Childhood obesity and obesity reduction program

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Project title: „Origin and pathogenesis of obesity in relation to non-traditional obesity risk factors“

Obesity

- Childhood obesity → most serious public health challenges of the 21st century
- Obese children → obese into adulthood and more likely to develop ***noncommunicable diseases*** (diabetes, cardiovascular diseases) at a younger age
- ***Overweight and obesity, as well as their related diseases, are largely preventable !!!***

World Health Organization

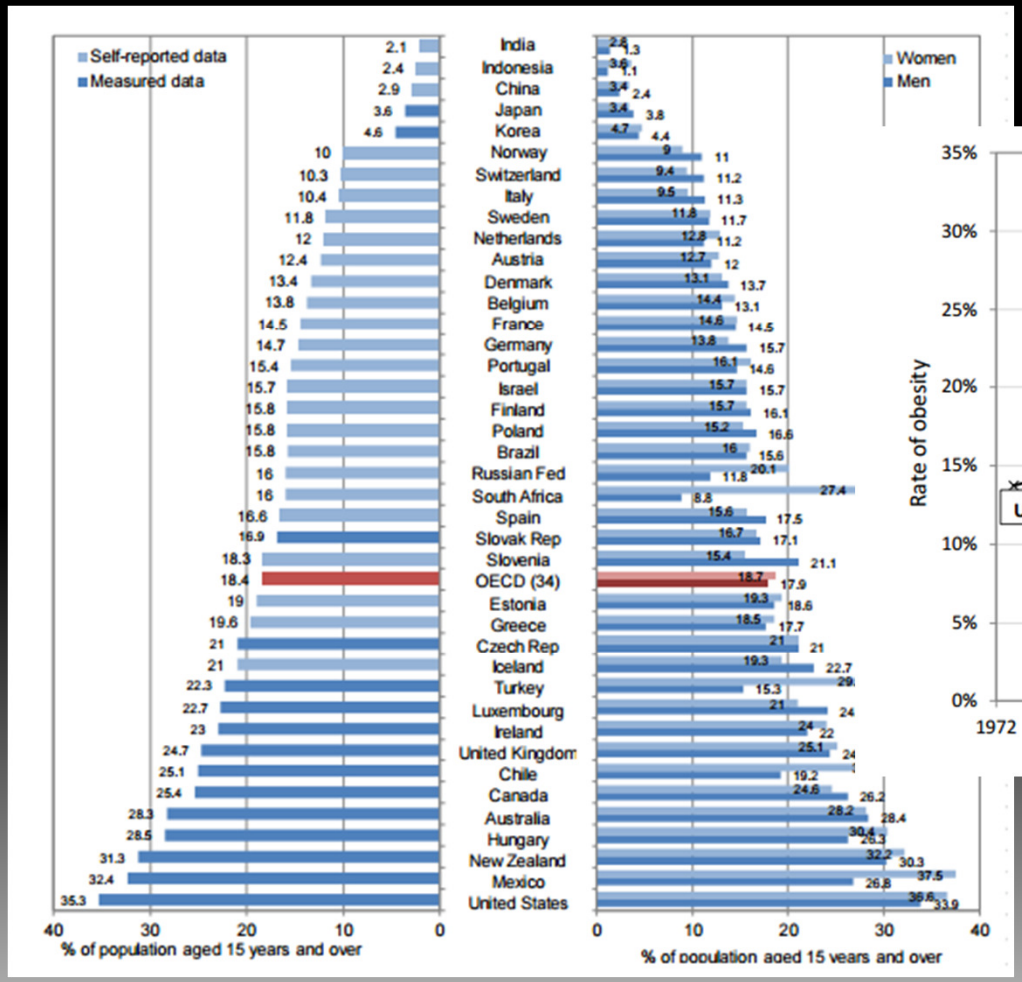
Etiology, Determinants and Risk Factors

- Genetic Variation
- Epigenetics
- Endocrine Disease
- Central Nervous System Pathology
- Intrauterine Exposures
- BMI Rebound
- Diet
- Sleep
- Infection
- Iatrogenic
- Ethnic Origin
- Country of Birth
- Urban Versus Rural Area of Residence
- Socioeconomic Level

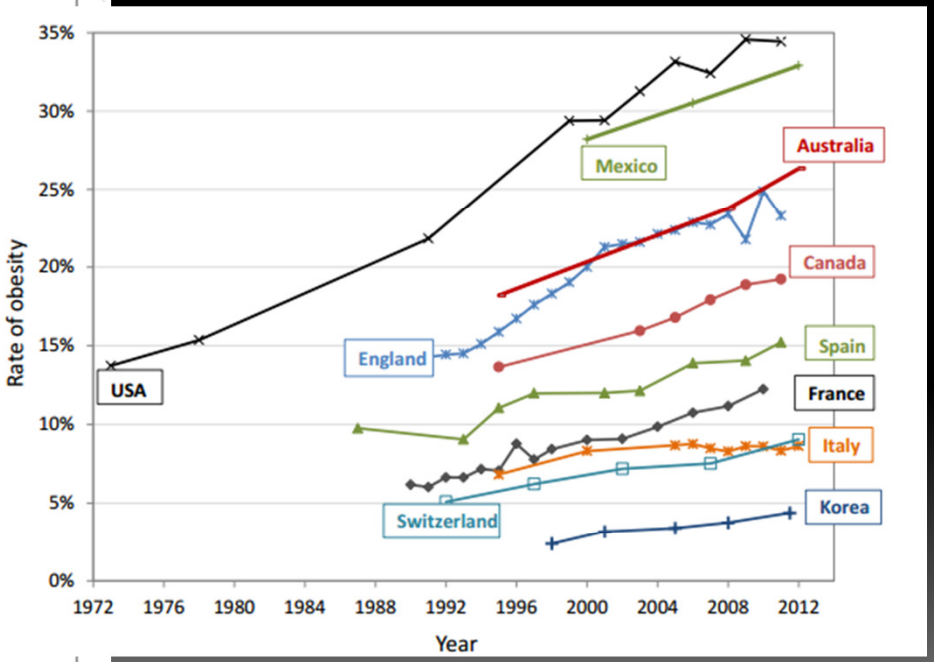
Endogenous obesity in children represents ONLY 5 % of obesity

Neslihan Kovuncuoglu Güngör et al. Overweight and Obesity in Children and Adolescents. J Clin Res Pediatr Endocrinol, 2014

Obesity epidemic continues



Obesity among adults



Trends in obesity

OBESITY Update

June 2014

OECD

BETTER POLICIES FOR BETTER LIVES

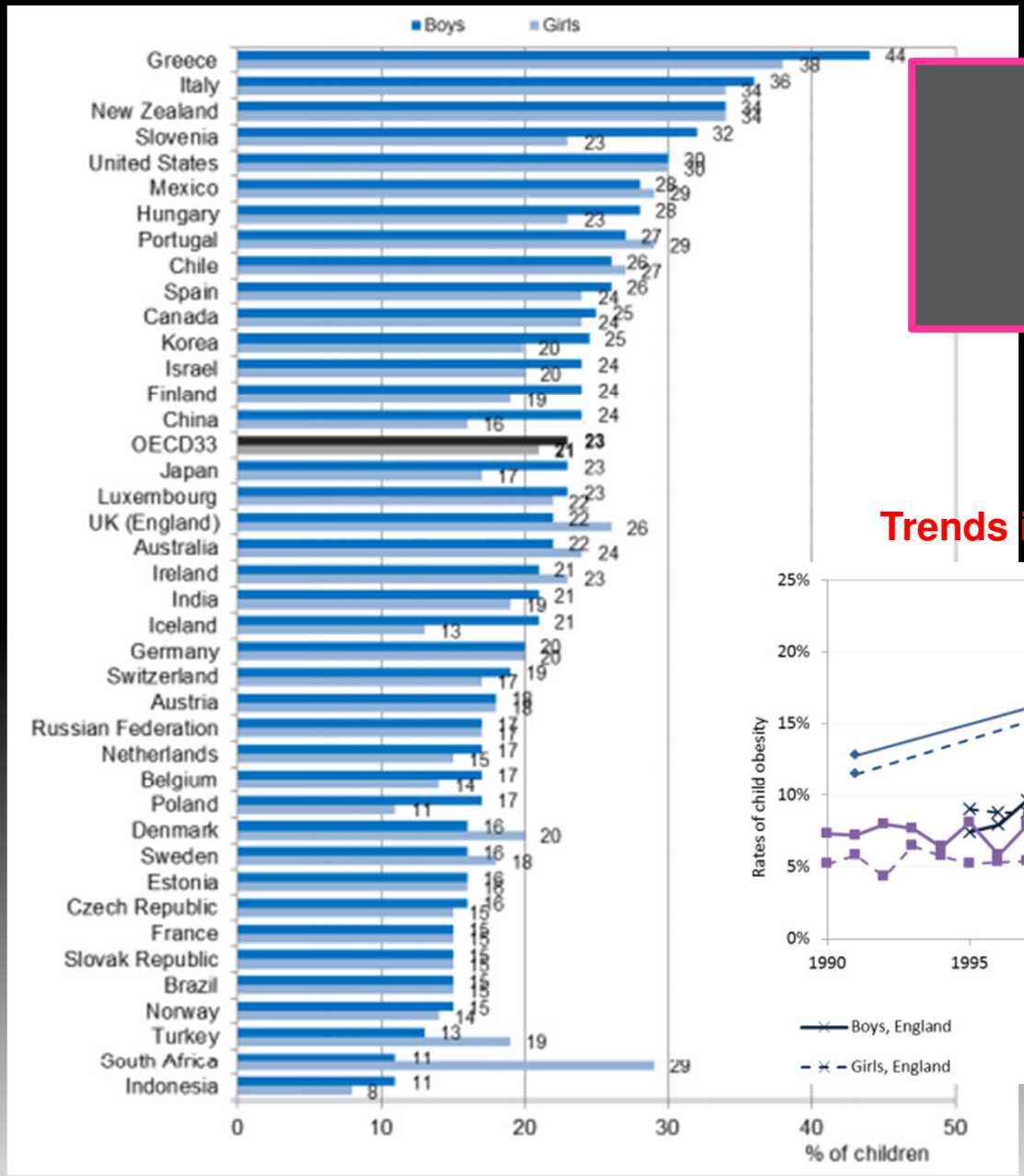
OECD Directorate for Employment, Labour and Social Affairs

OECD
BETTER POLICIES FOR BETTER LIVES
OECD Directorate for Employment, Labour and Social Affairs

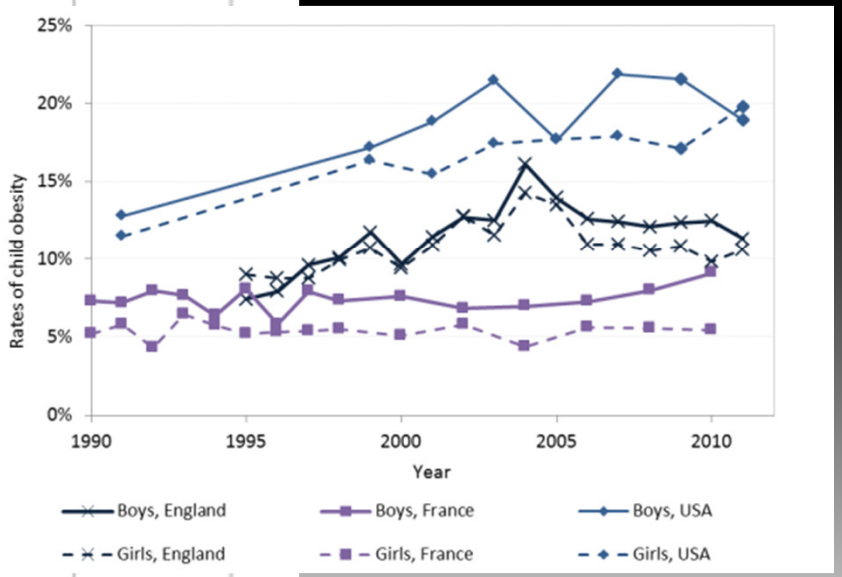
OBESITY Update

June 2014

Obesity epidemic continues



Trends in child obesity, age 3-17



Measured overweight (including obesity) among children aged 5-17

Healthy high-school students in Eastern Slovakia- **Our results**

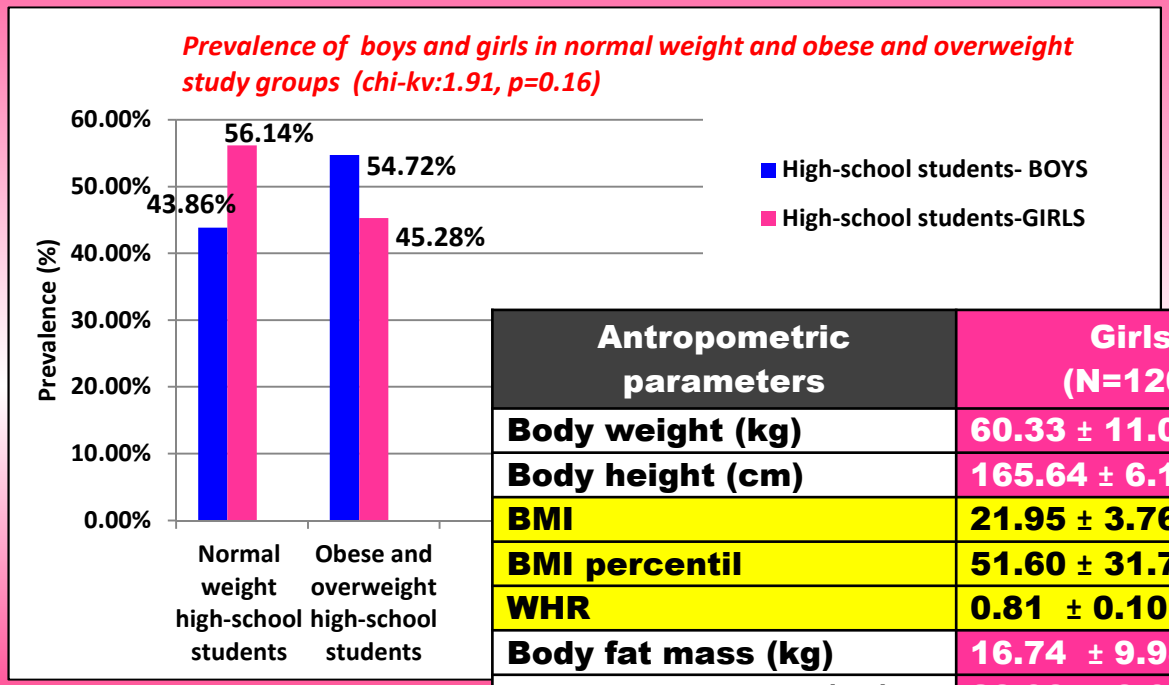
Prevalence of overweight and obesity 23.66%

Prevalence of insulin resistance 13.94%

8.9% in normal weight adolescents

30% in obese and overweight adolescents

Healthy high-school students in Eastern Slovakia- **Our results**



Antropometric parameters	Girls (N=120)	Boys (N=104)	p-value
Body weight (kg)	60.33 ± 11.04	75.46 ± 15.34	<0.0001
Body height (cm)	165.64 ± 6.15	181.18 ± 6.70	<0.0001
BMI	21.95 ± 3.76	22.94 ± 4.38	0.06
BMI percentil	51.60 ± 31.74	54.86 ± 31.84	0.44
WHR	0.81 ± 0.10	0.83 ± 0.06	0.25
Body fat mass (kg)	16.74 ± 9.98	13.66 ± 8.86	0.30
Body musle mass (kg)	23.93 ± 3.09	37.18 ± 3.84	<0.0001
Body fat percentile (%)	26.17 ± 8.86	16.26 ± 7.94	<0.001
Visceral fat mass (cm^2)	97.71 ± 111.18	95.57 ± 102.83	0.94
Basal metabolic rate (kcal)	1310.19 ± 110.12	1786.94 ± 134.83	<0.0001

Obesity treatment

- The aim of the obesity treatment in children is not to achieve fast and short-term weight reduction ('yo-yo effect'), BUT to achieve a long-term and sustainable stabilization of adequate body weight → the clear long-term strategy
- Focuses on the support of the quality of children's life and life enjoyment, encouragement of their self-confidence
- Measures in lifestyle
- Modifications of eating habits

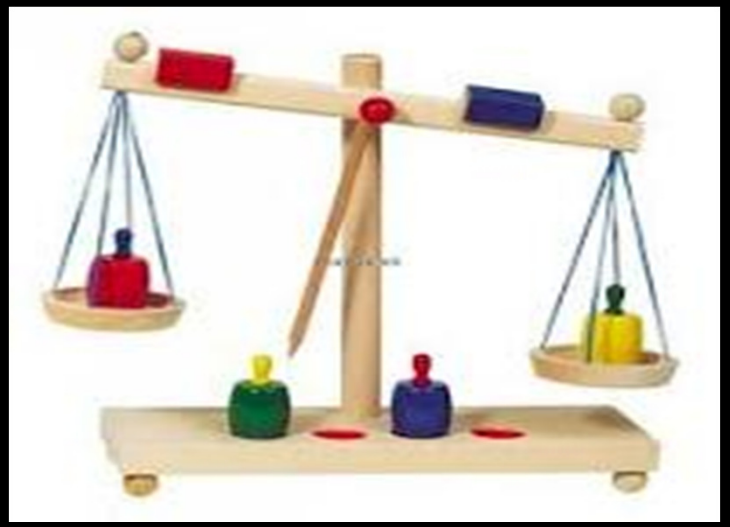
- ! The choice of a proper therapy for the child

Reinehr, T., et al. Therapie der Adipositas im Kindes- und Jugendalter, 2010

World Health Organization

Obesity treatment

- ***At first, stabilization of weight***
- ***Then, a slow weight reduction*** *(approximately 0.5 kg/month)*
- ***Suppression of anti-regulatory mechanisms*** *(basal metabolism reduction, etc.)*



Reinehr, T., et al. Therapie der Adipositas im Kindes- und Jugendalter, 2010

World Health Organization

Forms of obesity treatment in children in Slovakia

- **In-patient treatment** *at the beginning of diagnosis*
- **Spa treatment** *to initiate and strengthen their lifestyle and dietary habits*
- **Outpatient treatment** *(simple training programs) is preferred; it is carried out by a team of experts: (paediatrician, dietologist, psychologist, sports trainer, cardiologist)*

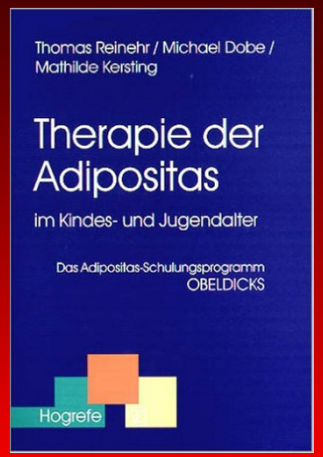
Clinic for preventive cardiology and lipid metabolism disorders

Children faculty hospital, Kosice

„School of Obesity”- Obesity reduction program

Held under the patronage of the *President of Slovak Section for Atherosclerosis of the Slovak Society of Clinical Biochemistry* (Member of IAS), *Assoc Prof. Ingrid Schusterova, MD, PhD.*

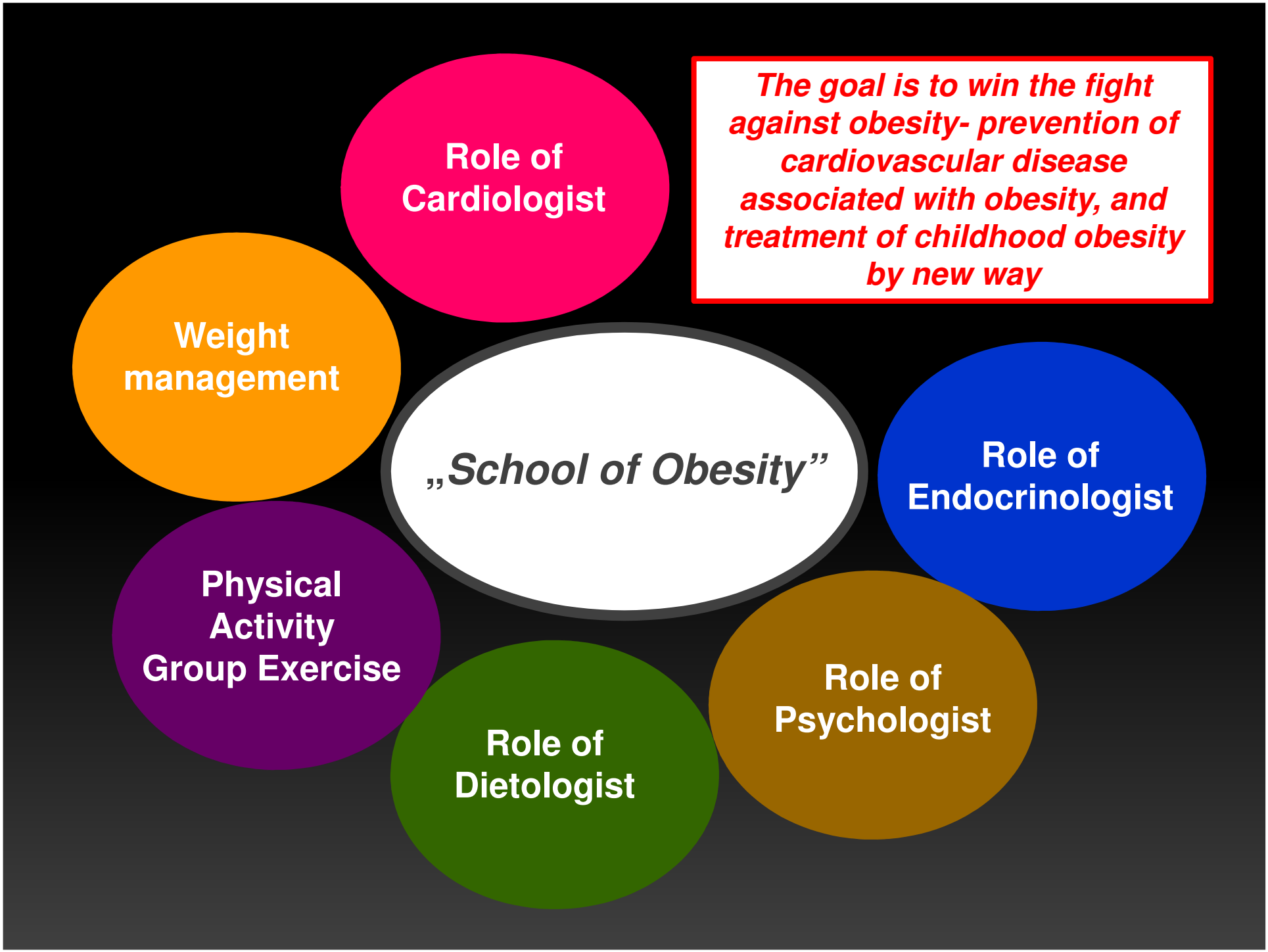
- **Based on a training program OBELDICKS**
- **Interdisciplinary outpatient program** ***(Highly organized team of specialists)***



„School of Obesity"- Obesity reduction program

- **Focuses on the same sex/ age groups of children and adolescent**
- **Family based strategies to control weight changes include**
  1) **Controlling the child's environment**
  2) **Monitoring behavior**
  3) **Setting goals**
  4) **Rewarding successful behavior changes**

World Health Organization

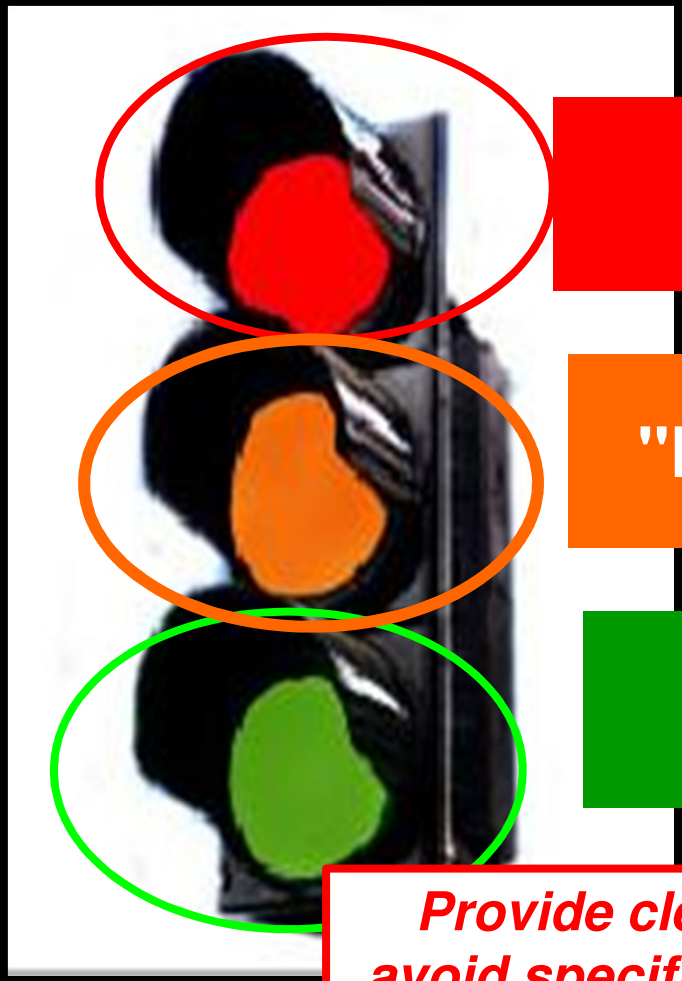

Role of Cardiologist
The goal is to win the fight against obesity- prevention of cardiovascular disease associated with obesity, and treatment of childhood obesity by new way
Weight management
„School of Obesity”
Role of Endocrinologist
Physical Activity Group Exercise
Role of Psychologist
Role of Dietologist

Physical activity
Group Exercise

- ✓ *Professional* / fitness instructor-led exercise
- ✓ *Promote physical activity*
- ✓ *Reduce sedentary behaviors in children*

Provide guidance to children and adolescents, their parents, caregivers on healthy body size, physical activity, sleep behaviors

Role of Dietologist



"BAD" (inadequate) FOOD

"NOT BAD – NOT GOOD" FOOD

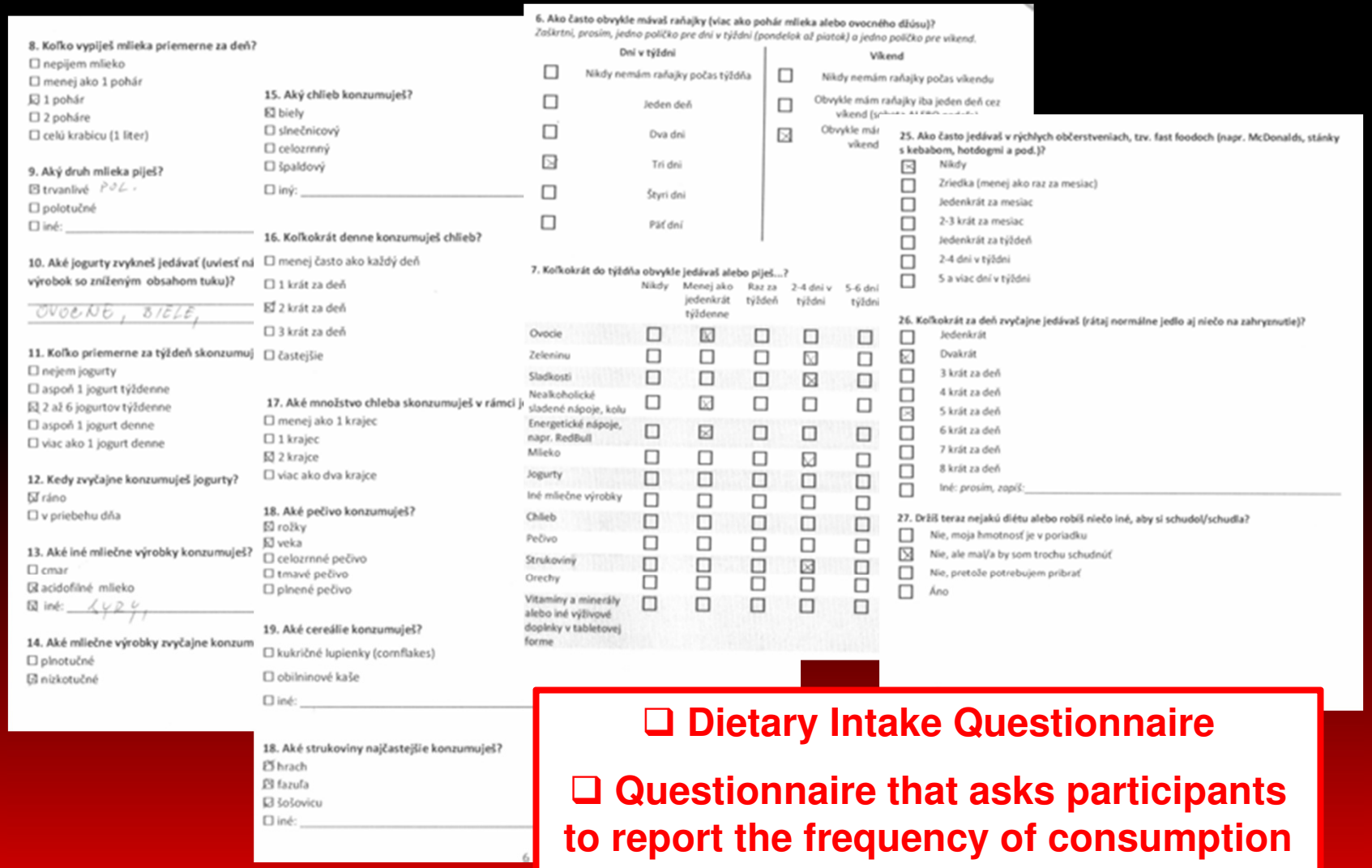
"GOOD" (adequate) FOOD

Provide clear guidance and support to caregivers to avoid specific categories of foods (e.g. sugarsweetened milks and fruit juices or energy-dense, nutrient-poor foods) for the prevention of excess weight gain

Recommended food

Not recommended food

Role of Dietologist



8. Koľko vypiješ mlieka priemerne za deň?
☐ nepijem mlieko
☐ menej ako 1 pohár
☒ 1 pohár
☐ 2 poháre
☐ celú krabicu (1 liter)

9. Aký druh mlieka piješ?
☒ trvanlivé POL.
☐ polotučné
☐ iné: _____

10. Aké jogury zvykneš jedávať (uviesť ná
výrobok so zníženým obsahom tuku)?
OVOCNÉ, BIELE,

11. Koľko priemerne za týždeň skonzumuj
☐ nejem jogurty
☐ aspoň 1 jogurt týždenne
☒ 2 až 6 jogurtov týždenne
☐ aspoň 1 jogurt denne
☐ viac ako 1 jogurt denne

12. Kedy zvyčajne konzumuješ jogurty?
☒ ráno
☐ v priebehu dňa

13. Aké iné mliečne výrobky konzumuješ?
☐ cmar
☒ acidofilné mlieko
☒ iné: KYPR.

14. Aké mliečne výrobky zvyčajne konzum
☐ plnotučné
☒ nízkotučné

15. Aký chlieb konzumuješ?
☒ biely
☐ slnečnicový
☐ celozrnný
☐ špaldový
☐ iný: _____

16. Koľkokrát denne konzumuješ chlieb?
☐ menej často ako každý deň
☐ 1 krát za deň
☒ 2 krát za deň
☐ 3 krát za deň
☐ častejšie

17. Aké množstvo chleba skonzumuješ v rámci j
☐ menej ako 1 krajec
☐ 1 krajec
☒ 2 krajce
☐ viac ako dva krajce

18. Aké pečivo konzumuješ?
☒ rožky
☒ veka
☐ celozrnné pečivo
☐ tmavé pečivo
☐ plnené pečivo

19. Aké cereálie konzumuješ?
☐ kukričné lupienky (cornflakes)
☐ obilninové kaše
☐ iné: _____

18. Aké strukoviny najčastejšie konzumuješ?
☒ hrach
☒ fazuľa
☒ šošovicu
☐ iné: _____

6. Ako často obvykle mávaš raňajky (viac ako pohár mlieka alebo ovocného džúsu)?
Zaškrtni, prosím, jedno políčko pre dni v týždni (pondelok až piatok) a jedno políčko pre víkend.

Dni v týždni		Víkend	
☐	Nikdy nemám raňajky počas týždňa	☐	Nikdy nemám raňajky počas víkendu
☐	Jeden deň	☐	Obvykle mám raňajky iba jeden deň cez víkend (s
☐	Dva dni	☒	Obvykle má víkend
☒	Tri dni		
☐	Štyri dni		
☐	Päť dní		

7. Koľkokrát do týždňa obvykle jedávaš alebo piješ...?

	Nikdy	Menej ako jedenkrát týždenne	Raz za týždeň	2-4 dni v týždni	5-6 dní týždni
Ovocie	☐	☒	☐	☐	☐
Zeleninu	☐	☐	☐	☒	☐
Sladkosti	☐	☐	☐	☒	☐
Nealkoholické sladené nápoje, kolu	☐	☒	☐	☐	☐
Energetické nápoje, napr. RedBull	☐	☒	☐	☐	☐
Mlieko	☐	☐	☐	☒	☐
Jogurty	☐	☐	☐	☐	☐
Iné mliečne výrobky	☐	☐	☐	☐	☐
Chlieb	☐	☐	☐	☐	☐
Pečivo	☐	☐	☐	☐	☐
Strukoviny	☐	☐	☐	☒	☐
Orechy	☐	☐	☐	☐	☐
Vitamíny a minerály alebo iné výživové doplnky v tabletovej forme	☐	☐	☐	☐	☐

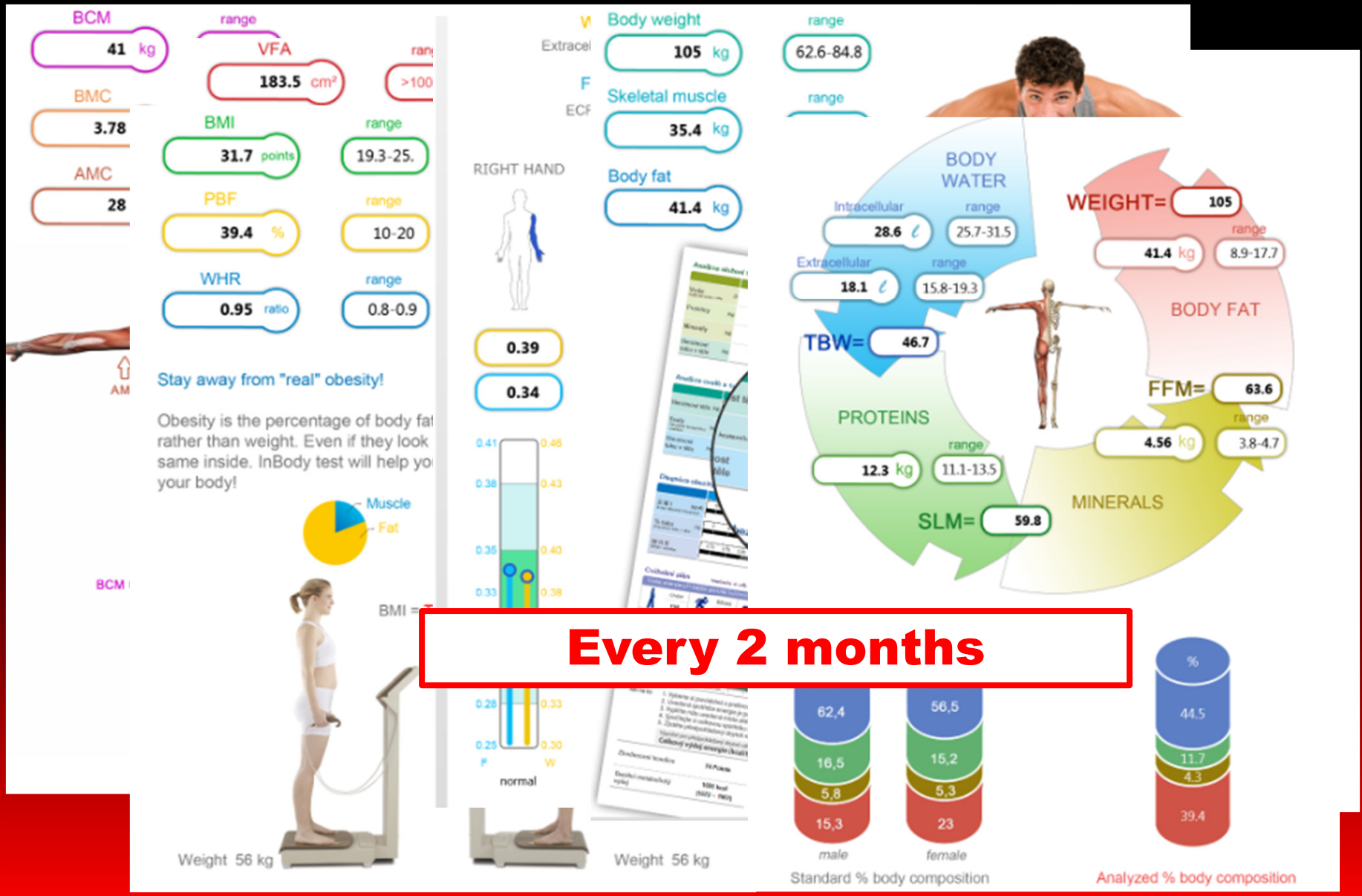
25. Ako často jedávaš v rýchlych občerstveniach, tzv. fast foodoch (napr. McDonalds, stánky s kebabom, hotdogmi a pod.)?
☒ Nikdy
☐ Zriedka (menej ako raz za mesiac)
☐ Jedenkrát za mesiac
☐ 2-3 krát za mesiac
☐ Jedenkrát za týždeň
☐ 2-4 dni v týždni
☐ 5 a viac dní v týždni

26. Koľkokrát za deň zvyčajne jedávaš (rátaj normálne jedlo aj niečo na zahryznutie)?
☐ Jedenkrát
☒ Dvakrát
☐ 3 krát za deň
☐ 4 krát za deň
☒ 5 krát za deň
☐ 6 krát za deň
☐ 7 krát za deň
☐ 8 krát za deň
☐ Iné: *prosím, zapíš*: _____

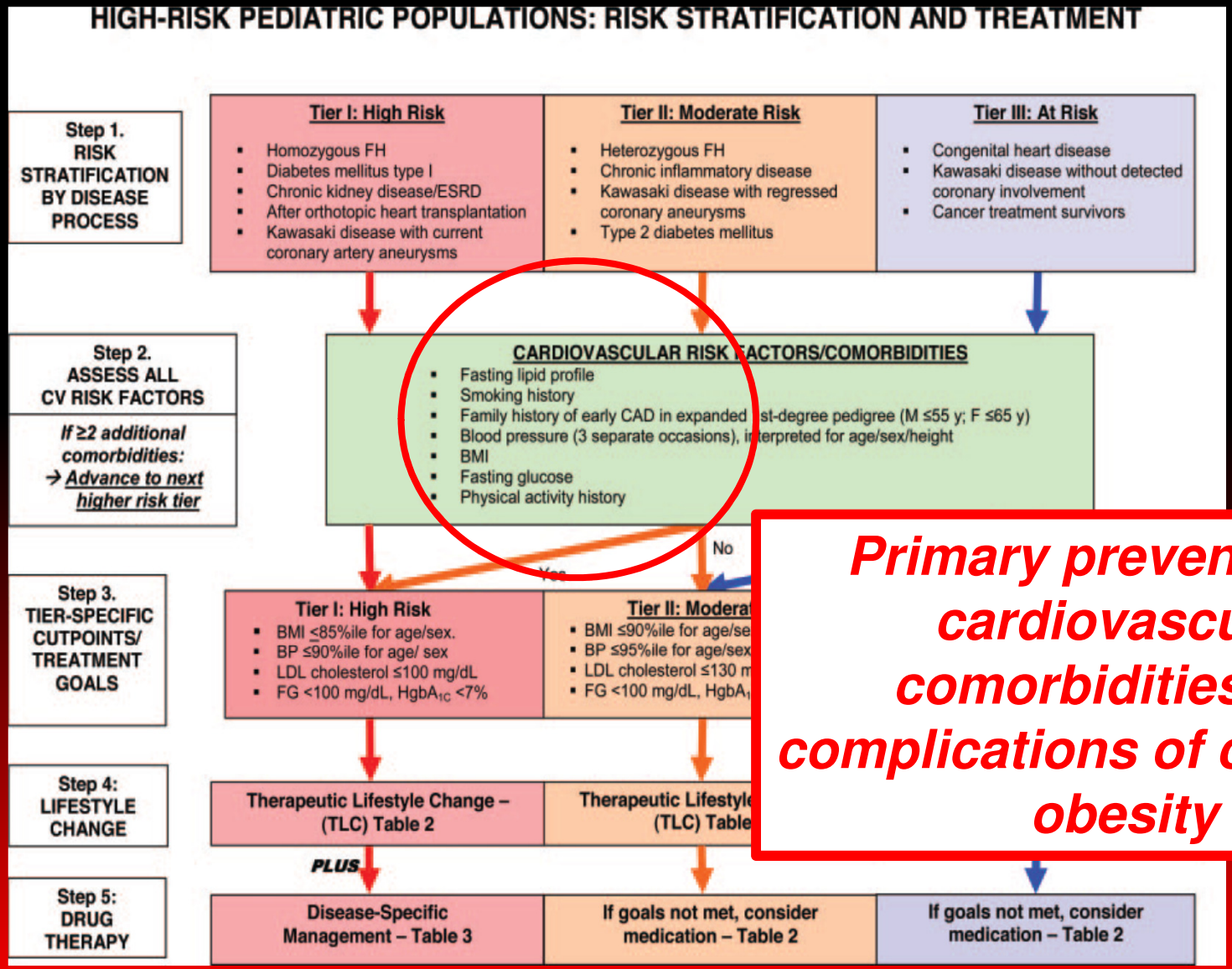
27. Držíš teraz nejakú diétu alebo robíš niečo iné, aby si schudol/schudla?
☐ Nie, moja hmotnosť je v poriadku
☒ Nie, ale mal/a by som trochu schudnúť
☐ Nie, pretože potrebujem pribrať
☐ Áno

- ❑ **Dietary Intake Questionnaire**
- ❑ **Questionnaire that asks participants to report the frequency of consumption of a defined list of foods**

Weight management



Role of Cardiologist



Primary prevention of cardiovascular comorbidities and complications of childhood obesity

FMD

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Technique Report

Guidelines for the Ultrasound Assessment of Endothelial-Dependent Flow-Mediated Vasodilation of the Brachial Artery

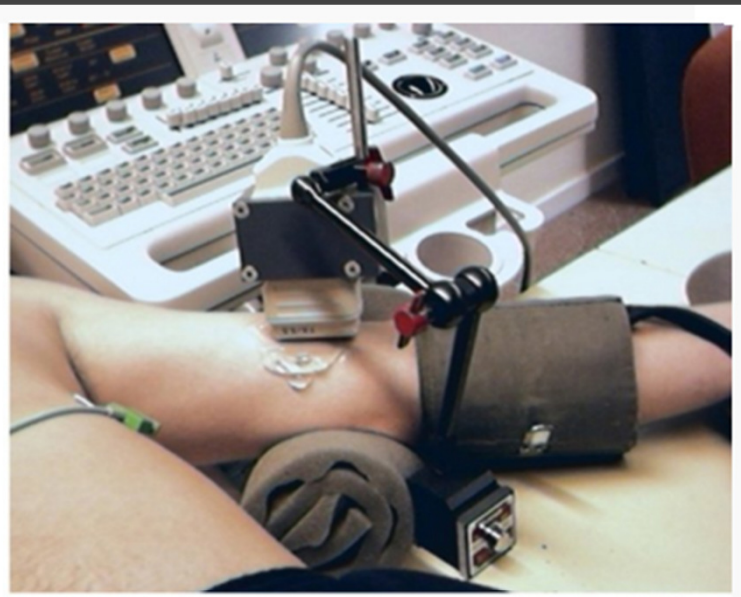
A Report of the International Brachial Artery Reactivity Task Force

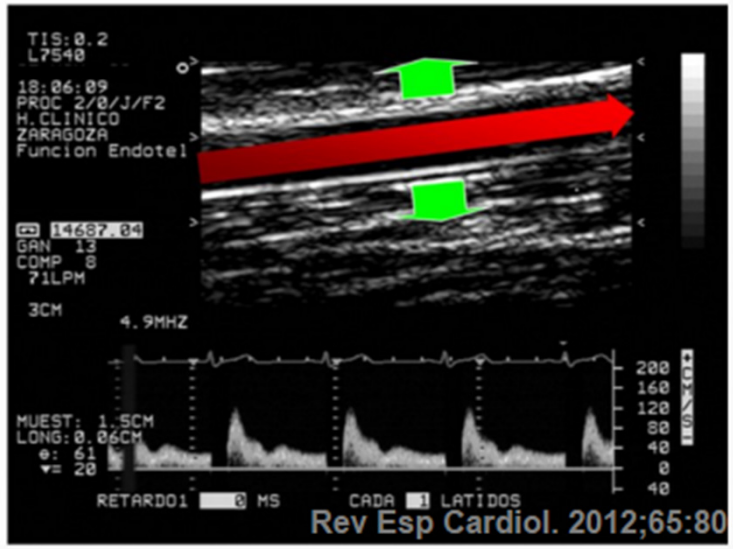
Mary C. Corretti, MD, FACC,* Todd J. Anderson, MD,† Emelia J. Benjamin, MD, MSc,‡ David Celermajer, MD,§ Francois Charbonneau, MD,‖ Mark A. Creager, MD,¶ John Deanfield, MD,# Helmut Drexler, MD,** Marie Gerhard-Herman, MD,¶ David Herrington, MD, MHS,†† Patrick Vallance, MD,‡‡ Joseph Vita, MD,‡ Robert Vogel, MD*

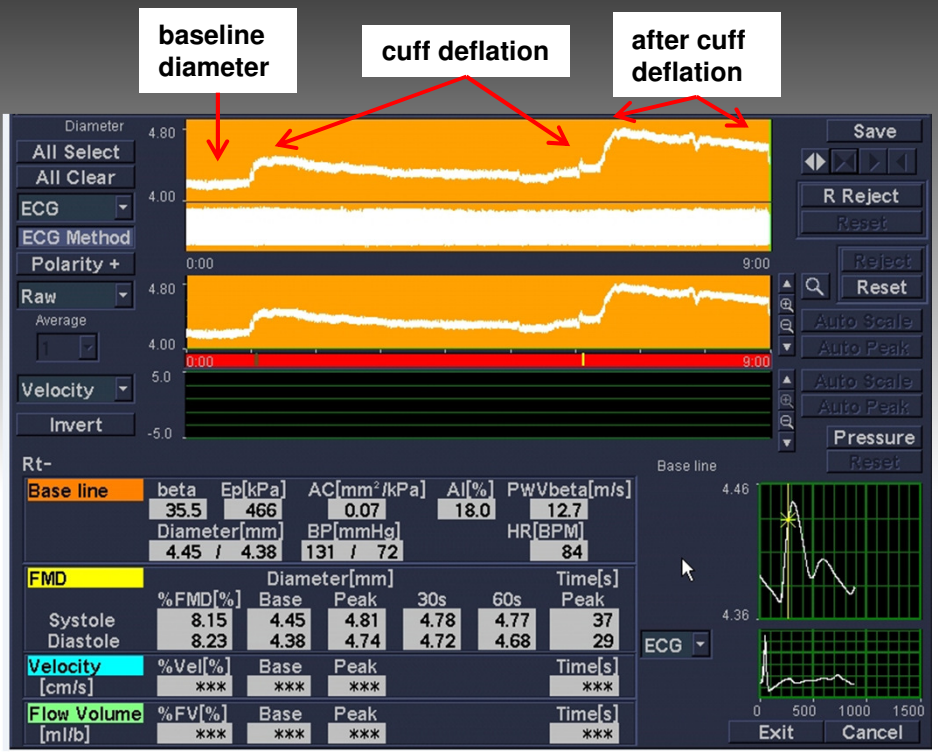
Baltimore, Maryland; Calgary, Alberta and Montreal, Quebec, Canada; Boston, Massachusetts; Sydney, Australia; London, United Kingdom; Hannover, Germany; and Winston-Salem, North Carolina

- Endothelial function is thought to be an important factor in pathogenesis of atherosclerosis, hypertension and heart failure
- In the 1990s, high-frequency ultrasonographic imaging of the brachial artery to assess endothelium-dependent flow-mediated vasodilation was developed

FMD







- FMD typically expressed as the change in post- stimulus as a percentage of the baseline diameter

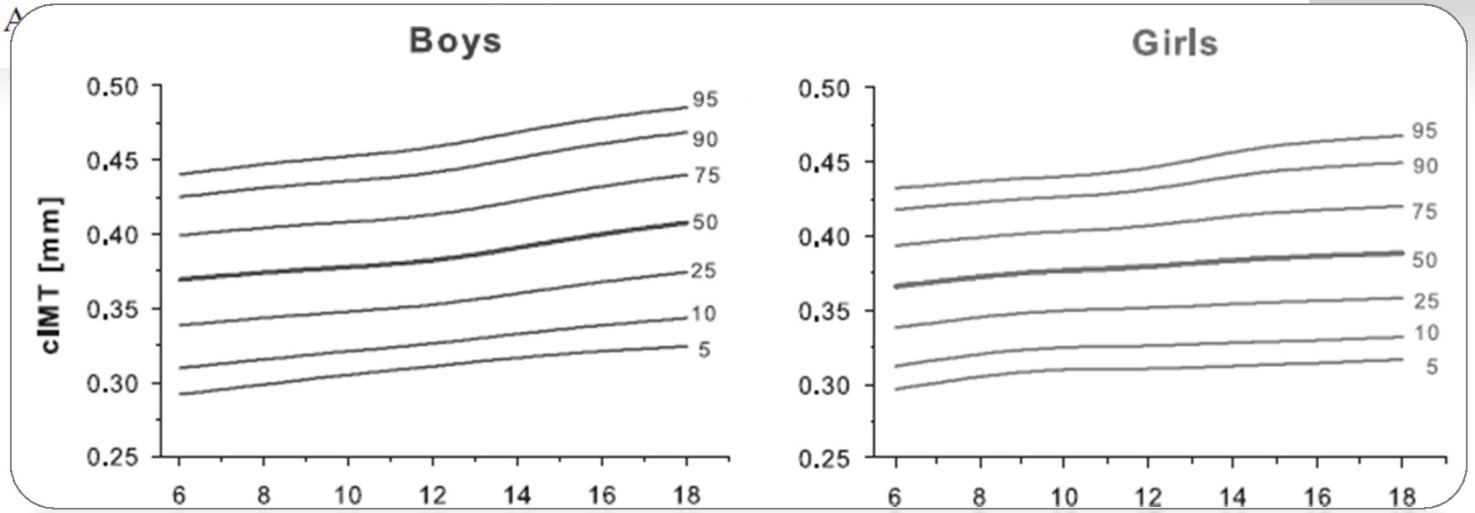
Corretti, MC. Journal of the American Collage of Cardiology, 2002

cIMT (Carotid Artery Intima-Media Thickness)

Carotid Artery Intima-Media Thickness and Distensibility in Children and Adolescents

Reference Values and Role of Body Dimensions

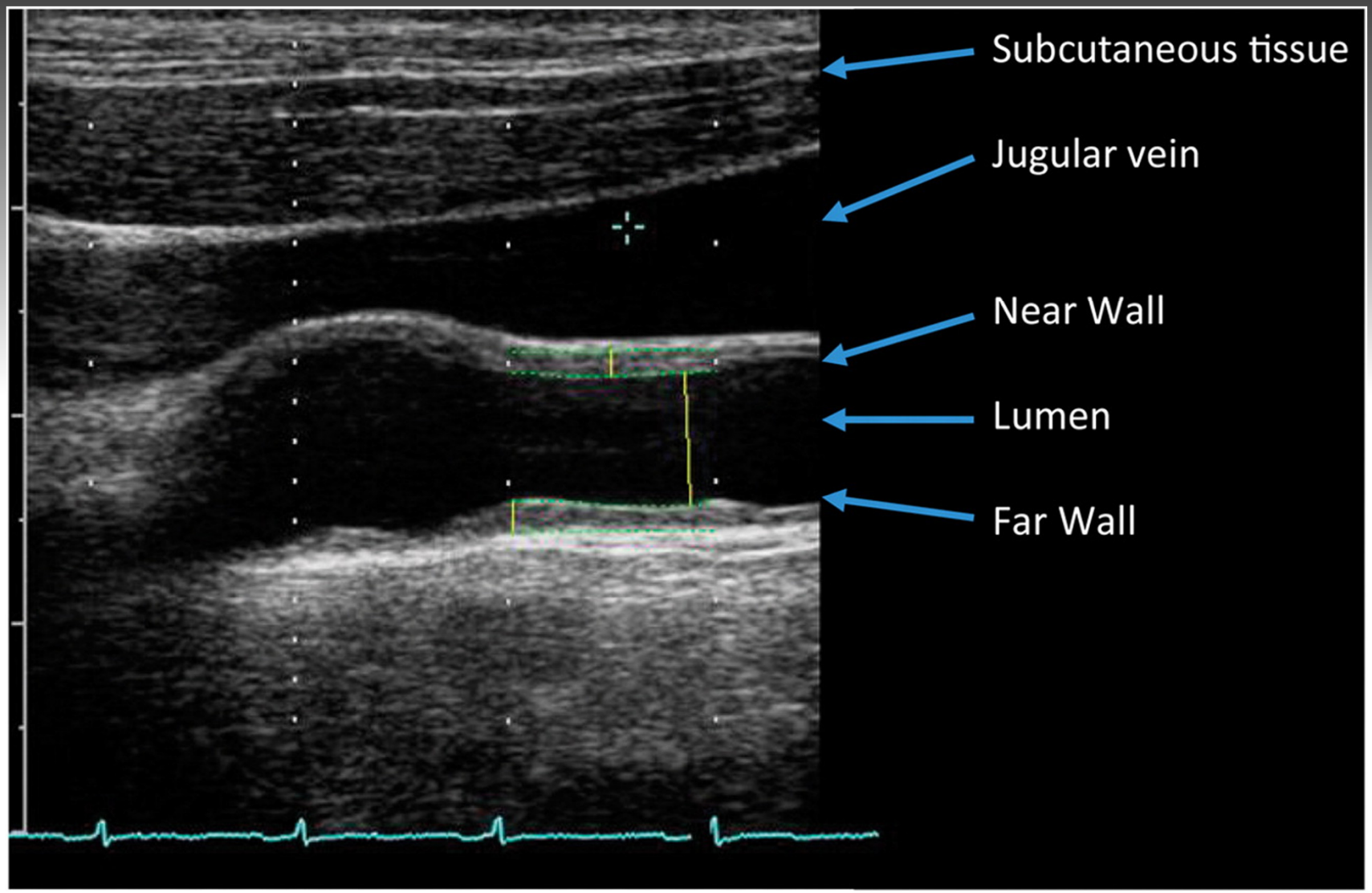
Anke Doyon,* Daniela Kracht,* Aysun K. Bayazit, Murat Deveci, Ali Duzova, Rafael T. Krmar, Mieczyslaw Litwin, Anna Niemirska, Berna Oguz, Bernhard M.W. Schmidt, Betul Sözeri, Uwe Querfeld, A



- **Reliable screening methods for vascular alterations and the assessment of cardiovascular risk in adult and pediatric cohorts**

Doyon, A., et al. Hypertension., 2013

cIMT

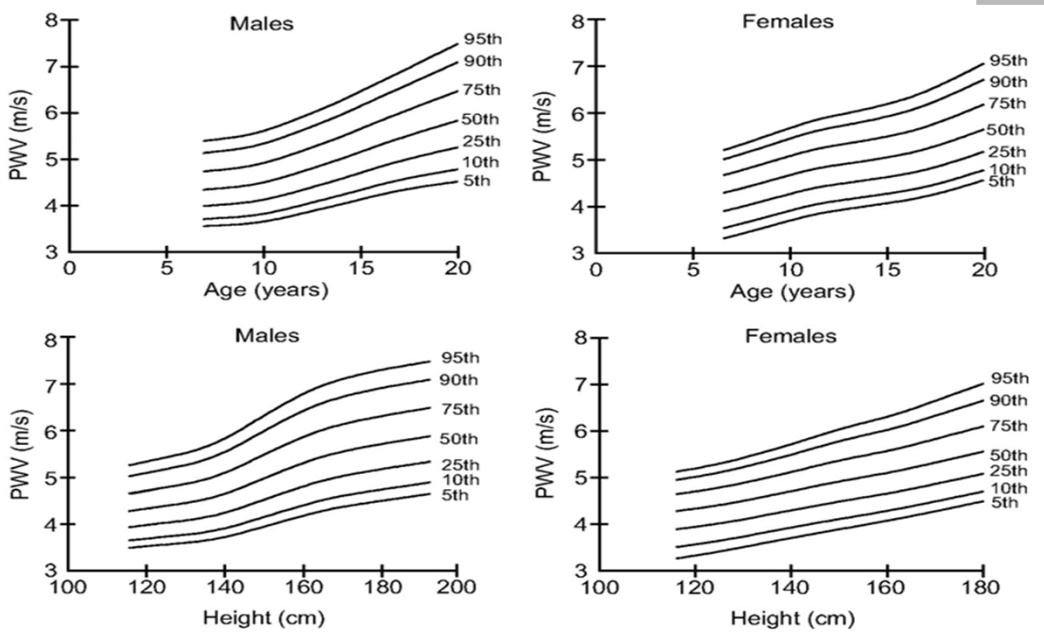


Doyon,A., et al. Hypertension, 2013

PWV (Aortic Pulse Wave Velocity)

Reference Values of Pulse Wave Velocity in Healthy Children and Teenagers

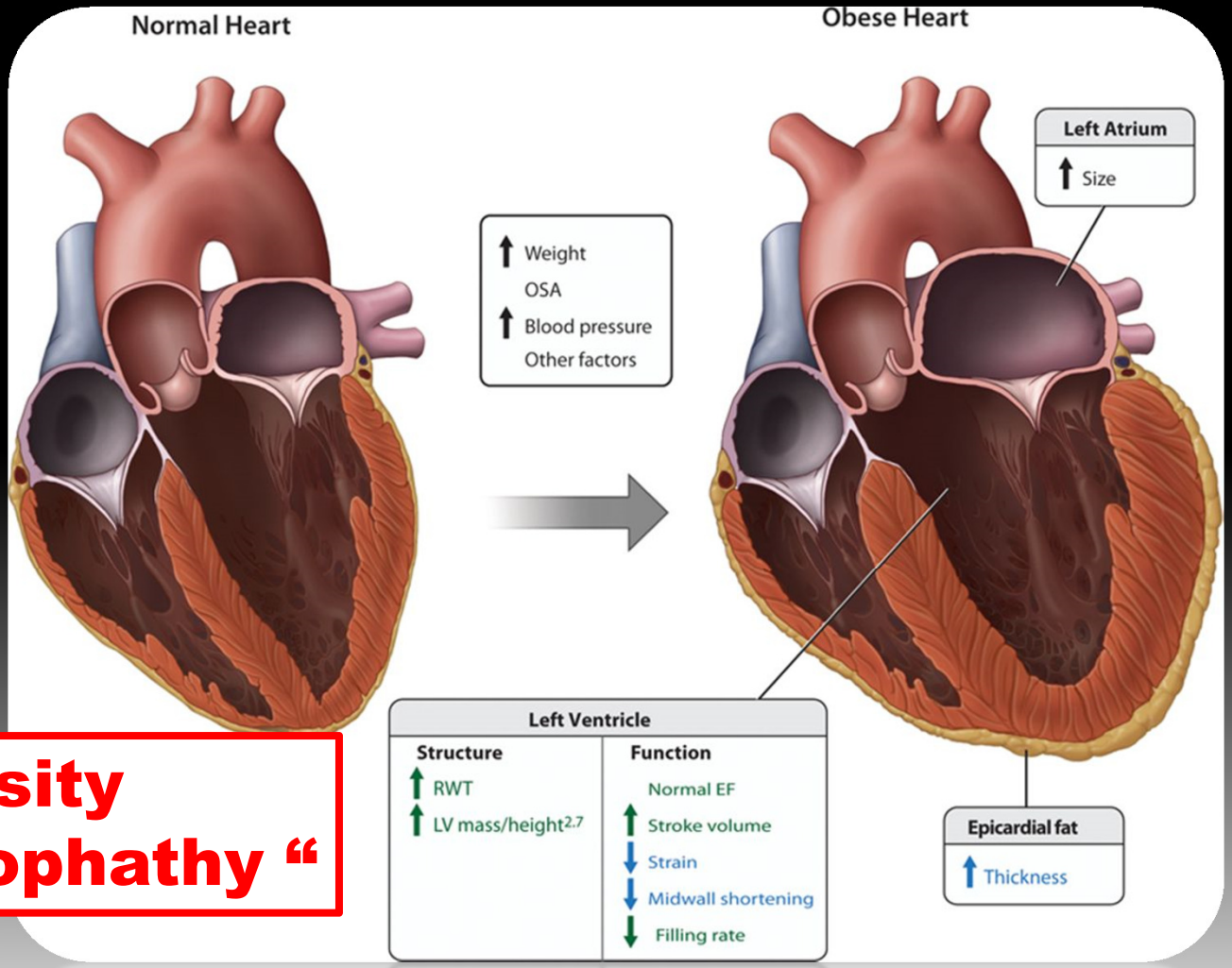
George S. Reusz, Orsolya Cseprekal, Mohamed Temmar, Éva Kis, Abdelghani Bachir Cherif, Abddelhalim Thaleb, Andrea Fekete, Attila J. Szabó, Athanase Benetos, Paolo Salvi



- PWV is a sensitive marker of arterial stiffness and, consequently, of cardiovascular outcome
- Reference database

Reusz, GS., et al. Hypertension, 2010

ECHO „Obesity cardiomyophathy “



„Obesity cardiomyophathy “

Schusterova, I. Cardiomyopathy associated with obesity: Obesity Cardiomyopathy, In Abdominal Obesity, Risk factors, Weight Reduction and Long- Term Health Effects, 2015

Gerard, P., et al. Cardiac remodeling in Obesity, Circulation, 2013

Role of Endocrinologist

A, Glucose metabolism

- Insulin resistance
- Prediabetes (impaired fasting glucose/ impaired glucose tolerance)
- Type 2 diabetes mellitus
- Metabolic syndrome

B, Growth- and puberty- related issue

Girls

- Hyperandrogenism/ polycystic ovarian syndrome
- Earlier menarche

Boys

- Later pubertal onset
- Pseudo- micropenis (hidden penis)
- Reduced circulating androgens

C, Thyroid function aberrations

Diagnosis and management of endocrine comorbidities and complications of childhood obesity

Role of Psychologist

Diagnosis of psychosocial complications

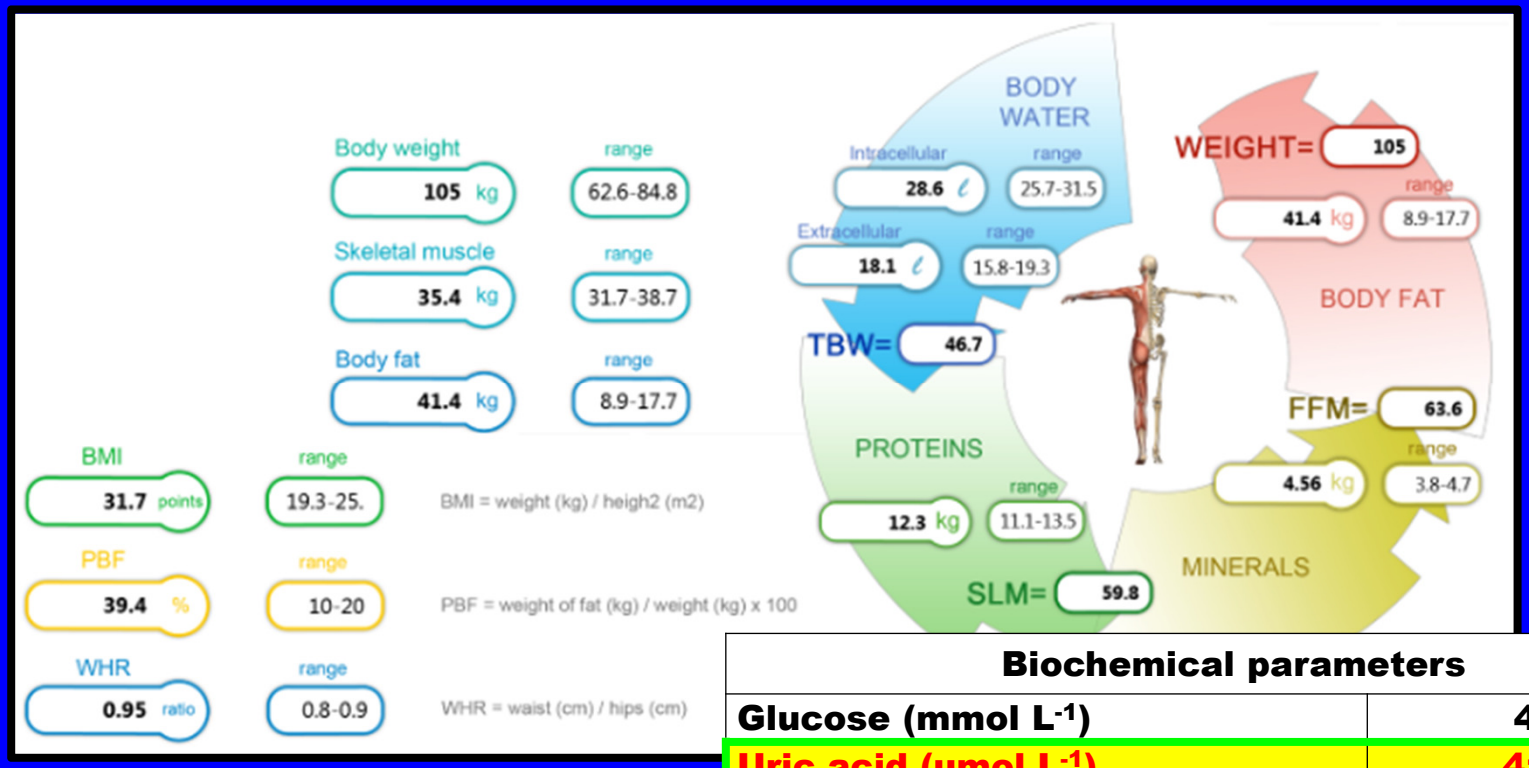
- *Body dissatisfaction*
- *Symptoms of depression*
- *Loss- of- control in eating*
- *Unhealthy and extreme weight control behaviors,*
- *Impaired social relationships decreased health-related quality of life*

Management of psychosocial complications

Important tools :

- *Motivational interviewing*
- *Patient talking points*
- *Brief screening measures*

Johanes (14y.)



Biochemical parameters	
Glucose (mmol L^{-1})	4.82
Uric acid (umol L^{-1})	414.2
Total cholesterol (mmol L^{-1})	3.98
TAG (mmol L^{-1})	1.87
HDL cholesterol (mmol L^{-1})	0.94
LDL cholesterol (mmol L^{-1})	2.70
Inzulin (uIU/ml)	24.2
HOMA-index	5.18

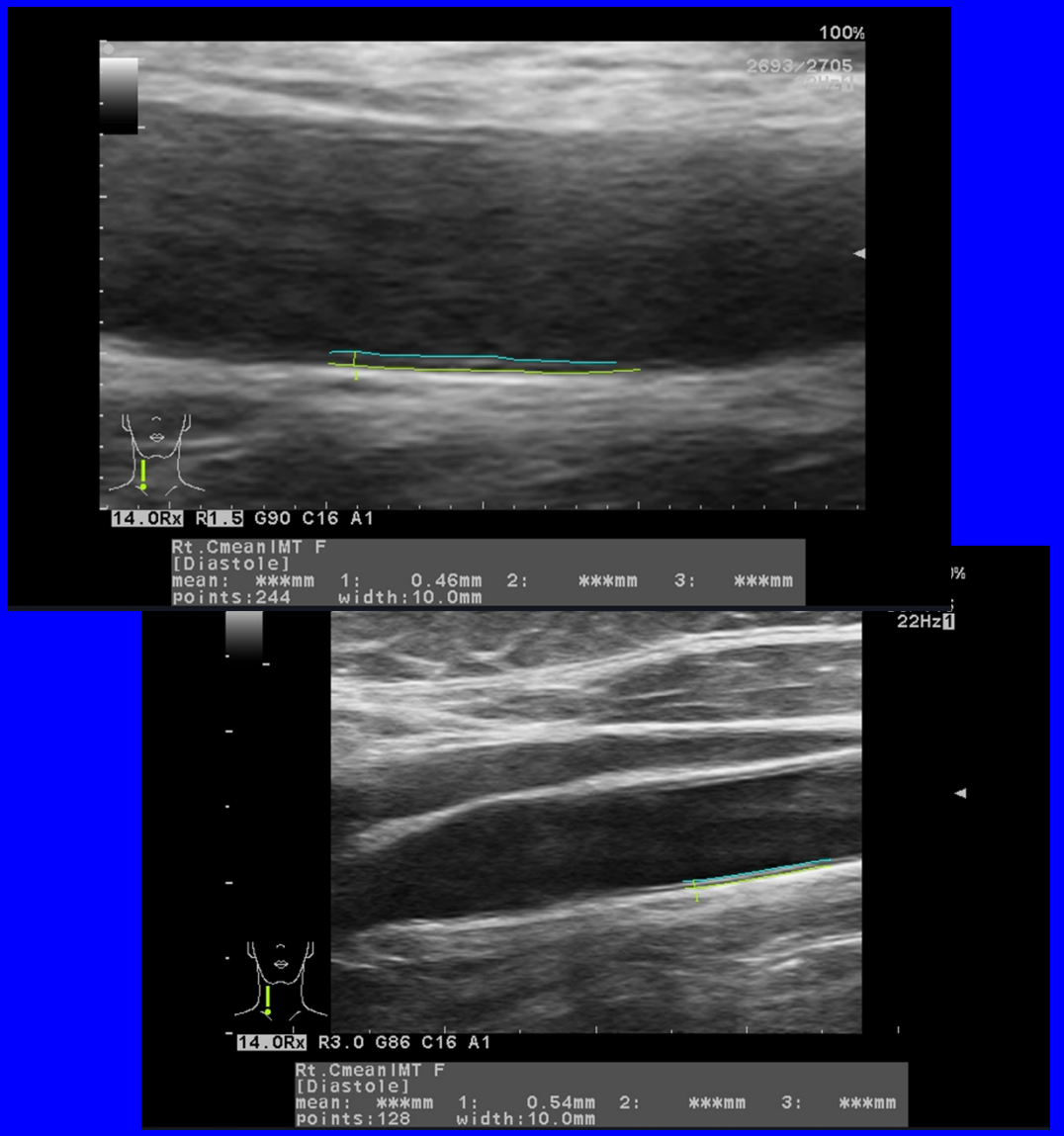
- ❑ Childhood obesity
- ❑ Hyperuricemia
- ❑ Elevated TAG
- ❑ Insulin resistance
- ❑ Prehypertension (BP: 130/82 mmHg)

Johanes (14y.)

Cardiovascular risk factors:

- ❑ Obesity
- ❑ Elevated TAG
- ❑ Insulin resistance
- ❑ Prehypertension
- ❑ Hyperuricemia

Elevated mean cIMT (≥90th percentile)



SUCCESSFUL TREATMENT

- ***Cooperation between the entire family and siblings is crucial!!!***
- ***Changes in children's lifestyle***
- ***<u>Encouraging child's awareness of:</u>***

- **Negative impacts of obesity**
- **Making them aware of difficulties it causes**
- **Explaining mistakes made in the choice of food, distribution of meals during a day, and in the choice of out-of-school and leisure activities**

Thank you for your attention