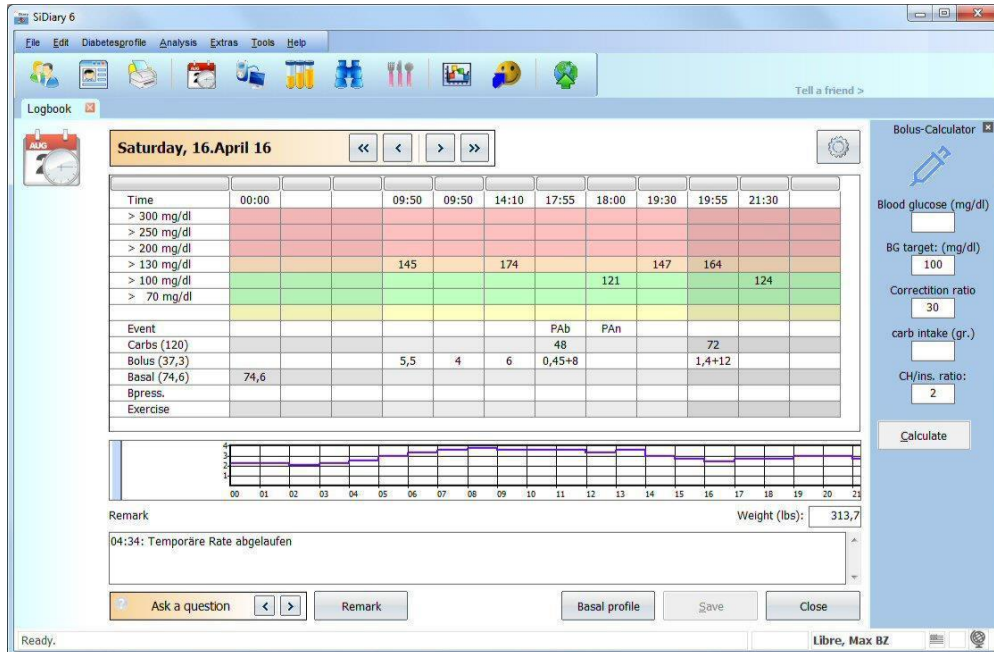## SiDiary – Successful work with continuous glucose monitoring systems (CGMS)

Since the update from SiDiary 6 to version 6.1, there is not only a new layout with different colors, but also a new option for the detail logbook. Until now the blood glucose levels were firmly integrated at the top of the table:

Since version 6.1 there is also a new button (see arrow 1), where you can switch the layout: either the day will be displayed with the blood sugar table like in the previous versions (pictured above in color), or it shows the progress curve of CGMS/FGM data, which is designed for systems such as the Freestyle Libre, the Freestyle Navigator, the Dexcom or other systems that provide data from a continuous glucose measurement:
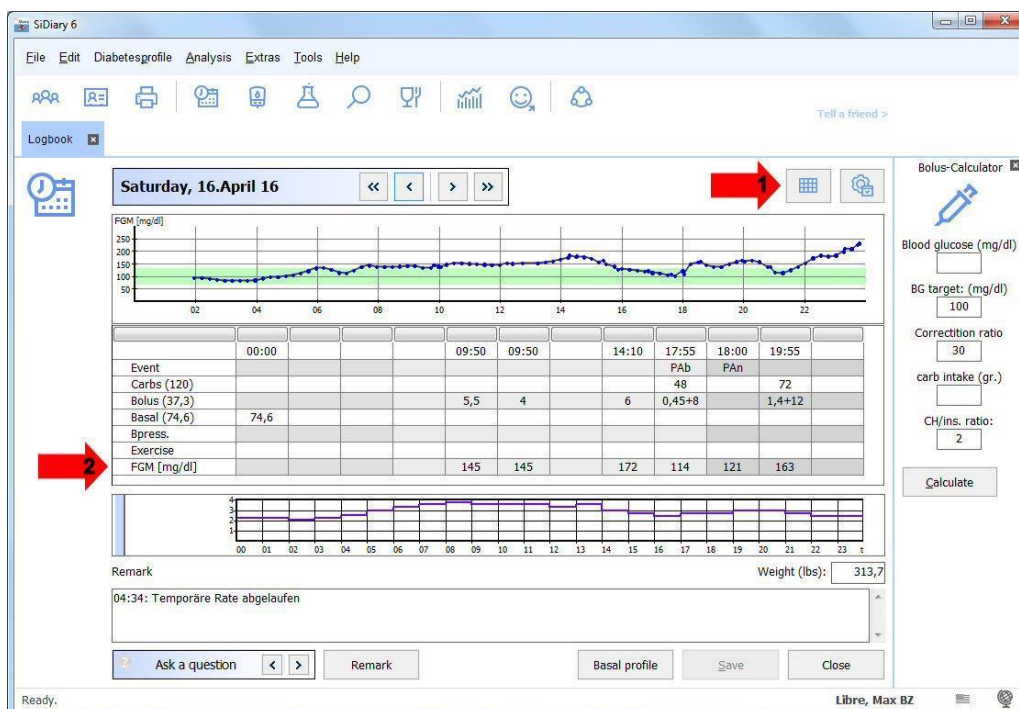
In this view, you can see at a glance when something has changed the glucose values during the day. Later these changes can be edited as post explanations.

If you move the mouse over a data point in the curve, you can directly see more information as a tool tip: the exact time, the exact value and the data source for this point (how this value got into the logbook).

In addition, another row appears in the graph view (see arrow 2). This line can't be changed; it shows for each column an entry with CGMS value at the measured time (the Freestyle Libre values are named 'FGM'). That means whenever you enter something in the logbook, you can find the appropriate CGMS value from that time there. It also works with entries that you have made in one of our Apps or for values that you added later.

CGMS-AddIn

Of course, you can continue to use our CGMS AddIn. Glucose values from CGM systems are not really blood glucose values, because they're not measured in the blood but in the interstitial fluid. Therefore, SiDiary imports these values not as BG (**blood** glucose), but as the data type (which roughly means "Category") CGMS.

CGMS values can't be displayed in the table view of the detail logbook, because there are too many values for each day. The table can display a maximum of 99 columns. If more columns are available for one day, the logbook can be presented as a data list only.

But you can hide data types in SiDiary in the logbook view. The records are still in the program (and may be displayed in the statistics as a line chart), but they no longer appear in the detailed logbook, so this way the day can also be displayed as a table (without the CGMS entries).

Our CGMS AddIn can extract individual values from the data type CGMS and then add them to the logbook as a blood glucose value.

You can activate this AddIn in the program menu by selecting "Extras →AddIns" and then start it in the program menu "Edit →CGMS"
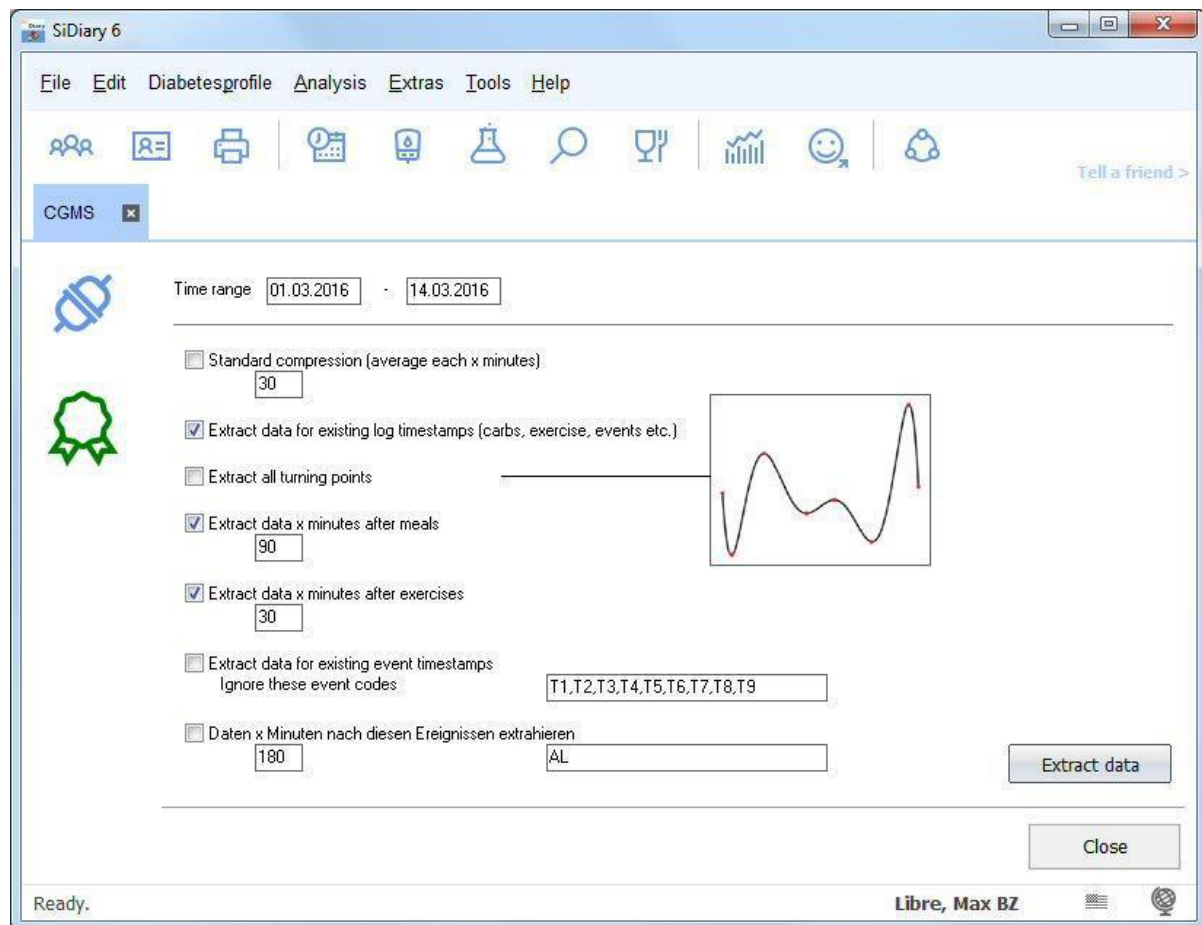
Above you can specify the period from which data is going to be extracted. Below the time range you have the option to set conditions, which data should be extracted and then added to the logbook as a blood glucose value.

Here should apply: "less is more". If you add too many values, the logbook view will get confusing. It remains clearest, if you add only the values that would be measured with a conventional blood glucose meter, if you have enough test strips.

With the setting shown in this screenshot, values will be added with entries such as meal with carbohydrates, sports entries, events like 'FBG' (fasting blood glucose in the morning after waking up), 'Car' (blood sugar before driving a car) or 'Bed' (blood sugar at bedtime).

'Car' and 'Bed' are currently not available in the list, but you can add your own events to the list in SiDiary.

Furthermore, a value is added as a BG 90 minutes after an entry for carbs (=post prandial BG) and 30 minutes after a sports entry.

That should be enough data already, because of the exact course of the glucose values you have the line graph in the statistic (which you can print there as a direct print or save it as a PDF file)

Very important: The here discussed values are *added*, that means before extracting values, all these entries that specify the conditions like carbs, sports entries and events must already exist in the logbook! They can be added, for example, with our apps for smartphones and tablets, which you can always carry with you. If you enter there your values for carbs, sports and events, then sync your app with SiDiary Online AND then synchronize also the PC version, you will have these entries available in the PC version too and nothing stands in the way of a successful adding of BG values.
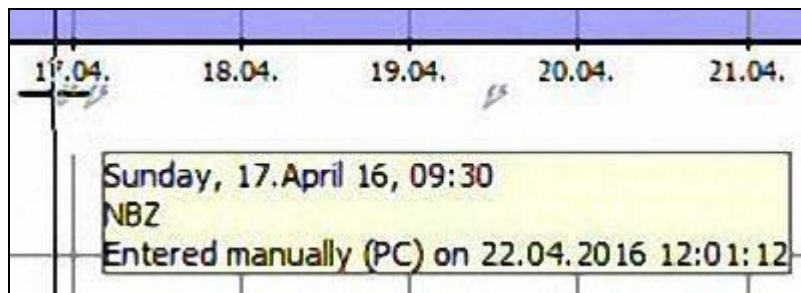
Statistic

While you see in the detailed logbook the CGMS/FGM data curve for the current day, you can display a curve over a longer period with the statistic in the graph type 'line graph'. Simply select *data types* as your *data source* and then add CGMS with the button with the three points (see picture)
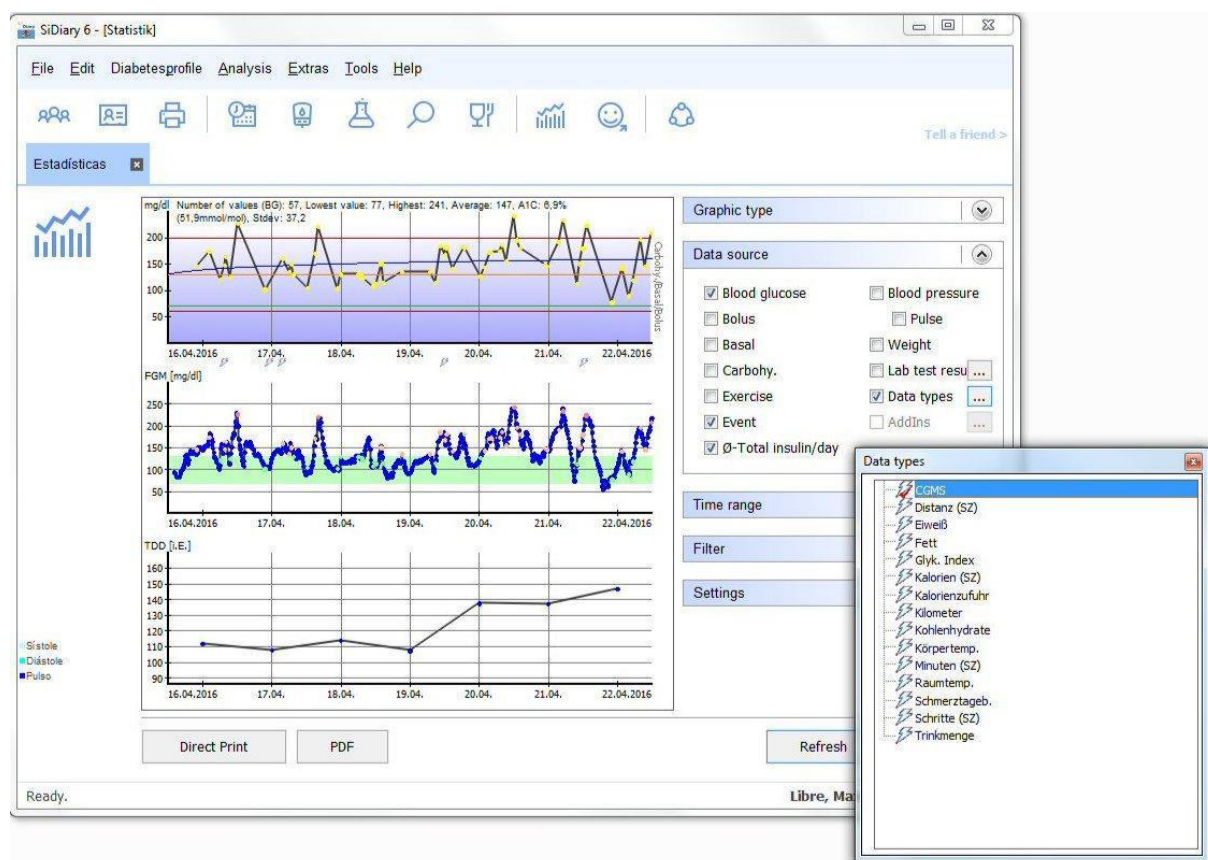
In the picture you see another new feature in SiDiary 6.1: you can use the events and "TDD", the Total-Daily-Dose (= total dose per day) of insulin as data source.

The total dose of insulin per day – basal and bolus insulin - (in this case the lowest of the three curves) is shown as a line graph and shows over a prolonged period e.g. a possible development of resistance with a steady increase.

Events appear under the BG curve as a flash symbol. If you move the mouse cursor over it, you can see the underlying entry as a tooltip incl. its data source, so you can see how this entry got into the logbook.

SiDiary provides also the graphics type 'Glucose Profile' in the statistics section, which shows the median of the glucose values as well as the standard deviation.
With this new option it is not only possible to see the magnitude of the glucose values over the time of the day, but also how strong these values are waving or how stable the glucose development is.
You can see it in the statistic selection of the PC version, if you select the entry 'Glucose Profile' as graphic type.
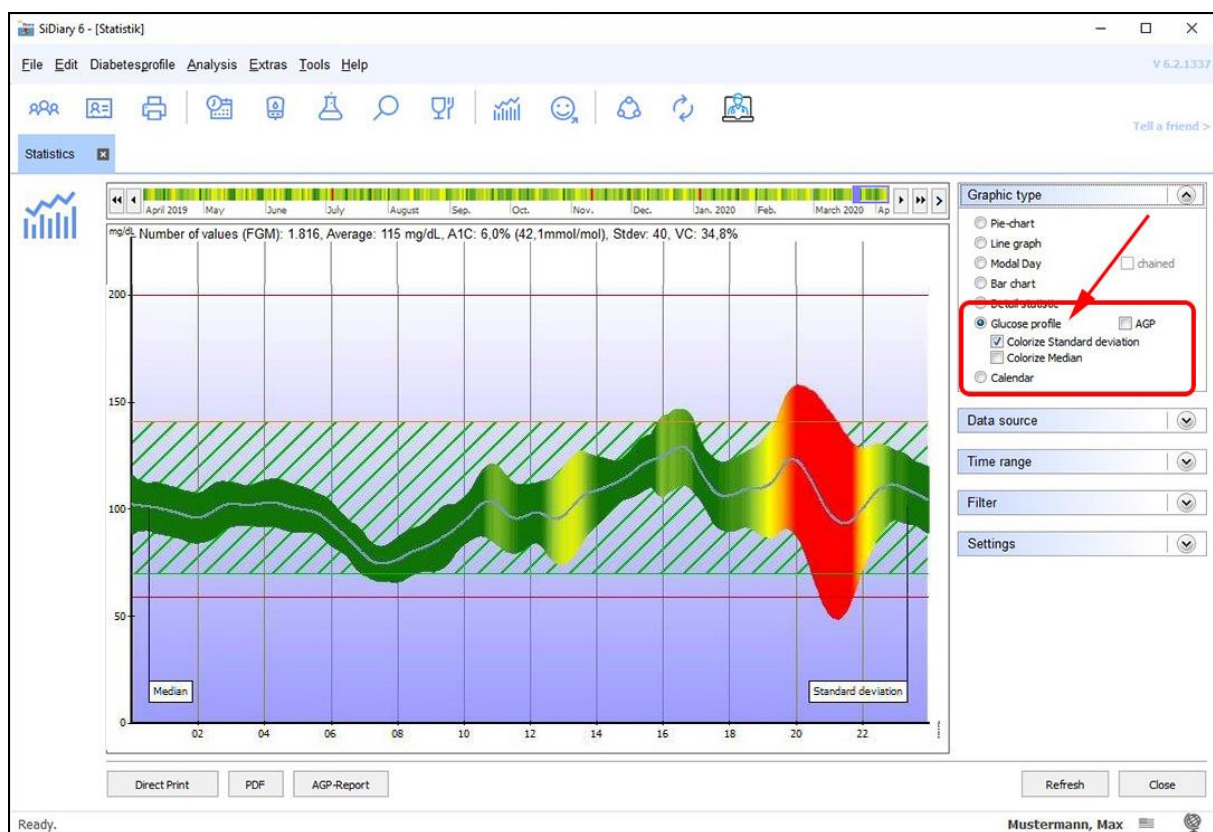
In the example shown here, the standard deviation is additionally colored, so that you can see at the very first glance: the greener, the more stable the glucose development is during this period while a deep red indicates that at this time of day (in the example here between 7 and 11 p.m.) the greatest variance occurs.

To calculate this graph all blood glucose and CGMS data of the selected time period is projected into a 24-hour graph. To see changes and improvements of your glucose profile, you might select one week as an example and then see how the median and standard deviation develop by shifting the time period by using the arrow buttons.

Alternatively, instead of the simple glucose profile (see above), you can also display the conventional AGP graph, with the median, interquartile range (IQR) and interdecile range (IDR). All you have to do is tick the "AGP" checkbox in the graphic type selection.
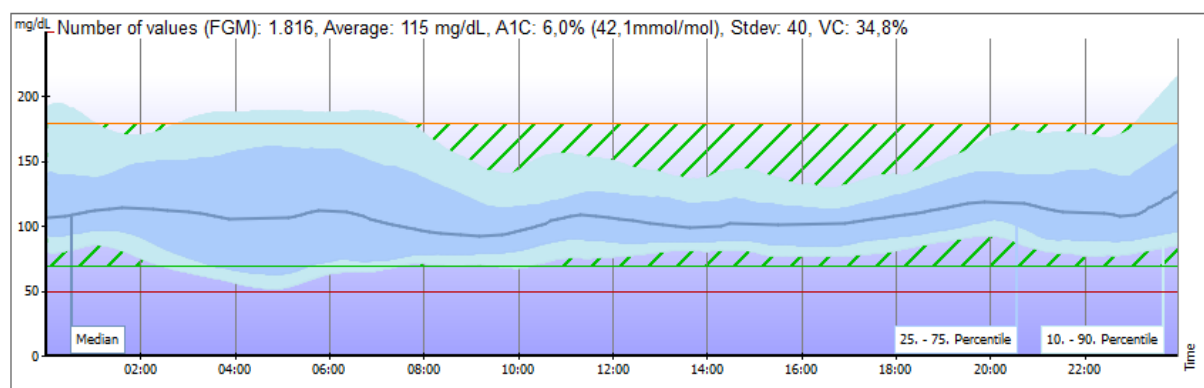
In the status line above the graphic, you then see evaluations that refer to the CGMS data: Number of measurements, mean value, calculated A1c, standard deviation (Stdev) and coefficient of variation (VC). Stdev and VC then report a value that says something about the stability of the glucose level, i.e. how stable or unstable these values were. For VC, a value below 36% is recommended.
You can see in the graph that an interdecile range from the 10th to the 90th percentile is set there. By right-clicking on the graph, you can also change this to the 5th to 95th percentile (according to AGP 4.0).

More or less, these two clouds around the median line indicate the range of fluctuation of the values. The (dark blue) IQR tells about the insulin dose in general, whereas the (light blue) IDR describes the "tricks of the trade" in a more general way: injection-eating distance, carbohydrate estimation, alcohol, exercise and the daily routine in general are factors that influence this range. You can find more details on the Internet if you search for "Evaluating an Ambulatory Glucose Profile".

In version 6.2 we added further data sources to the graphic type "glucose profile", which can be displayed together with the glucose profile. These are:
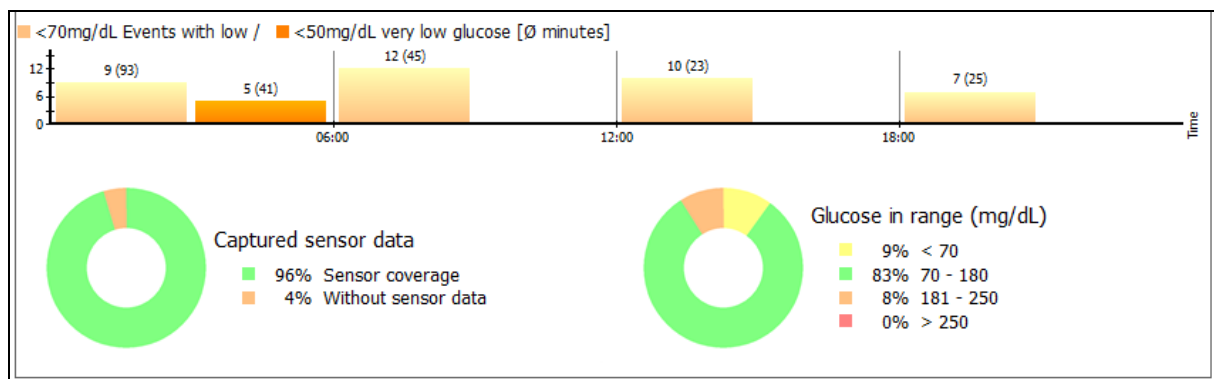
Carbohydrates, Bolus and Exercises (together in one chart)
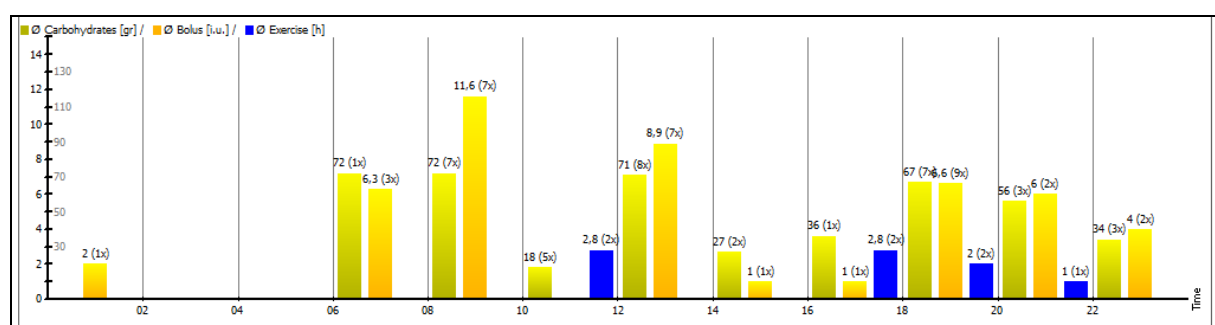
Basal
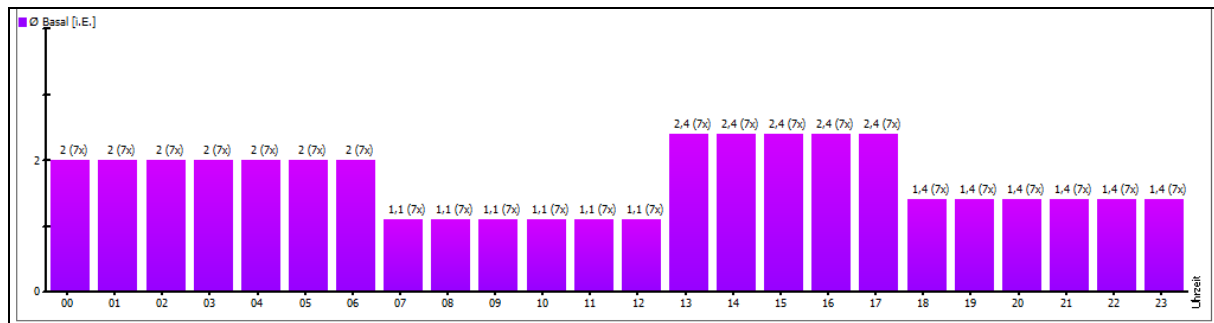
CGMS/FGM

With the data source CGMS/FGM you can get a quick overview of the days with your sensor:

- At which times of the day and how often low measured values occurred
  (You can define which limit value for low/very low is to be used as the basis in your profile.
  Simply open it with the F3 key on your keyboard and change the values for the lower limit of
  the blood glucose target range ("low glucose events") or the lower blood glucose limit ("very
  low glucose events") as required.)

- How long you had the sensor activated.
- The apportionment of the measured values in the different glucose ranges.

That's how the overall view looks – in which you can also print out directly with the button below or
save as a PDF file:
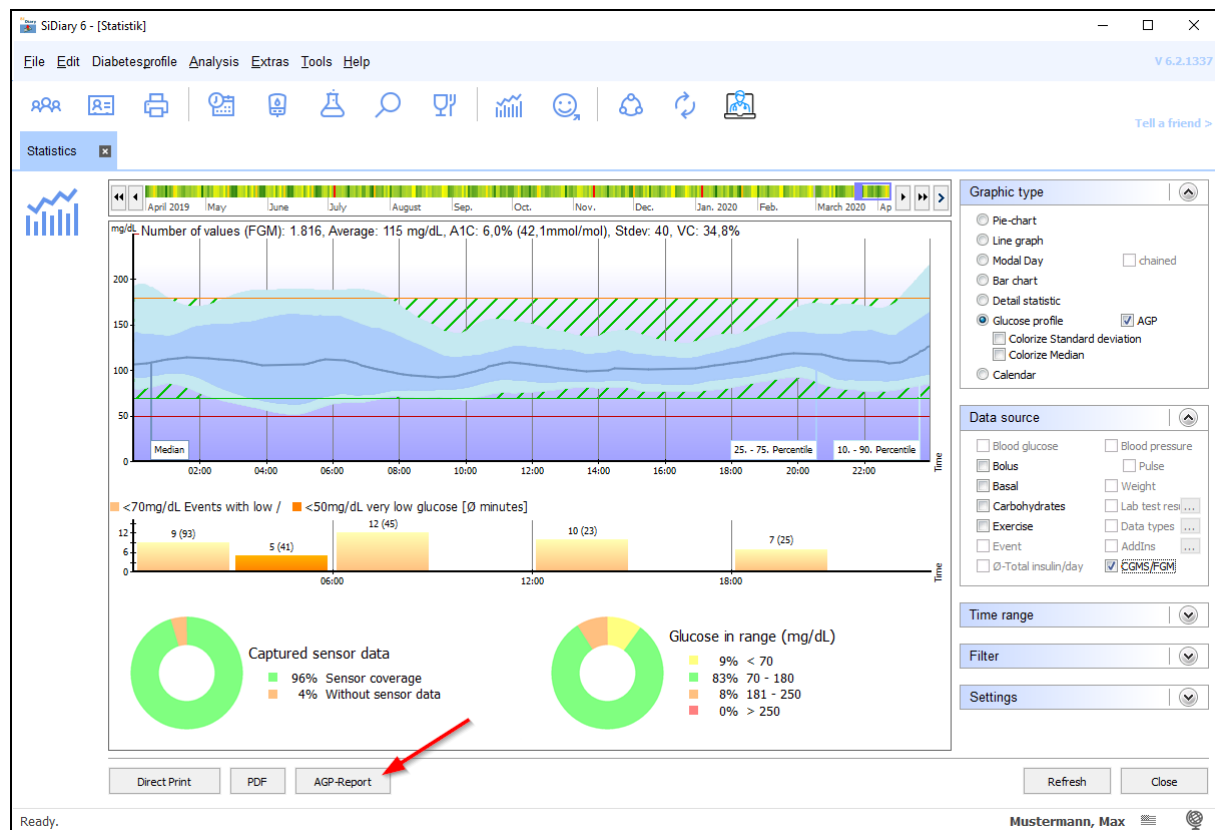
With the button "AGP report" you can then generate a two-page report as a PDF file containing the most important data about your therapy. Of course, including the AGP graph, the graphs for your low/very low values, sensor usage and your time in the target range.

In addition, this report also contains a complete overview as a monthly calendar. You can also select this graph in the "Graph Type" box.
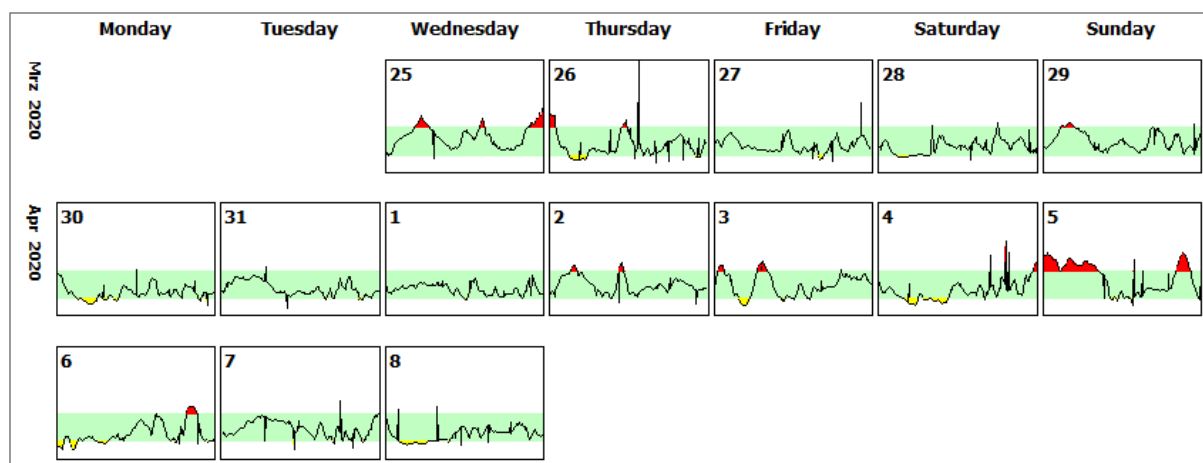

Here you can see at a glance on which days your glucose values were above or below the target range, which is shown there as a green band. To have a closer look at it in the Detail Logbook, click on a such a day in SiDiary. The days of the week are always below each other so you can see if there are certain patterns, e.g. on weekends.
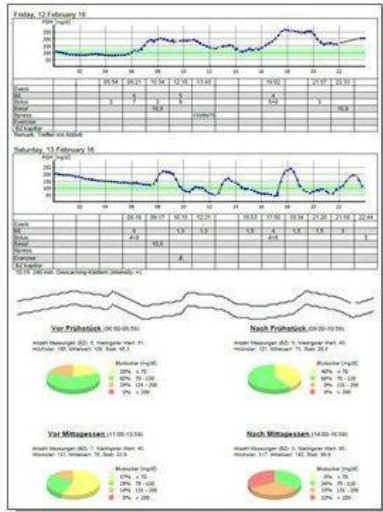
Print

Of course, you want to print your logbook, if necessary. Therefore, we have created a new template for the version 6.1. It can be found in the Print dialog under the name "SiDiary-CGMS".

This template can print the SiDiary data in the way it can be seen in the detail logbook view. Should it contain events as abbreviations (such as FBG for "fasting blood glucose"), then the explanations of the used abbreviations will also be displayed in this print:
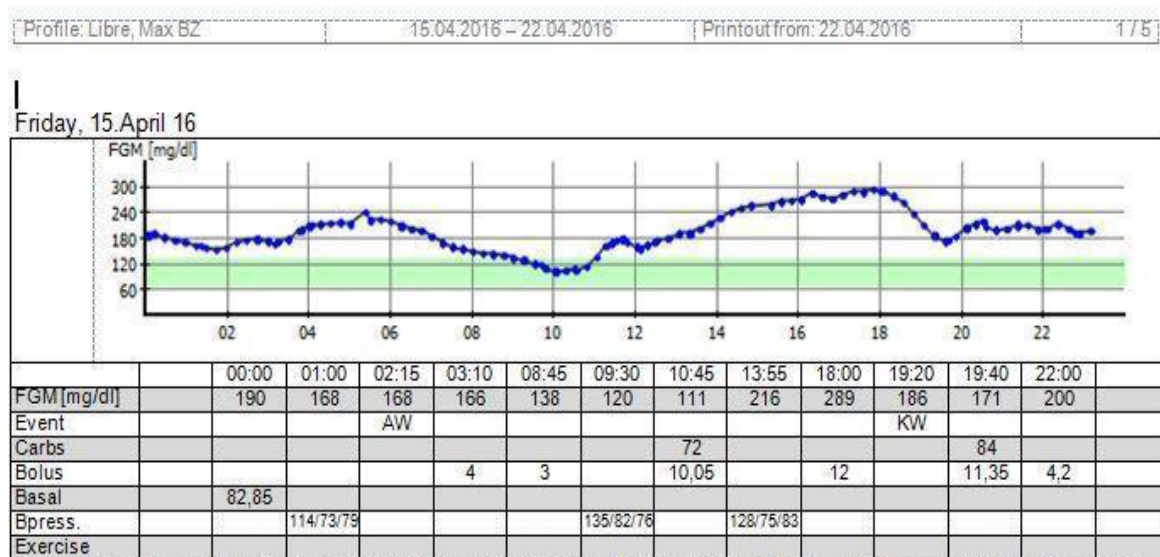
In the templates, you will also find the aforementioned APG report under the name "AGP Report CGMS". You can print it out or simply preview it.