sorgen von gestern hinter sich.



„Erfahren Sie mehr ...“

<http://www.kadis-online.de>

<http://www.diabetes-service-center.de>

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DCC
Diabetes Service Center
K a r l s b u r g