4. Meals: Setting ISF_weights in /Preferences

v.2.61

Please note that with autoISF 3.0 you are in an early-dev. environment, where the user interface is **not optimized for safety** of users who stray away from intended ways to use. Good safety features exist, but these are only as good as the development-oriented user understands and implements them. This is not a medical product, refer to disclaimer in section 0

Available related case studies:

Case study 4.1: Pizza
Case study 4.3: Hands-off FCL on Xmas

Warning regarding importance of proper profile ISFs.

Starters on autoISF FCL who are coming from using HCL with **dynamic**ISF must be aware of the following: It is absolutely essential to build your FCL on properly set **profile** ISFs (likely a circadian pattern over 24 hrs). It may not apply to you, but many dynamicISF users did never bother to determine their ISFs that would maximize their HCL performance, but employ dynamicISF so to speak for going „dynamically" through a wide range of possible ISFs, until eventually hitting a sweet spot, and the whole thing works better than before with their profile ISF (often only one, e.g. coming from Autotune).

The following is important to understand, as it also leads straight into the core idea behind FCL with autoISF, too: It is a good idea to establish a well-running hybrid closed loop with set (non-dynamic) **ISF (as in profile each hour of the day).** That ISF must be **aggressive enough** that it gets you down from a high around 200 mg/dl to target. That is roughly also the way you experimentally determined it (I hope).

Using that value also at lower bg, on the way up (after meal start), is very positive, as it is probably **stronger** than you would use, if you had just that (lower) bg to correct. autoISF will also do just that, but in a much more pronounced and elegant way.

On the way down from peak to glucose target, a somewhat too strong ISF will not hurt because much of the time your loop (well supplied with insulin before, „on the way up") is zero temping or at least has only a small gap to correct from predicted bg to target bg.

You have no business to be much above 200 mg/dl where an even stronger ISF may or may not help. It sure does not help at an occlusion which is about the only reason to see super high values as an experienced looper.
Pegging ISF strength to bg level therefore does not make much sense for us. You will use the autoISF toolbox to get strongest ISF **at low** but beginning-to-rise bg,

> Disclaimer: There are very much refined versions of dynamicISF that can have beneficial applications. But going to autoISF FCL, you absolutely must anchor on the proper profile_ISF (which in times of illness etc. you can temp. change via profile switch, also when using autoISF in FCL).

Warning not to simply copy settings from others

When setting **your** parameters, **don't use any given numerical example**, but data from **your** *successful* Hybrid Closed Loop!

> Most *examples given in this paper* are from an adult diabetic (Lyumjev, G6) whose insulin sensitivity can be characterized as follows: approximately 37 U TDD, thereof 13 U profile basal, at about 200g daily carbs from mainly lunch and dinner; no couch snacks or sweet drinks. The user also participates in multiple instances of daily moderate activity such as dog walking, biking and gardening. In Hybrid Closed Loop, a typical meal bolus was 8 U that was sometimes reduced such as when activity followed the meal.

> After seeing some more inputs from a variety of users we might put together a profile helper for some rough orientation and plausibility cross-checking in section 4.7

Warning. Importance of starting from a well-performing Hybrid Closed Loop

A **satisfying performance in Hybrid Closed Loop** mode is a pre-requisite. Expect to reproduce about the same %TIR also in your FCL, but with less daily interaction, once established.
Note that this refers to prior use of „vanilla“ software, without fancy „dynamic add-ons“ (such as: Autotune determined factors, dynamicISF etc). that probably will not be compatible with autoISF use, and may have introduced bias into the profile settings you bring with you into FCL now.

To reach a satisfying performance you must start from a hybrid closed loop in which you did **master your meal management well** using the oref(1) algo SMB+UAM**.**
This is a pre-requisite **to be able to forget it** … - because the initial tuning we now turn to demands that you analyze your prior best practice, in an attempt to find appropriate settings and „teach“ your FCL to come up with the necessary iob.

This is the main subject of this section 4 (finding settings for automatic meal management) and sections 5 and 6 (finding settings for highly automatic management also of other potential disturbances).

4.1 Getting started

Make sure you have studied the preceding sections 1-3 on the general pre-requisites for FCL and on the workings of autoISF. Notably make sure you have set your default iobTH (refer to section 2.4 and if available 4.7)

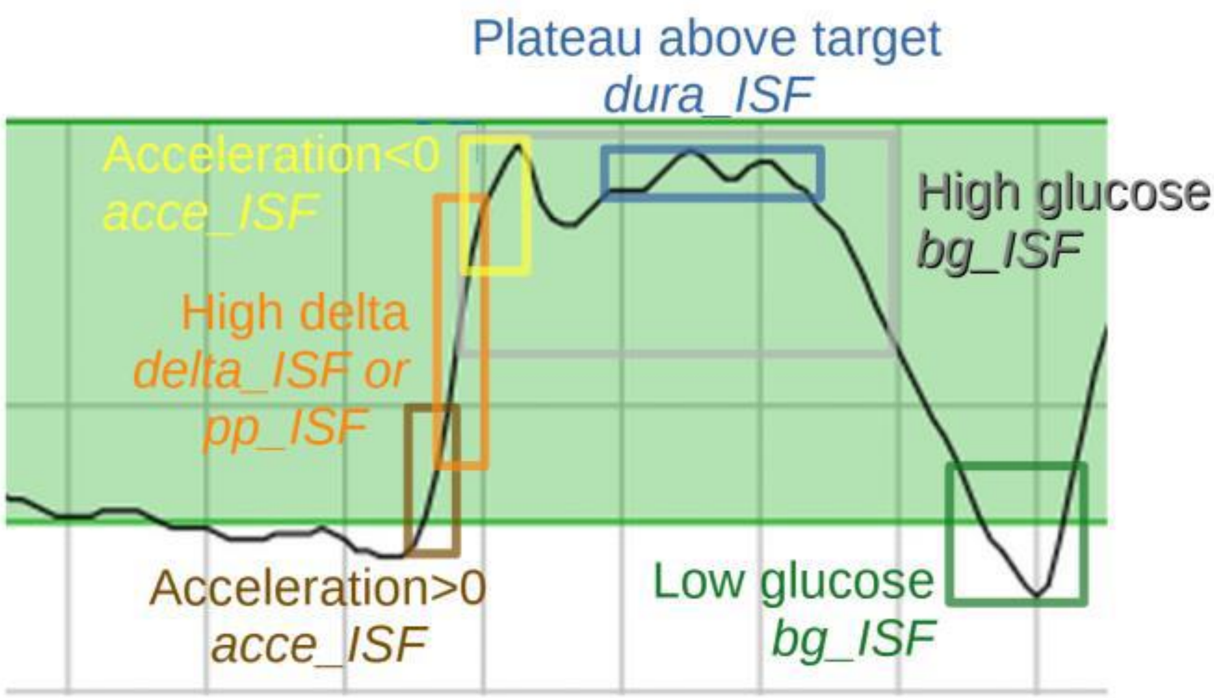
In the early test phase, it is recommended to:

- run the system as dummy, not connected to your body (or, on own risk, connect only as long as you watch closely)
- in AAPS preferences, switch your autoISF FCL (= **autoISF/"Enable adaptation of ISF to glucose behaviour"**) ON only during daytime hours of a meal, *e.g. 11-18h*, for fully automatic "full closed loop" management *of lunches*.

  You can do this switching manually *at 11 h and 18 h every day*, *or* set up an Automation that does that (see section 3.4).
- take typical but not extreme *lunches*. Omit sweet drinks, or drink only slowly
- do not use the Activity monitor (see section 6.6), unless it is already well calibrated. In case you use an EatingSoonTT at meal start: Any active TT shuts activity monitor automatically off.

It is then essentially a matter of your UAM Full Closed Loop recognizing a meal start from the glucose trend, and ramping up iob.

When setting up your autoISF Full Closed Loop, you must set several ISF_weight parameters in AAPS Preferences/OpenAPS SMB/autoISF settings. They relate to different stages of the typical glucose curve after starting a meal:



The core advantage of using autoISF with oref(1) SMB+UAM (in FCL as well as in hybrid closed loop) is that it manages the glucose curve it sees developing, no matter what the underlying reason is. 42 potential factors were identified (see: https://github.com/bernie4375/HCL-Meal-Mgt.-ISF-and-IC-settings/blob/FCL-w/autoISF/42%20factors%20influence%20bg.pdf), so, no wonder, that loopers who meticulously input their carbs will often not see the expected result.

Reminder: autoISF has that advantage only if the pre-requisites (section 1) are given, notably a very fast insulin.

Before you process, make sure you studied the flowcharts in section 3 that describe how autoISF calculates the effective(ly used) ISF.

Warning: **Any bolus you „sneak in“ will severely distort the glucose curve. That can render your tuning of weights** (see below) **useless, and could make your loop act in unpredictable** and potentially (see last bullet point below) dangerous **ways:**

- Your FCL ideally runs without an insulin button at the bottom of the AAPS home screen.
- Issuing a bolus should kick you out of the FCL mode, back into Hybrid Closed Loop. We are working on improving the User Interface (see e.g. section 5.3.1) that would facilitate and secure the bi-directional transitions.
- How proper autoISF settings would differ for your meal management, depending on no-bolus, bolus like in HCL, or very small pre-bolus (Meal Announcement), is not well investigated at this point.

Therefore it is best to remain consistent = use autoISF strictly for no-bolus FCL, and if you want to bolus for a meal, switch ISF adaptation to glucose behavior (autoISF) temporarily OFF.

- Maybe we are too cautious here, and in fact the autoISF adaptation to glucose behavior is tolerant enough of disturbances by **user boli**. Please report your findings in case you collect data of "mixed use" (FCL / Meal Announcement / HCL use with meal bolus). (A n=1 finding, and guide how to evaluate, is reported here: https://github.com/ga-zelle/autoISF/blob/A3.2.0.2_ai3.0/To%20prebolus%20or%20not%20to%20prebolus.pdf).

  Once we have a body of data, including from those who moved from *HCL with autoISF* to FCL, we may need to re-define what the bi-directional transitions FCL < - > HCL in detail shall mean, and whether or not this has implications for needing different autoISF settings in /preferences for FCL and for HCL. .

After doing the prep work as outlined in section 2 you now get to calibrate your FCL to your **normal meal spectrum** by initially **setting and tuning the various _ISF_weights**, that dynamically change with bg curve characteristics as sketched in the chart on the previous page.

Depending how satisfied you will be with the result, or which more extreme meals (smaller? faster/slower carbs? totally different fat/protein content?) you would like to manage, as well, you have a variety of options to deal with that, and this will be the topic in sections 5 and, focused on exercise, in section 6.

In a nutshell, this will be about manual *or* (aided by Automations you would set up) semi-automatic (user triggered) *or* fully automatic **temporary modulation** of your FCL **to deal with *different* disturbances than presented by the meal spectrum you were calibrating for.** This "nudging" will often involve:
* the **%profile button** (top left on your AAPS home screen). Note that the set % multiplies with both, the ISF resulting from autoISF and also with the default iobTH you have set, so both are nicely modulated in a linear way with the % temporarily chosen
* the **TT button** (top right on your AAPS home screen). Note that a lowered (relative to profile glucose target) TT signals lowered sensitivity (more insulin need), and an elevated TT (as often used with exercise) increases sensitivity and hence works in the direction of a lowered % profile to also reduce insulin given by the loop.
Moreover, the **exercise button** ((top center on your AAPS home screen) can be activated (turns yellow, then). This will **further boost** how your set TT elevates the resulting ISF, and sharply lowers iobTH, as often desired for sports. See section 6.1).

Taken together with a couple of more features (section 5.2 and 6.3), these functions make the AAPS home screen your **FCL cockpit**.

So, yes, FCL is about fully automatic cruising. However, you have a cockpit to check how everything is running, to sometimes “nudge” – and in exceptional situations also to temporarily intervene, or even take over.

Also, like a pilot, you need to learn a bit, so everything will fly well.

But: You should do some fair weather stuff first *), which brings us back to our intended next step:

Researching your standard meal patterns, and finding settings for the various .._ISF_weights.

*) If, to keep the motivation up for your project, you are itching to see what fancy stuff can all be done, you might peek for instance into case study 6.2 And if that looks like way too much, decide to be just a fair weather flyer for now - or, no offense taken, give up now before spending too much effort. Section 13 is about (maybe) “easier” alternatives.

4.2 bgAccel_ISF_weight

When looping without carb inputs and without giving a bolus ourselves, the first crucial setting is to set the **bgAccel_ISF_weight** so that large SMBs are requested immediately when the loop detects an acceleration in your blood glucose (bg) that is starting to rise.

Ideally within about 20 minutes after acceleration detection, which would be the first up to 4 SMBs, as much iob should automatically be supplied as we would have given with our bolus in hybrid closed loop.

Rule of thumb: Two of the first three SMBs each should be about ¼ (max 1/3) the size of a previous meal bolus in your HCL „career“.

Going over 1/3 can be problematic if your diet contains occasional low carb (or only snacking), and generally of course if your CGM quality is sometimes unreliable, and might produce an artefact that could be mistaken for a meal start. Be vigilant about this topic!

For hands-off FCL, your settings have to fit the whole **range of <u>your</u> meals**. In extreme cases you will have to balance too high running iob with additional carbs (a late additional snack against going too low), and in the opposite case, you will have to reckon with temporarily exceeding the glucose target range and losses of the achieved %TIR for this day.

If your meals vary very strongly, there are avenues to ease your initial tuning job, or to optimize overall resulting loop performance:

- Automations allow you to differentiate. For instance it is possible to apply different iobTH_percent and/or different bgAccel_ISF_weights for meals in different **time windows** or geo locations (details see sections 3.4 and 5.1)

  In case you use autoISF 3.0 on the iAPS platform for i-phones, you need to use a third party automation software (! call for a case study 4.X)

- You can pre-program **custom buttons for special** meal (or snack) **types**, with different underlying FCL settings (see "cockpit", section 5.2.2.3)

- You can **modulate FCL aggressiveness manually** making use of temporary switches of %profile and/or set glucose target (section 5.2.2.2)

- In an update, autoISF 3.x might provide the option to pre-program settings for 4 different meal type clusters, accessible from the TT button (presented in section 5.3.3.1 (4) and 6.3).

In search of appropriate settings, you must keep (real-time) track of the **SMB tab** when tuning. This can be impractical. You probably will end up making a lot of screenshots (quickly in the crucial minutes where the SMBs were given, or when you thought they should be given), for later analysis.

The superior method is to just copy **logfiles** about once a day from your phone/internal memory/AAPS/logs (all zip files there), and analyze them at your convenience later, using the **emulator** (see section 10). Some emulator-based analysis is also possible within AAPS on your phone (section-11).

Already when tuning the bgAccel_ISF_weight it can become evident that safety restrictions (as discussed in section 2) must be widened further:

- Especially if your *profile basal* rate is very small, the **smb_delivery_ratio** and/or the **smb_max_range_extention** "must" often be increased further.

- Furthermore, the **smb_delivery_ratio** provides more leeway to increase the aggressiveness (e.g. 0.6 -> 0.72 results in another +20%).

  In the end you should not set the limits too tight, so "nudging" aggressiveness by another 10 or 20% from your cockpit later will not bounce into your set limits.

In any case, it is worth the effort to tune the **bgAccel_ISF_weight** in such a way that high glucose increases are already nipped in the bud, so to speak.

This also facilitates the tuning task for the subsequent phases of the meal, because there is then largely zero-temping, as well known from HCL-times after YOUR administered bolus. Also, the lower and shorter lasting the glucose peak, the lesser the hypo danger from the activity tail of SMBs given when glucose was „stuck“ high.

Default bgAccel_ISF_weight is set to zero in autoISF. **To start**, I would try 0.05 or **max 0.1**, and keep trying in max 0.05 steps. Soon move to 0.02 steps (which still means 10-20% change). From my (very limited) overview, many use around 0.2, but possibly higher if their hourly basal rate is 0.1U or lower. (Consult section 4.7 when available). Do not be tempted to rush this setting by using large jumps in adjustments.

How changing the _weights influences the resulting calculated insulinRequired

<- wrong info in past versions ! Examples added for clarification of this important tuning related topic:

~~If you double the bgAccel_ISF_weight, the ISF strengthening is doubled.~~

To get a feel for how changing the _weights influence the resulting calculated insulinRequired, it is best to start cautiously and just do 10 to max 20% steps up, and watch out for the effects. Doing similar step sizes should yield about similar effects each time.

Example 1: Going from bgAccel_ISF_weight of 0.2 to 0.16 (20% less).

If your profile_ISF is 40 mg/dl/U and with bgAccel_ISF_weight = 0.20 you saw acce_ISF factor of 1.31, this would ((if the acce influence dominates and is used as effective ISF)) lead to the effectively used ISF of 40/1.31 = 30.53 mg/dl/U. For an intended correction by – 10 mg/dl the insulinRequired would calculate to 10 / 30.53 = 0.328 U.

Now, going with a 20% reduced bgAccel_ISF_weight of 0.16:

*acce_ISF = 1+ bgAccel_ISF_weight * internalFactor*

*before 1,31 = 1 + 0.20 * iF => 0.31 = 0.20 * iF => iF = 1,55*

*after ? = 1 + 0.16 * iF => ? = 1 + 0.16 * 1.55 = 1.25*

New effective ISF would be 40 / 1.25 = 32.05 mg/dl/U. For an intended correction by – 10 mg/dl the insulinRequired would calculate to 10 / 32.05 = 0.312 U, which is 4.9% less.

Example 2: Going from bgAccel_ISF_weight of 0.2 to 0.10 (50% less; or doubling in the other direction).

If your profile_ISF is 40 mg/dl/U and with bgAccel_ISF_weight = 0.20 you saw acce_ISF factor of 1.31, this would ((if the acce influence dominates and is used as effective ISF)) lead to the effectively used ISF of 40/1.31 = 30.53 mg/dl/U. For an intended correction by – 10 mg/dl the insulinRequired would calculate to 10 / 30.53 = 0.328 U.

Now, going with a 50% reduced bgAccel_ISF_weight of 0.10:

*acce_ISF = 1+ bgAccel_ISF_weight * internalFactor*

*before 1,31 = 1 + 0.20 * iF => 0.31 = 0.20 * iF => iF = 1,55*

*after ? = 1 + 0.10 * iF => ? = 1 + 0.10 * 1.55 = 1.155*

New effective ISF would be 40 / 1.155 = 34.63 mg/dl/U. For an intended correction by – 10 mg/dl the insulinRequired would calculate to 10 / 34.63 = 0.289 U, which is 12 % less (going the other way, 0.328 is 13.5 % more).

Example 2 (-50%) reduces _weight 2.5 times lower than example 1 (-20%), and the resulting effect (-12% vs. -4.9%insulin Required) is also factor 2.5 different. ((Still, the crossed out sentence on the preceding page was misleading as to what “strengthening” shall mean))

Note: “Your” internal factor “iF” might differ; for sure it is very different between the various …_ISF components. (Also, never forget to look into how other .._ISFs play into the effective_ISF that overall results).

Ideally, one should set the bgAccel_ISF_weight so that for meals that are in the **lower** range of the "fast **carb load**" of your cluster, the necessary insulin supply is already approximately provided with 3 SMBs. The glucose curve, at such meals, begins to flatten early in this SMB phase, so a deceleration follows very soon (-> section 4.4).

Note regarding acceleration happening “again” in late part of dropping glucose:

> In version 2.2.8.2 there was a potential deficiency in situations where glucose was falling and the glucose acceleration was already positive. That meant a minimum glucose level can be extrapolated. If that happens to be less than target and expected in less than 15 minutes then there should be no strengthening of ISF as it would lower glucose even more. Therefore bgBrake_ISF_weight is used now instead of bgAccel_ISF_weight. But those situations were rare and less critical than might be expected at first sight. The reason is that in most cases the predictions ended up even below their threshold meaning SMB were disabled.

4.3 pp_ISF_weight

With **higher carb load** meals, or meals that come with a sweet drink, the acceleration phase will last longer, and BG will rise further, which will require a higher insulin supply.

Between acceleration and deceleration there is a more or less linear further increase of insulin need in these cases.
Our autoISF should now "fight" this with the help of the post-prandial ISF, set via **pp_ISF_weight,** after we have set a halfway suitable bgAccel_ISF_weight.

Select **pp_ISF_postprandial all day = ON**

In full closed loop mode, this parameter is preferred over deltaISF ((.. and highly beneficial also for managing meals with gastroparesis)).

Tune your **pp_ISF_weight** *after* you have set a halfway suitable (not too aggressive) bgAccel_ISF_weight. You now should check meals in the upper spectrum of your g carb, and carefully start tuning with a weight of 0.01.

Normally (except for very low carb meals) the SMBs triggered by bgAccel_ISF_weight and pp_ISF_weight should be sufficient to reach and slightly exceed the **iobTH** (see section 2.4) so all *the other* autoISF parameters are relatively unimportant for now.

A reason why this can work at all, also for quite a variety of meals, lies in the fact that there is an hourly carb absorption limit of about 30g/h (reference: Dana Lewis: https://github.com/danamlewis/artificialpancreasbook/blob/master/8.-tips-and-tricks-for-real-life-with-an-aps.md#heres-the-detailed-explanation-of-what-we-learned). So while meals might wildly vary in composition and size: What is digested, and needs insulin in the first <90 minutes (when FCL tries to catch up with insulin need and differs strongly from HCL, and bgAccel_ISF and pp_ISF play the leading role), will be relatively close (…for meals with similar *initial* glucose acceleration and rises, anyways)

(The others, low carb with much slower initial acceleration and rise, are recognized as different by the loop loop).

Depending on the type of meal and "aggressiveness" of your bgAccel_ISF_weight and pp_ISF_weight tuning, the iob will already be so high that in the phase of decelerated glucose rise towards the peak (the "last part of the rise") that no insulinReq is seen by the loop.

Therefore the **bgBrake_ISF_weight** is often unimportant (-> section 4.4)

Warning: **Occasionally consult the SMB tab to see how your settings really work.**
A setting that is actually set too aggressive might be masked. **Tuning only works if** the effects of the settings being tuned are **not** unintentionally **limited by other** (e.g.„safety“) **settings**.

Also, **always look at two or three *different* meals** before deciding whether a tuning "fits" („good enough“ for each of them) Case Study 4.1 (Pizza Meal) contains, towards the end, an example how you can go about tuning the _weights for various _ISF factors of autoISF.
You probably will have to iterate back and forth doing this for two or three different kinds of meals until you find *one* good enough set of settings *for all* of them.

4.4 bgBrake_ISF_weight

At a **low carb** meal, or an attempt at doing a **weight reduction diet**, the glucose goes up only sluggishly and iobTH should not be reached at all.

Acceleration and the phase of strong glucose rise are quickly over in these cases, and there is mainly a decelerating bulge of insulin action that projects over the next few hours.

Now the importance of the **bgBrake_ISF_weight** comes in. In full closed loop, the bgBrake_ISF_weight is often only about half as large as the bgAccel_ISF_weight (but that would also depend on your personal diet pattern and eating/digestion speed). Also here, one should approach the tuning gradually, increasing the weight from small values.
Case Study 4.2 shows a user example of a low carb meal managed in FCL by autoISF.

What is very helpful for us in any case is that the loop calculates the situation every 5 minutes, and corrects it.

However, if there is too much insulin in the system, the loop can only correct to a very limited extent, namely only to the extent that it can set basal to zero.
Therefore, the core problem is that the Full Closed Loop must build up iob very quickly, but not too much, in the initial phase of a meal.
But high BG values (out of range, >180 mg/dl) can not always be avoided..

4.5 High Glucose Values: dura_ISF_weight (and bg_ISF)

With **large or high fat/protein** meals, a 2nd hill of glucose will form, or a long high plateau.
For such situations there is in autoISF the modulation of ISF depending on bg level or duration of plateau formation.

High bg values and a plateaus in bg values are tuned using the **dura_ISF_weight** and associated parameters. This feature is also very useful in Hybrid Closed Loop. It elegantly manages, fully automatically, temporary fatty acid resistance. Please refer to other papers for details (for instance, section „Late stage of meals“ of:
https://www.facebook.com/download/649096606100188/MealMgt.Basics_09Dec21.pdf).

Since in Full Closed Loop we "turn up" our loop to give the maximum SMB size we can at the beginning of a rise, it is crucial to **resist the temptation to continue with a particularly strong ISF in the meal phase with the highest glucose values** .

This is a reason why in Full Closed Loop we do not make much use of the **bg_ISF** component of autoISF.

- Wanting to get most of our insulin from SMBs delivered at fairly low (but beginning-to-rise) bg implies that we do not make ISF weaker at low bg. Under preferences/OpenAPS SMB/autoISF/bg_ISF settings we set lower_ISF_range_weight = 0.0

- The higher_ISFrange_weight should also be fairly irrelevant: Near glucose peak, zero-temping usually prevails anyway, so the settings we try might often not be used really by the loop. You probably can live with setting 0.0 there, too. Or you might set 0.1 or 0.2 to see in the emulator tables where this effect, *after inputting a much higher weight*, could lead, and whether *that* would be desirable (unlikely).

Caution: Investigating effects of set weights is not really possible in periods of zero-temping. Too aggressive settings might not come into play most of the time. However, some *other* time they might come into play, and *then* produce a hypo 1-2 hours later.

Therefore, **carefully study the SMB tab** (or better yet, do an emulator based analysis, see sections 10-11) **to see what the selected weights would do, if there was no zero-temping** at the time. Also, try a completely different meal to see how your settings work there.

The UAM Full Closed Loop doesn't get any information from you as to how many grams of carbs will be absorbed late. Not knowing when your steady-state max carb absorption phase (the earlier mentioned 30g/h), and even sometimes a brief episode of insulin resistance to fats, might end, the FCL will struggle to provide desired amounts of insulin, facing potential hypo danger later because of the DIA of the insulin in use.

Actually, the UAM Full Closed Loop is *not completely clueless* regarding how carb absorption will go on. It will work with a prediction of further carb absorption building on the **carb deviation** (=hypothesis of how much got absorbed in the past 5 minute segments), and phase out more carb decay in the course of the next 1 to max 3 hours. For more detail see https://openaps.readthedocs.io/en/latest/docs/While%20You%20Wait%20For%20Gear/Understand-determine-basal.html#understanding-the-basic-logic-written-version (or study your SMB tab info).

This UAM prediction about further carb absorption can be worse, but can also be better than a prediction based on the user's „e-Carb" input in Hybrid Closed Loop.

In any case, and even when having perfect knowledge about how exactly the carbs fade out in the next hours, there would still be a principal problem for the loop: Heavy insulin „fire“ against highs will not work immediately (depending on the insulin’s time-to-peak), and notably it comes with a significant hypo danger (from the „tail“ of insulin activity.) A big bolus, or also a series of boli, will rarely work exactly for several hours matching the absorption of carbs (from what, how much and and how fast the user ate).

Once your BG sits high, neither you, nor a hybrid closed loop with all the carb info, nor your FCL can work wonders. Resist the temptation to elevate the **dura_ISF**_weight very high.

The author is sceptical about using the **bg_ISF** (at least be careful, use small weight, or shut-off). Highs will take time to resolve. Interestingly, an after-dinner walk can work wonders sometimes.

4.6 Tuning your initial settings

Be pro-active: **The earlier large SMBs come** (driven by bgAccel_ISF and pp_ISF) …

Also the settings for your CGM smoothing may play a role here that you may want to look into at some point!

…the less high the overall increase in BG will be, and (provided you set a proper iobTH) **the lesser the risk will be for a hypo after the meal**.

Therefore, put most of your FCL tuning effort into determining suitable weights for bgAccel_ and for pp_ISF, and a suitable iobTH_percent.

Your FCL cockpit will give you access to modulate 2 of these 3 essential parameters (see section 5.2.), providing you an opportunity for more research on the fly, so to speak.

The experience of the author is that it is possible to tune the above mentioned weights for very different meals in such a way that the glucose almost always remains acceptably in range.

However, if you come to the conclusion that **differentiated settings** for different meals or meal time clusters, would be easier to establish and/or work better for you, you can:

- define Automations that use different iobTH and/or different bgAccel_ISF-weights for different rough meal-time slots in your days (see section 5.1.4)
- manually modulate FCL aggressiveness via setting temp. %profile and/or TT (see section 5.2.2.2)

- or install and activate a user defined extra button in your cockpit for it (see section 5.2.2.3)
- or pre-program 4 different clusters in /preferences, and call them up within a second from the TT button in your AAPS home screen (*only after implementation of an improved cockpit,* see section 5.3.3.1 (4) and section 6.4.3))

After you tuned your **initial settings** well, there should rarely arise a need for “fine tuning” later, see section 8 and case study 8.2!

4.7 Profile helper

xls based tool is still under development / needs more user data / chapter will follow later