

Case Study 6.2: Biking day with high carb lunch

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I set for most of the day a **70% profile**, and had only a minimal breakfast in order to keep iob low when starting to bike.

Additionally I activated the exercise mode, using a **TT=125 mg/dl** which I kept running over lunch time, but for a shorter period than the 70% profile.

In just seconds I was able to „frame“ the upcoming exceptional situation for my loop, to manage me fully automatically through the day!

Of course, in my initial set-up and tuning, I had to first „learn“ from my looping data, where about %profile and set TT should lie for the kind of exercise that I was up to. But, no need to make a science out of it. Unless you are competing in professional sports, it should be good enough to go by gut feeling, and by experience („what setting should I slightly alter the next time?“).

Using the top button row on the AAPS main screen, I just input the 70% and 125, which goes super fast and easy. It will immediately turn

- from all three fields grey,
- to „70%..“ on the profile field-turned-yellow, „125 .. „ in the TT field-turned-yellow, and also the exercise field lit yellow in the middle.

So, very easy to see on one glance, I am in the exercise mode, and which are the key settings (see picture with „95“ glucose below).

And in case I want to prematurely exit, or adjust a parameter, same easy procedure, just within 1-2 seconds, right from my AAPS home screen.

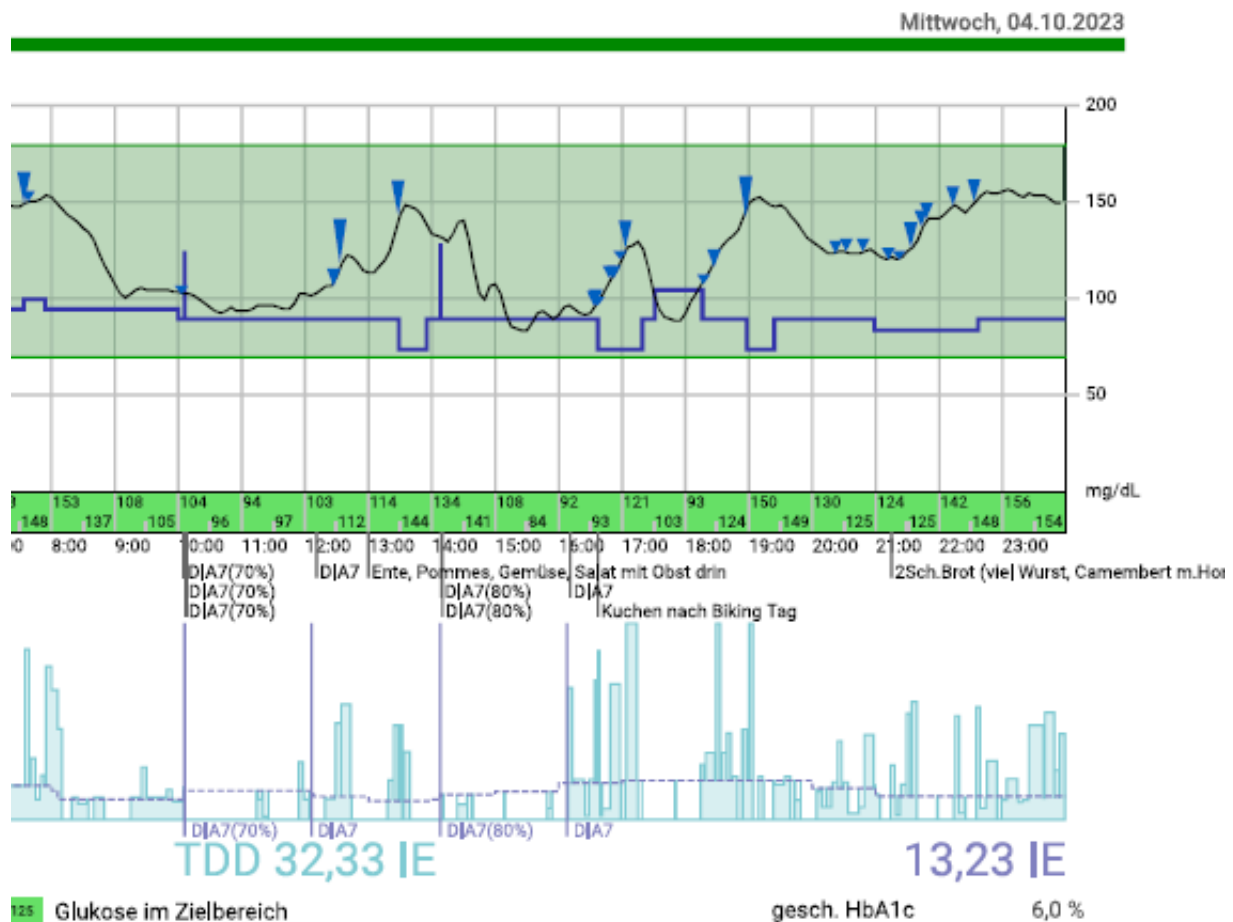
A **70% profile** was set for the entire day until dinner (AAPS screenshot) This modulates my 0.55 U profile basal to $0.7 * 0.55 = 0.39$ U (see [p.6, emulator line 20](#))

Exercise mode with a **125 mg/dl TT** was set in meant another basal reduction of 33%%, to 67% of $0.39U = 0.26$ U ([p.6, emulator line 19](#)).

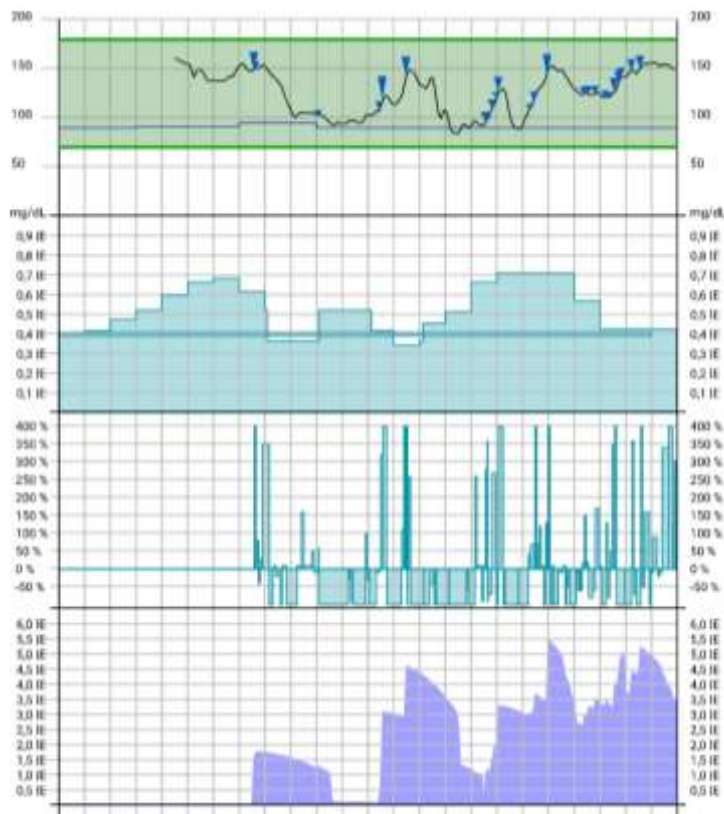
The exercise mode also results in a **dynamic_iobTH** which goes, like basal, also 33% lower:

- from my default settings in /Preferences = $60\% * 11$ (maxIOB) = 6.6 U iobTH w/o exercise...
- ...to $0.67 * 6.6 = 4.4$ U iobTH* on exercise day.

32 These measures lead to a pretty overall glucose curve for this biking day, which included a
 33 fairly substantial lunch (duck, french fries, a fancy salad with fruit in it), as well a piece of
 34 cake at the end of the tour:



35 (No carbs entered, no bolus given). The lunch iob hump in middle of the bottom graph of the
 36 chart below shows that the 4.4 U iobTH was preventing higher iob as would be normal for a
 37 big lunch.
 38



Conclusions from this example:

The example demonstrated that using the **exercise mode with a selected sports TT** will soften the loop response.

Background, how sensitivity ratio is automatically reduced (-> lower basal, higher ISF), and how dynamic_iobTH works in the exercise mode (-> lower iobTH, to reduce iob for meals on exercise days) see [sections 3.3 and 6.4](#). The delta (how much higher the set exercise target is above profile target), and the half-basal-exercise target set in AAPS/preferences during your initial set-up define the sensitivity ratio the loop uses.

profile Target	100	100	100
halfBasalTarget	180	150	120
delta "c"	80	50	20
TempTarget	Sens. Ratio for HBT 180	Sens. Ratio for HBT 150	Sens. Ratio for HBT 120
72	1,54	2,27	n.a.
76	1,43	1,92	n.a.
80	1,33	1,67	n.a.
85	1,23	1,43	4,00
90	1,14	1,25	2,00
95	1,07	1,11	1,33
100	1,00	1,00	1,00
110	0,89	0,83	0,67
120	0,80	0,71	0,50
130	0,73	0,63	0,40
140	0,67	0,56	0,33
150	0,62	0,50	0,29
160	0,57	0,45	0,25
170	0,53	0,42	0,22
180	0,50	0,38	0,20

Table: Your general set half-basal exercise target set in Preferences (its distance to the valid profile target), and what TT you set in your exercise mode, lets you differentiate the desired loop aggressiveness.

Note that the **reduced temp.% profile** (on top of using the exercise mode with an elevated TT) multiplies with the results in above table, and further reduces basal *but not* iobTH. Dynamic_iobTH is strictly tied to the exercise mode and TT set.

If the suggested „cockpit“ user interface would already be in place, I could have gone through the day with just one time un-critical step (as discussed in [section 6.5.2](#)). Should during my exercise arise a need to stop a selected mode, or to change a setting, I could do this within 1-2 seconds also right from the AAPS home screen („FCL cockpit“).

For their kinds of favourite exercise, users must, over time, learn what combination of settings (half-basal_exercise_target,TT, %profile) leads to good-enough results.

As the loop re-calculates every 5 minutes, it is *not* important to get things *exactly* right. Adjustments (every 5 minutes) allow the loop to still keep things under good-enough control.

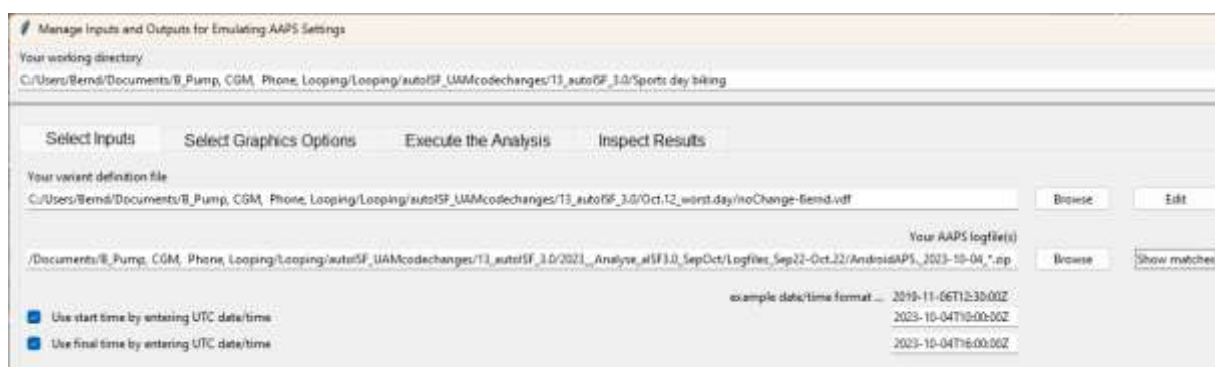
The time windows for doing the profile switch, and for setting a suitable TT can differ (and they can also be automated, so not to require multiple inputs over the course of your exercise day). Using all available tools allows a nearly surgical approach to what you want to achieve for your favourite type(s) of exercise.

Logfile analysis with the emulator

Skip this last section, unless you like to learn more about using the emulator.

Analysis of my biking day with the emulator required to load the logfiles from my phone into the PC, and to have the files for the emulator downloaded from Github.

- 1) Load an empty vdf file, and access to logfiles (erasing the end with UTZ time, and putting an asterics after date_ => all of that date get loaded into the mask
- 2) Define the time window of interest, using UTZ (= MEZ summertime minus 2) in the last two lines (right hand side input fields) of the form:



Manage Inputs and Outputs for Emulating AAPS Settings

Your working directory
C:/Users/Berni/Documents/B_Pump, CGM, Phone, Looping/Looping/autosf_UAMcodechanges/T3_autosf_3.0/Sports day biking

Select Inputs Select Graphics Options Execute the Analysis Inspect Results

Your variant definition file
C:/Users/Berni/Documents/B_Pump, CGM, Phone, Looping/Looping/autosf_UAMcodechanges/T3_autosf_3.0/Oct12_worst.day/noChange-Berni.vdf Browse Edit

Your AAPS logfile(s)
/Documents/B_Pump, CGM, Phone, Looping/Looping/autosf_UAMcodechanges/T3_autosf_3.0/2021_Analyse_ofSF3.0_SepOct/Logfiles_Sep22-Oct22/AndroidAPS_2023-10-04_*.zip Browse Show matches

example date/time format ...
2019-11-06T12:30:00Z
2023-10-04T10:00:00Z
2023-10-04T16:00:00Z

☒ Use start time by entering UTC date/time
☒ Use final time by entering UTC date/time

- 3) Execute Analysis / Run Emulation yields results as table:

81

82

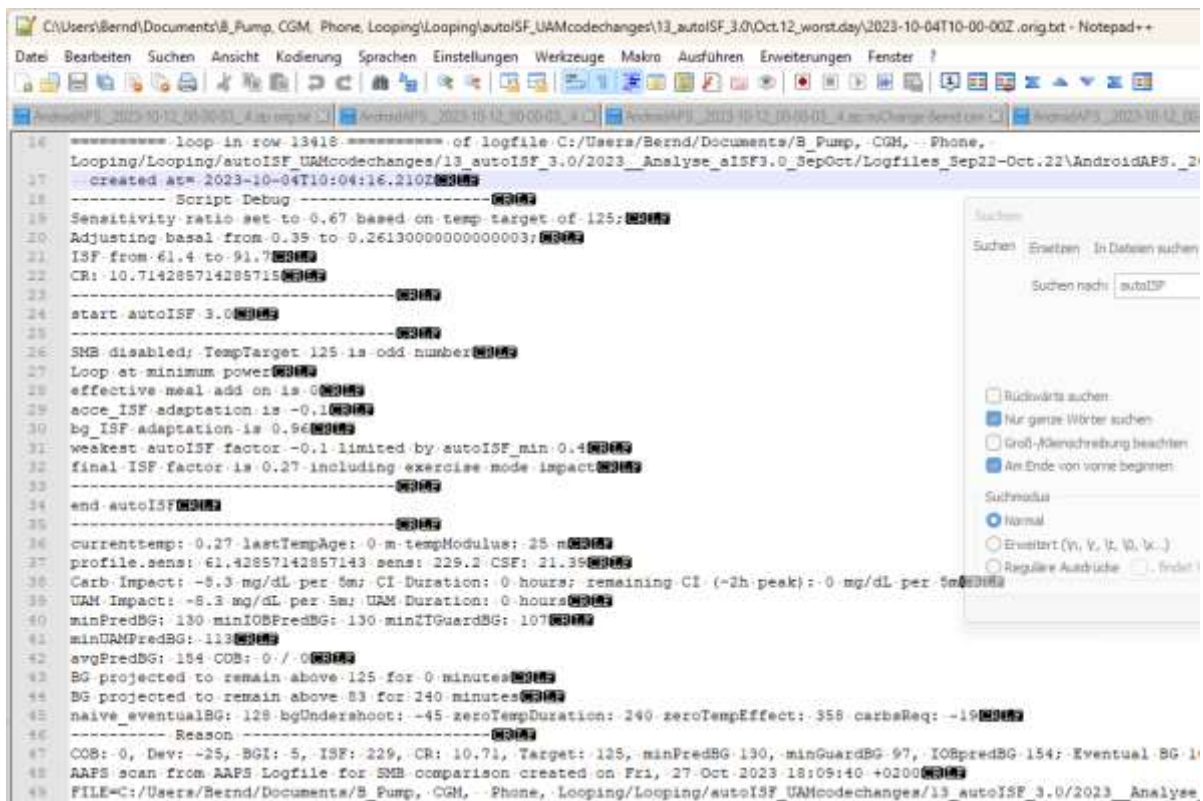
83

85

88

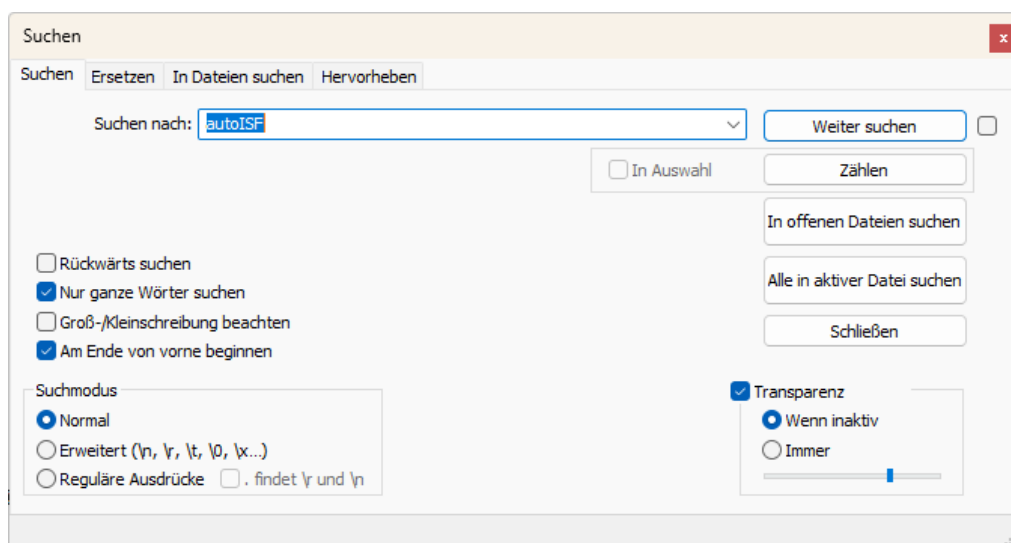
8990

91 If you press the 4th option you get the logs which include basically all SMB tab info in an
92 exhaustively long list.



93
94 The blue highlighted line shows we are at 10:04 UTZ (12:04 CET) . We can see how sensitivity
95 ratio and also basal were lowered due to sports setting with a 125 mg/dl TT, or 129 used a
96 bit later, which also disabled SMBs.

97 By using the search function you can jump, in that long list, to all places that e.g. have
98 „autoISF“ in it, or „script debug“, or „SMB disabled“ (if you want to analyze when that
99 happened...)



100

101 5) Now lets look at 11:29 UTZ (13:29 CET) which was when the first relevant size SMB
102 was issued:

103

104 In the following, I copy and shorten texts from the log table as above, for some time points
105 of high interest:

106 11:29 UTZ (13:29 CET), when SMB was delivered:

107 loop in row 14007created at= 2023-10-04T11:29:11.005Z

108 ----- Script Debug -----

109 Sensitivity ratio set to 1.1 based on temp target of 74;

110 Adjusting basal from 0.55 to 0.6050000000000001;

111 ISF from 41 to 37.3

112 CR: 7.5

113 So, we see the meal TT of 74 (set by one of my Automations for cases in which I did not
114 bother to set an EatingSoonTT) temp. overrides the exercise target and sharpens the
115 applicable ISF: ((It also elevates basal ; note that TBRs can run several 100% of basal))

116 -----

117 start autoISF 3.0

118 -----

119 SMB enabled; TempTarget 74 is even number

120 Loop at full power

121 effective meal add on is 0.04

122 acce_ISF adaptation is 1.81

123 bg_ISF adaptation is 1.05

124 pp_ISF adaptation is 1.22

125 dura_ISF by-passed; bg is only 0m at level 141

126 final ISF factor is 1.81

127 -----

128 end autoISF

129 -----

130 profile.sens: 41 sens: 22.6 CSF: 3.01

131 minPredBG: 220 minIOBPredBG: 135 minZTGuardBG: 94 minUAMPredBG: 231

132 avgPredBG: 220 COB: 0 / 0

133 BG projected to remain above 74 for 240 minutes

134 IOB 2.033

135 Full loop capped SMB at 1.87 to not exceed 130 % of effective iobTH 30%

136 ... maxBolus: 3.2

137 ----- Reason -----

138 Eventual BG 304 >= 74, insulinReq 6.46. Microbolusing 1.8U. adj. req. rate: 13.53 to

139 maxSafeBasal: 5.5, temp 2.75 < 5.5U/hr.

140

141

142 6) A look at the cake after 14:20 (16:20 CET):™

143

144 From 14:09 UTZ (16:09 CET) on, I discontinued the 129 sports TT and the loop reverted to 90

145 mg/dl profile target.

146 This made SMBs possible after starting to eat cake (then).

147 However, 14:14 - .19 - .24 and :29 there was no insulinRequired yet (while ISF factor

148 gradually ramped up from 0.52 to 1,09 (line 1735, 1772, 1807) .

149 At 14:34 UTZ (16:34 CET) a first cake related SMB of 0.5 U was issued based on 0,66 U

150 ins.Requ (line 1897), and based on a bgAccel_ISF factor of 1,54 (and final ISF factor of 1,52).

151

152 As there is a >10 mg/d delta (glucose rise), my Automation kicks in and sets for the next

153 loop decisions (for 26 minutes is as my Automation defines it) a TT=74 mg/dl which makes

154 the loop more aggressive from 14:37 on:

155 created at= 2023-10-04T14:37:15.371Z

156 ----- Script Debug -----

157 Sensitivity ratio set to 1.1 based on temp target of 74;

158 Adjusting basal from 0.48 to 0.528;

159 ISF from 39 to 35.5

160 CR: 6.6

161 -----

162 start autoISF 3.0

163 -----

164 SMB enabled; TempTarget 74 is even number

165 Loop at full power

166 acce_ISF adaptation is 1.64
167 bg_ISF adaptation is 1
168 pp_ISF adaptation is 1.08
169 dura_ISF adaptation is 1.11 because ISF 35.5 did not do it for 30 m
170 final ISF factor is 1.64
171 -----
172 end autoISF
173 -----
174 profile.sens: 39 sens: 23.8
175 avgPredBG: 94 , BG projected to remain above 74 for 240 minutes
176 IOB 0.438 Eventual BG 100 >= 74, insulinReq 0.84. Microbolusing 0.6U.
177
178 created at= 2023-10-04T14:39:16.537Z
179 ----- Script Debug -----
180 Sensitivity ratio set to 1.1 based on temp target of 74;
181 Adjusting basal from 0.48 to 0.528;
182 ISF from 39 to 35.5
183 CR: 6.6
184 -----
185 start autoISF 3.0
186 -----
187 SMB enabled; TempTarget 74 is even number
188 Loop at full power
189 effective meal add on is 0.04
190 acce_ISF adaptation is 1.25
191 bg_ISF adaptation is 1
192 pp_ISF adaptation is 1.06
193 dura_ISF by-passed; bg is only 5m at level 97.5
194 final ISF factor is 1.25
195 -----

```
196     end autoISF
197     -----
198     profile.sens: 39 sens: 31.2
199     avgPredBG: 78    BG projected to remain above 74 for 240 minutes
200     IOB 1.114
201     Eventual BG 84 >= 74, insulinReq 0.13; setting 30m low temp of 0.04U/h.
202     Microbolusing 0.1U.
203
```