

Dietary considerations for Diabetes Technology

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Insulin Delivery Systems Traditional Method - Pen injections

Connected Pens



Insulin is injected into the skin through a needle. Data held in the pen and is downloadable.

Patch Pumps



Insulin held in a small pod/patch connected to a cannula and attached to the skin, which needs to be changed every 2-3 days. Controlled via handheld device connected to Bluetooth.

Tubed Pumps



Insulin is delivered from a small pump device through a tube into a cannula, which sits just under the skin and has to be replaced every 2-3 days. Controlled using the handheld pump device.



Medtronic



t:slim



Glucose Monitoring Systems Traditional Method - Finger Prick

Flash (Available via prescription) Also known as intermittent CGM (ICGM)



Small sensor reads glucose level in interstitial fluid and when scanned with reader or phone gives glucose reading and pattern of previous 8 hours. Alarms can be set for high and/or low readings.

Continuous Glucose Monitoring



Small sensor reads glucose level in interstitial fluid and automatically sends realtime data to reader or phone to be viewed at any time. Options to set alarms for high and/or low readings. Can be used as part of a closed-loop system.



Libre Libre 2



Libre 3

Medtronic

DEXCOM

Closed Loop Systems Traditional Method - None

Hybrid Closed Loops

A pump working together with a CGM.

Insulin delivered via a pump under the control of data coming from the CGM via an algorithm which is either held within the pump or on a phone app.

Insulin is automatically adjusted with limited intervention from the patient, however carbohydrate calculations for food need to be entered.



Not all combinations of pump/cgm available.

Medtronic 780G



CamAPS | FX

t:slim

WITH CONTROL-IQ TECHNOLOGY

Data Uploading Traditional Method - Hand Written Diary

Generic

Generic systems speed up the efficiency of teams by reducing the number of software packages needed to view data in clinics, however, not all devices currently allow uploading to generic systems.



All offer extensive and similar reporting options.

Industry Generated

Industry developed systems allow upload of individual company devices only to share data with medical teams and support self-management.

TIDEPOOL
glooko diasend



LibreView

CareLink™

Self
Management
skills
acquisition
important

carb counting

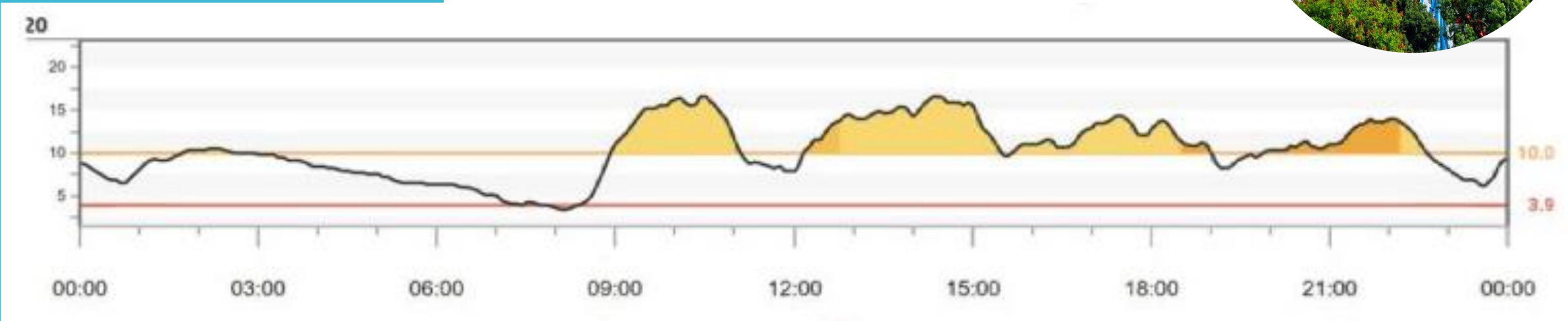
insulin carb ratio

insulin sensitivity factor

appropriate correction doses

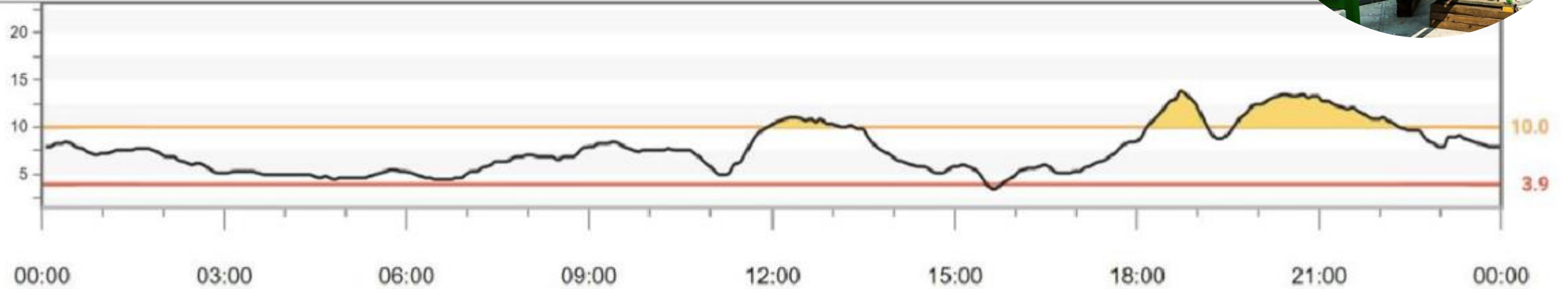
appropriate treatment of hypos

optimisation of basal insulin



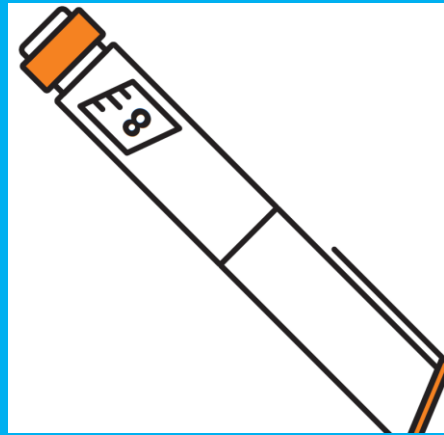


I20

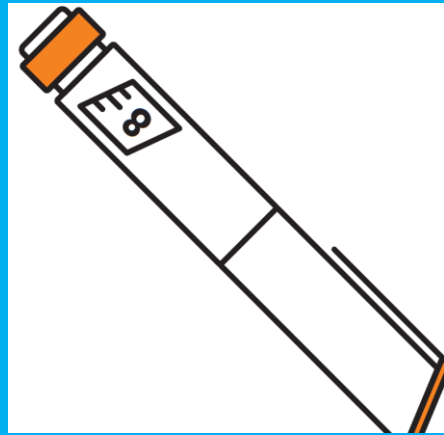


Smoother Ride ?

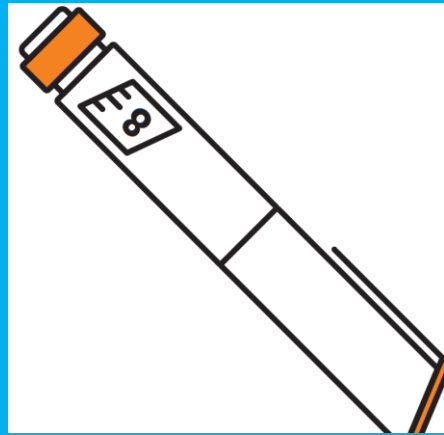
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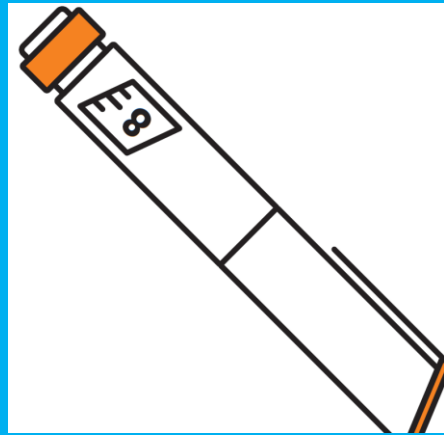
Smoother Ride ?



Smoother Ride ?



Smoother Ride ?



Glucose
level

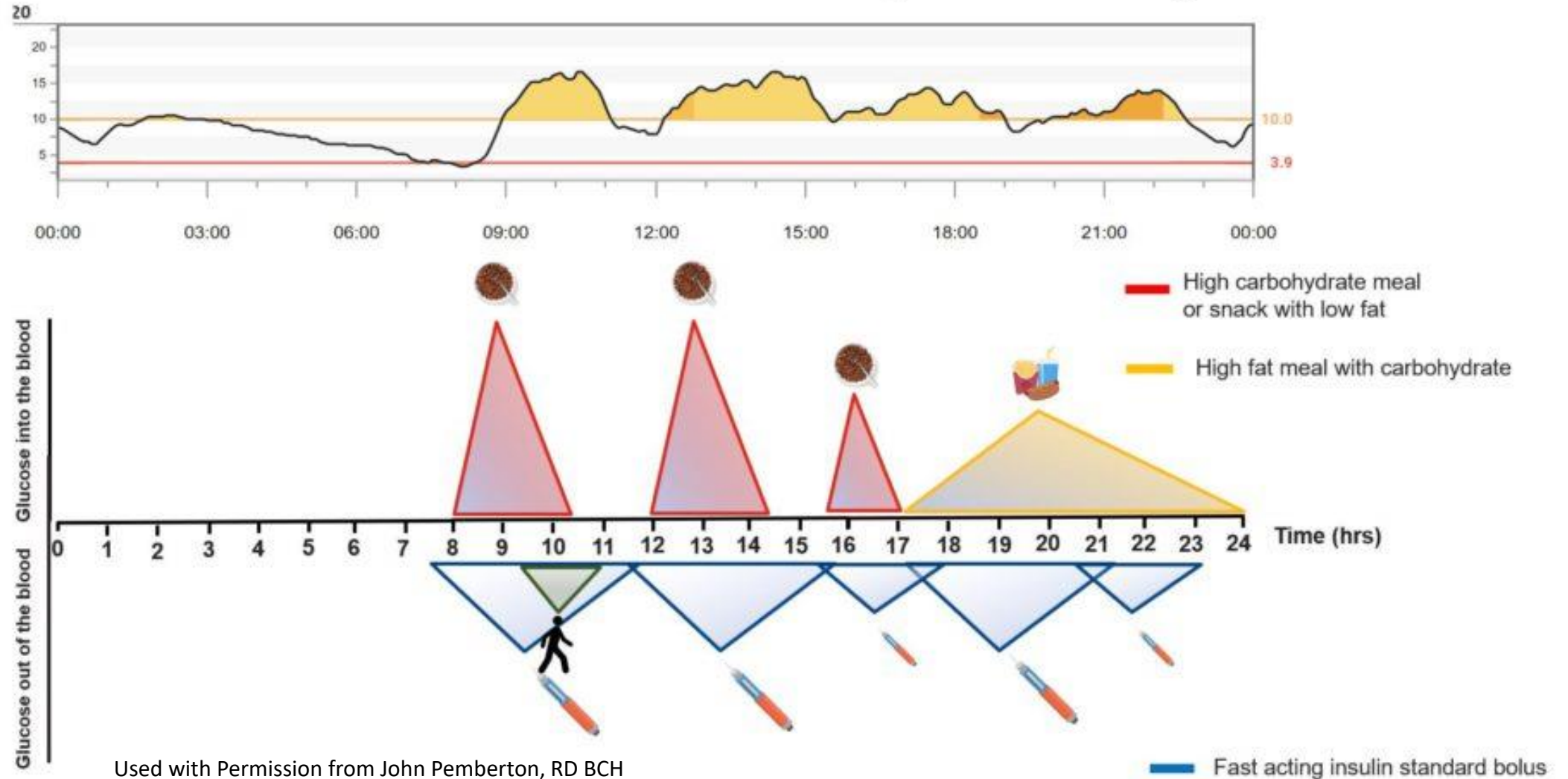
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Timing of
Insulin Bolus

Eating
pattern

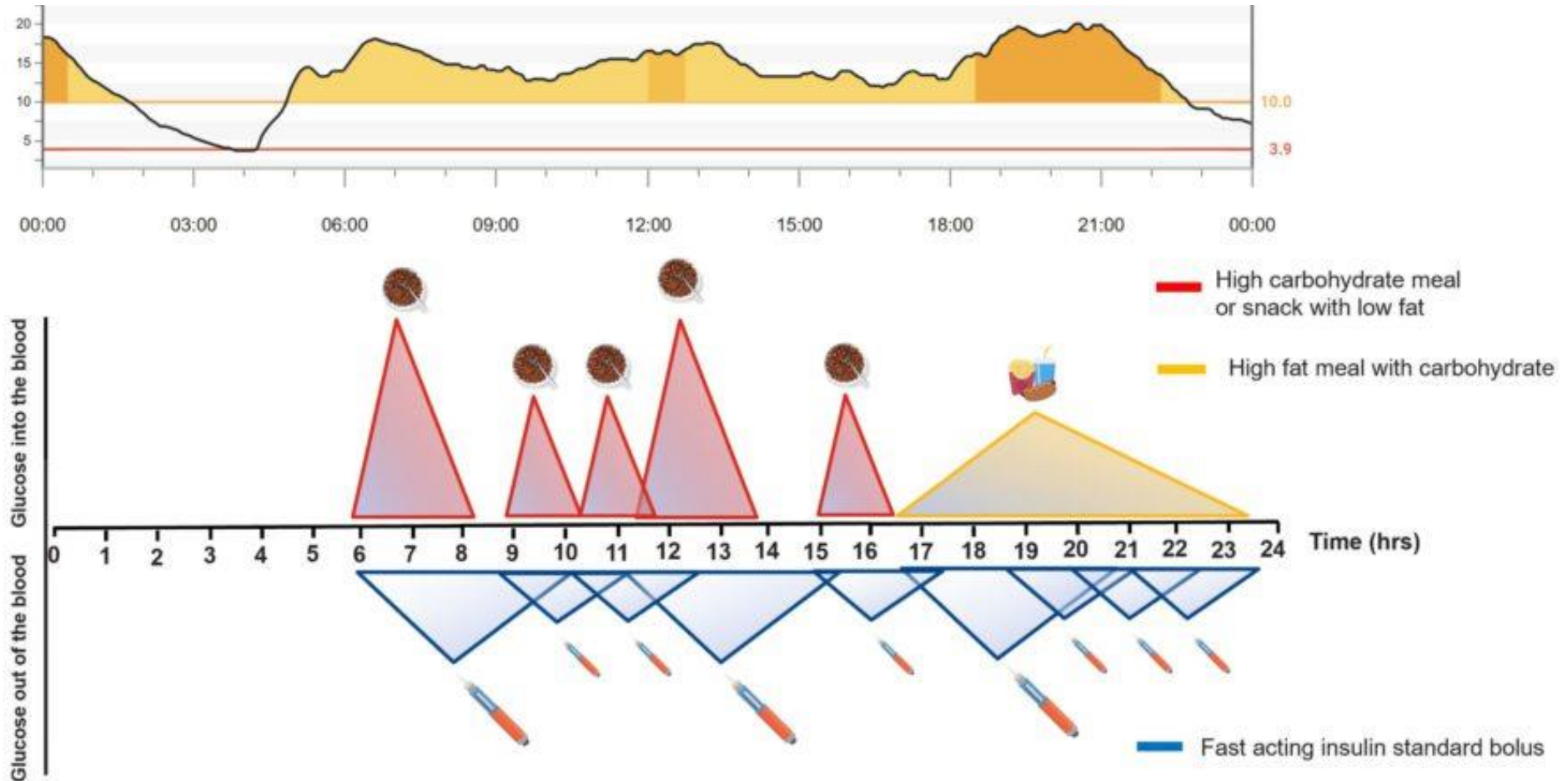
Activity
after meal

Insulin – Just before. Eating – Typical UK diet. Activity levels - low



Used with Permission from John Pemberton, RD BCH

Insulin – just before. Eating pattern – FREQUENT. Activity - none

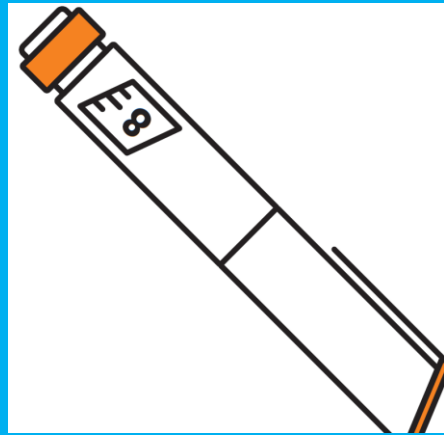


Used with Permission from John Pemberton, RD BCH

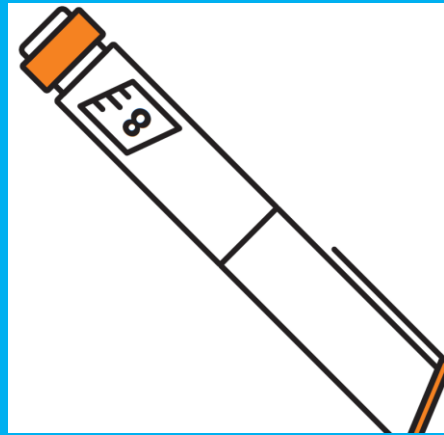
Beyond Limits - Help needed !

Smoother Ride ?

Smoother Ride ?



Smoother Ride ?



Glucose
level

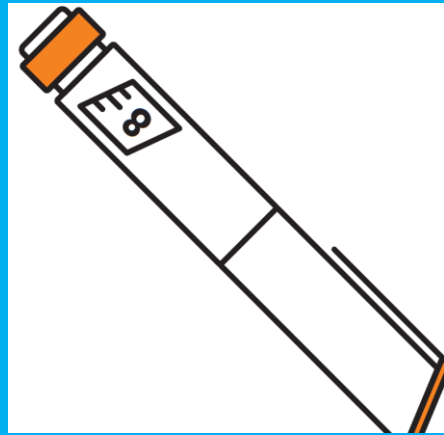
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Timing of
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Smoother Ride ?



Glucose
level

=

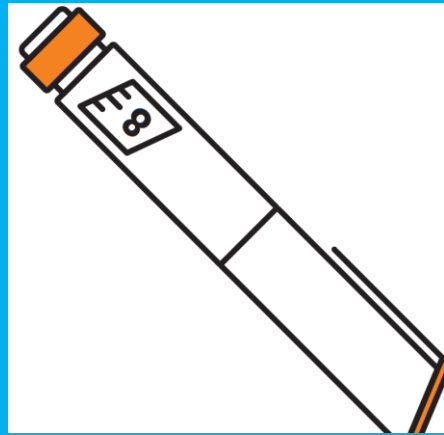
Timing of
Insulin Bolus

15-20 mins before

Eating
pattern

Activity
after meal

Smoother Ride ?



Glucose
level

=

Timing of
Insulin Bolus

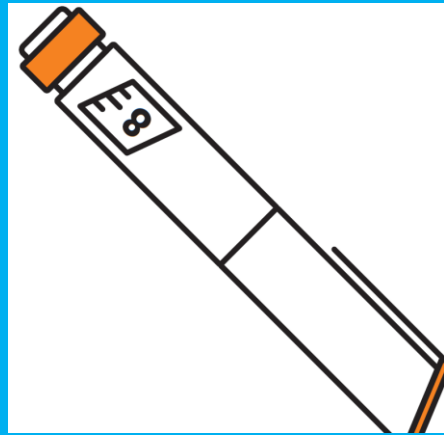
15-20 mins before

Eating
pattern

Smart

Activity
after meal

Smoother Ride ?



Glucose
level

=

Timing of
Insulin Bolus

15-20 mins before

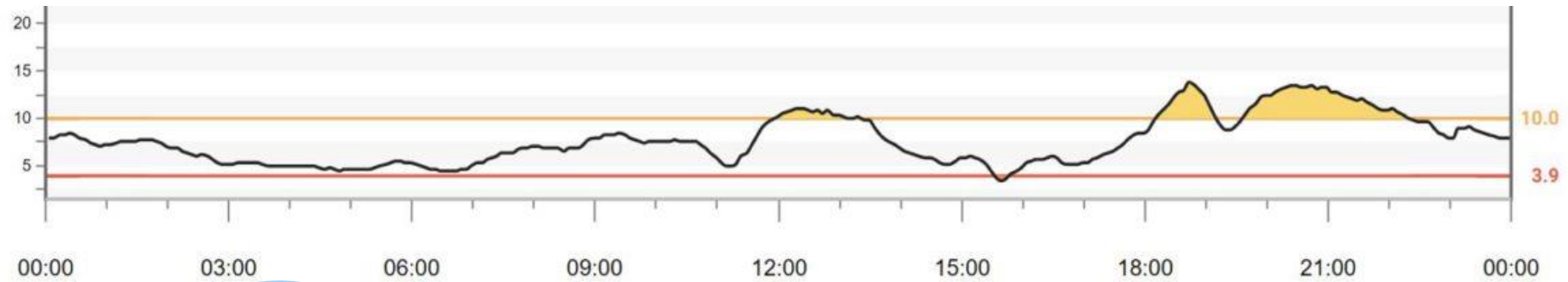
Eating
pattern

Smart

Activity
after meal

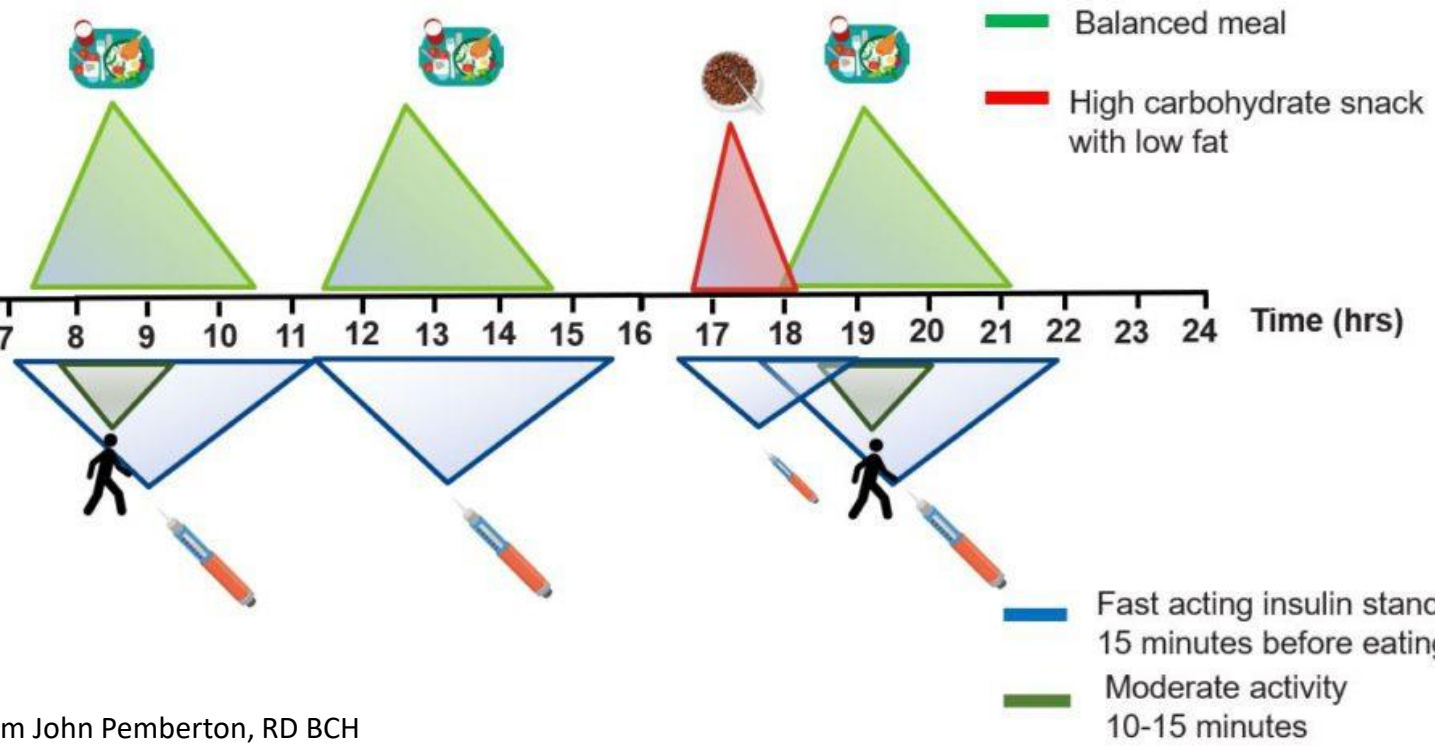
For 10 mins after

Insulin – Pre-bolused. Eating pattern – Balanced meals, less snacking. Activity – after some meals



Glucose into the blood

Glucose out of the blood



Used with Permission from John Pemberton, RD BCH

Smoother Ride



Can't bolus before

Options?



Can't eat smart

Options?



Can't be active after

Options?

Normal Eating vs Smart Eating

Normal Eating vs Smart Eating

Dose Adjustment for Normal Eating



Normal Eating vs Smart Eating

Dose Adjustment for Normal Eating



Est 1998

Normal Eating vs Smart Eating

Dose Adjustment for Normal Eating



Est 1998

How has 'normal' eating changed over past 25 years?

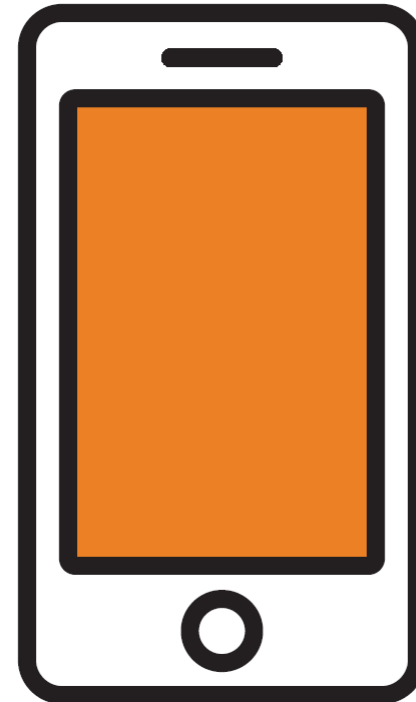
Normal Eating vs Smart Eating

Dose Adjustment for Normal Eating



Est 1998

How has 'normal' eating changed over past 25 years?



Normal Eating vs Smart Eating

Dose Adjustment for Normal Eating



Est 1998

Normal Eating vs Smart Eating

Dose Adjustment for Normal Eating



Est 1998



Normal Eating vs Smart Eating

Dose Adjustment for Normal Eating



Est 1998

2010s



DAFNE® Type 1 Diabetes: Less guesswork, more freedom, better health

2020's

Base your meal on salad and vegetables including green leafy types.
Healthy portion guide: Two handfuls at a main meal.

Balanced Meal



Include a portion of healthy protein food.
Healthy portion guide: Around a quarter of plate or a palm sized portion.

Healthy carbohydrate choices make up part of a balanced meal.
Healthy portion guide: Around a quarter of the plate or fist size portion.

Carb Smart



Type



Amount



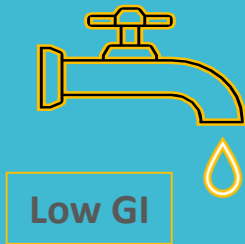
Timin
g



Activity



Type of Carbohydrate



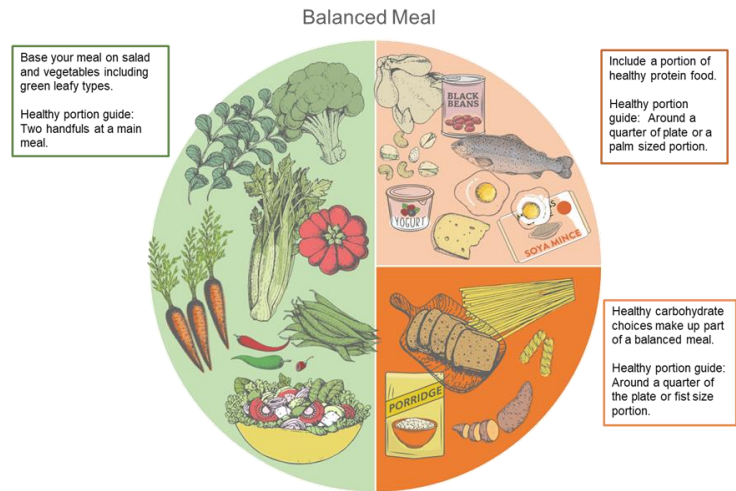
1. Choose Low Glycaemic Index (GI) carbs



2. Lower the GI of meals

3 to 4 balanced meals a day

Other meal preparation tips





Examples of lower GI swaps

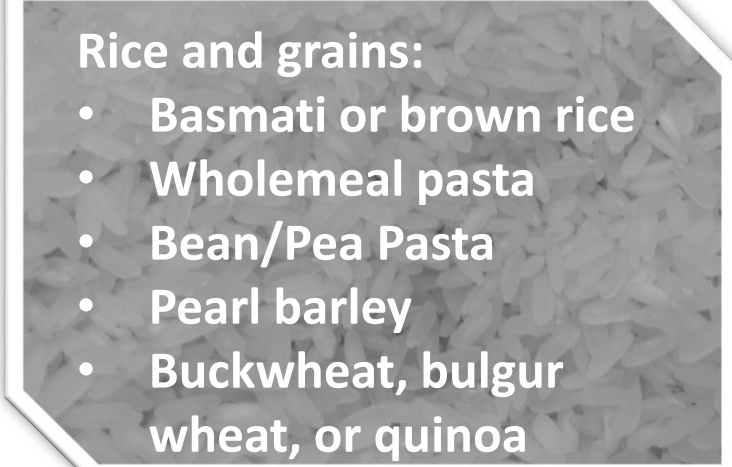
Bread:

- Multigrain, granary, or seeded options
- Wholemeal pittas
- Rye or pumpernickel
- Sourdough



Rice and grains:

- Basmati or brown rice
- Wholemeal pasta
- Bean/Pea Pasta
- Pearl barley
- Buckwheat, bulgur wheat, or quinoa



Cereals:

- Porridge made with jumbo oats
- Nutty muesli (choosing no added sugar)
- Shredded Wheat



Potatoes:

- New potatoes with skin
- Sweet potatoes with skin, boiled
- Green banana
- Caribbean breadfruit



Meal Prep – tips to lower GI



- Adequate protein at each meal
- Include healthy fat at each meal – nuts, seeds, olives and oils made from these. Full fat yoghurt, avocado, nut butters
- More insoluble fibre - wholegrains
- More soluble fibre – beans and pulses, fruit (with skins, berries) and vegetables
- Less processed food
- Avoid overcooking carbs
- Reheat chilled, cooked carbs – resistant starch
- Increase acidity of meals – vinegar, pickled vegetables
- Consider the order in which you eat foods so carbs are later in meal e.g. salad or veg/bean soup for starter, carbs as dessert



Avoid eating carbohydrate foods on their own.

Serve alongside protein and/or healthy fats.



Amount of Carbohydrate



Reviewing CGM – what works for me



About a quarter of plate is worth considering. Around 40g carb a meal

Personalise - Activity levels, age, weight history, dietary preferences etc

Swaps to reduce carb portions



Sometimes instead of ..	Try these low carb swaps
Spaghetti or noodles	Spiralised vegetables such as courgette, carrot or butternut squash spaghetti
Pasta or lasagne sheets	Leeks, courgette or aubergine Lentil or bean pasta
Rice	Broccoli or cauliflower rice
Mashed potato (e.g. on cottage/shepherd's pie)	Cauliflower mash or celeriac mash
Chips	Celeriac or pumpkin cut into chips and oven baked
Tortilla wraps (e.g. for fajitas) or taco shells	Lettuce leaves using little gem or iceberg lettuce
Burger buns	Grilled large flat mushrooms
Pizza base	Cauliflower pizza base
Breadcrumbs on meat/fish	Ground almonds



What do 'Carb Smart' meals look like?



Serve **1 medium chapatti (20 cm diameter)** with **2 scoops of prawn curry** and **half a plate of salad vegetables**). Season with olive oil, and vinegar.



Serve **3 tablespoons of pearl barley** with **chicken breast in a tomato sauce made with olive oil** and **half a plate of steamed vegetables** (such as broccoli, carrot). Season with pesto.



Timing of Carbohydrates

- Satisfying meals 4 to 5 hours apart
- Less snacking
 - Explore fear of hypos
 - Explore emotional eating – eating due to boredom, loneliness, stress etc.

Examples of low carbohydrate Snacks

- use to increase fibre or protein intake

- Small handful of plain nuts, seeds, roasted beans or chick peas
- High protein yoghurt, such as Skyr
- Raw vegetables, such as carrot, pepper, or cucumber with tablespoon of houmous or guacamole
- Cold meat or fish, such as slices of chicken, ham, smoked mackerel
- Individual cheese portion
- Boiled egg with spinach
- Pickled onion or kimchi



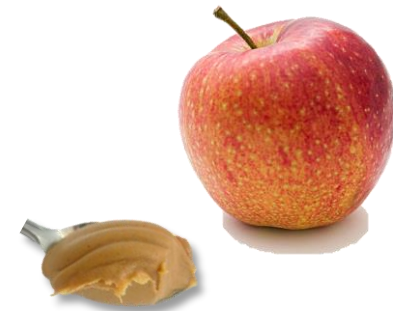


Healthy Carbohydrate Snacks

Carbohydrate snacks should be eaten with protein foods or healthy fats.



2 x oatcakes with cottage cheese

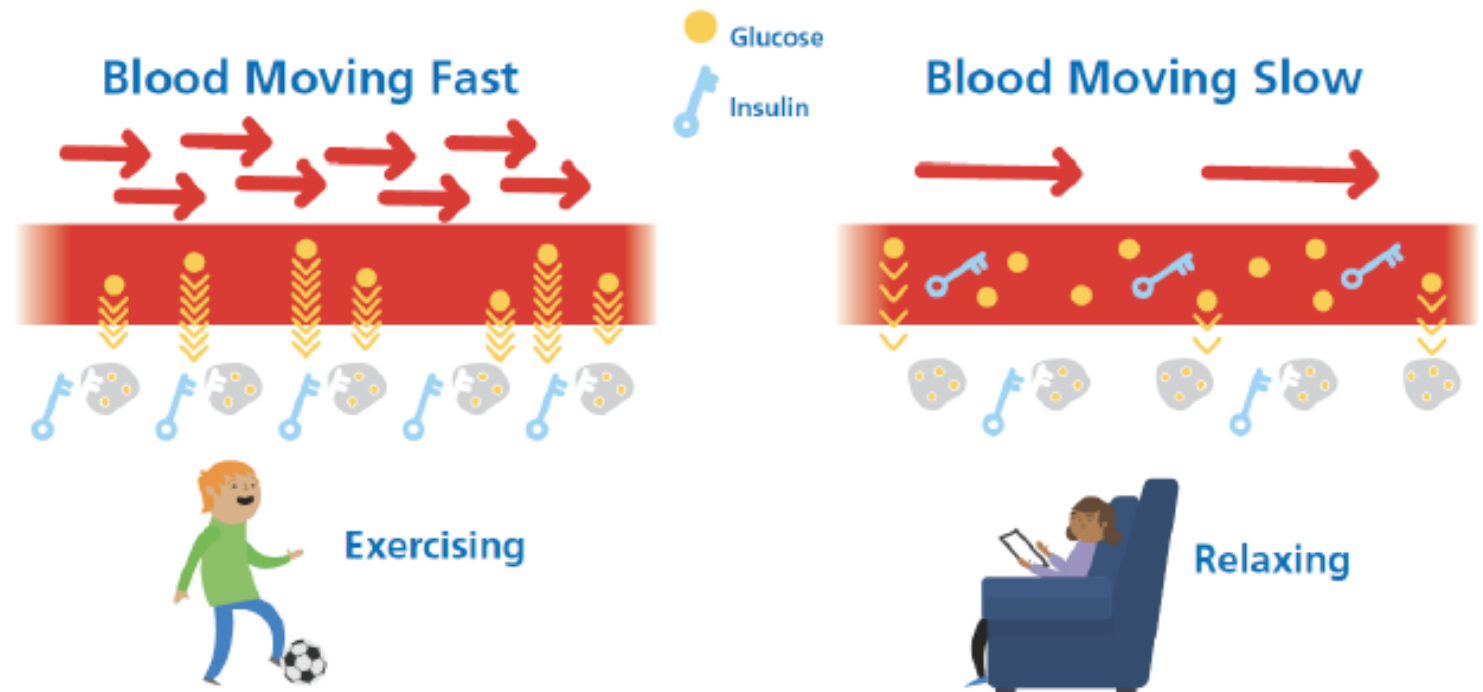


1 x sliced apple with a spoon of peanut butter



Activity

- Keep active for 10 to 15 minutes after meals.



Practical Tips for Moving More after meals



Outside of the Home

- Active travel to work after breakfast, some or all journey.
- After a meal out, have a walk before you go home
- Go shopping after a meal



At Home

- Clear up straight after tea
- Keep housework and other active jobs for after meals
- Make a walk after a meal in evening a routine
- Play with children after meals



Work

- After meals, have standing or walking meetings
- Suggest a lunchtime walking group at work to go round the block
- Plan your day to do more active tasks after meals



Smoother Ride



Can't bolus before

can you eat lower GI or lower carb meal or can you be active for 15mins after?



Can't eat smart

can you bolus 15-20 mins before or be active for 15 mins after?



Can't be active after

can you bolus 15-20 mins before or can you eat lower GI or lower carb meal ?

Check for readiness



ELICIT

‘What do you think may be causing the spikes in glucose after meals?’

PROVIDE

‘There are different tips that have worked for other people. Would now be a good time to look at these together?’

ELICIT

‘We have talked through some ideas that can help reduce glucose spikes after meals. What are your thoughts about these?’

Connected Pens

With Pumps You Know the:

Exact amount of insulin delivered – total daily dose

Number of boluses

Doses of each bolus

Timing of bolus insulin

Amount of basal insulin

Basal to bolus ratio

NovoPen

NovoPen Echo Plus

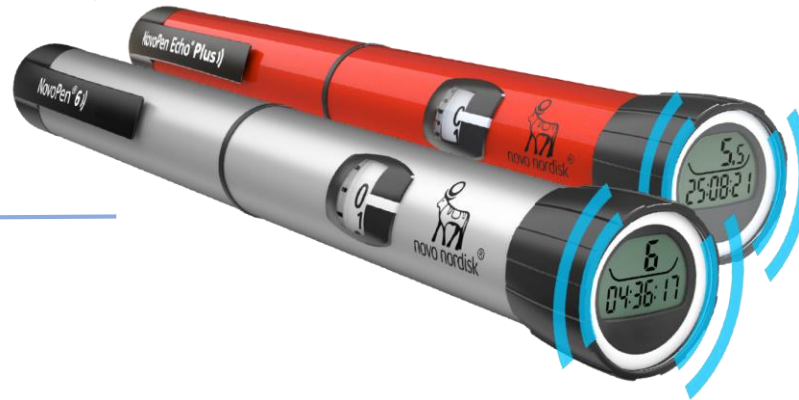
1-30 units

0.5 unit increments

NovoPen 6

1-60 units

1 unit increments



NovoPen

NovoPen Echo Plus

1-30 units
0.5 unit increments

NovoPen 6

1-60 units
1 unit increments



Last dose and time
since last dose

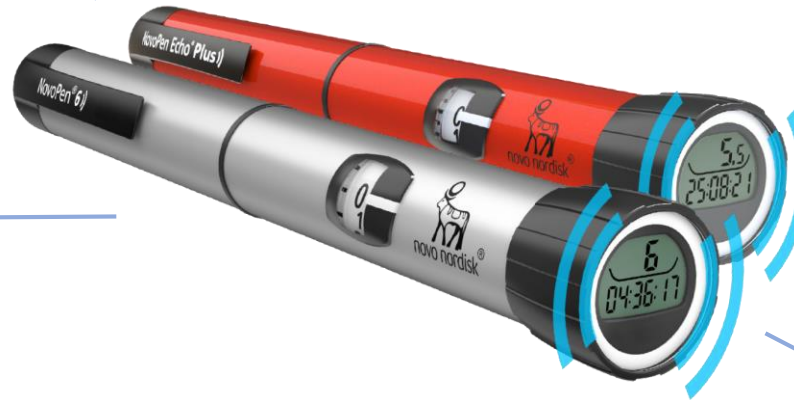
NovoPen

NovoPen Echo Plus

1-30 units
0.5 unit increments

NovoPen 6

1-60 units
1 unit increments



NFC data transfer,
last 800 doses

Last dose and time
since last dose

NovoPen

NovoPen Echo Plus

1-30 units
0.5 unit increments

NovoPen 6

1-60 units
1 unit increments



Can share data with LibreView,
Glooko, mySugr

NFC data transfer,
last 800 doses

Last dose and time
since last dose

NovoPen

NovoPen Echo Plus

1-30 units
0.5 unit increments

NovoPen 6

1-60 units
1 unit increments

Lifespan 4-5 years, no battery
exchange or recharge

Can share data with LibreView,
Glooko, mySugr

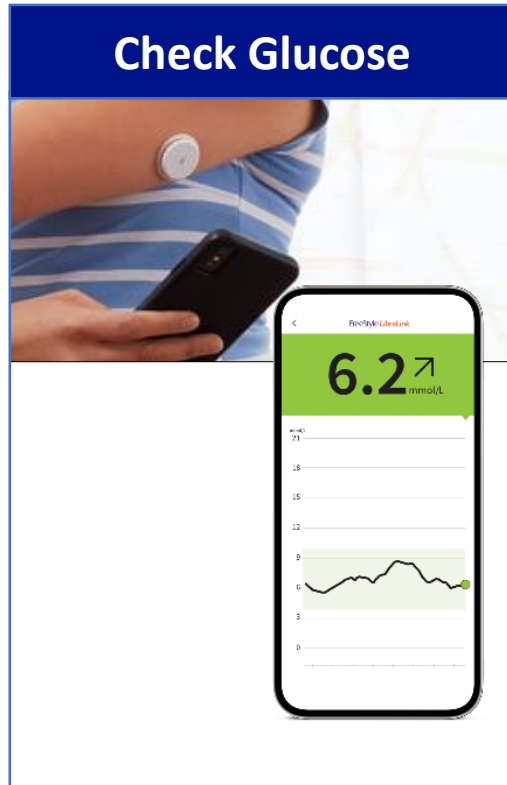
NFC data transfer,
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Last dose and time
since last dose



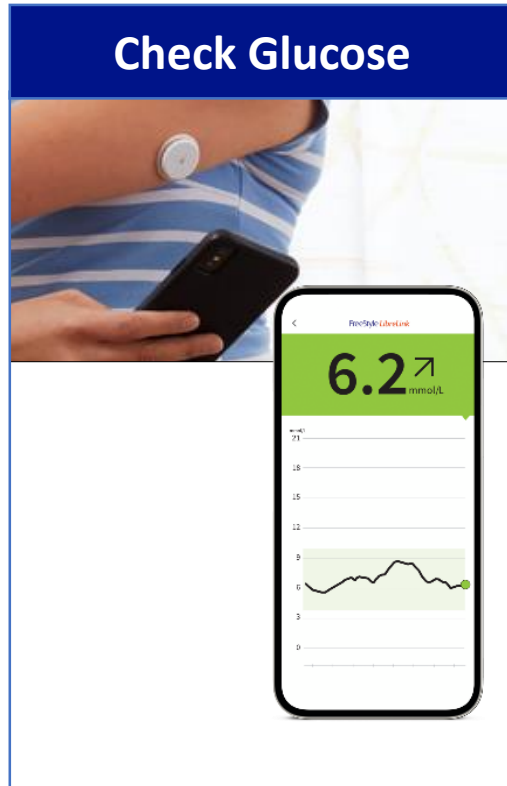
NovoPen 6 or ECHO Plus

- Connect, review and share insulin usage data with a compatible smart insulin pen¹, FreeStyle LibreLink², and LibreView³



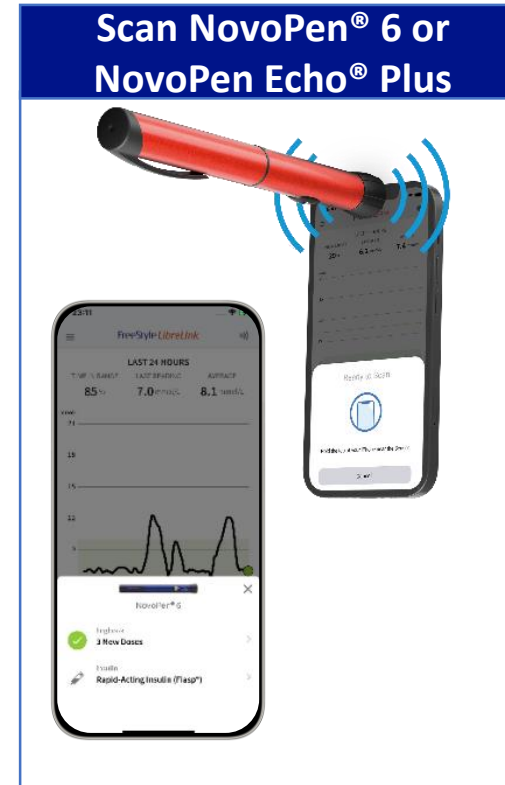
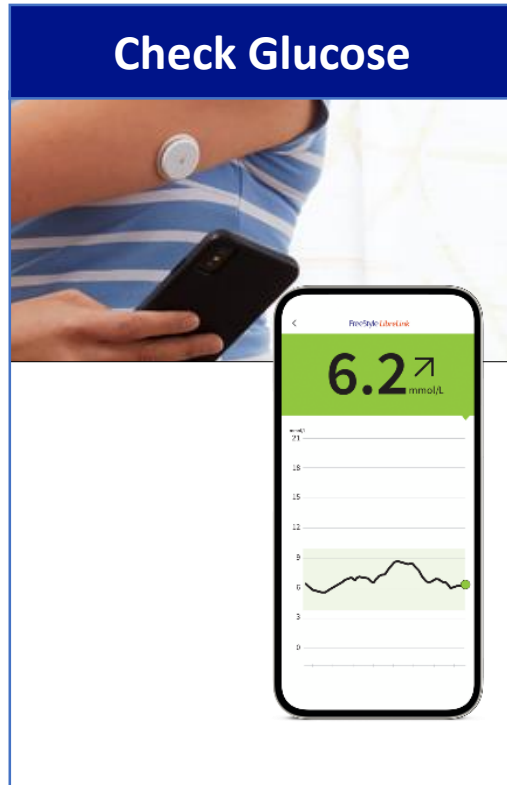
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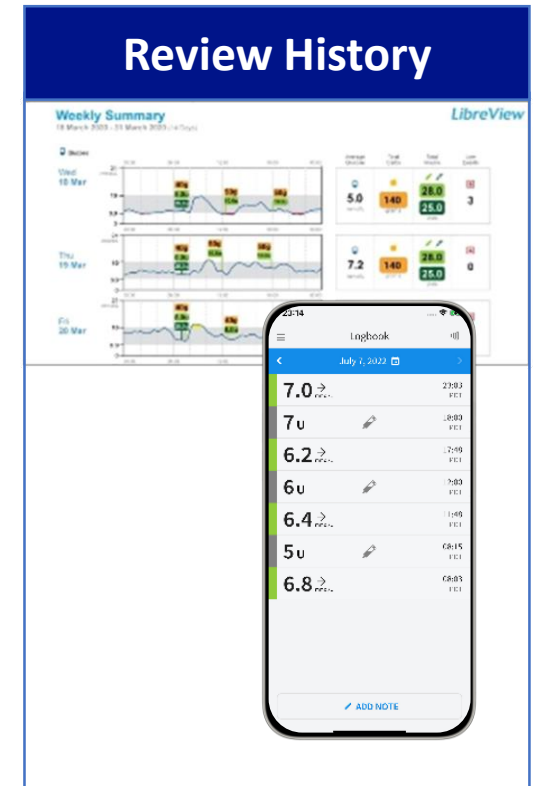
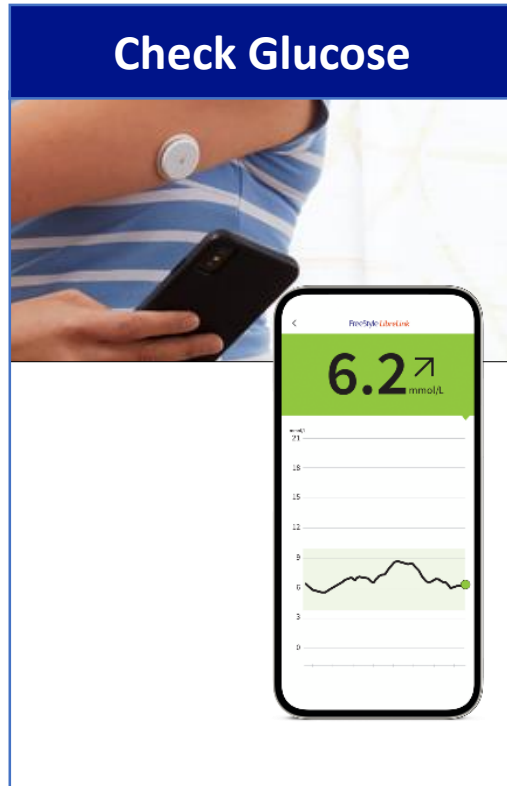
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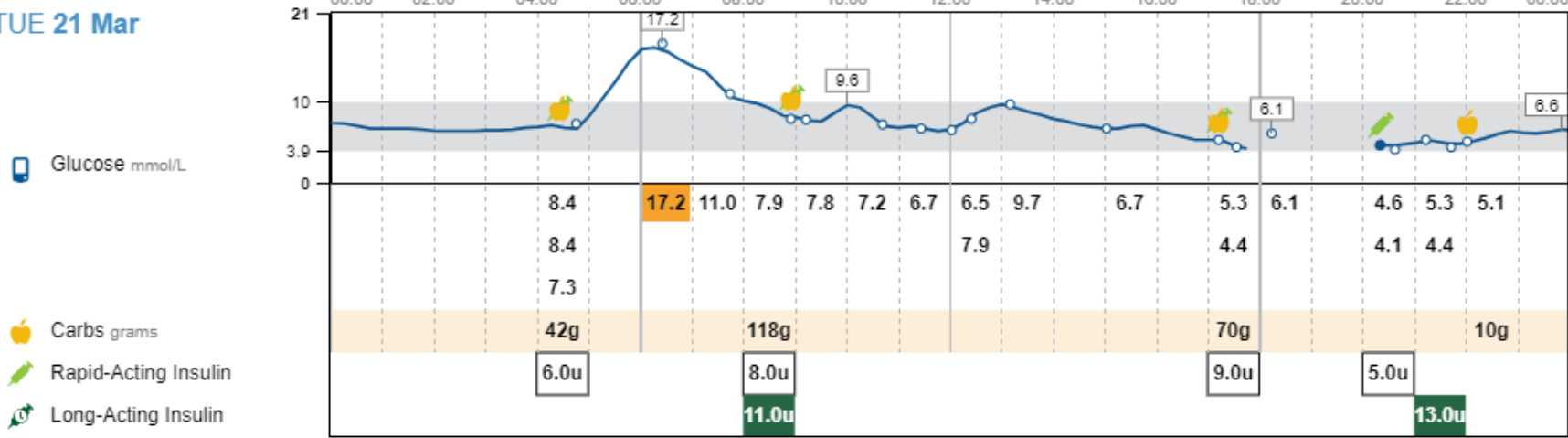
NovoPen 6 or ECHO Plus

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Connected Pens and Libre 2 via LibreView

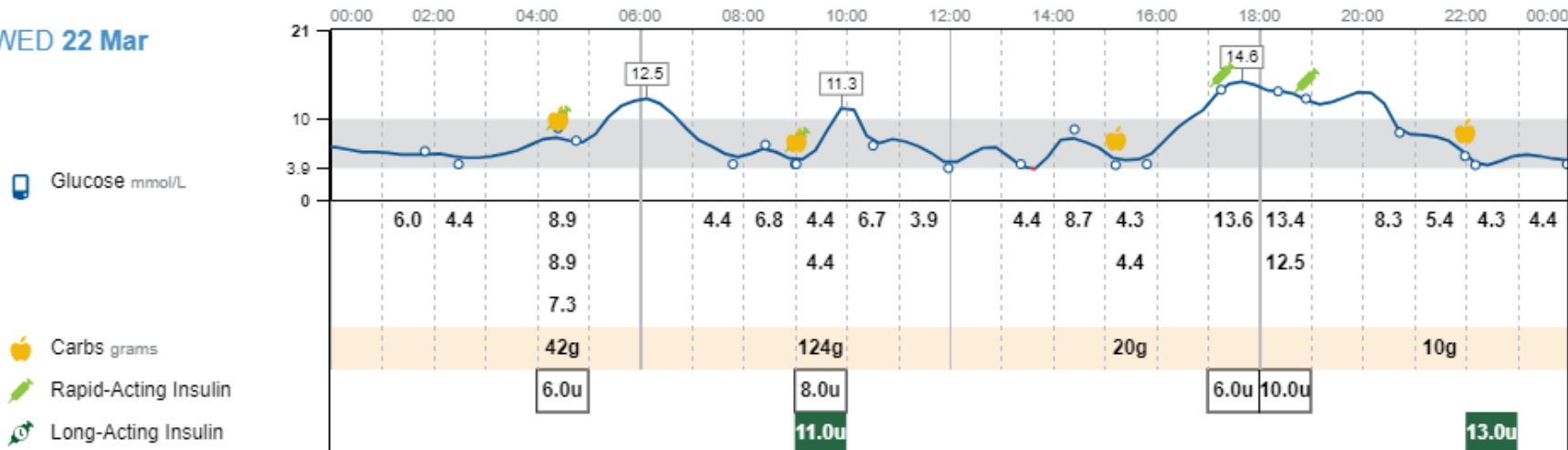
TUE 21 Mar



4am Changed from cornflakes to Weetabix with nuts

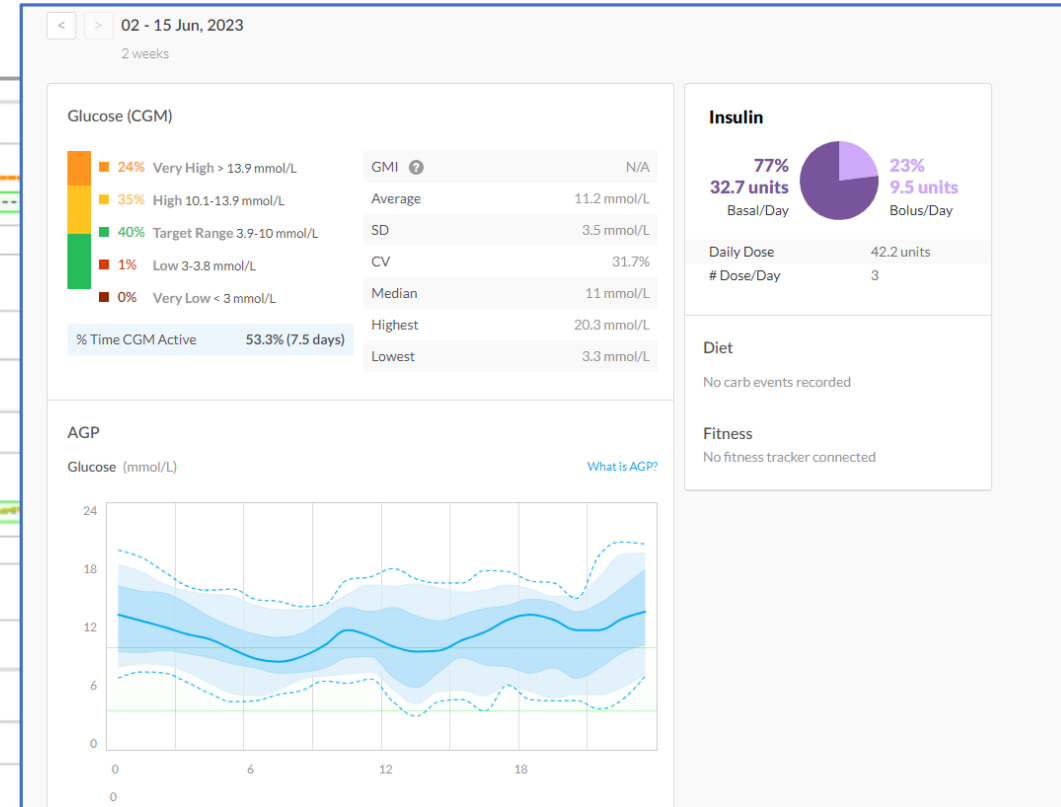
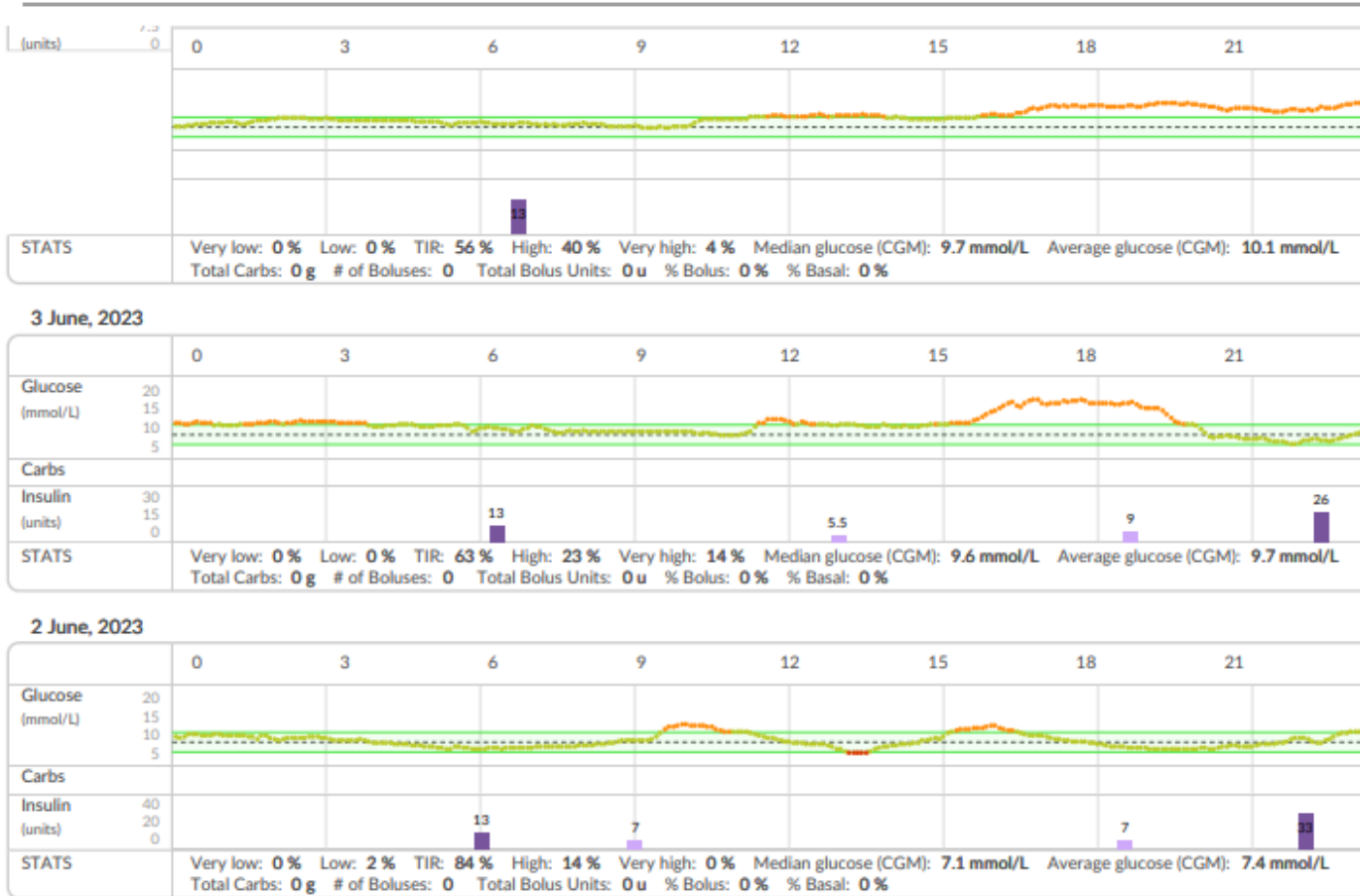
Tolerates large portions of carbs – very active job

WED 22 Mar



Bolus timings ?

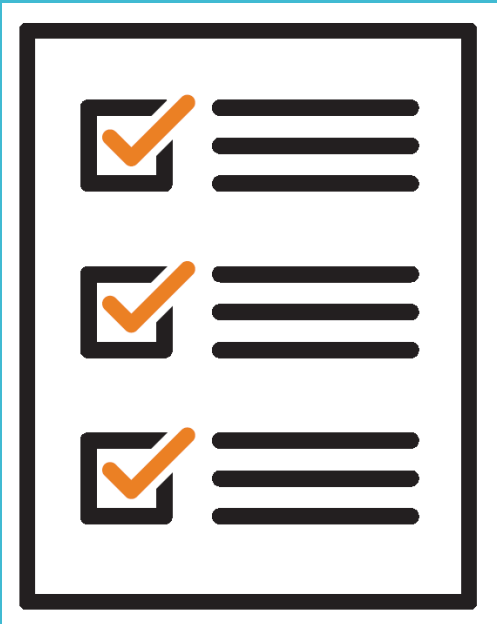
Connected Pens and Dexcom One via Glooko



Hybrid Close Loop – Introductory advice

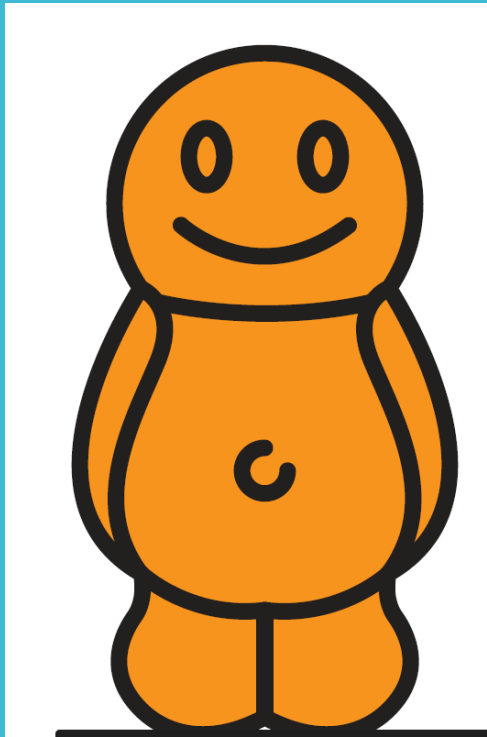


Trouble shooting checklist



- Regular set changes
- Minimise cannula insertion issues
- 'Accurate' carb counting
- Bolus 15 mins before eating
- ICR review

Hypo Treatment



Blood glucose levels	Usual advice	Hybrid Closed Loop advice	
Hypo 3.5 mmol/l or below	15 to 20 g rapid acting carbs and recheck in 15 mins	5 to 10 g rapid-acting carbs and recheck in 15 mins	
Hypo alert 3.5 mmol/l to target blood glucose	10 g carbohydrate	Nothing may be needed. Base decision on trend arrow.	
Examples of hypo treatment		5 g carb	10 g carb
		1 jelly baby	2 jelly babies
		2 small glucose tablets	3 small glucose tablets
		1 larger glucose tab	2 larger glucose tabs
		50 ml orange juice	100 ml orange juice

Eating Out Suggestions



Low GI meals

- System specific functions or
- Try a part-bolus e.g.70% at start of meal and leave system to sort out the rest.

Eating Out

- Take a part-bolus when ordering
- Top up promptly through meal

Physical Activity (aerobic) – initial advice



BEFORE

- Switch to higher glucose target 90 mins before activity
- Top up carbs not required

DURING

- Additional carbs can be useful for prolonged activity. Base on trend arrow and glucose level
- Switch back to usual glucose target at end

AFTER

- No additional carbs before bed

Alcohol



BEFORE

Temporary increase in glucose target

DURING

Personal experience on whether to take boluses for carb containing alcoholic drinks.

AFTER

Extra carbs to reduce hypo risk not required

Continue to avoid bolus corrections

If hypos still occur consider a pre-programmed BR for alcohol if system allows

In Conclusion

For any level of diabetes tech

- Self management education to optimise skills
- Bolus technique (timing, sites)
- Carb Smart
- Active after meals