Overweight and Obesity

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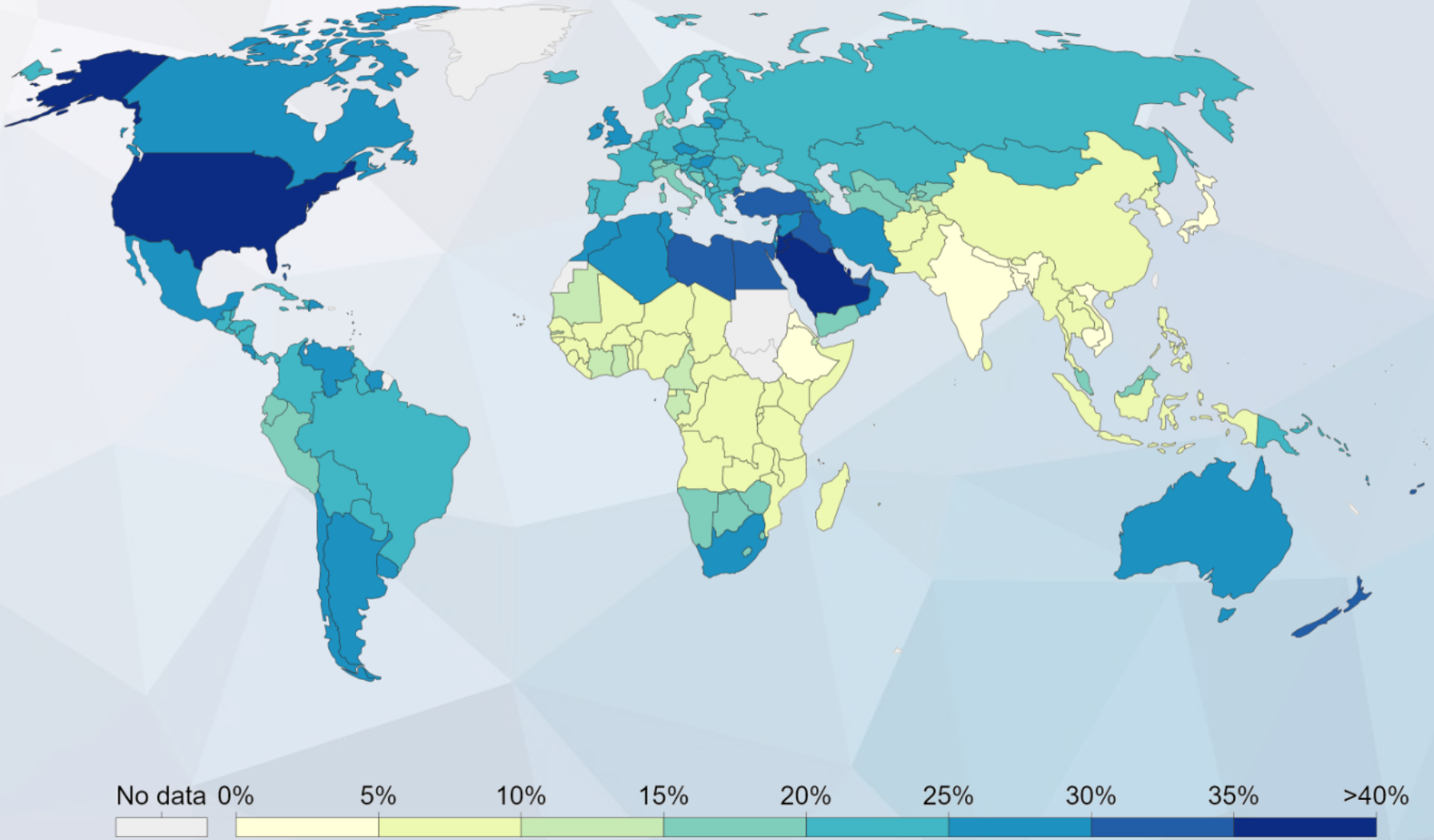
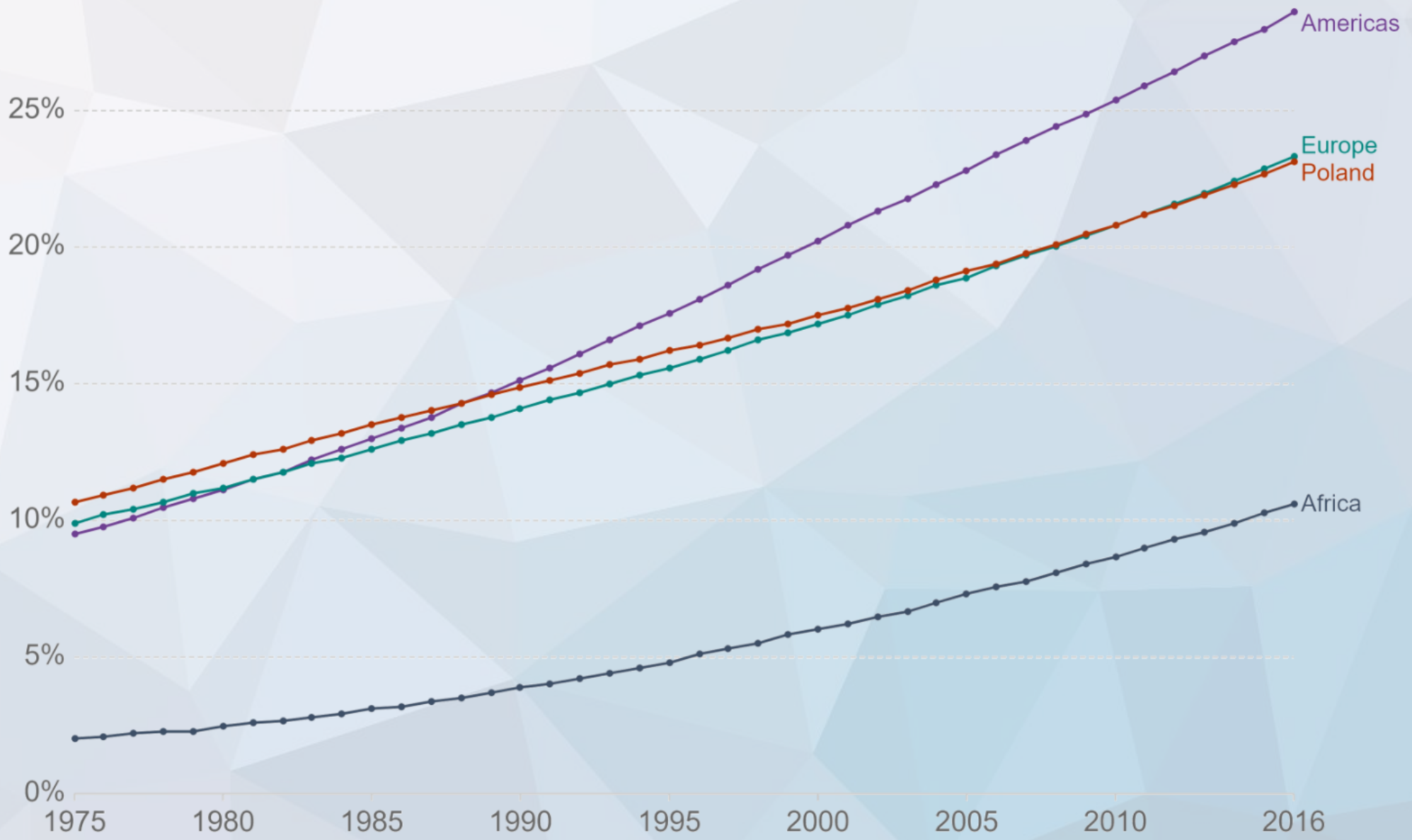
UNIWERSYTET MIKOŁAJA KOPERNIKA W TORUNIU

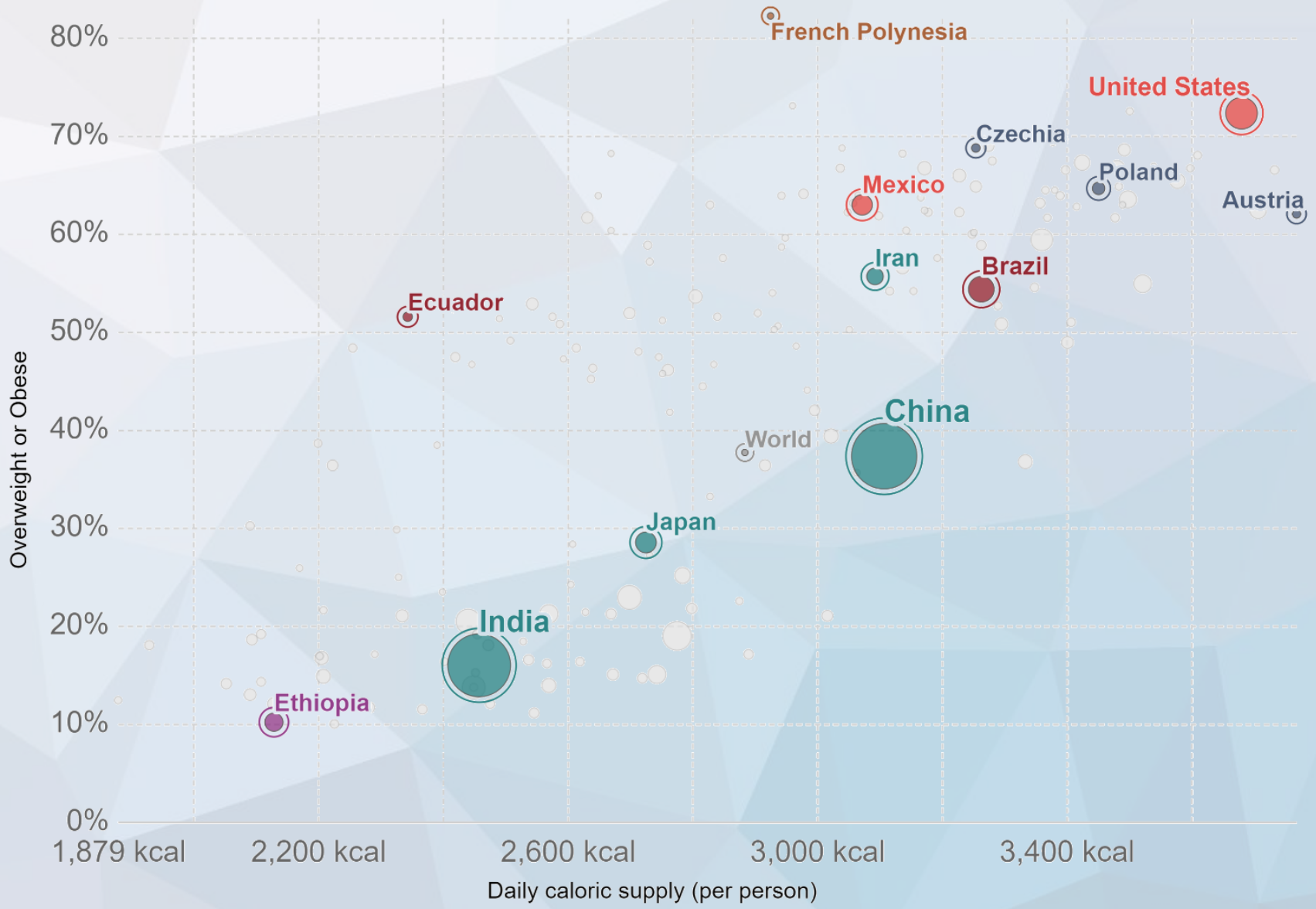


2016

Źródło: WHO, Global Health Observatory



Źródło: WHO, Global Health Observatory

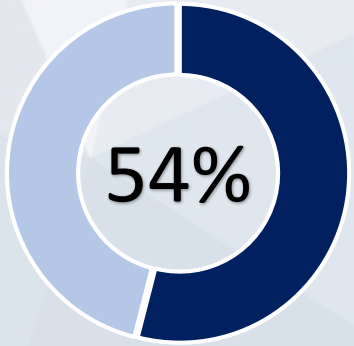


NCDRisC and FAOstat

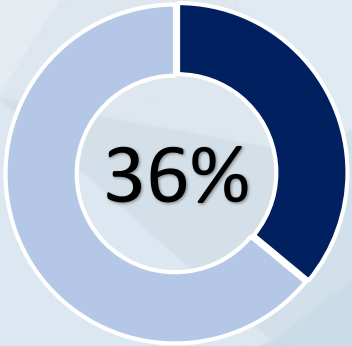
THE BIOPSYCHOSOCAL MODEL

Źródło: Modern management of obesity. B. S. Aditya, J. Ph. Wilding. Clinical. Medicine 2009;6(9):617-621

patients with obesity n = 14 502

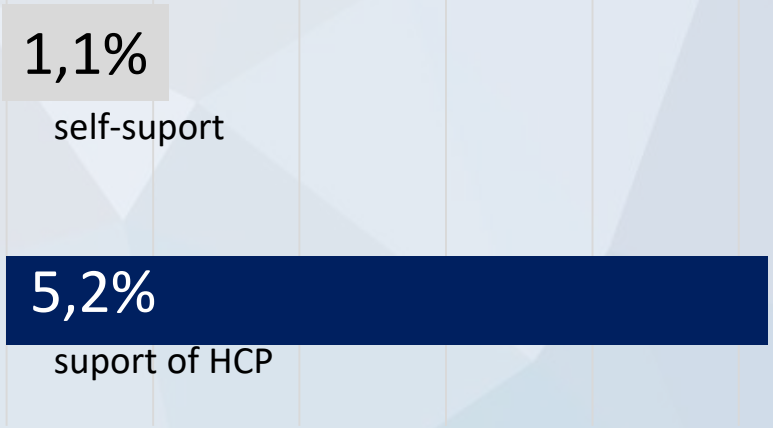


talking to doctor about weight in the last 5 years



have been formally diagnosed

Body mass reduction, n=415 T=24m

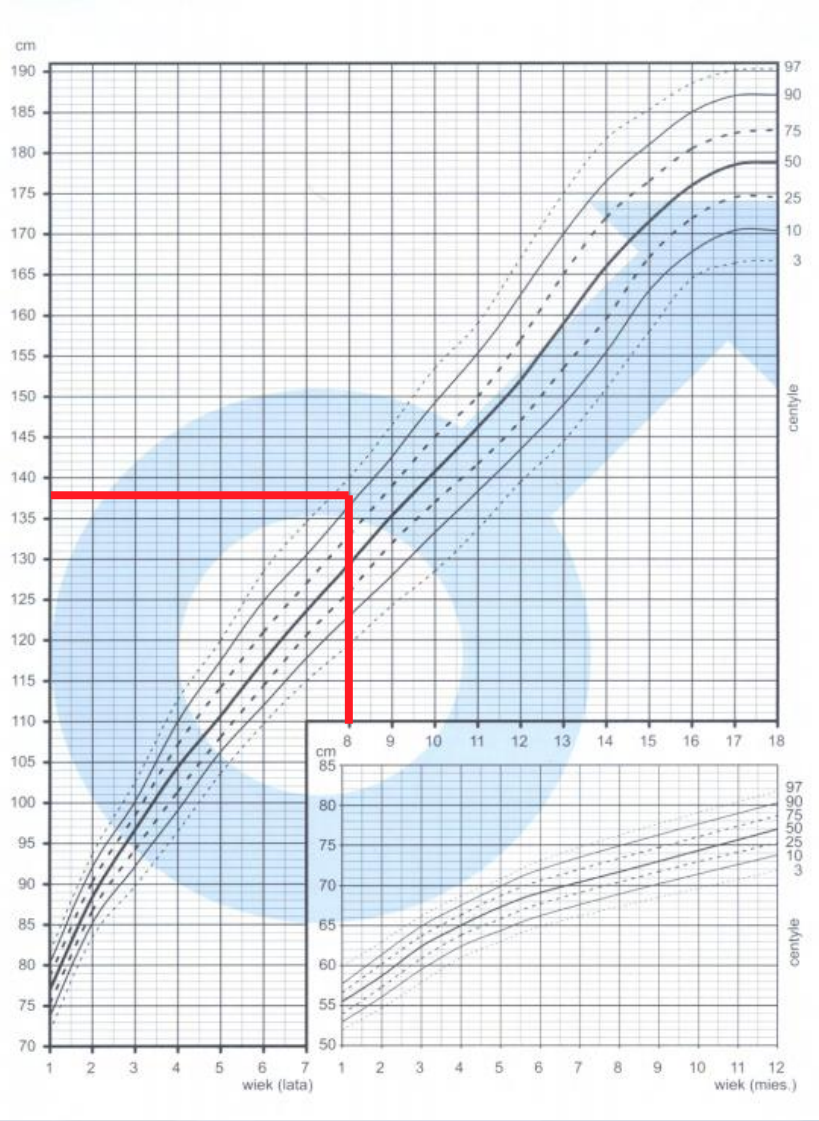


MEDICAL VISIT

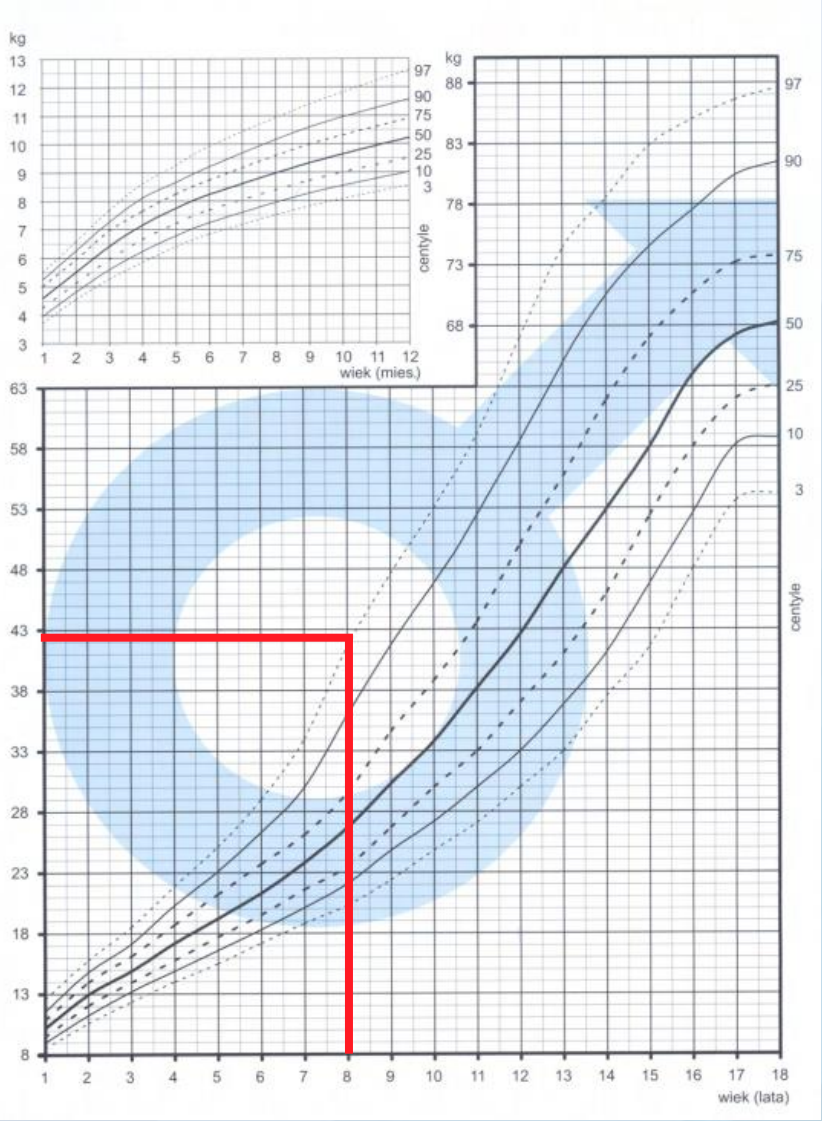
$$\mathbf{BMI} = \frac{body\ mass\ [kg]}{growth[m]^2}$$

WILEY Gaps to bridge: Misalignment between perception, reality and actions in obesity. *Diabetes Obes Metab. 2019;21:1914–1924*

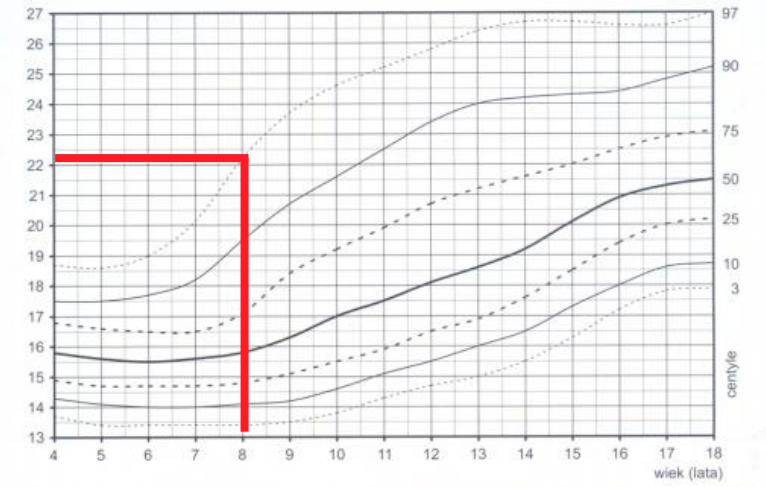
body height percentile grid for Warsaw boys

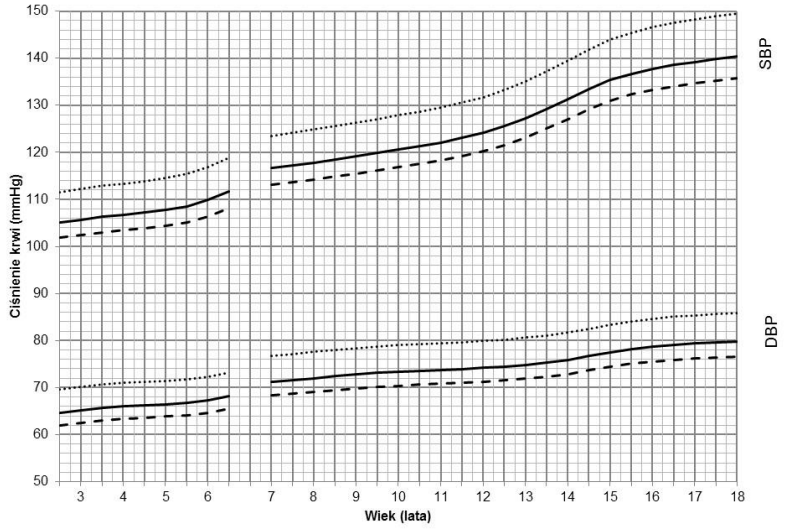


weight percentile grid of Warsaw boys

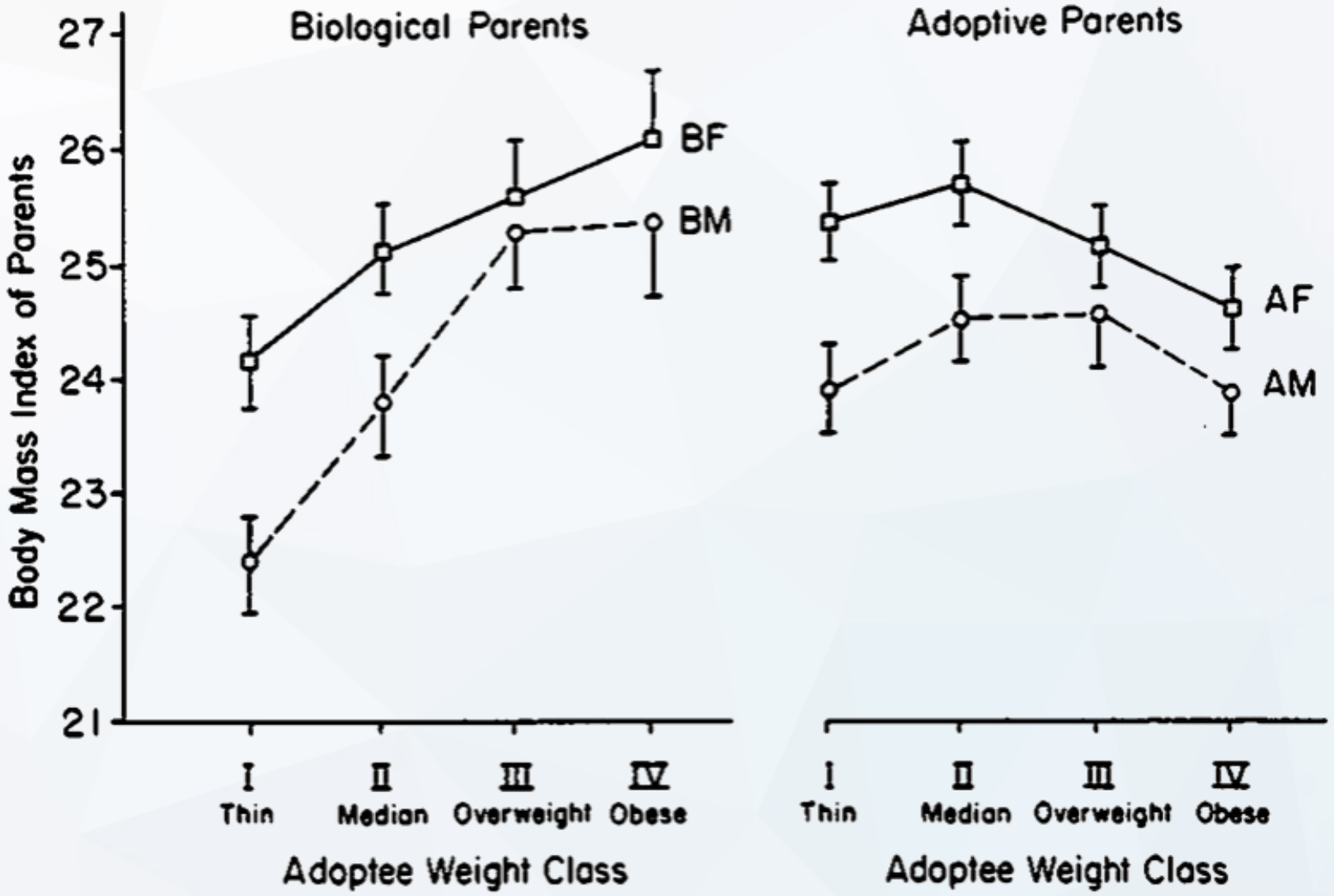


the percentile grid of the relative body mass index (BMI) of Warsaw boys





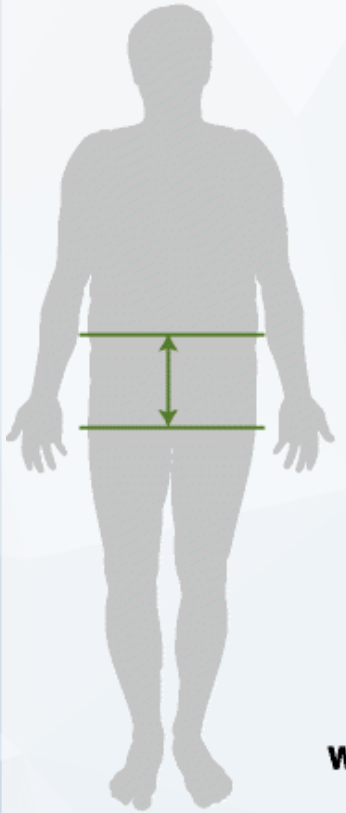
Centyle ciśnienia krwi: skurczowego (SBP) i rozkurczowego (DBP) chłopców wg wieku; badania OLAF i OLA w latach 2007-2012 centyl 90-linia przerywana, centyl 95-linia ciągła, centyl 99-linia kropkowana. Źródło: Standardy Med. Pediatria 2013;10:22-30

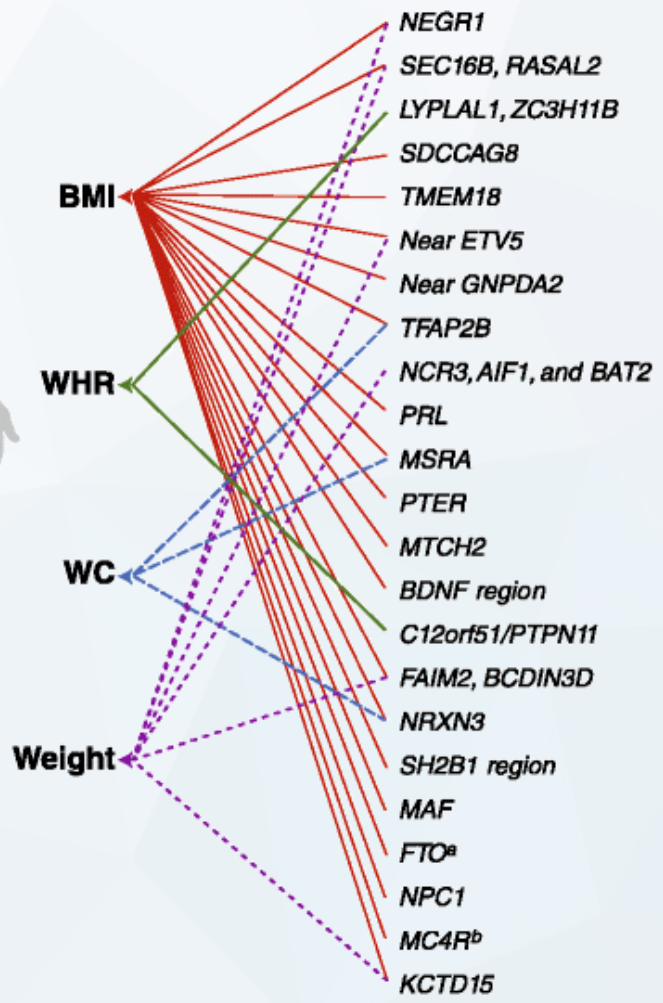


Źródło: An Adoption Study of Human Obesity. A. Stunkard et al. N Engl J Med 1986; 314:193-198

GENETIC FACTORS IN DEVELOPMENT OF OBESITY

mice ob/ob, mice y db/db,





Gene name	Position	Study
NEGR1	1p31	[36••, 37••]
SEC16B, RASAL2	1q25	[37••]
LYPLAL1, ZC3H11B	1q41	[17••]
SDCCAG8	1q43–q44	[39]
TMEM18	2p25	[36••, 37••, 39]
Near ETV5	3q27	[37••]
Near GNPDA2	4p13	[36••]
TFAP2B	6p12	[17••]
NCR3, AIF1, and BAT2	6p21	[37••]
PRL	6p22.2–p21.3	[38••]
MSRA	8p23.1	[17, 39]
PTER	10p12	[38••]
MTCH2	11p11.2	[36••]
BDNF region	11p14	[37••]
C12orf51/PTPN11	12q24	[53••]
FAIM2, BCDIN3D	12q13	[37••]
NRXN3	14q31	[47]
SH2B1 region	16p11.2	[36••, 37••]
MAF	16q22–q23	[38••]
FTO[a]	16q22.2	[29••, 30, 35••–38••, 39]
NPC1	18q11.2	[38••]
MC4R[b]	18q22	[35••–38••, 39, 40••]
KCTD15	19q13.11	[36••, 37••]

Źródło: The Genetics of Obesity Blanca M. Herrera, C. M. Lindgren, Curr Diab Rep (2010) 10:498–505

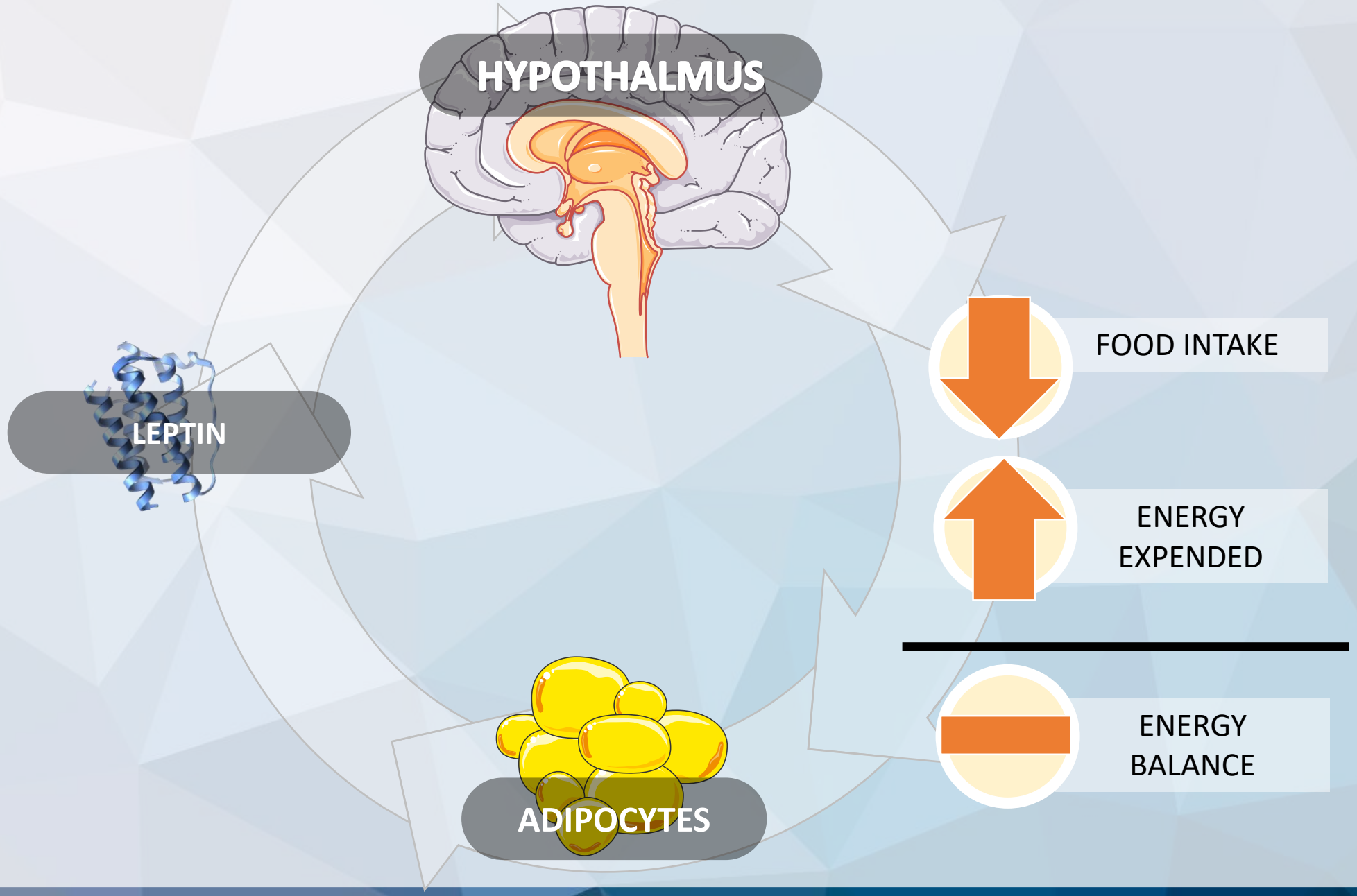
Genetic determinants of obesity

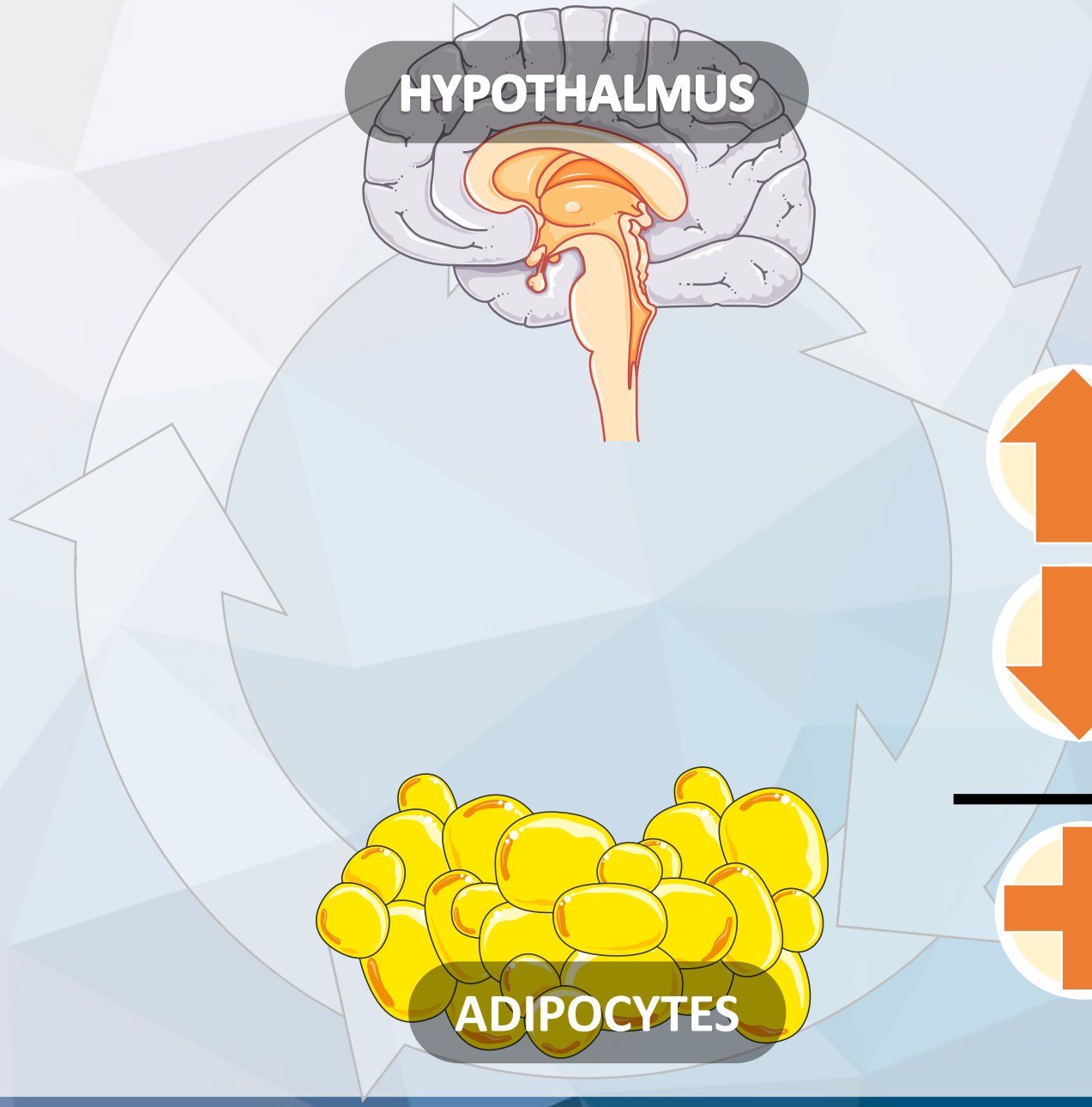
MONOGEN FORMS:
there are rare mutations in the leptin and melanocritin pathway, leading to obesity in early childhood,
e.g. **POMC**, NPY, **LEP, LEPR**, MC3R, **MC4R**, FTO, PC1,

MULTIGENUM FORMS:
UCP1, UCP2, UCP3, ADRB1, ADRB2, ADRB3, SLC6A14, FABP2,

Disease syndromes:
Prader-Willi syndrome (chromosome 15q11.2, 15q11-q13 deletion),
The WAGR team Alstrom's syndrome (2p13.1)
Bardet Biedl's syndrome (the mutation affects at least 11 loci)
Berardinelli-Seip syndrome - lipodystrophies 1,2
Cohen syndrome,
Fanconi-Bickel,
Camey,
Angelman,
Dunningann lipodystrophies and others.

Źródło: Molecular genetics of human obesity: A comprehensivereview. R.K. Singh et al. C. R. Biologies 340 (2017) 87–108


HYPOTHALMUS
LEPTIN
ADIPOCYTES
FOOD INTAKE
ENERGY EXPENDED
ENERGY BALANCE



FOOD INTAKE

ENERGY EXPENDED

ENERGY BALANCE

OBESE

weight gain during pregnancy, gestational diabetes, malnutrition during pregnancy,

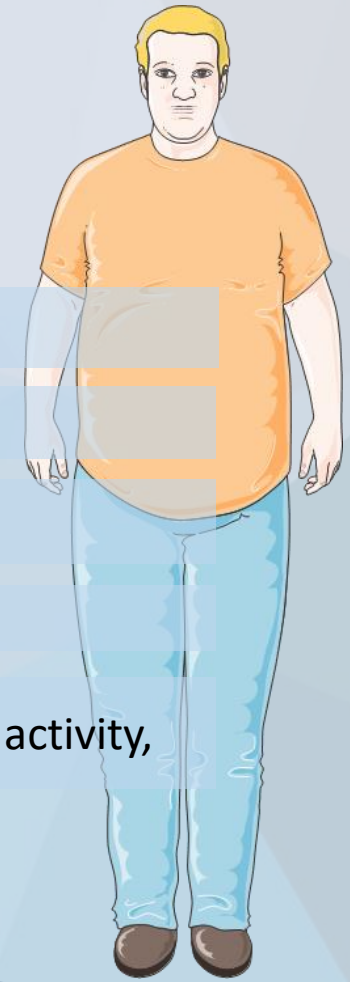
environmental toxins, intestinal microflora, oral cavity, vagina,

quantity and quality of food,

psychosocial factors

insufficient quantity and quality of sleep,

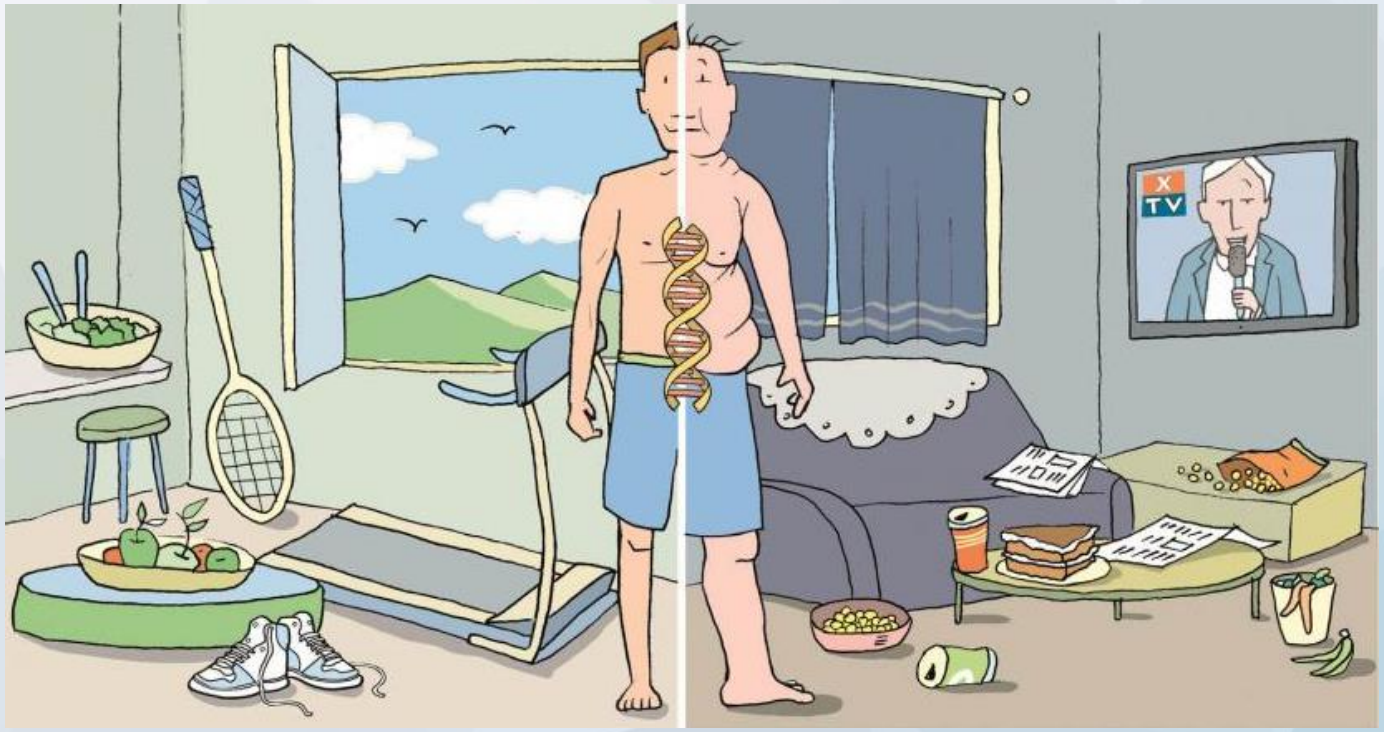
appetite and satiety – increased calorie intake, insufficient physical activity,



PLASTICITY AND REVERSIBILITY

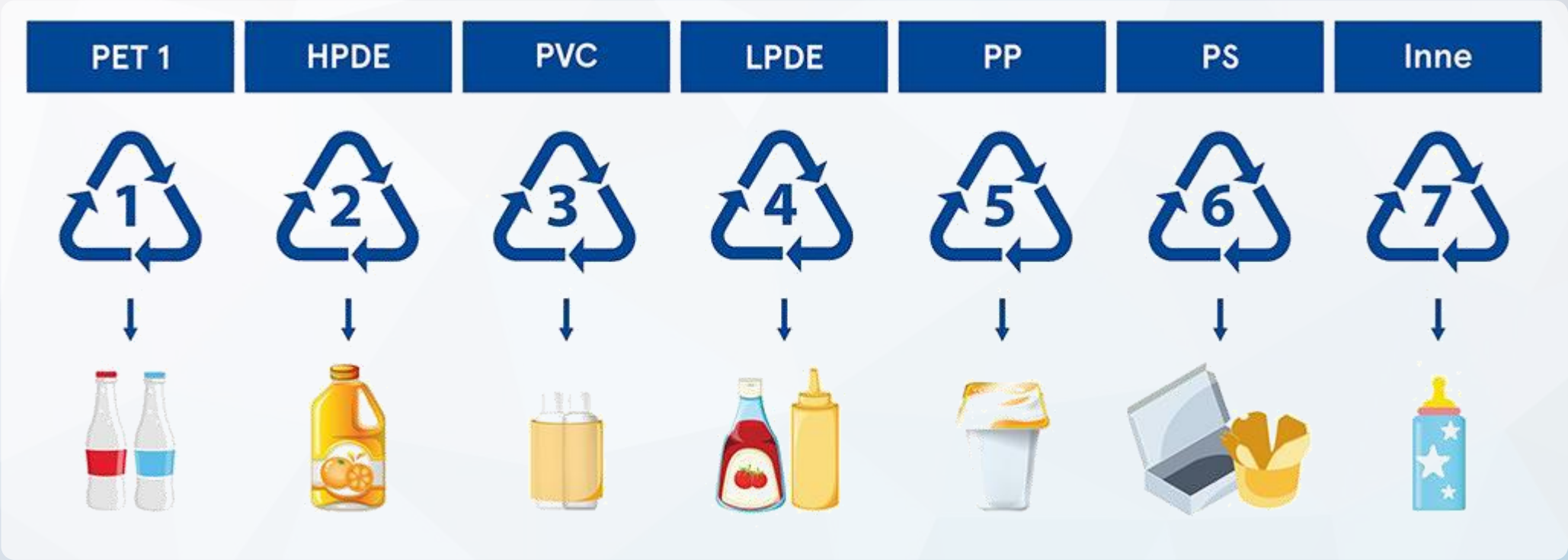
embryonic	fetal	neonatal	early childhood	puberty	adulthood

PATIENT SUFFERING FROM OBESITY...



WEIGHT BIAS in various areas of life:

- Human Relationships (teasing, bullying, exclusion, embarrassment)
- Education (lower expectations, lower academic performance, teasing, stereotypical teachers)
- Work (employment inequality, lower pay, termination of work, stigma from colleagues
- Healthcare (health worker bias, lower quality of care, refusal of procedures, blaming, judging patients)
- Stereotypes in the media (entertainment and news media, television, movies, social media)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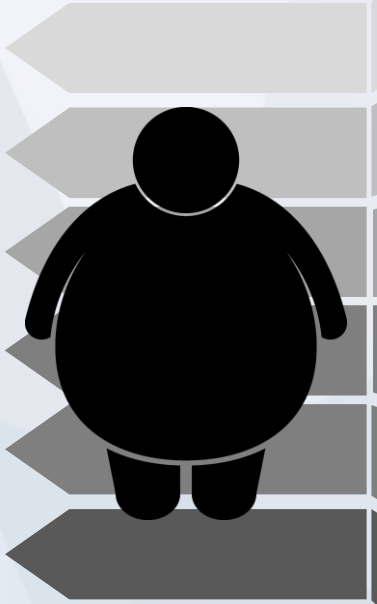


the treatment of obesity is about improving health and well-being, not reducing numbers per weight

good obesity treatment starts with finding the causes of obesity

the best weight is the one that is for maintaining a healthy lifestyle

the best diet plan is the one that the patient will follow

regular medical visits are important, weight gain may recur if not treated properly

obesity is a chronic disease requiring long-term treatment

Pulmonary disease
Abnormal function
Obstructive sleep apnoea
Hypoventilation syndrome

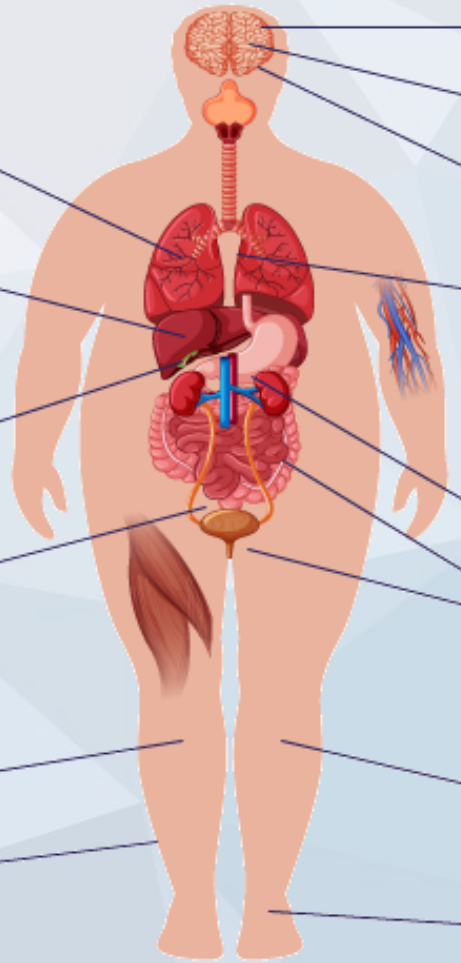
Non-alcoholic fatty liver disease
Steatosis
Steatohepatitis
Cirrhosis

Gall bladder disease

Gynaecologic abnormalities
Abnormal menses
Infertility
Polycystic ovarian syndrome

Osteoarthritis

Skin



Idiopathic intracranial hypertension

Stroke

Cataracts

Coronary heart disease
← **Diabetes**
← **Dyslipidaemia**
← **Hypertension**

Severe pancreatitis

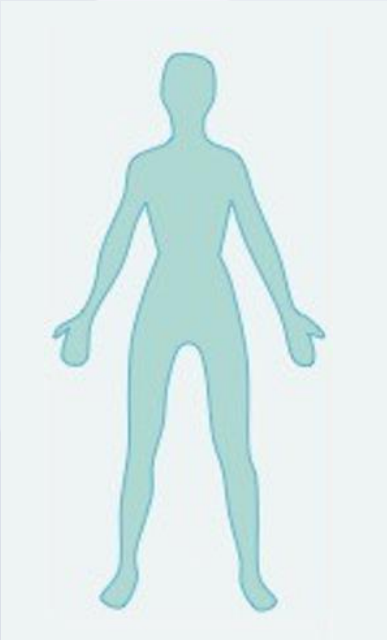
Cancer
Breast, uterus, cervix, colon, oesophagus, pancreas, kidney, prostate

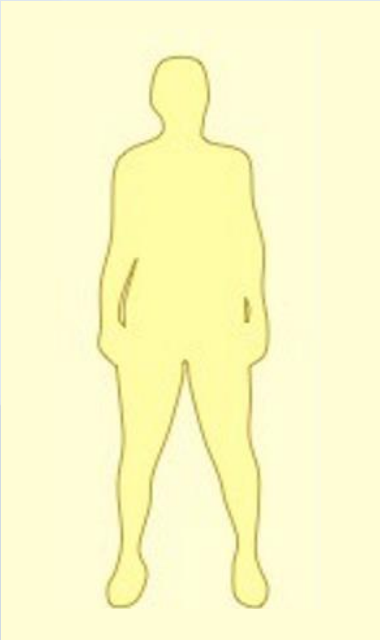
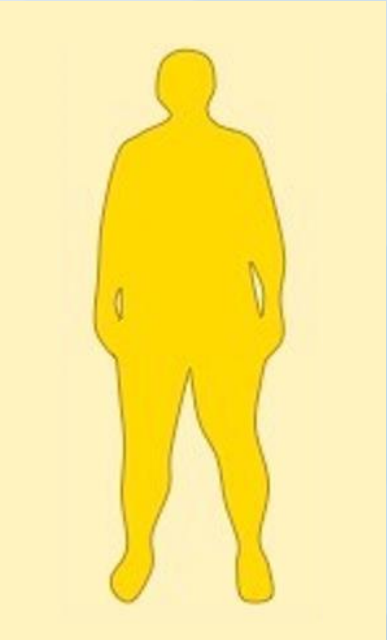
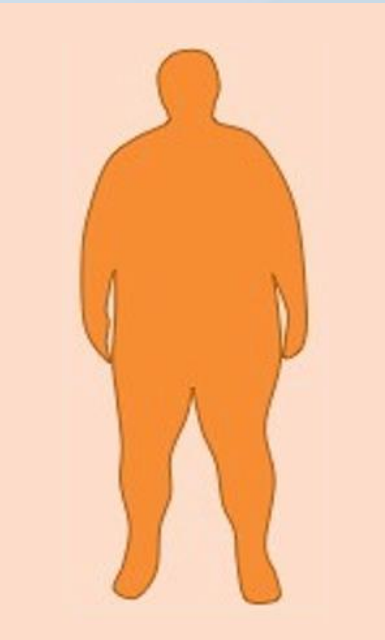
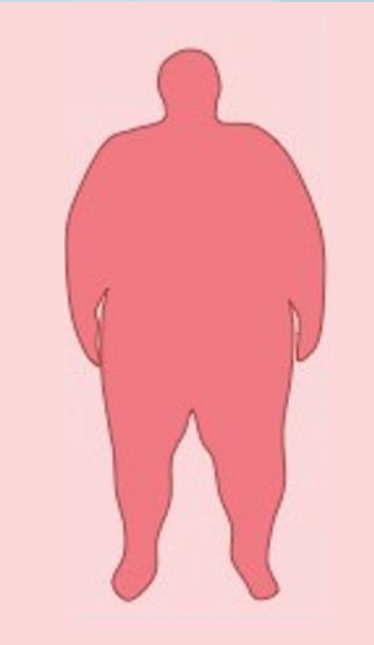
Phlebitis
Venous stasis

Gout

UNDERWEIGHT	NORMAL	OVERWEIGHT 0	OBESITY 0º	OBESITY IIº	OBESITY IIIº
< 18,5	18,5 – 24,9	25,0 – 29,9	30,0 – 34,9	35,0 – 39,9	>40,0
		without complications	without complications		

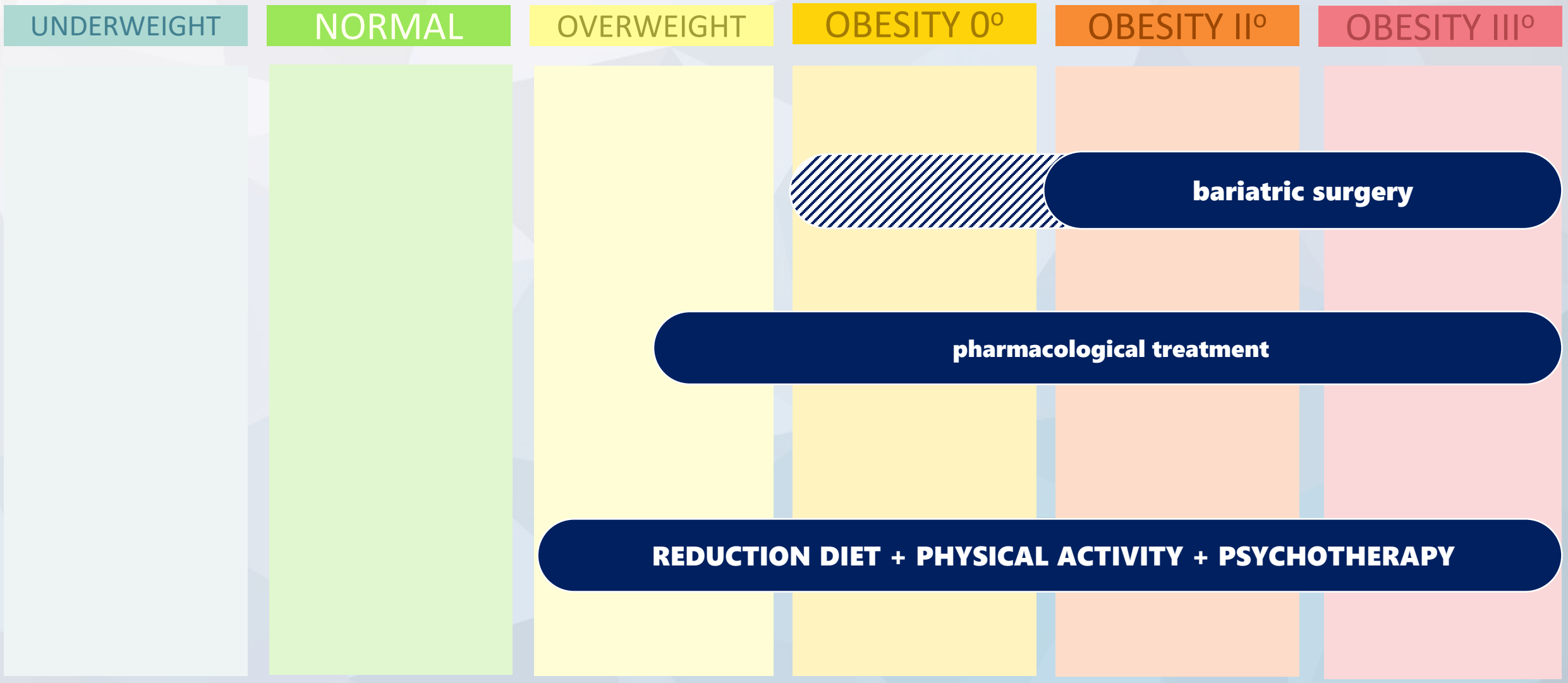
OBESITY Iº	OBESITY IIº
25,0 – 29,9	25,0 – 29,9
with mild complications	with severe complications



UNDERWEIGHT	NORMAL	OVERWEIGHT	OBESITY 0º	OBESITY IIº	OBESITY IIIº
					bariatric surgery
			pharmacological treatment		
			LIFESTYLE CHANGE		

TREATMENT OF WEIGHT AND OBESITY IN THE ABSENCE OF COMPLICATIONS



TREATMENT OF WEIGHT AND OBESITY WITH COMPLICATIONS

ABDOMINAL OBESITY

waist circumference

♂ >94 cm

Low	<94
High	94-102
Very high	>102

♀ >80 cm

Low	<80
High	80-88
Very high	>88

WHR and Health Risk

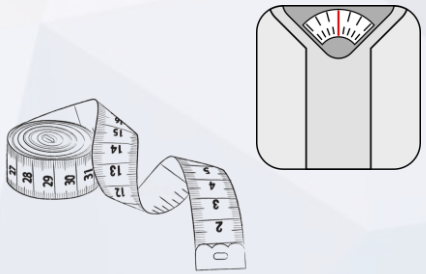
♂ ≥0,9

♀ ≥0,85 cm

$$\mathbf{WHR} = \frac{waist[cm]}{hip\ [cm[}$$

Źródło: World Health Organization: Waist circumference and waist-hip ratio report of a WHO expert consultation. 08.11.2008.

HEALTH RISK ASSESSMENT OF EXCESS BODY WEIGHT



	OVERWEIGHT	OBESITY I°	OBESITY II°	OBESITY III°
obwód talii: <102 cm u mężczyzn, <88 cm u kobiet	increase	high	very high	extremely high
obwód talii: ≥102 cm u mężczyzn, ≥88 cm u kobiet	high	very high	very high	extremely high

Źródło: World Health Organization: Waist circumference and waist-hip ratio report of a WHO expert consultation. 08.11.2008.

METODY OCENY ZAWARTOŚCI TKANKI TŁUSZCZOWEJ

bioelectric impedance method

two-beam absorptiometry X-ray (DXA)

magnetic resonance imaging (MRI)

Project Implicit

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Gender-Career IAT	***Gender - Career.*** This IAT often reveals a relative link between family and females and between career and males.
Age IAT	***Age* ('Young - Old' IAT).** This IAT requires the ability to distinguish old from young faces. This test often indicates that Americans have automatic preference for young over old.
Asian IAT	***Asian American* ('Asian - European American' IAT).** This IAT requires the ability to recognize White and Asian-American faces, and images of places that are either American or Foreign in origin.
Native IAT	***Native American* ('Native - White American' IAT).** This IAT requires the ability to recognize typically White and typically Native last names.
Religion IAT	***Religion* ('Religions' IAT).** This IAT requires some familiarity with religious terms from various world religions.
Gender-Science IAT	***Gender - Science.*** This IAT often reveals a relative link between liberal arts and females and between science and males.
Race IAT	***Race* ('Black - White' IAT).** This IAT requires the ability to distinguish faces of European and African origin. It indicates that most Americans have an automatic preference for white over black.
Skin-tone IAT	***Skin-tone* ('Light Skin - Dark Skin' IAT).** This IAT requires the ability to recognize light and dark-skinned faces. It often reveals an automatic preference for light-skin relative to dark-skin.
Weight IAT	***Weight* ('Fat - Thin' IAT).** This IAT requires the ability to distinguish faces of people who are obese and people who are thin. It often reveals an automatic preference for thin people relative to fat people.

https://implicit.harvard.edu/implicit/Study?tid=-1

01

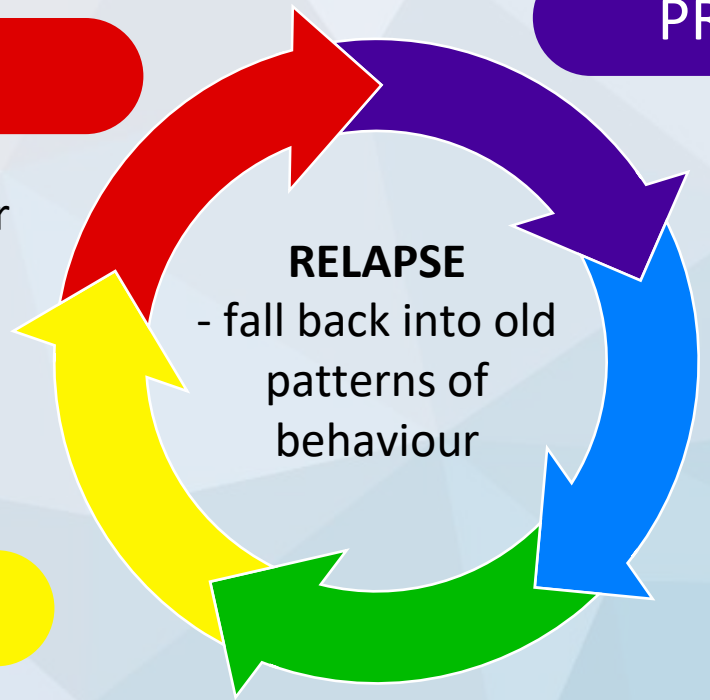
ZAPYTAJ

- body weight is a sensitive topic,
- the patient may be afraid of stigma, live in guilt,
- assess patient readiness
- non-judgmental and accepting attitude towards the patient
- a person who feels judged or lectured will have less chance of making changes

CONSEQUENCES OF STIGMA:

- mental disorders
- physiological stress
- low physical activity
- obesity and weight gain
- increased calorie intake
- reduced quality of life

TRANSTHEORETICAL MODEL OF PROCHASA AND DICLEMENTE CHANGE



PRECONTEMPLATION

No intention of changing behaviour.

CONTEMPLATION

Awere a problem exists. No commitment to action.

PREPARATION

Intent upon taking action.

ACTION

Active modification of behaviour.

MAINTENANCE

Sustained change – new behaviour replaces old

UPWARD SPIRAL – Learn from each (re)lapse

↓ the energy value of food

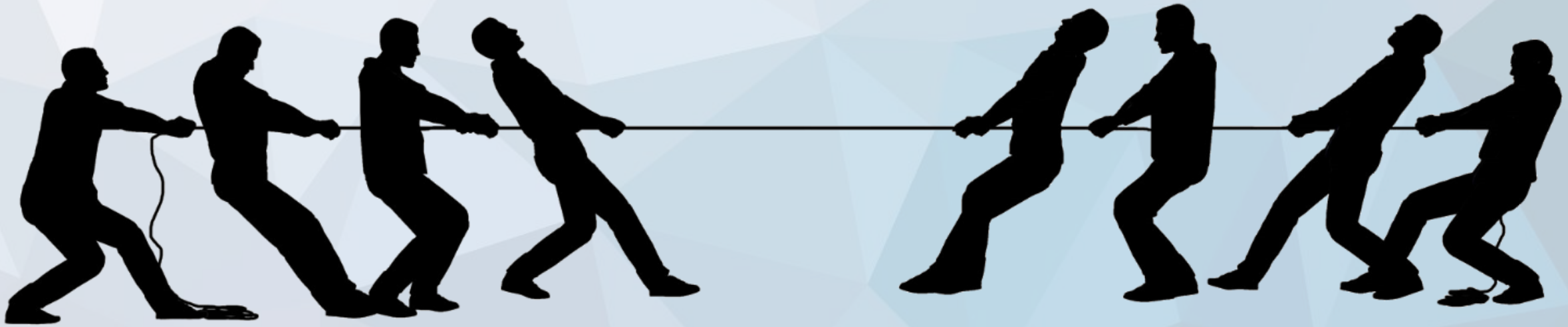
↑ physical activity

↓ metabolism

↑ hunger hormones

↓ satiety hormones

↓ Reward system



ENERGY BALANCE

- ↓ energy value of food
- ↑ physical activity
- ↑ metabolism
- ↓ hunger hormones
- ↑ satiety hormones
- ↑ reward system
- ↓ stress
- ↘ sleep

MEDICAL EXAMINATION IN A PATIENT SUFFERING FROM OBESITY

- When did significant weight gain first occur? (e.g. during childhood, adolescence, after pregnancy, after retirement)
- The amplitude of body weight changes should be determined: the highest body weight in adult life (when?) and the lowest body weight in adult life (when?)
- Attempts to treat increased body weight - what treatment? (e.g. independent use of the diet, reduction of the amount of food and increase in the amount of exercise, visit to a dietitian and use of the diet prepared for him, use of dietary supplements, treatment under the guidance of a doctor with the use of medicines)
    - Effects of treatment
    - Duration of maintenance of reduced body weight
- Occurring chronic diseases:
    - Hypertension
    - Prediabetes
    - Type 2 diabetes
    - Lipid disorders
    - Polycystic ovary syndrome
    - Depression
    - Cardiovascular diseases
    - NAFLD,
    - Hypogonadism
    - Infertility
    - Sleep apnea syndrome,
    - Osteoarthritis.
- Complications of obesity...

MEDICAL EXAMINATION IN A PATIENT SUFFERING FROM OBESITY

- Chronic drugs
- Dietary interview – number of meals eaten at the table, snacking between meals (frequency, type of meal, circumstances), time of the strongest feeling of hunger, family history (obesity in the family, nutritional increase and physical activity)
- Psychological interview – episodes of excessive overeating, feeling anxious, feeling of loss of control, eating despite fullfeelness, embarrassment with the amount of food eaten, guilt,
  - Assessment of motivation to introduce changes, the reality of re-education of body weight, the period of obtaining the effect, the causes of motivation (improvement of health, sleep, well-being, appearance),
- **Environmental interview –** assessment of physical activity (small, medium, large), type of physical activity, frequency, physical activity questionnaire – International Physical Activity Questionnaire – IPAQ)
- Stimulants: ethanol – frequency, type, quantity, cigarettes, drugs

CONSUMED PRODUCTS:

determine the frequency of consumption:

- **dairy:**
  - yellow cheese, processed cheese, blue cheese,
  - cottage cheese (lean, semi-fat, fatty),
  - cream (%),
  - milk (%),
  - butter
- cold cuts: sausages, pâtés, sausages for heating, minced meats, tags, blood sausage, salceson, salami, bacon, lard.
- meat: type and method of preparation (cooking, baked, grilled, fried)
- fish: type and method of preparation (cooking baking, grilling, frying)
- soups: with cream (%), on meat decoctions (type of meat or bones) with rouxes
- vegetables: salad additives (oil, cream, mayonnaise)
- fruit (to be replaced)
- fast food: fries, burgers, hot dogs, pizza, kebab, and more
- snacks: peanuts, almonds, pumpkin seeds, sunflower seeds, sticks, crackers, chips,
- Sweets
- beverages (consumption in liters per day, or sweetened tea, fruit juices, sweet carbonated drinks, alcohol – including beer)

Physical examination:

- body weight measurement
- calculation of the BMI value
- waist circumference measurement
- assessment of body fat using the bioimpedance method
- standard elements of a physical examination
- looking for symptoms of obesity complications
- assessment of the severity of obesity and its complications,

LEKI OBISOGENNE

- neuroleptics
- antidepressants
- anxiolytics
- antiepileptic drugs
- steroid hormones
- serotonin antagonist
- antidiabetic drugs
- antihypertensive drugs

- **by influencing the central mechanisms of satiety and hunger regulation as well as increasing food intake**
- **by influencing the process of lipogenesis and thermogenesis**

Źródło: Zasady postępowania w nadwadze i otyłości w praktyce lekarza rodzinnego. LEKARZ RODZINNY – WYDANIE SPECJALNE 3/2017

MEDICAL

Mechanical:
- Obstructive sleep apnea
- Degenerative changes in joints
- Chronic pain
- Gastro-esophageal reflux disease
- urinary incontinence
- thrombosis
- chafing
- plantar fasciitis

Metabolic:
- diabetes
- dyslipidemia
- hypertension
- Gout
- fatty liver
- cholecystolithiasis
- PCOS
- tumors

PSYCHICAL

Mental aspects:
- cognitive abilities,
- Depression
- lack of concentration of attention,
- addiction
- psychosis
- eating disorders
- trauma
- insomnia

ENVIRONMENTAL

Monetary:
- education
- work
- income
- disability
- insurance
- benefits
- obesity treatment program
- bariatric supplies

SURGICAL TREATMENT OF OBESITY - CONTRAINDICATIONS

Źródło: Modern management of obesity. B. S. Aditya, J. Ph. Wilding. Clinical. Medicine 2009;6(9):617-621

Surgical procedures with a well-documented effect on weight loss and metabolic effects include:

A| sleeve gastrectomy - SG;

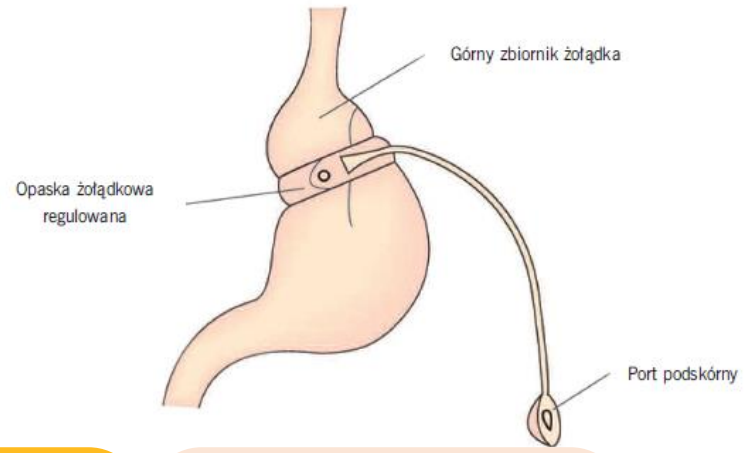
B| Roux-en-Y gastric bypass - RYGB;

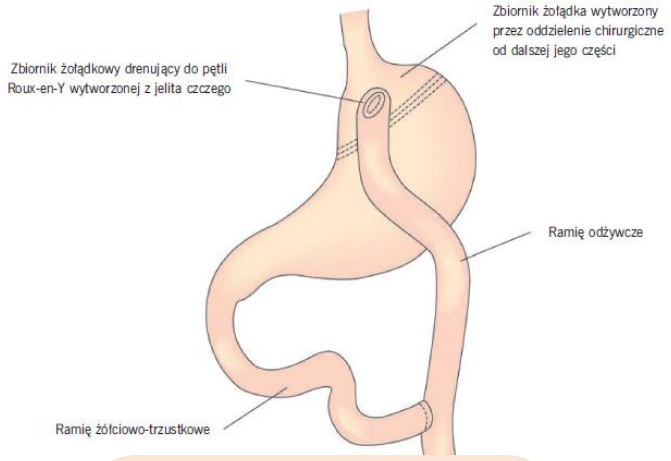
C| mini gastric bypass/ omega loop gastric bypass - MGB/OLGB;

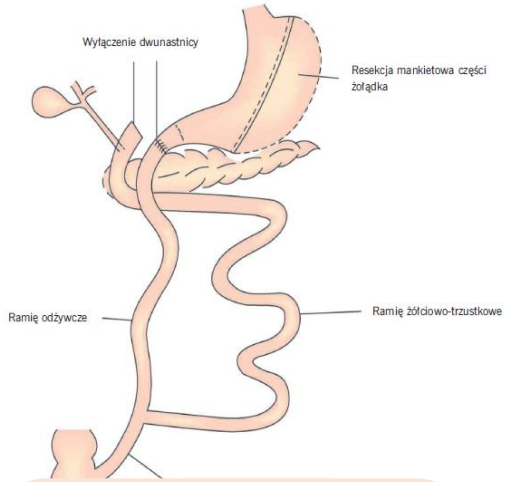
D| adjustable gastric banding - AGB;

E| biliopancreatic diversion - BPD;

F| biliopancreatic diversion/duodenal switch - BPD-DS.







LOSS OF BODY WEIGHT	46,2%	59,7%	63,6%
MORTALITY	0,06%	0,16%	1,11%

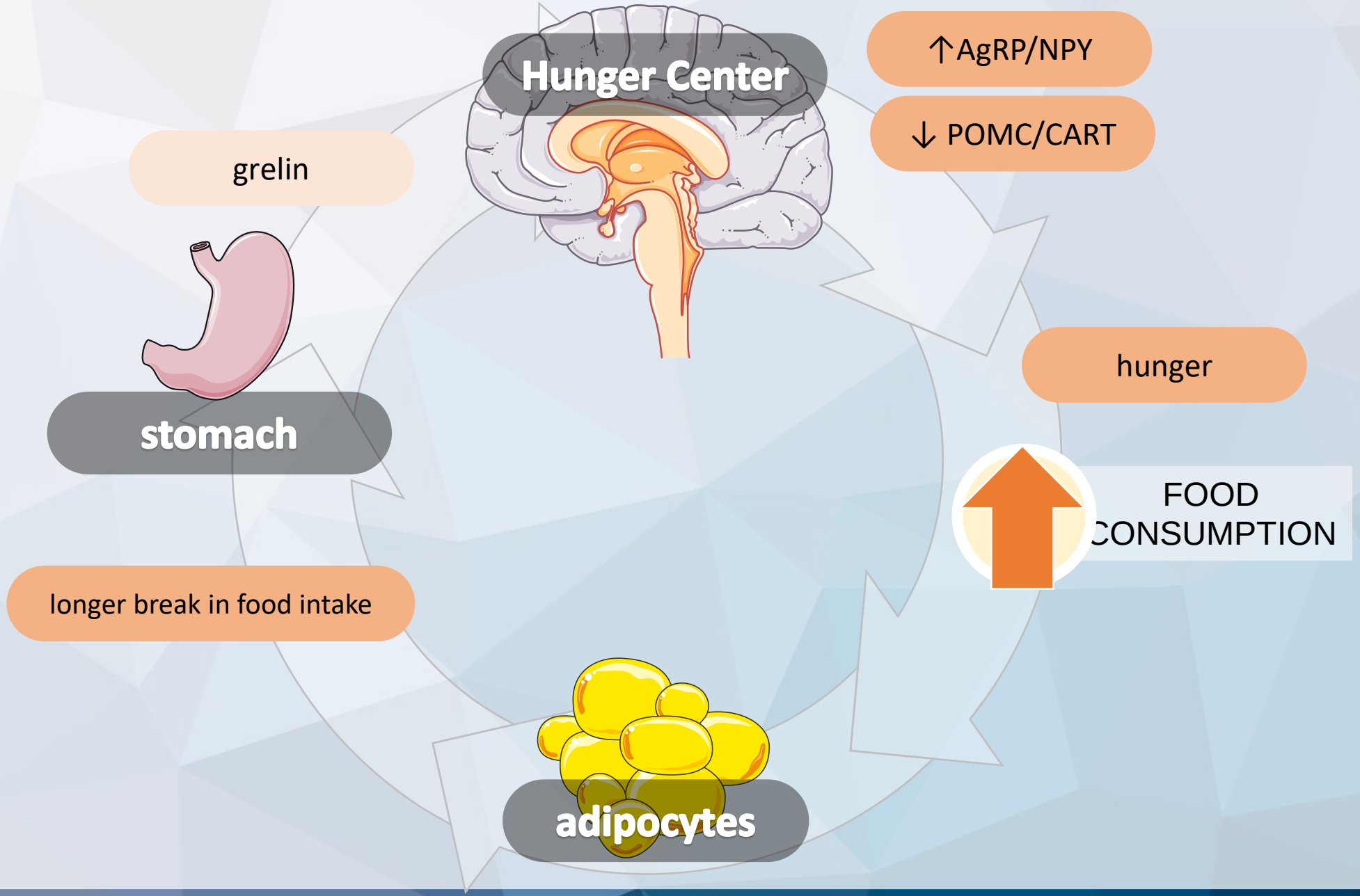
SURGICAL TREATMENT OF OBESITY - CONTRAINDICATIONS

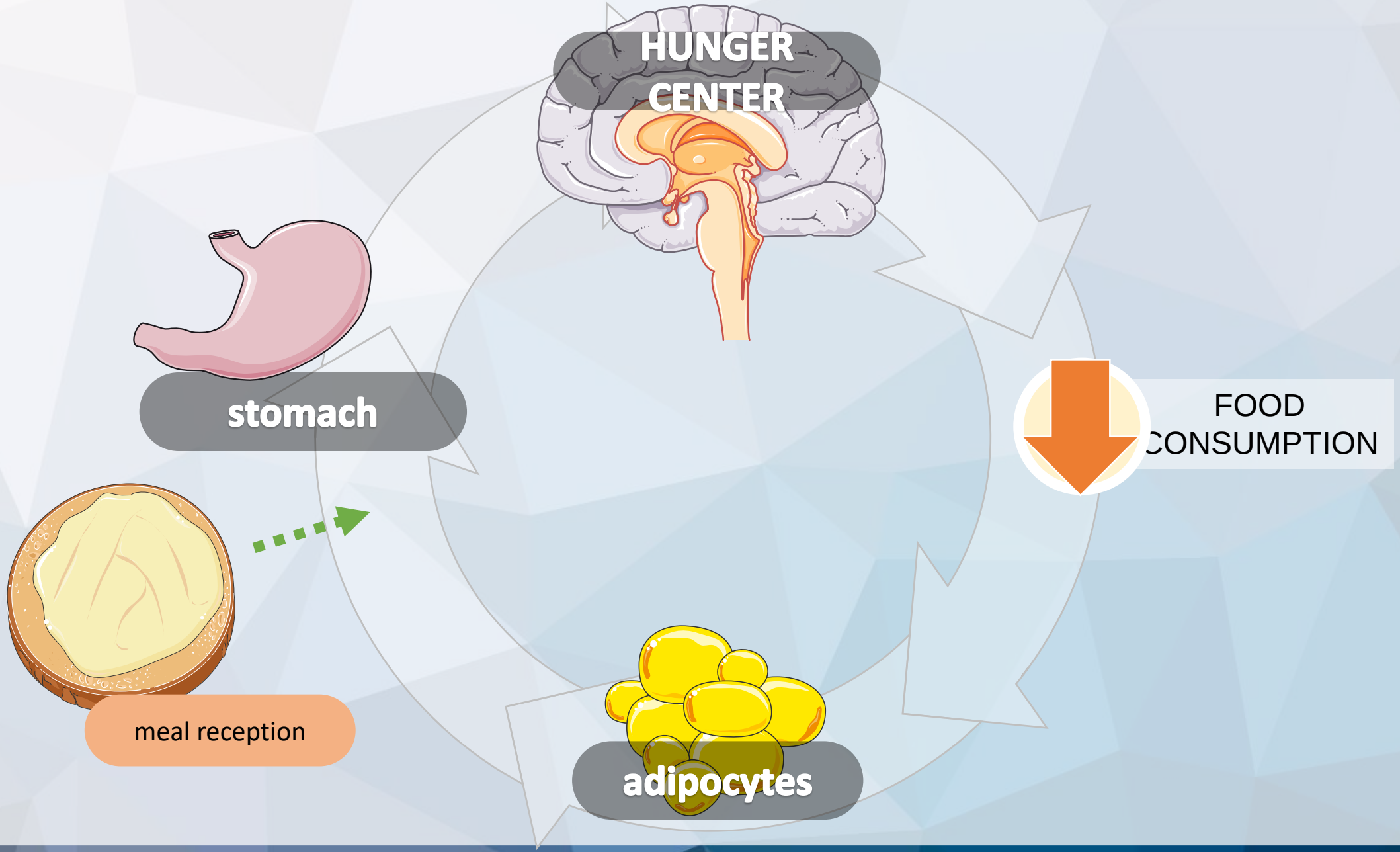
Surgical obesity treatment methods for which long-term observations are not yet available:

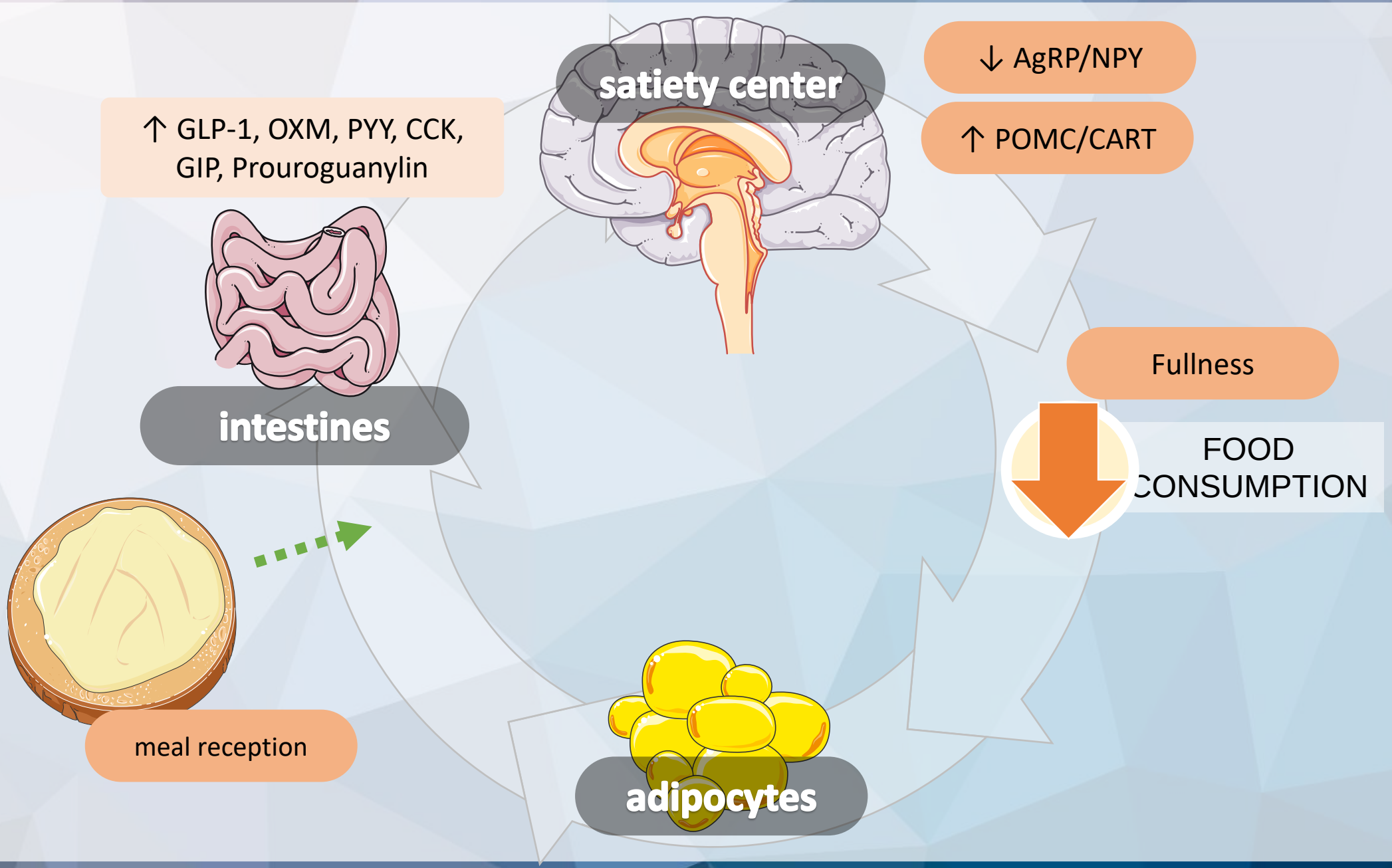
- laparoscopic gastric plication laparoscopic greater curvature plication (LGCP);
- single anastomosis duodeno-ileal bypass (SADI);
- intestinal translation (ileal interposition).

Endoscopic methods of obesity treatment:

gastric balloon - the main application seems to be the preparation for surgery of patients with a particularly high BMI and high perioperative risk.


Hunger Center
↑AgRP/NPY
↓ POMC/CART
grelin
stomach
hunger
FOOD CONSUMPTION
longer break in food intake
adipocytes


HUNGER CENTER
stomach
FOOD CONSUMPTION
meal reception
adipocytes


satiety center
↓ AgRP/NPY
↑ POMC/CART
↑ GLP-1, OXM, PYY, CCK, GIP, Prouroguanylin
intestines
Fullness
FOOD CONSUMPTION
meal reception
adipocytes

https://www.mdcalc.com/calc/25/basal-energy-expenditure

Formula

Note: The Basal Energy Expenditure must be multiplied by activity and stress factors to calculate total caloric requirement.

BEE, kcal/day (male) = 66.5 + (13.75 × weight, kg) + (5.003 × height, cm) - (6.775 × age)

BEE, kcal/day (female) = 655.1 + (9.563 × weight, kg) + (1.850 × height, cm) - (4.676 × age)

Harris-Benedict adjustment:

- Sedentary (little to no exercise) = BEE × 1.2
- Light exercise (1-3 days per week) = BEE × 1.375
- Moderate exercise (3–5 days per week) = BEE × 1.55
- Heavy exercise (6–7 days per week) = BEE × 1.725
- Very heavy exercise (twice per day, extra heavy workouts) = BEE × 1.9

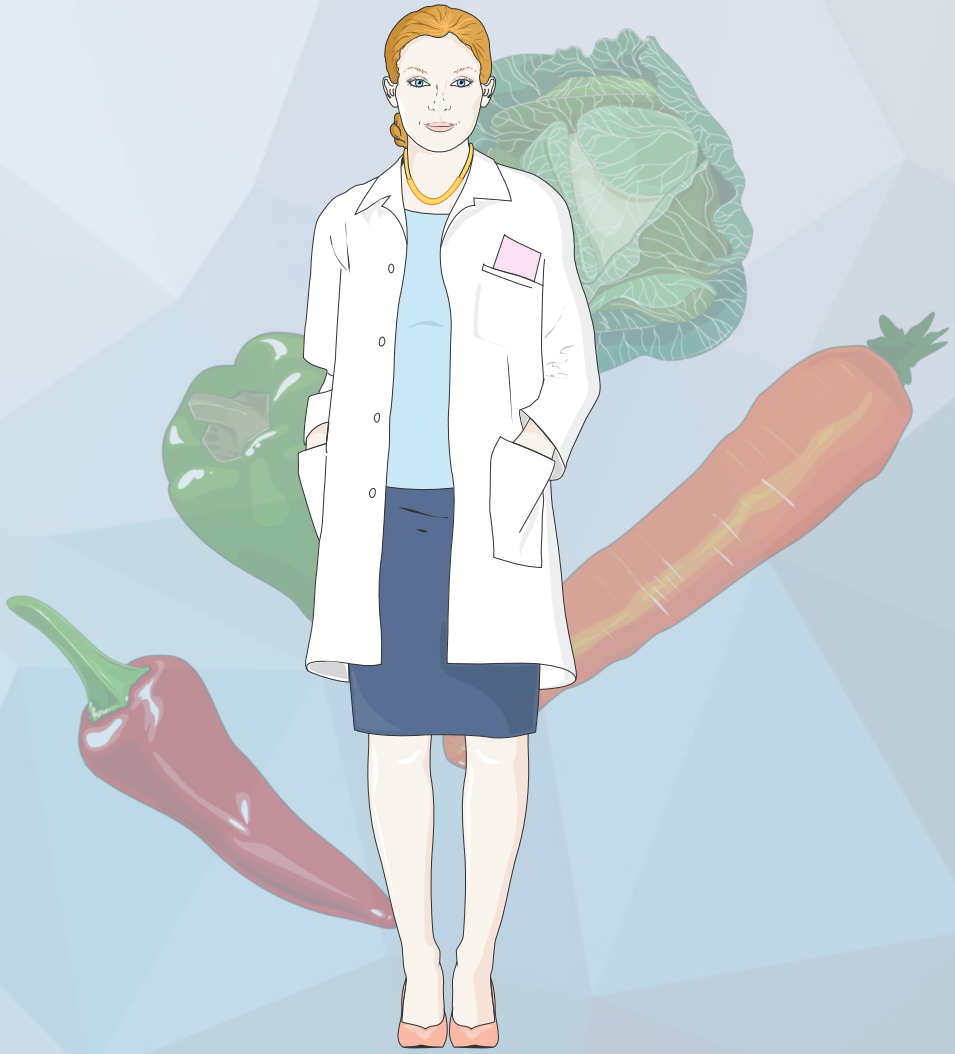
Body weight: 81.8 kg Height: 164 cm
BMI: 30.4 kg / m2
Waist: 85 Circumference: 112 WHR: 0.72

Harris J, Benedict F. A biometric study of basal metabolism in man. Washington D.C. Carnegie Institute of Washington. 1919.

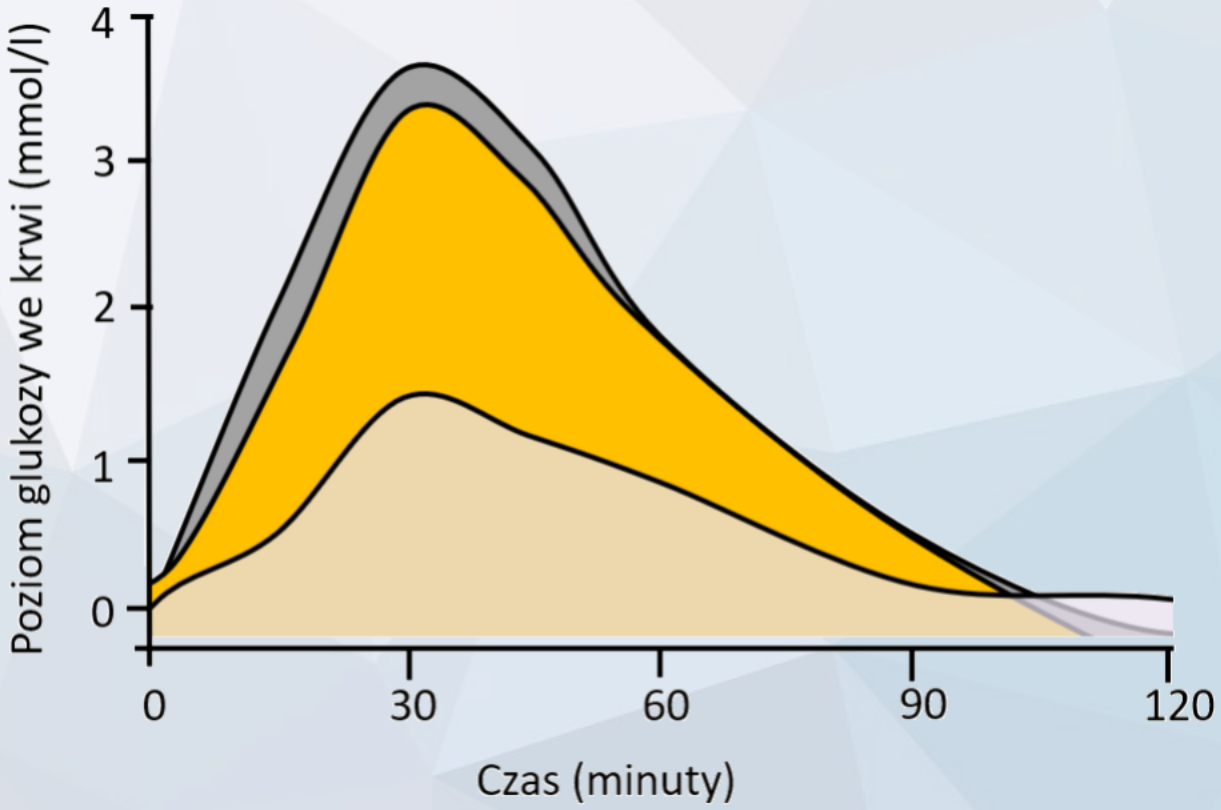
DIETETIC INTERVENTIONS

- diet plan with calorie restriction
- energy deficit of 500-750 kcal
- a diet plan can be based on:
  - Mediterranean diet
  - the DASH diet
  - low-carbohydrate diet
  - a diet with a low glycemic index
  - low-fat diet
  - a high-protein diet
  - vegetarian diet
  - a portion size diet
  - ketogenic diet
  - very low energy diets (VLCD)

- Participation in therapy: dietitian, nutritional educator.



GLYCEMICAL INDEX



GLYCEMICAL INDEX - IG is a classification of food products based on their effect on blood glucose levels and the time of the onset of changes (postprandial glycemia). The benchmark is pure glucose with a glycemic index of 100.

Glycemic Load, GL

reflects the carbohydrate content in food. It is calculated according to the formula:

$$GL = \frac{amount\ carbohydrates\ in\ food\ x\ GI}{100}$$

- Low Glycemic Load ≤10
- Average Glycemic Load 11-19
- High glycemic load ≥20

A LOW GLYCEMIC INDEX DIET

Eating a product with a high GI leads to a rapid increase in blood glucose levels in response to a large burst of insulin. The blood glucose level is then reduced, often not only to the baseline value but also lower, leading to the so-called Reactive hypoglycemia.
A symptom of hypoglycaemia is feeling hungry.

Planetary health diet

Food	Maximum amount	Example
Red meat	14 grams per day	one strip of bacon every other day *or* one medium-size hamburger per week
Chicken	29 grams per day	one boneless, skinless chicken thigh every other day or one slice of chicken lunch meat per day
Eggs	13 grams per day	one egg every other day (e.g., poached, made into pancakes, etc.)
Dairy product	250 grams per day	one cup of milk per day
Starchy vegetables	50 grams per day	Two medium-sized potatoes or servings of cassava per week
Sugar	31 grams per day	two tablespoons of honey per day

The EAT-Lancet Commission on Food, Planet, Health

PHYSICAL ACTIVITY IN OBESITY:

F requency

I ntensity

T ime

T ype -

more than 5 times a week	F
first moderate - 40-60% of the exercise reserve, then you can consider increasing the intensity - 50-70% of the exercise reserve	I
30-60 minutes / day of moderate-intensity exercise (150-300 minutes / week) or 150 minutes / week. high-intensity or a combination of both	T
dynamic, aerobic, using large muscle parts, supplemented with resistance exercises	T

Training rules: it should always start with a warm-up and end with calming-down exercises

MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY	SUNDAY
≥30 minuts	≥30 minuts	≥30 minuts	≥30 minuts	≥30 minuts		

PSYCHOLOGICAL SUPPORT

GOAL SETTING

STRESS MANAGEMENT

SELF-CONTROL

BEHAVIORAL THERAPY

EATING DISORDERS
compulsive eating syndrome,
night eating sundrome (NES)

SOCIAL SUPPORT

ALTERNATIVE HABITS

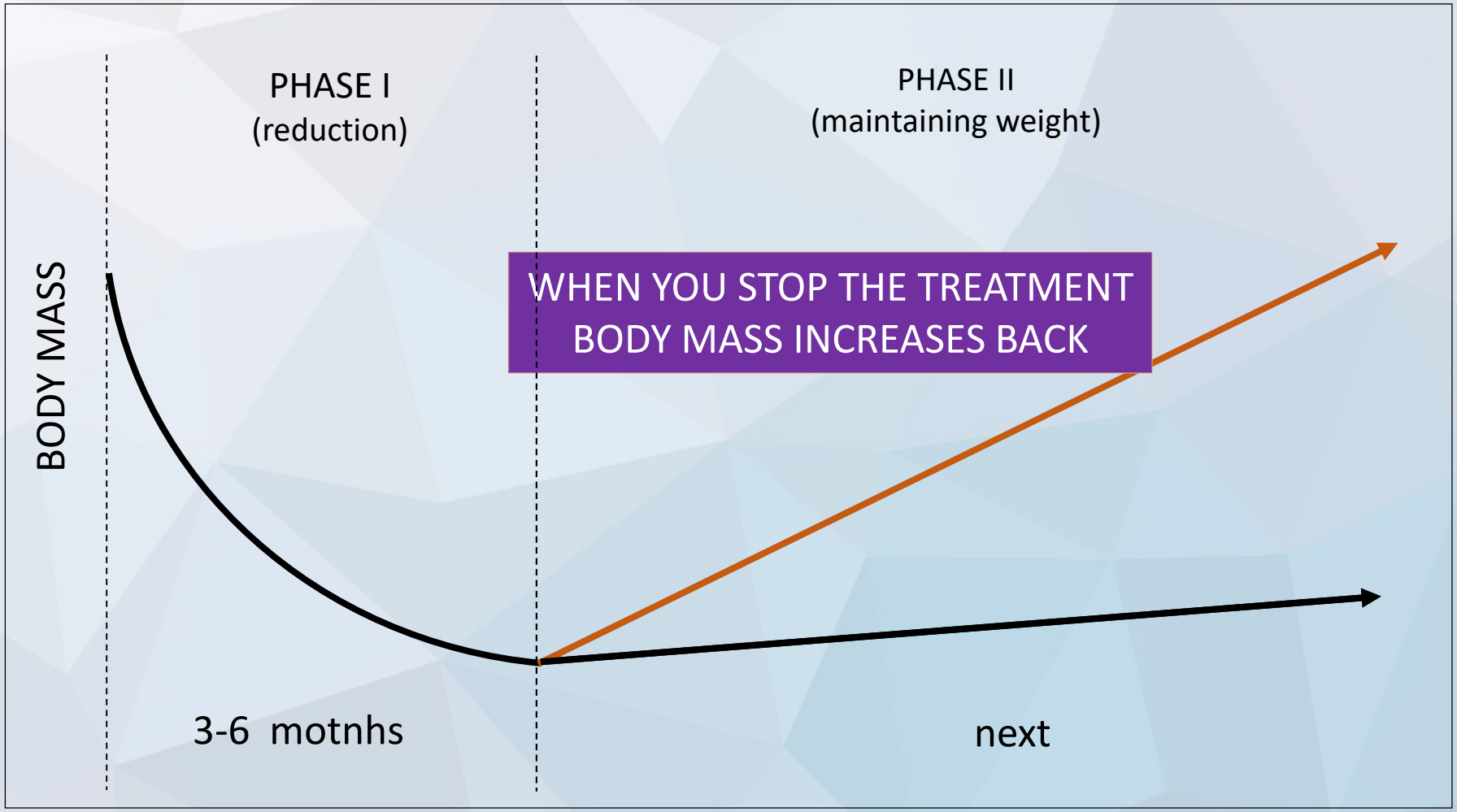
Źródło: Olszanecka-Glinianowicz M. et al. Treatment of overweight and obesity during and after a pandemic. Let’s not wait for the development of complications — new guidelines for doctors. Arterial Hypertension, Vol 24, No 3 (2020)

10 kg weight reduction in 6 months to weigh 70 kg, by:
apply a diet with a low glycemic index
and walk 5 times a week for 30 minutes to walk 2.5 km.

S	M	A	R	T
Specific	Measurable	Attainable	Relevant	Time-based

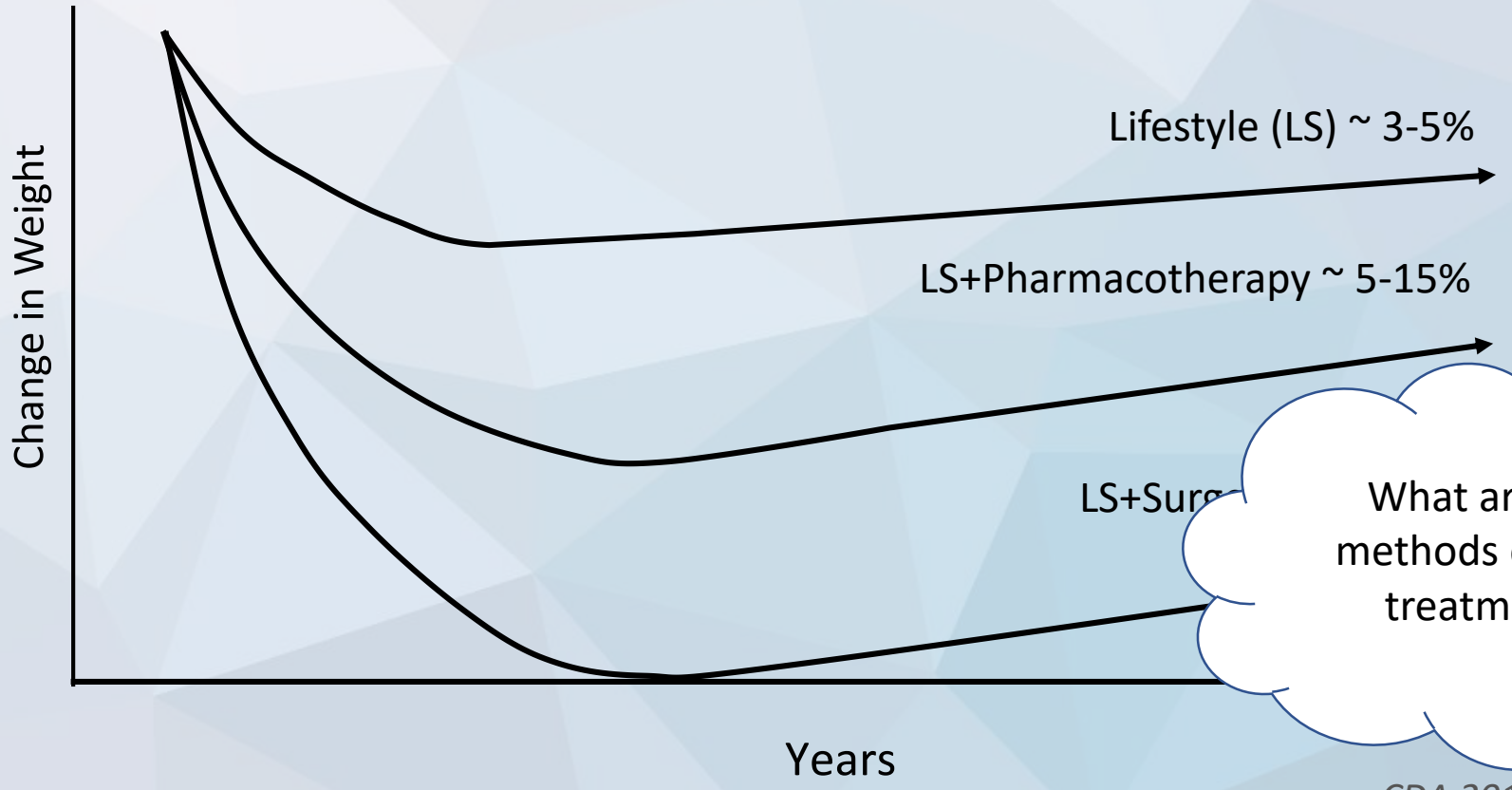
WORK TIME

OBESITY TREATMENT PHASES



2011 Reference

OBESITY TREATMENT PHASES



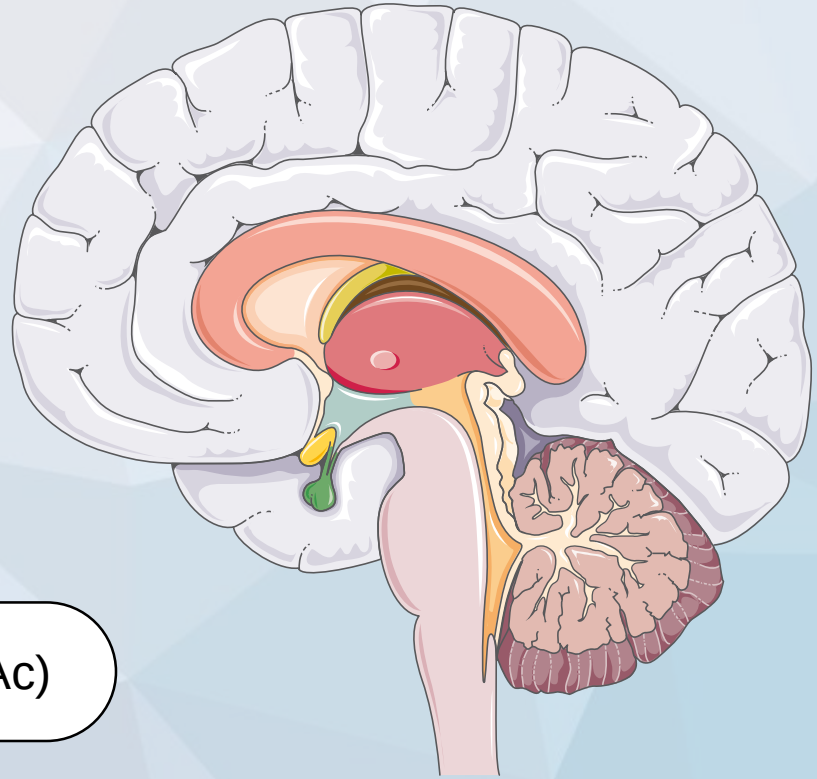
What are the methods of drug treatment?

CDA 2011

CONTROL OF FOOD INTAKE IN THE CNS

awareness (PFC)

emotion, memory (amygdala, hippocampus)



attention (occipital cortex, parietal cortex)

award (VTA, NAc)

homeostasis (hypothalamus)

activation of neurons NPY, AgRP

peptide release NPY, AgRP

receptor inhibition MC4-R by NPY/AgRP

feeling hungry

- INSULIN
- LEPTIN
- GHRELIN

POMC neurons activation

release α-MSH

activation of receptor MC4-R by α-MSH

Felling fullness

- INSULIN
- LEPTIN
- GLP-1

release β-endorfin

binding β-endorfin with opioid receptor μ

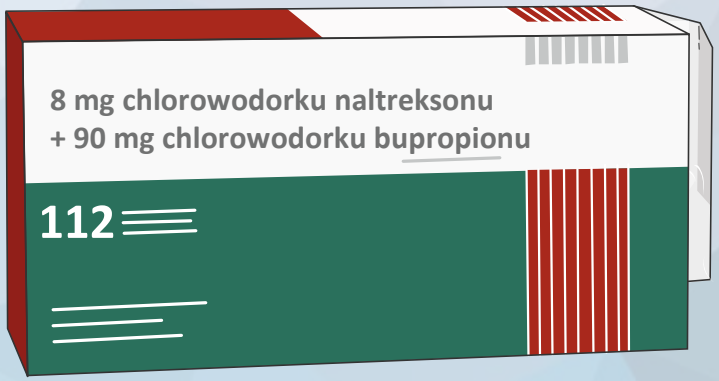
inhibition of n activation. POMC = satiety reduction

- PYY
- CKK

BUPROPION+NALTREKSON

CONTRAINDICATIONS

- decompensated hypertension
- current epilepsy or history of seizures
- neoplastic tumor in the central nervous system
- the period immediately after abrupt withdrawal from alcohol or benzodiazepines in an addicted person
- history of bipolar disorder
- taking bupropion or naltrexone for an indication other than weight loss
- bulimia nervosa or anorexia nervosa - now or in the past
- dependence on long-term use of opioids or opioid agonists (e.g. methadone)
- the period immediately after abrupt withdrawal of opioids in an addicted person
- taking monoamine oxidase inhibitors for ≥14 days
- severe liver dysfunction
- end-stage renal disease
- pregnancy



Źródło: Charakterystyka produktu leczniczego Mysimba 8 mg + 90 mg tabletki o przedłużonym uwalnianiu

BUPROPION+NALTREKSON

CONTRAINDICATIONS

very often:

nausea, vomiting, constipation (usually transient, mild or moderate)

often:

dizziness, tremor, disturbance in attention, lethargy, tinnitus, hot flush, palpitations, increased sweating, altered taste sensation, dry mouth, itching, upper abdominal pain, alopecia

Not so often:

dehydration, abnormal dreams, nervousness, psychomotor agitation, mood swings, intention tremor, balance disorder, tachycardia, lower abdominal pain, cholecystitis, menstrual irregularity, erectile dysfunction, general weakness, thirst, increased blood creatinine, increased enzyme levels in the blood, decreased hematocrit

rarely:

convulsions (generalized clonic-tonic seizures), worsening of depression, suicidal ideation and behavior, increase in blood pressure

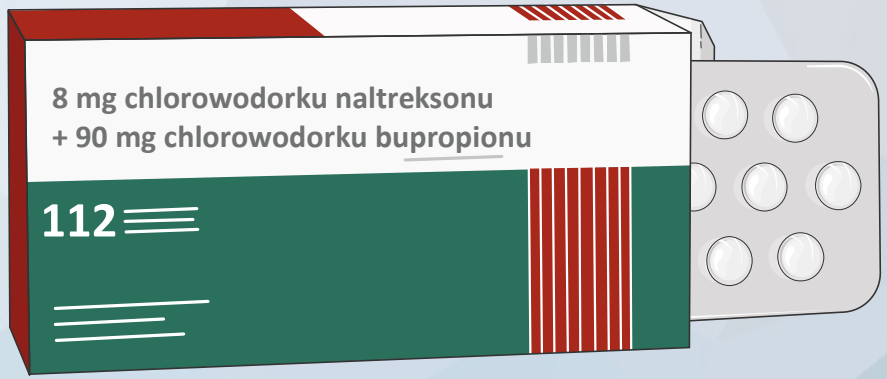
Źródło: Charakterystyka produktu leczniczego Mysimba 8 mg + 90 mg tabletki o przedłużonym uwalnianiu

PHARMACOLOGICAL TREATMENT

BUPROPION+NALTREKSON

USING

1st WEEK		
2nd week		
3rd week		
4th week		



- ≥5% weight loss after 16 weeks of treatment
- review of treatment every 12 months

Źródło: Charakterystyka produktu leczniczego Mysimba 8 mg + 90 mg tabletki o przedłużonym uwalnianiu

OVERWEIGHT	OBESITY I°	OBESITY II°	OBESITY III°

TREATMENT OF DEPRESSION DEPENDING ON THE SEVERITY:

- recommended: bupropion, reboxetine, trazodone, agomelatine, fluoxetine, sertraline, vortiotexin, mocobemide
- not recommended: mirtazapine, mianserin, TCA (tricycline antidepressants)

BARIATRIC SURGERY

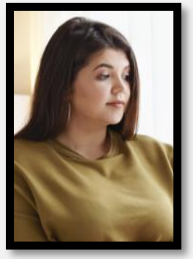
PHARMACOLOGICAL TREATMENT OF OBESITY

recommended: bupropion + naltrexone

REDUCTION DIET + PHYSICAL ACTIVITY + PSYCHOTHERAPY

TREATMENT OF OVERWEIGHT AND OBESITY IN CO-EXISTING DEPRESSION

Smerek Zuzanna



Woman, Age: 30 years old,
Divorced,
Place of work: teacher

Main Interview

Control visit. The patient feels delighted.

Physical Exam

Body weight: 63.9 Height: 168 BMI: 22.6 kg / m2

Recomendation:

- maintaining the current lifestyle
- control visit in 6 months,

ANALYSIS OF THE RESULTS:

	Body Mass	Muscle Mass	Fat %
13.05.2019	79,4	42,6	43,5
03.06.2019	75,6	42,8	40,3
14.07.2019	71,8	41,9	38,6
01.08.2019	70,4	41,6	37,8
31.08.2019	67,9	41	36,4
15.10.2019	65,4	41,2	33,6
26.11.2019	63,9	39,4	35,1

Fasting x 8-10 hours (preferred):

- ☐ Lipid panel with calculated LDL
- ☐ Fasting glucose
- ☐ Fasting insulin (optional)
- ☐ Hemoglobin A1c
- ☐ ALT

If non-fasting:

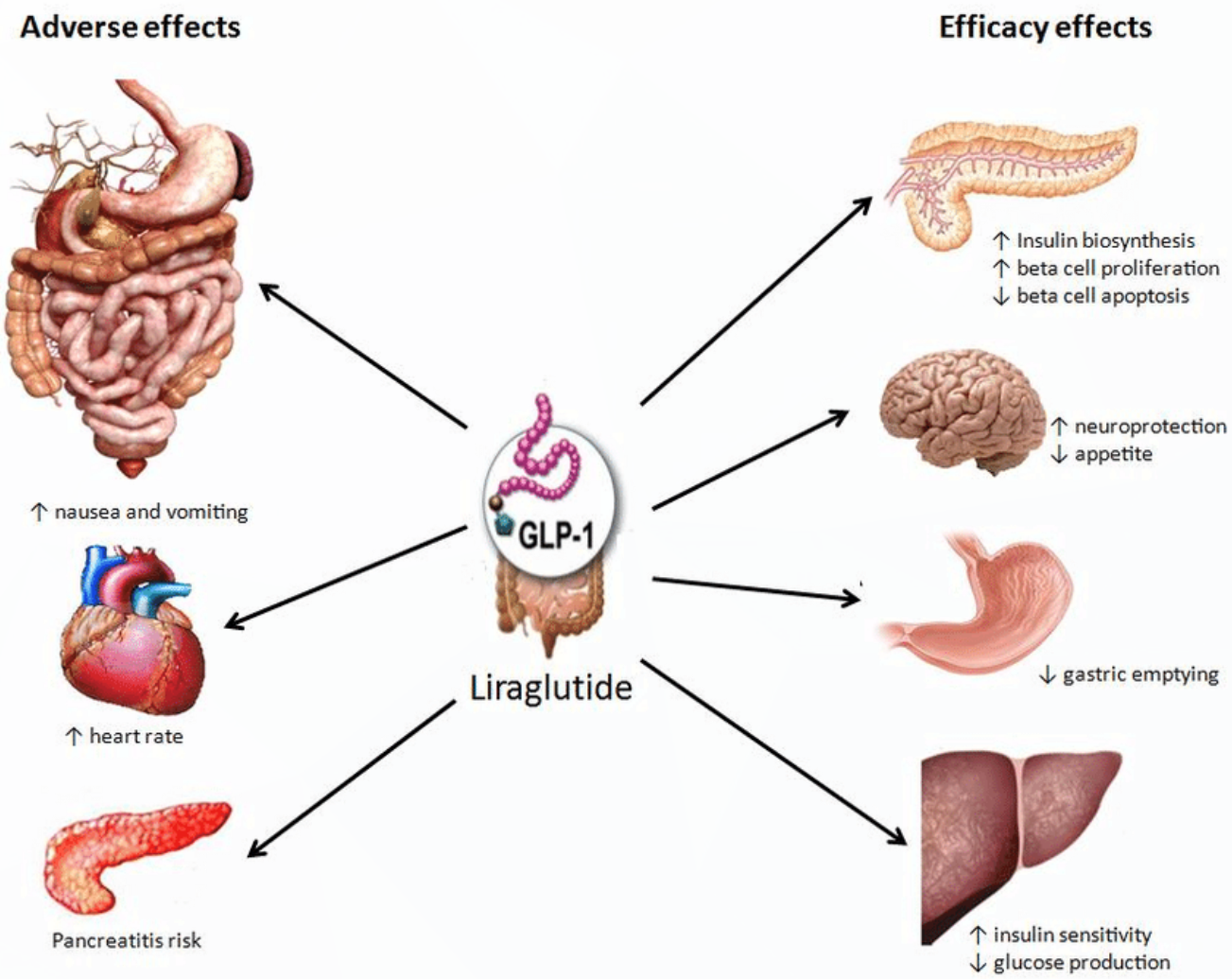
- ☐ Total cholesterol
- ☐ HDL
- ☐ Random glucose
- ☐ Hemoglobin A1c
- ☐ ALT

With concern for PCOS:

- ☐ Free and total testosterone

(For additional labs beyond screening see PCOS order set in Epic)

LIRAGLUTIDE

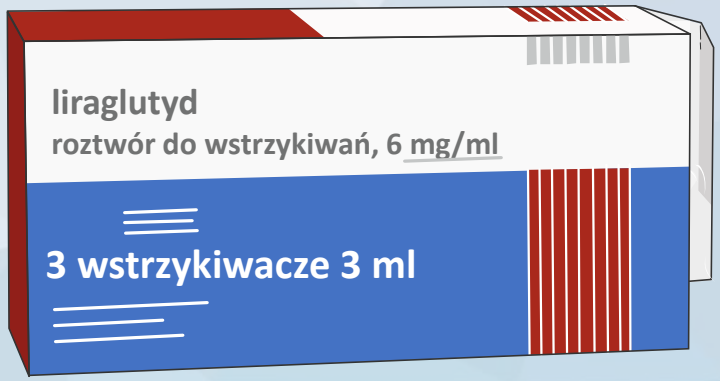


Źródło: Cardiovascular effects of Glucagon-like peptide 1 (GLP-1) receptor agonists Saraiva and Sposito Cardiovascular Diabetology 2014, 13:142

LIRAGLUTIDE

CONTRAINDICATIONS

- hypersensitivity to any component of the formula
- past pancreatitis
- severe hepatic impairment
- end-stage renal failure
- breastfeeding
- pregnancy



Źródło: Charakterystyka produktu leczniczego Saxenda, 6 mg/ml, roztwór do wstrzykiwań w fabrycznie napełnionym wstrzykiwaczu

LIRAGLUTIDE

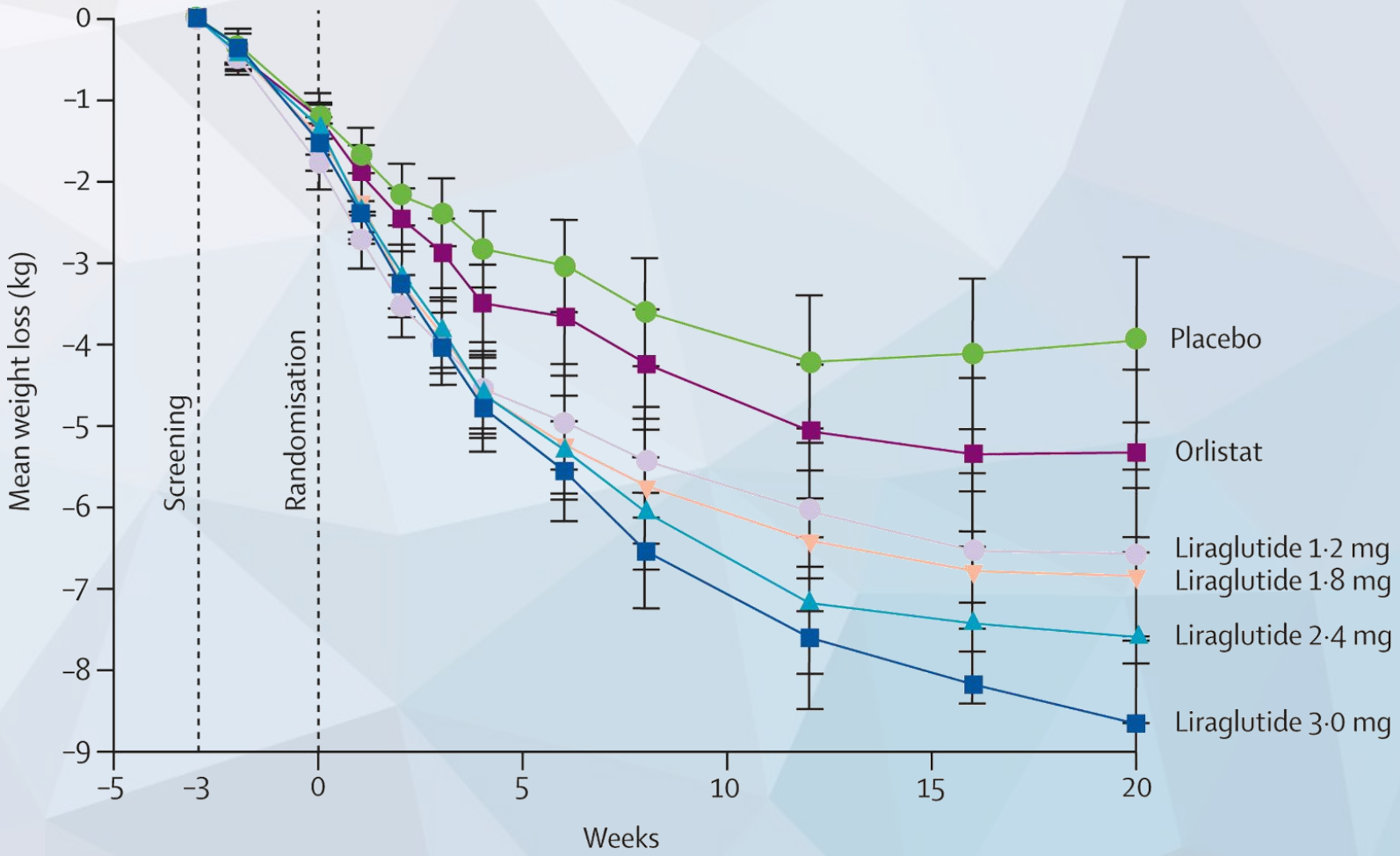
CONTRAINDICATIONS

1st week	0,6 mg s.c.
2nd week	1,2 mg s.c.
3rd week	1,8 mg s.c.
4th week	2,4 mg s.c.
5th week	3,0 mg s.c.

- ≥5% decrease in initial body weight after 12 weeks of treatment

Źródło: Charakterystyka produktu leczniczego Saxenda, 6 mg/ml, roztwór do wstrzykiwań w fabrycznie napełnionym wstrzykiwaczu

EFFECT OF LIRAGLUTIDE ON BODY WEIGHT:



Źródło: Lancet. 2009 Nov 7;374(9701):1606-16, Effects of liraglutide in the treatment of obesity: a randomised, double-blind, placebo-controlled study.

OVERWEIGHT | OBESITY I° | OBESITY II° | OBESITY III°

TREATMENT OF TYPE 2 DIABETICS DEPENDING ON THE SEVERITY OF THE DISEASE:

- HbA1c < 6,5 %: metformin
- HbA1c < 7-8 %: metfmormin + DDP-4i lub SGLT-2i lub GLP-1RA
- HbA1c > 9 %: metformin + SGLT-2i lub GLP-1RA + insulin
- not recommended: insulin, sulphonylureas, pioglitazone

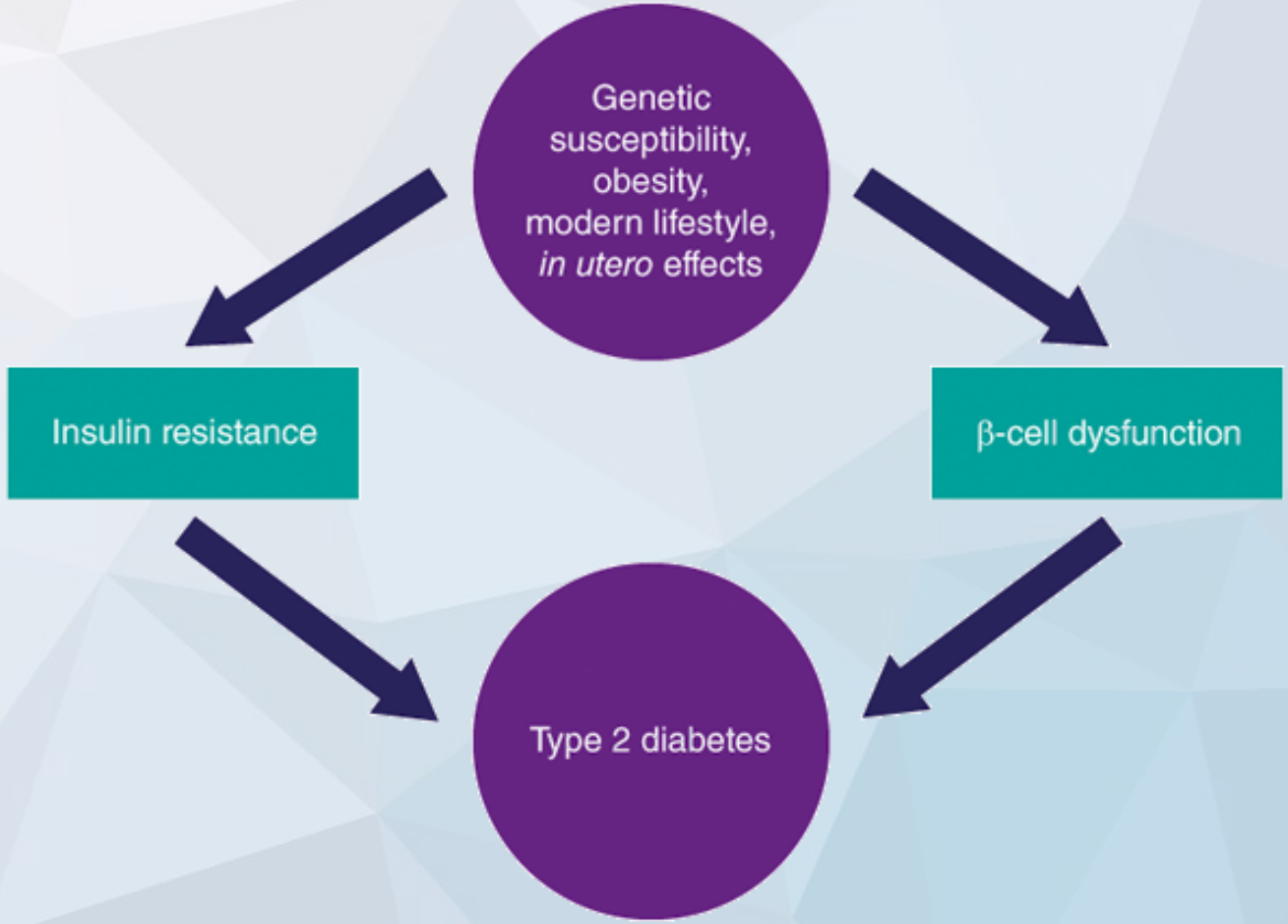
BARIATRIC SURGERY

PHARMACOLOGICAL TREATMENT OF OBESITY

recommended: liraglutide, semaglutide

REDUCTION DIET + PHYSICAL ACTIVITY + PSYCHOTHERAPY

TREATMENT OF WEIGHT AND OBESITY WITH CONCOMITANT TYPE 2 DIABETES


Genetic susceptibility, obesity, modern lifestyle, *in utero* effects
Insulin resistance
β-cell dysfunction
Type 2 diabetes

Hormones
Nutrients
Adiposity

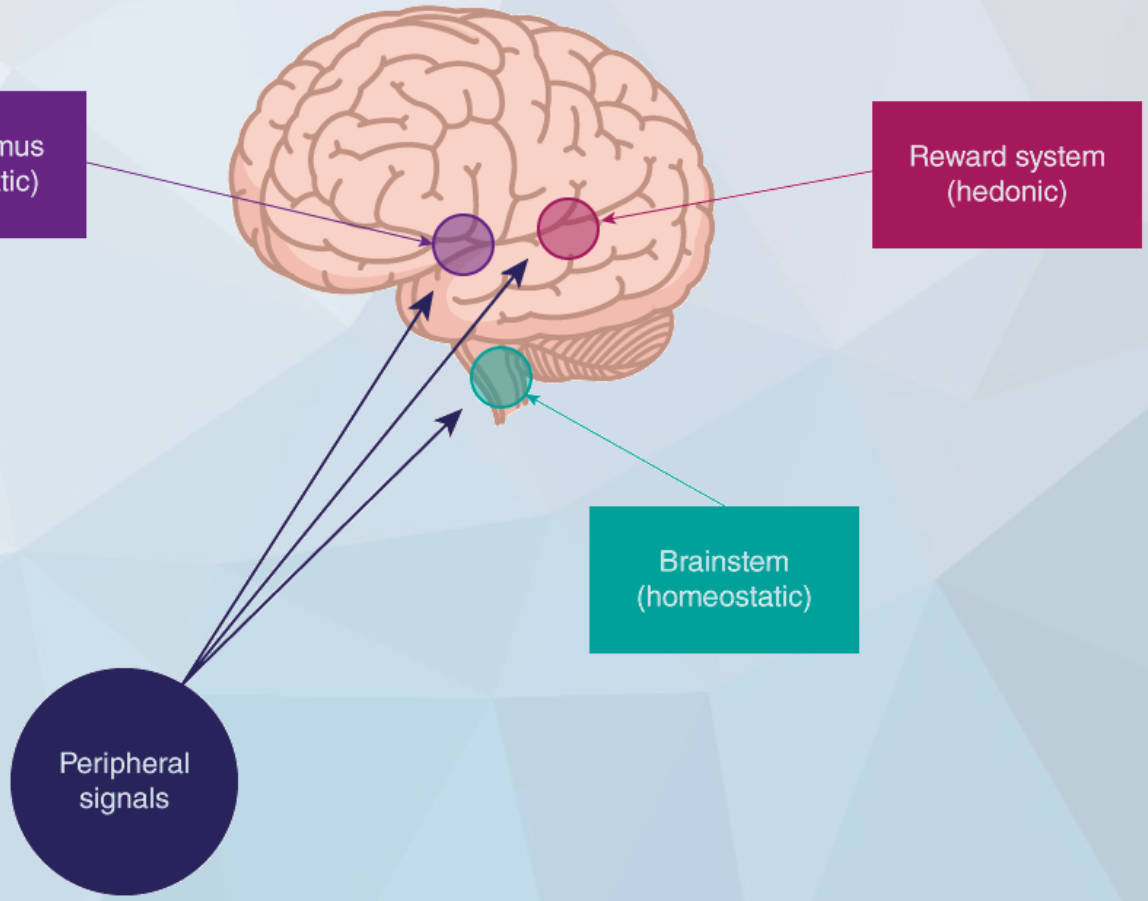
Smell
Sight
Taste
Mood

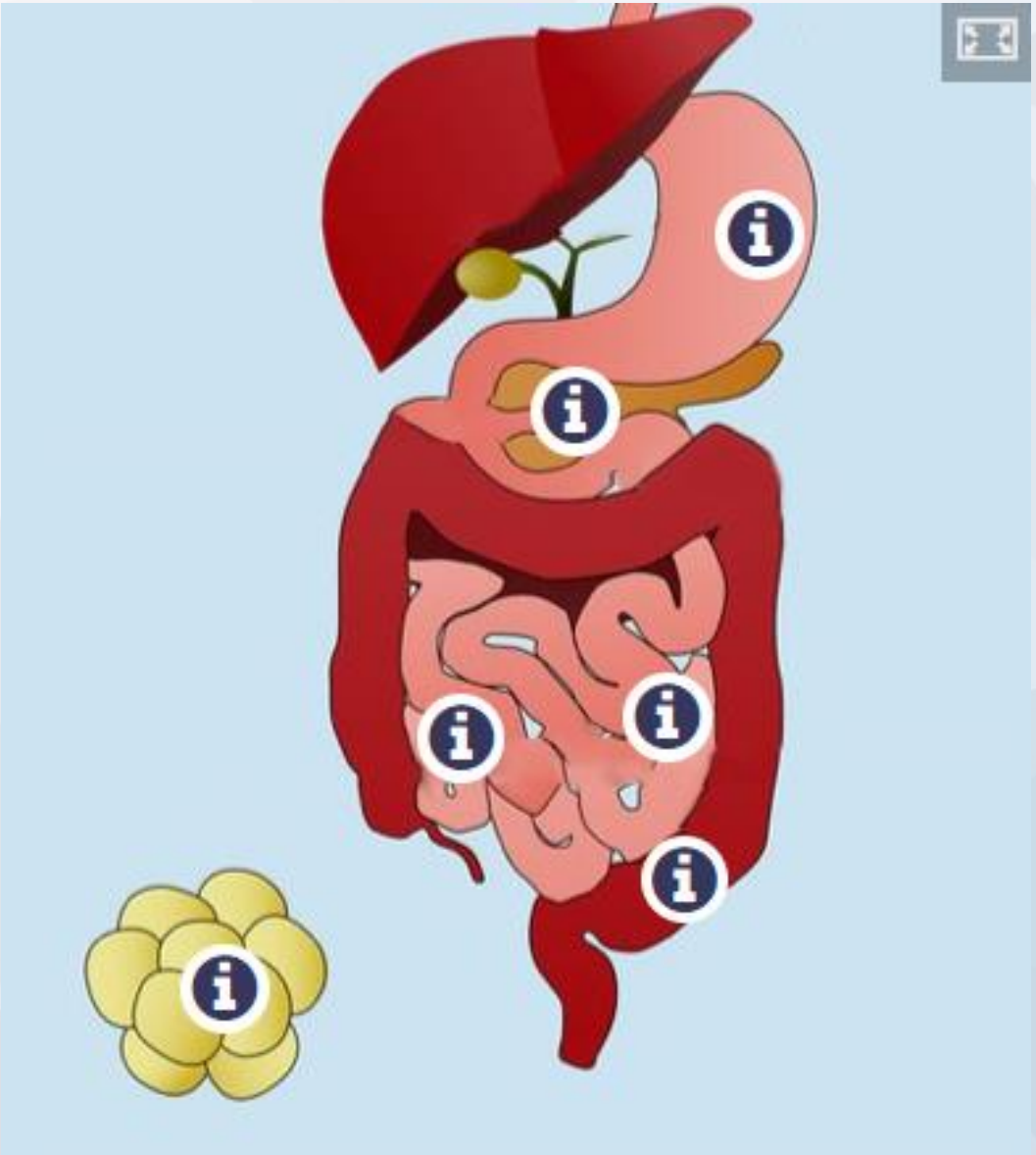
Brain

Homeostatic system
- Body maintenance
- Nutritional needs

Hedonic system
- Pleasure
- Wants

Eating behaviour
- What
- When
- How much





STOMACH

Appetite-stimulating

Ghrelin

PANCREAS

Appetite-suppressing

Insulin

Glucagon

Amylin

Pancreatic polypeptide

SMALL INTESTINE

Appetite-stimulating

Ghrelin

SMALL INTESTINE

Appetite-suppressing

Cholecystokinin (CCK)

Glucagon-like-peptide-1 (GLP-1)

Oxyntomodulin

Peptide YY

COLON

Appetite-suppressing

GLP-1

Oxyntomodulin

Peptide YY (PYY)

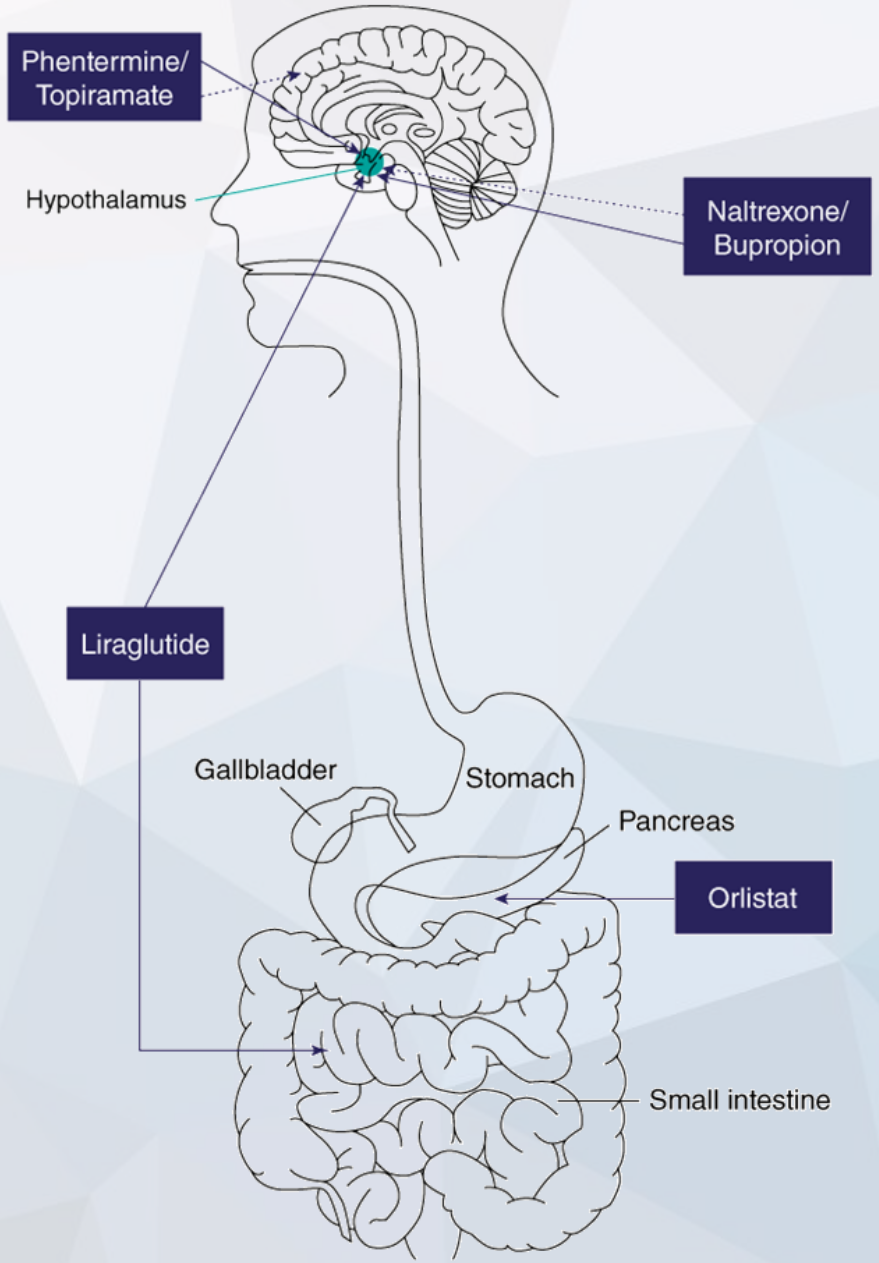
ADIPOSE TISSUE

Appetite-suppressing

Leptin

Adiponectin

Resistin



Agent	Route of administration	Dose and regimen
Orlistat	Oral	Prescription: 120 mg three times daily OTC: 60 mg three times daily
Phentermine/ topiramate	Oral	Up to 15 mg/92 mg daily
Liraglutide	Subcutaneous	3 mg daily
Naltrexone/ bupropion	Oral	Up to 32 mg/360 mg daily

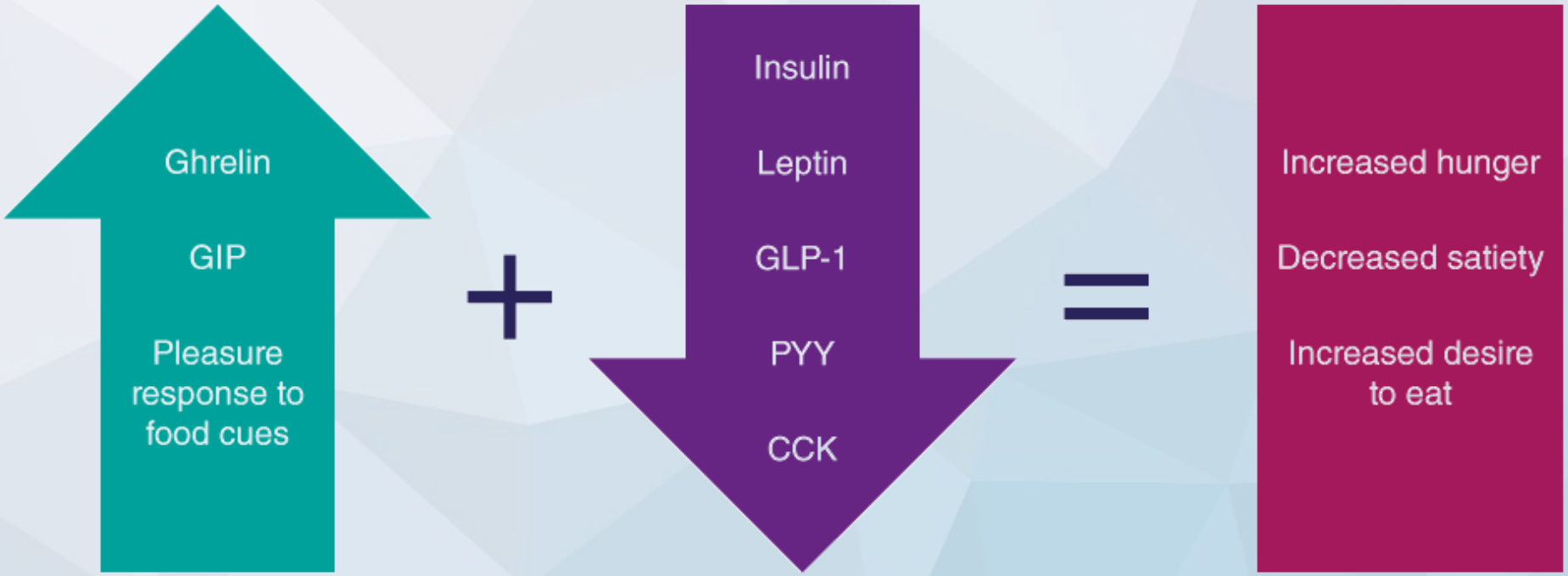
Most common side effects:

Orlistat: faecal urgency, increased defecation, faecal incontinence

Phentermine/topiramate: paraesthesia, dizziness, dysgeusia, insomnia, constipation, dry mouth

Liraglutide: nausea, constipation, vomiting, dyspepsia

Naltrexone/bupropion: nausea, constipation, headache, dizziness, insomnia, vomiting, dry mouth, diarrhoea


Ghrelin
GIP
Pleasure response to food cues
+
Insulin
Leptin
GLP-1
PYY
CCK
=
Increased hunger
Decreased satiety
Increased desire to eat

5A RULES

TREATMENT OF OBESITY IS PRIMARILY ....

SHORTENED LIFE EXPECTANCY

OBESITY II°	OBESITY III°
2-4 years	8-10 years

- lower risk of behavior for type 2 diabetes
- lower risk of behavior for heart disease
- improvement of lipid profile
- improvement of blood pressure
- reduction of joint pain
- reduction of OSA ailments
- prolongs and improves the quality of life

Source: Body-mass index and cause-specific mortality in 900 000 adults: collaborative analyses of 57 prospective studies. Lancet. 2009 Mar 28; 373(9669): 1083–1096.