

CASE STUDIES – OVERWEIGHT TEENS

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RISK FACTORS FOR OBESITY

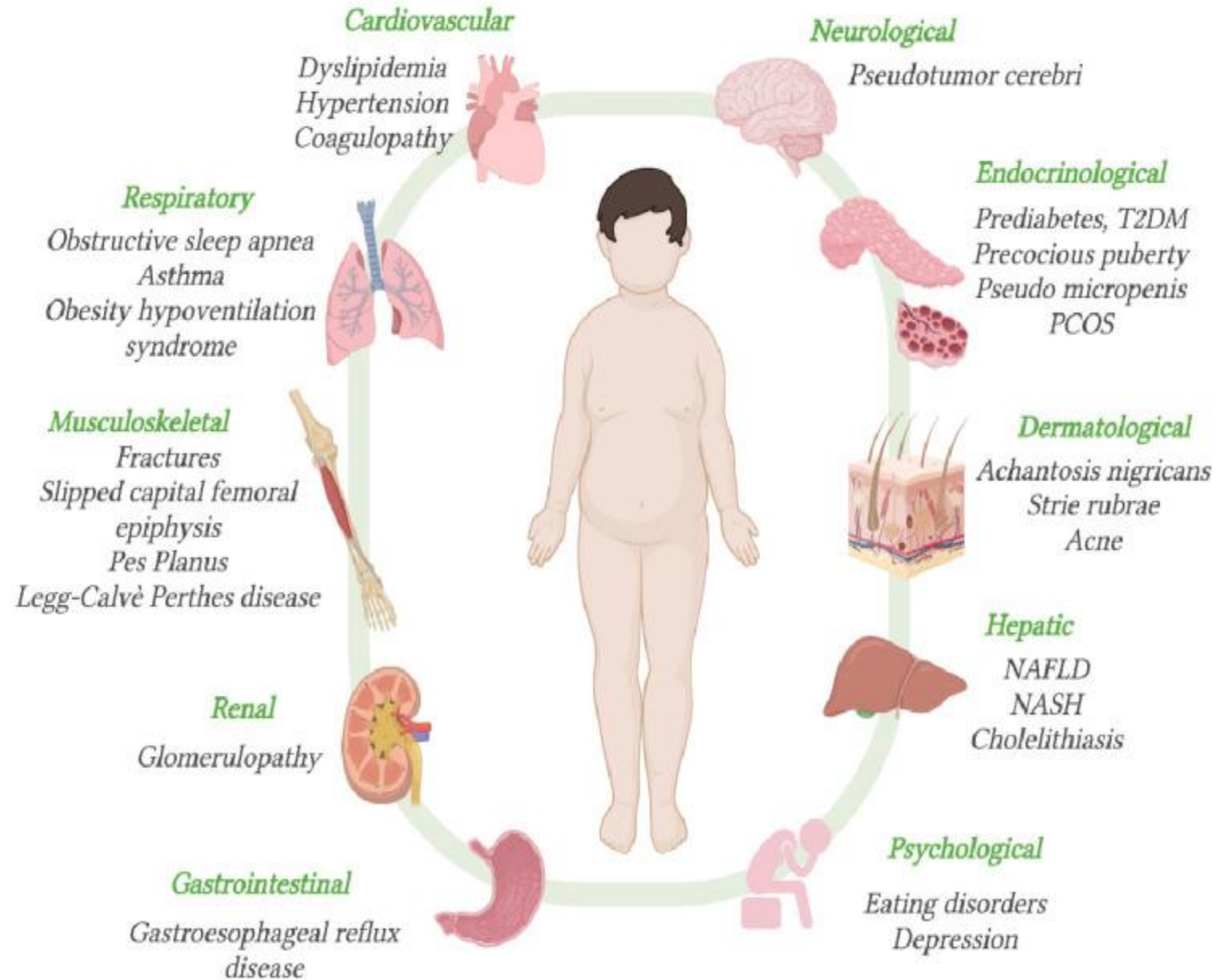


- Diet of highly processed foods
- Insufficient sleep:
 - Metabolic effects
 - Craving for sugary foods
=vicious cycle



OBESITY RELATED COMPLICATIONS

- Prediabetes
- Insulin resistance
- Type 2 diabetes (T2DM)



OBESITY CAN LEAD TO T2DM

Obese children are hyperinsulinemic and have approximately 40% lower insulin-stimulated glucose metabolism compared with non-obese children.

The inverse relationship between insulin sensitivity and abdominal fat is stronger for visceral than for subcutaneous fat.

Expanding adipose tissue secretes metabolites and signalling proteins (leptin, adiponectin, tumour necrosis factor-alpha) and alter insulin secretion and sensitivity, causing insulin resistance.

T (FEMALE) T2DM

Overweight from small child

Caribbean food, takeaways, sugary and high fat snacks, sugary drinks, grazing all day, sedentary (not binge eating)

Diagnosed T2DM and insulin resistance 16 years age

Difficult family situation

Social worker and independent living at 17 years

- Learnt cooking skills

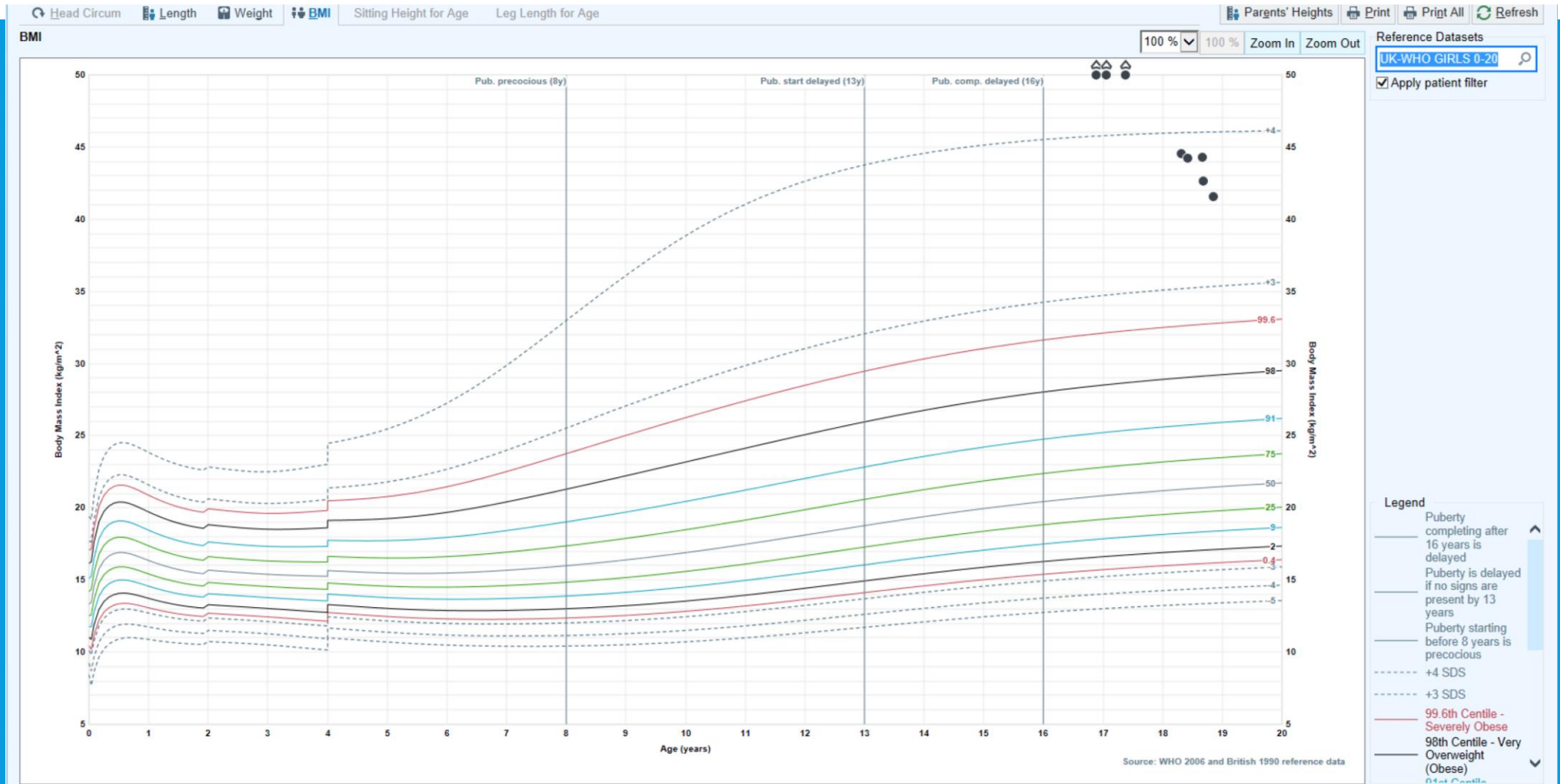
- Gym membership (paid by social services)

Weight 161 kg Dec 2018, 138 kg Aug 2021 **Lost 23 kg**

HbA1c now 5.3% (no medications)



T BMI CHART



T (FEMALE) T2DM



What worked well for T

Excellent Social Worker !

Diet changed to more freshly cooked unprocessed foods

T really enjoys gym and weights

Loves recording meals (goal sheets meal planner)

Monthly telephone call with dietitian

Currently

Working on stopping in-between meal snacks

Reducing portion sizes and carbohydrate portions

Advice on recipes, meal prep

Re-joined Gym

Discharge to adults with resources

A (MALE) CROHN'S DISEASE

Started gaining weight at 5 years – 'treats' every day, vegetarian

Medications for Chron's Disease and Hidradenitis

Low mood year 9, sleep apnoea

Stopped school year 10 due to anxiety about overweight

Isolated from friends

Psychiatrist and Dietitian joint meeting (April 2019)

Many different 'diets' tried April 2019 to August 2019

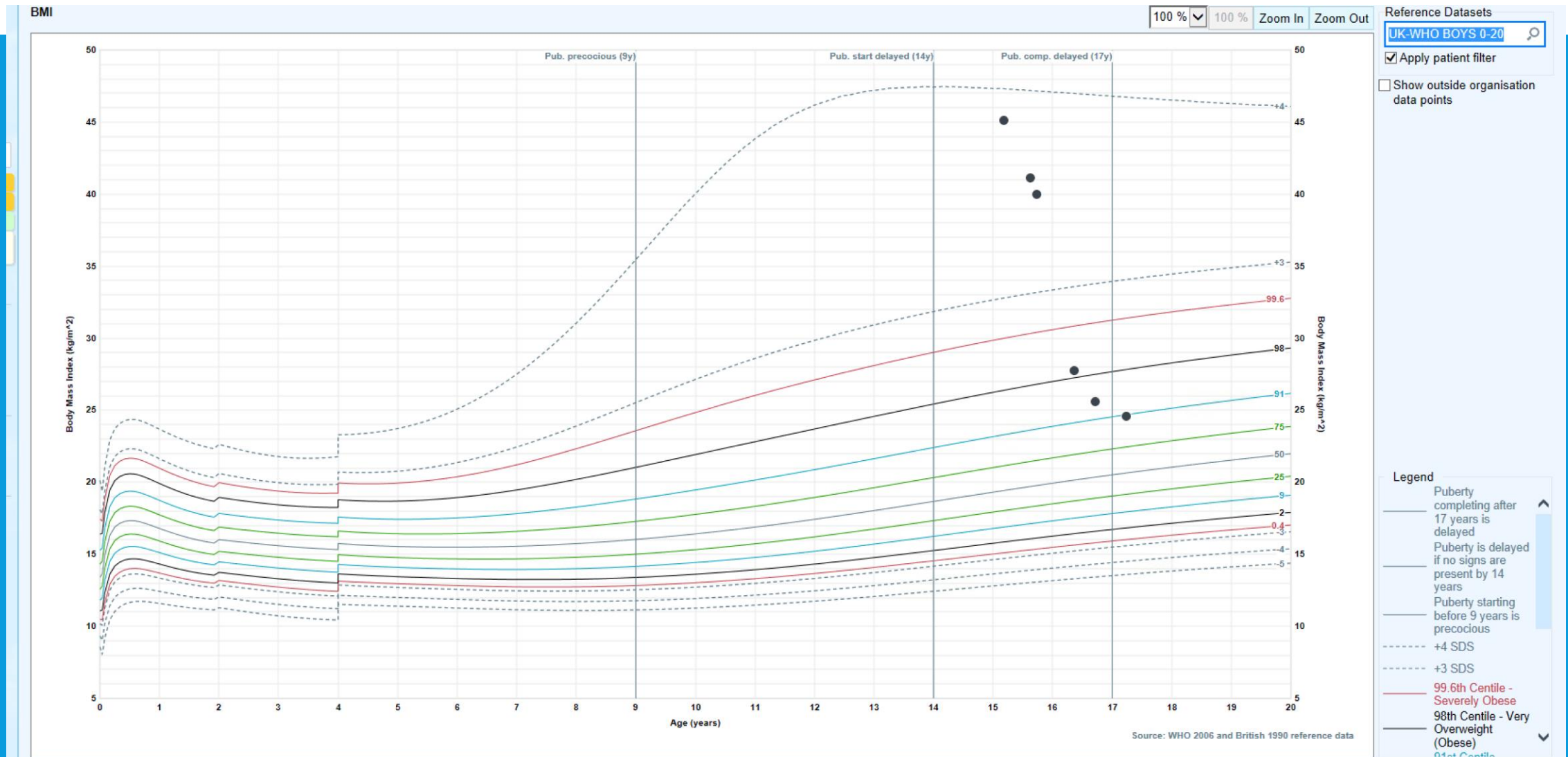
Settled on 3 meals a day and no snacks

Started with personal trainer

2 – 4 weekly sessions with dietitian



A BMI CHART



A (MALE) CROHN'S DISEASE

Weight 125.6 kg Aug 2019, 71.4 kg Sept 2021 **Lost 54.2 kg**

What worked well for A

- Two weekly Psychiatry and dietitian sessions initially (not joint)
- Frequent email contact with dietitian
- **No in-between meal snacks (only water)**
- Three healthy meals a day (started animal protein)
- **Personal trainer twice a week (supportive Mum)**

Currently

- No sleep apnoea
- Loose skin
- Requested Keto diet - ? Build muscle
- Back at school, more confident

R (MALE) T2DM



Started gaining weight around 10 years age, snacking on sugary/fatty foods

Diagnosed T2 age 17

Autism, Hypertrophic Cardiomyopathy, Hypertension, Sleep Apnoea, Asthma, Hayfever, victim of money laundering at school

Parents with health problems, passive

Very unmotivated family (? depressed)

History of unable to utilise services and let down by some services

Medications for other health problems

Forgets to take Metformin

R (MALE) T2DM

Regular dietitian contact (every 2 – 6 weeks)

- Education each session with R and parents
- Help with life skills for R and parents
- Continued to encourage R and parents
- Ensure a 'sense of hope'



Outcome

- DNAs
- No engagement with Bright Futures etc
- Parents unable to help despite gentle encouragement and counselling
- Difficult to stop snacking on sugary foods, e.g. corner shop snacks
- Struggles with anger and mood
- No weight loss 116 kg July 2019, 121kg Aug 2021 **Gained 5 kg**
- However HbA1c improved from 7.5% to 6.4 % since taking Metformin
- Recently discharged to Adults (Mencap referral)

L (FEMALE) OBESITY

Overweight from 8 years – large portions, processed foods, snacks and grazing, sugary drinks

Joined STEP TEENS randomised, double blind, parallel group, multicentre clinical trial

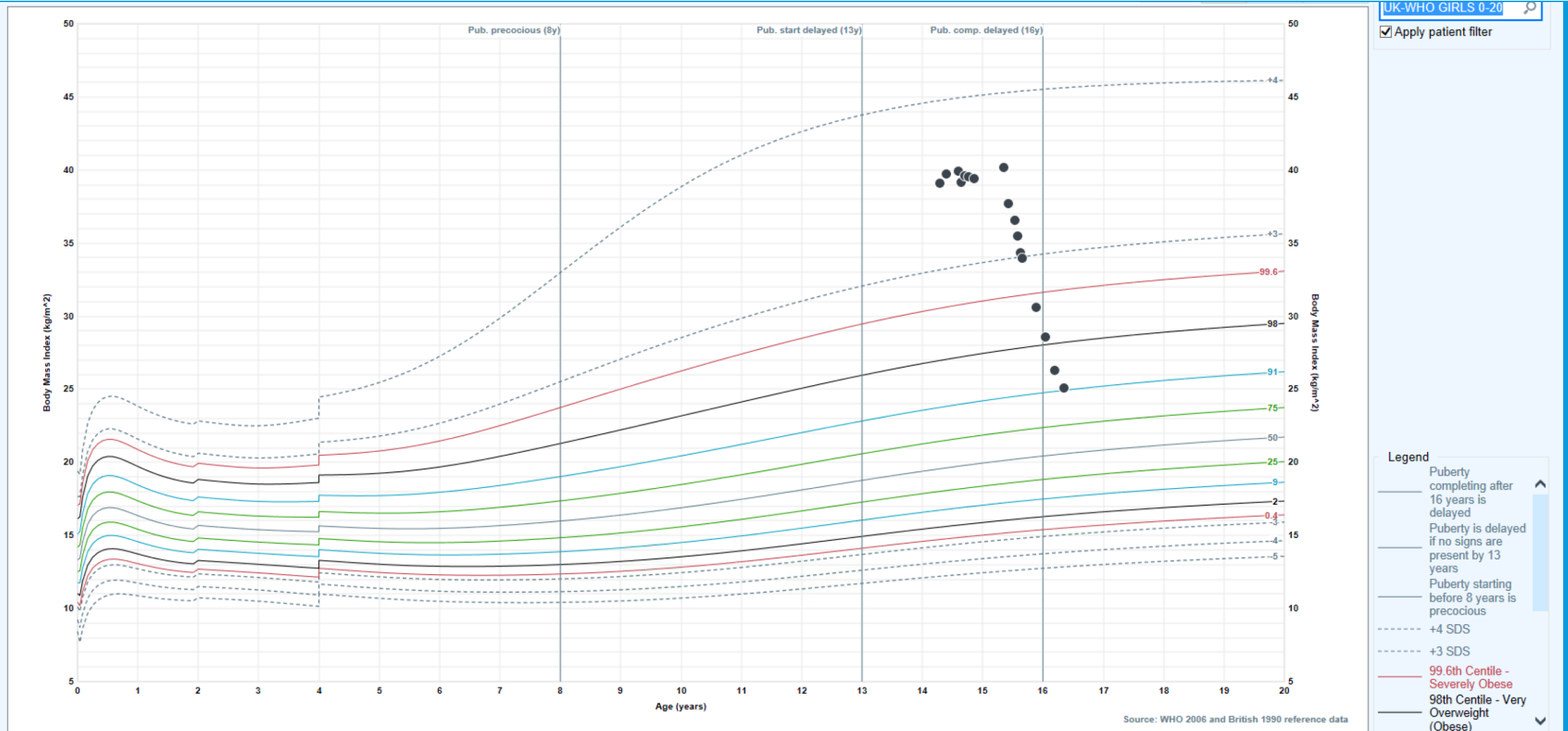
To compare the effect of semaglutide subcutaneous once-weekly versus semaglutide placebo as an adjunct to a reduced-calorie diet and increased physical activity on weight management in adolescents (ages 12<18 years) with overweight or obesity

Reduces appetite

Unable to lose weight during run-in



L BMI CHART



L (FEMALE) OBESITY

Dietitian and research nurse 2 weekly contact

Consistent dramatic weight loss 124.8 kg Sept 20, 77.8 kg Sept 21 **Lost 47 kg**

CAMHS referral

What worked well for L

Not hungry (some nausea)

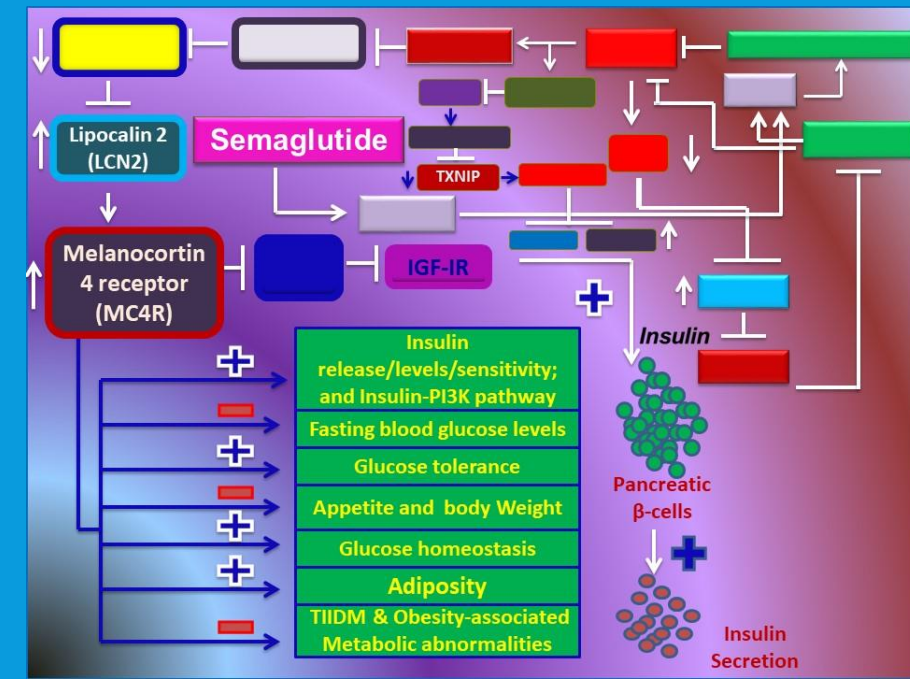
No snacks

Smaller portions

Benefit from clinical trial

Discharged from CAMHS

Now looking at maintenance



SEMAGLUTIDE

GLUCAGON-LIKE PEPTIDE-1 (GLP-1) RECEPTOR AGONIST

HALF LIFE OF ~160 HOURS

GLP-1 IS A PHYSIOLOGICAL REGULATOR OF APPETITE

GLP-1 RECEPTORS PRESENT IN SEVERAL AREAS OF BRAIN INVOLVED IN APPETITE REGULATION

DATA SHOWS WEIGHT-REDUCING EFFECT DUE TO REDUCED ENERGY INTAKE

CURRENTLY USED IN ADULTS WITH TYPE 2 DIABETES (T2D)

52 WEEK TRIAL IN ADULTS WITHIN WEIGHT MANAGEMENT ESTIMATED WEIGHT LOSS 13.8%

COMPARED TO WEIGHT LOSS OF 2.3 % ACHIEVED BY DIET, EXERCISE AND PLACEBO

POTENTIAL RISKS

GASTROINTESTINAL, INCLUDING CHOLELITHIASIS, ACUTE PANCREATITIS, PANCREATIC CANCER

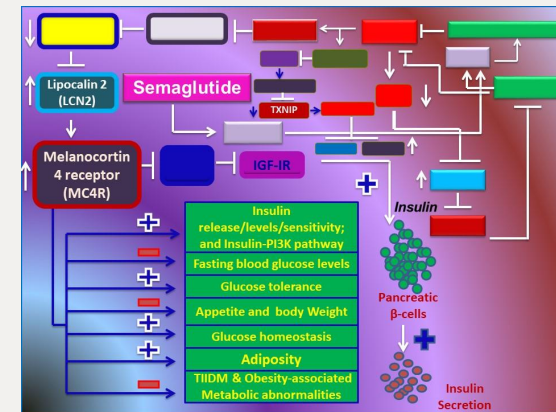
HYPOGLYCAEMIA (IDENTIFIED FOR T2D) ON MEDS

DIABETIC RETINOPATHY

MEDULLARY THYROID CANCER (BASED ON ANIMAL STUDIES)

ALLERGIC REACTIONS

PREGNANCY AND FERTILITY (BASED ON ANIMAL STUDIES)



B (FEMALE) MIGRAINES

- Attended A and E with migraine July 2021
- 17 1/2 years
- 163 kg
- Suicidal thoughts
- Always been 'big' Mum same weight
- No schooling nor seen health care professional since 14 years age
- Discharged from CAHMS, social worker at 14 years
- Isolated family
- Lies on sofa watching 'Come Dine With Me'



J (MALE) OBESITY

Overweight from toddler – fussy eater

Parents and siblings had Bariatric Surgery
Isolated family

Not in school from 13 years
No home schooling
Depressed, suicidal thoughts

Mum in conflict with school and all services

Unable to walk far and shower due to weight

Computer games in room all day

Paediatrician gently persuaded Mum to enlist family support worker

Dietitian regular contact building trust with family

J would have been lost to contact at 13 years age if not for Paediatrician (Billy) persuading family for Early Help referral



J (MALE) OBESITY



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Weight gain - ? Reported kcal approx. 1600 kcal/day, May 2021 151 kg

Looks slimmer since starting school

What worked well for J

- Paediatrician – Dr White initial 1.5 hour consultation (intense)
- Family support worker (excellent)
- Hospital school part time start June 2021
- Teacher astounded by ability to intellectualize learning
- Looking forward to full time school starting this week
- Dietitian education – now working with school – sense of hope!
- Suspect will lose weight now happy and routine

THE TRIAL



SOMEONE MUST HAVE BEEN
TELLING LIES ABOUT JOSEF K.

FRANZ KAFKA



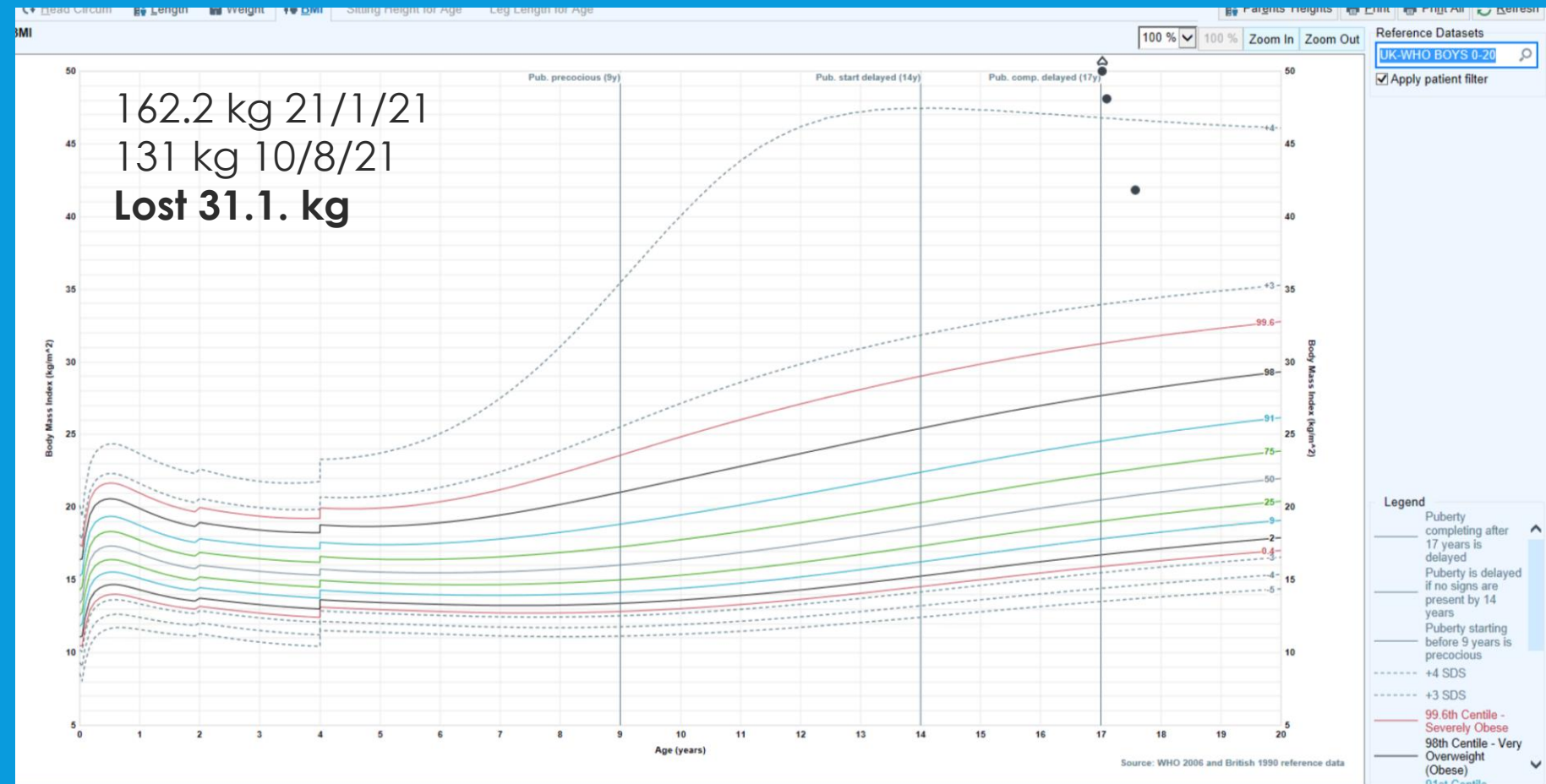
G (MALE) SLEEP APNOEA



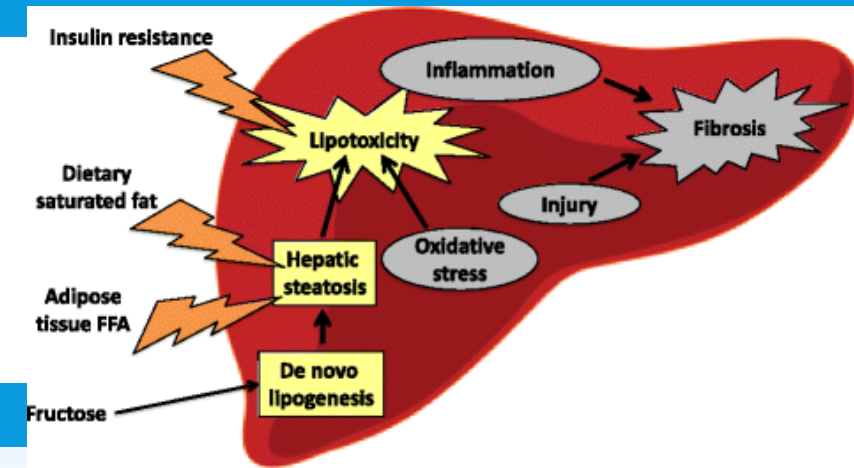
High carb and high fat diet
Constantly snacking on packet snacks

Ensure Mum support
Home cooked meals (protein and veg at each meal)

Stopped snacks
Sleeping better

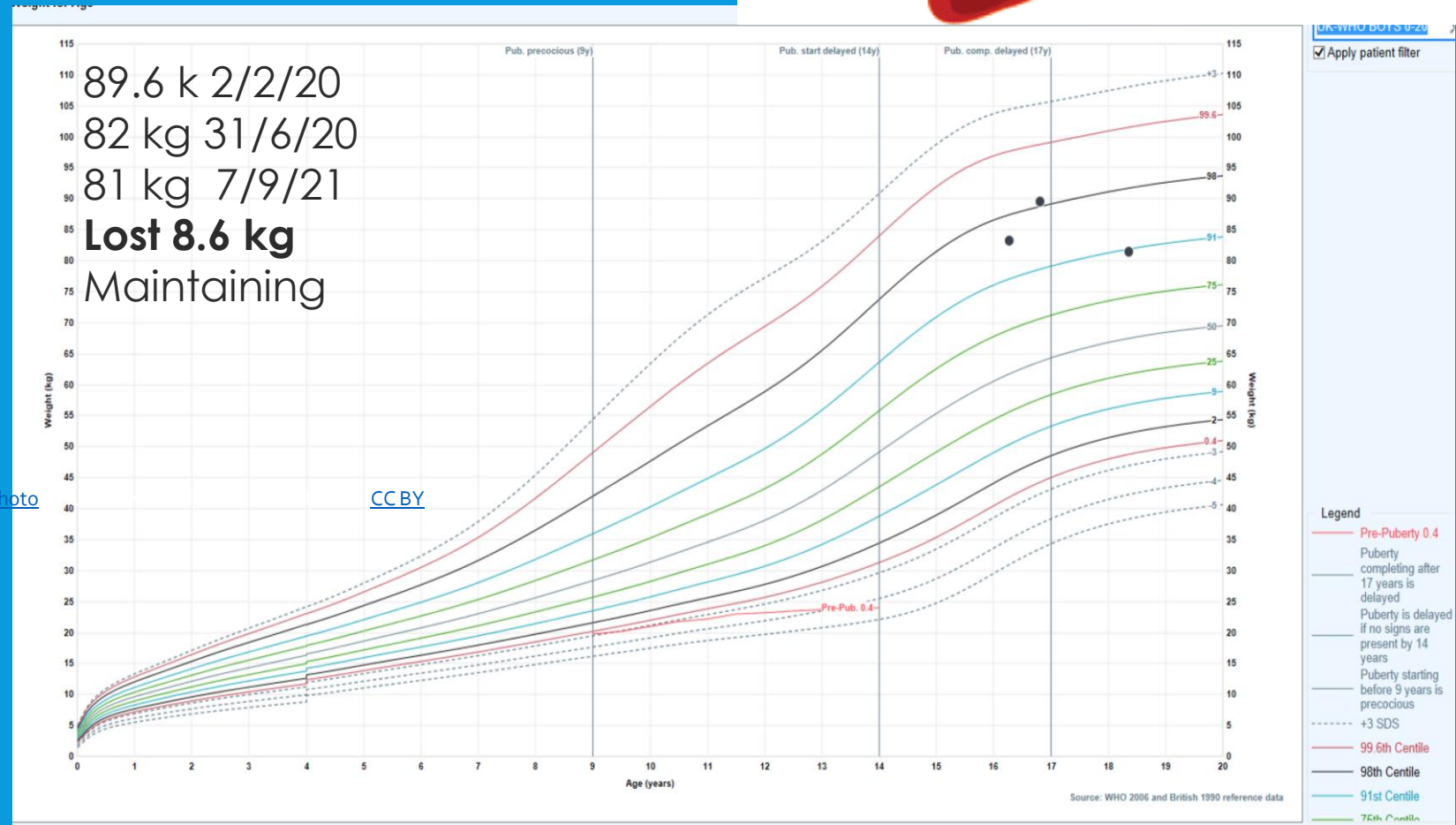


JL (MALE) NALFD PREDIABETES



4 – 5 large meals a day –
large carb portions
Cycles
Smokes cannabis

Meal plan of 3 meals a day
Smaller carb portion
JL requested two weekly tel contact
with dietitian to keep motivated
Discharged to Adults



EXAMPLE OF INDIVIDUALISED MEAL PLAN

- Eat three meals a day
- Aim for smaller carbohydrate portions at meal times
- Ensure have some protein and more fibre at meal times (these foods help you feel full)
- Avoid eating in-between meals (eating in-between meals stops fat burning)
- Drink plenty of water in-between meals (helps fill you up and helps stop hunger)
- Include some dairy foods each day (for calcium)
- Eat some good fats (helps you feel full)

Carbohydrate foods - eat smaller portions

- Bread, wraps, rolls, croissants, bagels etc.
- Pasta, rice, chips, crisps
- Cakes, pastries, biscuits, crackers, sweets, ice cream
- Breakfast cereals
- High carbohydrate fruit – grapes, bananas, melons, mango, all fruit juice, sugary drinks

Protein foods eat every meal time

- All meats (beef, lamb, pork, venison)
- All poultry (chicken, turkey, duck)
- All fish (including tinned fish)
- Sausages, bacon and ham
- Cheese (small portion)
- Eggs
- Handful nuts or seeds
- Pulses (lentils, chickpeas etc.)

Fibre foods – eat larger portions at meal times

- All vegetables
- All salad
- Lower carb fruit – apples, oranges, satsumas, kiwi fruit, plums, strawberries, raspberries, blueberries, blackberries (including frozen berries), melon.

Dairy foods – include some dairy foods each day

- Yoghurt (avoid sugary yoghurts)
- Cheese (small portion)
- 200 ml of milk per day

Good fats to include

- Olive oil (avoid all other vegetable oils)
- Avocado
- Olives
- No added sugar peanut butter
- Oily fish (mackerel, sardines, salmon, herring)

Good activities

- Walking and running
- Cycling
- Dancing
- All sports
- Housework and cleaning
- Gym

Suggested Breakfasts/Brunch: (note to help increase protein on breakfast cereals – add some lower carb/high protein yoghurts or some pumpkin seeds or sunflower seeds)

- Porridge sachet made with milk
- 2 weetabix with milk
- Cooked breakfast – eggs, sausage, bacon, mushrooms, tomatoes and 1 slice of toast
- Scrambled eggs on 1 slice of toast
- Smoked mackerel or smoked salmon on 1 slice of toast
- Banana pancake (see recipe) served with lower carb/high protein yoghurt

Suggested Lunches: (have apple, orange, kiwi or berries after lunch)

- Large Tuna salad with real mayonnaise (not low fat)
- Large cheese salad or ham salad with real mayonnaise (not low fat)
- Cheese salad or ham salad sandwiches (use double portions of cheese or beef to increase the protein of lunch) with 1 apple or 2 satsumas or 1 orange
- Jacket potato with cheese and butter or tuna and butter and salad or with chilli con carne
- Cheese pasta pot

Suggested evening meals -family meal at home:

- Shepherd's pie or cottage pie with vegetables or salad
- Steak and small portion of chips or sweet potato chips with vegetables or salad
- Chicken or turkey with potatoes with vegetables or salad
- Lasagne with vegetables or salad
- Fish with potatoes or rice and vegetables or salad
- Big bowl of butternut squash and vegetable soup with cheese topping and 1 small bread roll
- Take out meal (limit to once per week)
- Spaghetti bolognese served with vegetables and salad
- Meatballs or meat patties with mashed potatoes and vegetables or salad
- Jacket potato with cheese and butter or tuna and butter and salad or with chilli con carne
- Sausages and mash served with vegetables or salad
- Family meal (cultural foods/meal)
- Chicken pie with vegetables

Suggested desserts (for after evening meal):

- 25 g of cheddar cheese (matchbox size)
- 1 lower carb/high protein yoghurt pot (see links on page 4)
- Berries and Greek yoghurt (can have frozen berries)
- Low sugar apple crumble (see recipe)
- Apple or 2 satsumas or 1 orange or 2 kiwi fruit
- 20 grams of salted peanuts
- Fruit salad with yoghurt or double cream
- Dark chocolate (2 squares)
- Home made ice cream (use dates or honey to replace sugar)
- Fresh coconut
- 200 ml of semi skimmed milk

Suggested drinks:

- Drink mainly water
- Occasional no added sugar squash or occasional sugar free drink
- Occasional tea or coffee with milk (no sugar)
- Occasional low calorie hot chocolate

Avoid in-between meal snacks – however choose one of these if need to have one in-between meal snack per day:

- 1 boiled egg
- 20 grams of salted peanuts or some peanut butter with 1 oatcake
- 1 slice of meat or chicken or ham with salad
- Packet of biltong (choose lower carb brands)
- 1-2 packets of seaweed thins. <https://www.tesco.com/groceries/en-GB/products/279834507>
- Small tuna or cheese salad with real mayonnaise
- Packet of Hippyas or salted popcorn, or Wotsits
- 1 slice of toast with no added sugar peanut butter or low fat cheese spread
- Olives
- Avocado on 1/2 slice of toast
- 17 walnuts or 7 cashew nuts or 7 almonds
- 2 squares of dark chocolate
- 1 low calorie hot chocolate
- 2 satsumas or 1 orange or 1 apple or melon pieces
- Portion of berries served with double cream or Greek yoghurt
- Fresh coconut
- Coconut chips
- Houmous with carrot or cucumber sticks
- Cut up sticks of pepper, carrot, cucumber, celery with cream cheese or cheddar cheese
- Meat patty with lettuce wrap and real mayonnaise (see recipe for meat patty)

Recipe for meat patties:



- 500 gram pack of 10% fat mince beef.
 - Divide the pack of mince beef into 5 portions and shape with your hands to make a 'patty' shape or a burger shape.
 - Add a tiny bit of butter to melt in the bottom of the pan and place the patties in the pan and cook on both sides until cooked through
 - Keep in fridge for up to 4 days or freeze for 2 months
 - Serve with salt and pepper or with some melted cheese wrapped in a lettuce leaf with no-added sugar tomato ketchup or mayonnaise and some sliced tomatoes.

Low carb banana pancake:



- 1 small banana (or ½ medium size banana)
- 1 medium egg
- 5 grams of butter (1 heaped teaspoon)
- 2 teaspoons SR flour
 - Mash the banana really well so that it forms a puree using the back of a fork on a dinner plate. Beat the egg well and add the well mashed banana and the flour. Melt the butter in a non-stick fry pan and let the butter cool a little. Using a silicone spatula scrape all of the butter into the egg and banana mixture. Mix well. Pour the whole pancake mixture in the non-stick pan on medium heat (or can make 2 smaller pancakes). Push the edges of the pancake into the middle just a little so that the pancake does not spread too much and will be easier to flip. Flip the pancake when cooked on one side. When cooked can eat on its own or add some Greek yoghurt and berries (or lemon juice).

Apple crumble (makes 6 – 8 portions)

- 5 medium size English eating apples
- 230 ml water
- 90 grams of butter
- 120 grams of plain flour
- 90 grams of oats
- 30 grams of sugar (Demerara is best) or 30 grams of honey
- 1 teaspoon of ground dry cinnamon or 1 teaspoon of ground dry ginger (optional)

Method (only need one saucepan)

- Wash the apples. Weigh the apples and record weight in worksheet (weigh whole).
- Cut up the apples into small pieces (take out the core, but leave the skin on – skin is good source of fibre, vitamins and minerals).
- Put the cut up apples with 230 ml of water in a saucepan. Boil and then simmer for 15 minutes – leave the saucepan lid on.
- Once the apples are cooked (soft), pour them into a baking dish (approx size baking dish 9 inches by 7 inches).
- Weigh other ingredients.
- Don't wash the saucepan. Put the butter in the saucepan and put on gentle heat so that the butter melts but does not burn.
- One the butter has melted, turn the heat off and add the sugar, flour and oats and cinnamon or ginger and stir with a wooden spoon until the mixture is like breadcrumbs.
- Pour the breadcrumb mixture on top of the apples (in baking dish). Put tin foil on top of baking dish.
- Place in oven at 160 C for 20 minutes.

- Lower carb/higher protein yoghurts

<https://www.tesco.com/groceries/en-GB/products/299609590>



<https://www.tesco.com/groceries/en-GB/products/305738989>



<https://www.tesco.com/groceries/en-GB/products/288729288>



<https://www.sainsbury.co.uk/aisle-us/product/dairy/eggs-new/yeo-valley-super-thick-5-natural-450g>

<https://www.yeovalley.co.uk/things-we-make/yogurt/super-thick-harvest-0-fat-natural/>



<https://www.sainsbury.co.uk/aisle-us/product/grain-seeded-bread/hovis/>



<https://www.sainsbury.co.uk/aisle-us/product/wholemeal-brown-bread/fit-to-go/>



<https://www.waitrose.com/products/lidl-life-seriously-seeded-sliced-bread/609667-288713-288714>

Lower carb oatcakes:

<https://www.tesco.com/groceries/en-GB/products/259999618>



<https://lidlough.co/>

Some lower carb websites with recipe ideas:

<https://www.bbcgoodfood.com/recipes/collection/low-carb-snacks-recipes>

<https://www.bbcgoodfood.com/recipes/collection/low-carbohydrate-recipes>

<https://www.bbcgoodfood.com/howto/guide/recipes-teenagers>

<https://www.olivemagazine.com/guides/best-ever/best-ever-low-carb-recipes/>

<https://www.caldesi.com/category/recipes/>

<https://www.lowcarbtogether.com/>

<https://thelowcarbkitchen.co.uk/>

Beginners' exercises – You Tube

No equipment needed:

<https://www.youtube.com/watch?v=48HMCy5fEvg>

Using dumbbells:

<https://www.youtube.com/watch?v=L3eImBAXT7I>

OR

<https://www.youtube.com/watch?v=r9M6CjJFMDU>

Fun UK workout:

https://www.youtube.com/watch?v=gC_L9qAHVj8

A little harder workout (8 minutes long):

JA18 ½ years 206 kg

480 g tub of corner shop ice cream - £3.00



**960 kcal, 53.4g fat, 32.4g sat fat,
110g carbs, 14.4g protein**
(contains milk)

500 g packet 10% fat mince beef
corner shop - £2.60



**845 kcal, 49g fat, 20g sat fat,
0g carbs, 101g protein**
(Ca, Fe, Mg, K, P, Zn, Se, Folate,
B vits, Choline, vits A, E and K)

LOSING WEIGHT - SOME CHALLENGES

Always hungry

Poor sleep – tired

Emotional eating/comfort eating

Addicted to high carb/high fat foods and 'junk' foods

Addicted to games/sedentary behaviour

NHS Website states:

Addiction is a common problem, but help is available

Addiction is defined as not having control over doing, taking or using something to the point where it could be harmful to you



HIGHLY PROCESSED FOODS/PROTEIN LEVERAGE HYPOTHESIS

Addictive nature of highly processed foods

Large multinational companies huge spending on food scientists, advertising product packets etc. enticing children to buy. Huge influence with the associated feelings and memories

‘guilt free treat’

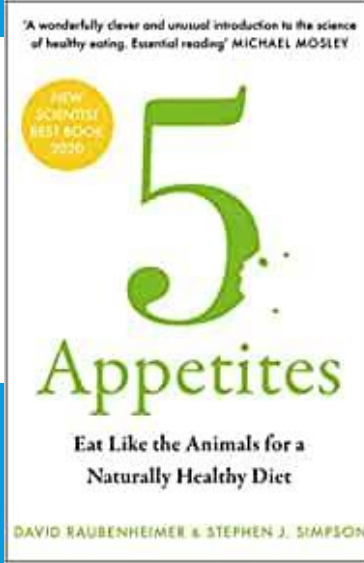
Availability of highly processed foods

Vending machines, shops, takeaways, parties, Greggs!!

Protein Leverage Hypothesis

Retrospective study : Young people with obesity protein dilution by either carbs or fat increases total energy expenditure

? Children and young people diluting % protein energy intake by eating highly processed foods (typically carbs and fat) and a high fat/carb diet – driving hunger and appetite?





REFERENCES AND RESOURCES

References

Slide 2 Calcaterra et al (2021) Metabolic Derangement in Pediatric Patient with Obesity: The Role of Ketogenic Diet as Therapeutic Tool, Nutrients Aug; 13(8): 2805.

Slide 2 Chaput and Dutil (2016) Lack of sleep as a contributor to obesity in adolescents: impacts on eating and activity behaviors, International Journal of Behavioral Nutrition and Physical Activity Sep 13:103.

Slide 3 Reinehr (2013) Type 2 Diabetes Mellitus in children and adolescents, World Journal of Diabetes Dec 15; 4(6): 270-281 Slide 21 Saner et al (2020) Evidence for Protein Leverage in Children and Adolescents with Obesity, Obesity Apr 28(4):822-829

From internet: <https://www.england.nhs.uk/midlands/wp-content/uploads/sites/46/2019/09/Diagnosis-and-management-of-Type-2-Diabetes-T2DM-in-Children-and-Young-People-CYP-Clinical-Practice-Guideline.pdf>

Few of the many resources

BEAT

<https://www.beateatingdisorders.org.uk/search/?query=binge+eating>

<https://www.ukat.co.uk/food-addiction/>

Caroline Walker Trust <https://www.cwt.org.uk/>

Bright futures <https://www.brightfuturesuk.org/>

Young Minds <https://www.youngminds.org.uk/>

<https://www.nhs.uk/change4life/your-childs-weight/home>

<https://www.nhs.uk/live-well/healthy-weight/healthy-weight-children-advice-for-parents/>

<https://www.bbcgoodfood.com/howto/guide/recipes-teenagers>