



Overvægt i et oplyst, nyt, effektivt og værdigt perspektiv



Jens-Christian Holm

Consultant in Paediatrics, PhD, Associate Clinical and Research Professor,
Head of Research and The Children's Obesity Clinic and
The HOLBAEK study

(formerly known as the Danish Childhood Obesity Biobank)

Department of Paediatrics
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Co-chair of The Childhood Obesity Task Force (EASO)





EASO

European Association for the Study of Obesity

EASO Collaborating Centres for Obesity Management (COMs) Paediatric Section

Centre: The Children's Obesity Clinic, Copenhagen University Hospital
Holbæk, Denmark

Contact: Jens-Christian Holm

We would like to take this opportunity to thank you for submitting an application for your centre to become an EASO accredited Collaborating Paediatric Centre for Obesity Management.

Under the EASO COM scheme, paediatric obesity management centres (including university and public clinics) are accredited against a set of carefully developed criteria and in accordance with accepted European and academic guidelines, with applying centres assessed by the EASO Childhood Obesity Task Force (COTF). The COTF has completed its assessment of your centre and we are pleased to confirm that your application was successful – your centre has thus been granted EASO COM status for the three year period **1st May 2019 to 30th April 2022**.

Your centre will therefore be recognised by EASO as a leading paediatric obesity management centre in Europe throughout that period. The EASO COM network brings together accredited centres from across Europe and as a member of this network, your centre will have the opportunity to contribute to a number of important EASO projects. One of the main goals of the COM network is to develop consensus guidelines on a number of management issues, with consensus achieved via the exchange of expertise during specially convened 'Paediatric COM Summit Meetings'.

We will send further information in due course and look forward to working with you to develop the EASO Paediatric COM network and its important actions in the coming years.

With kind regards
Yours sincerely

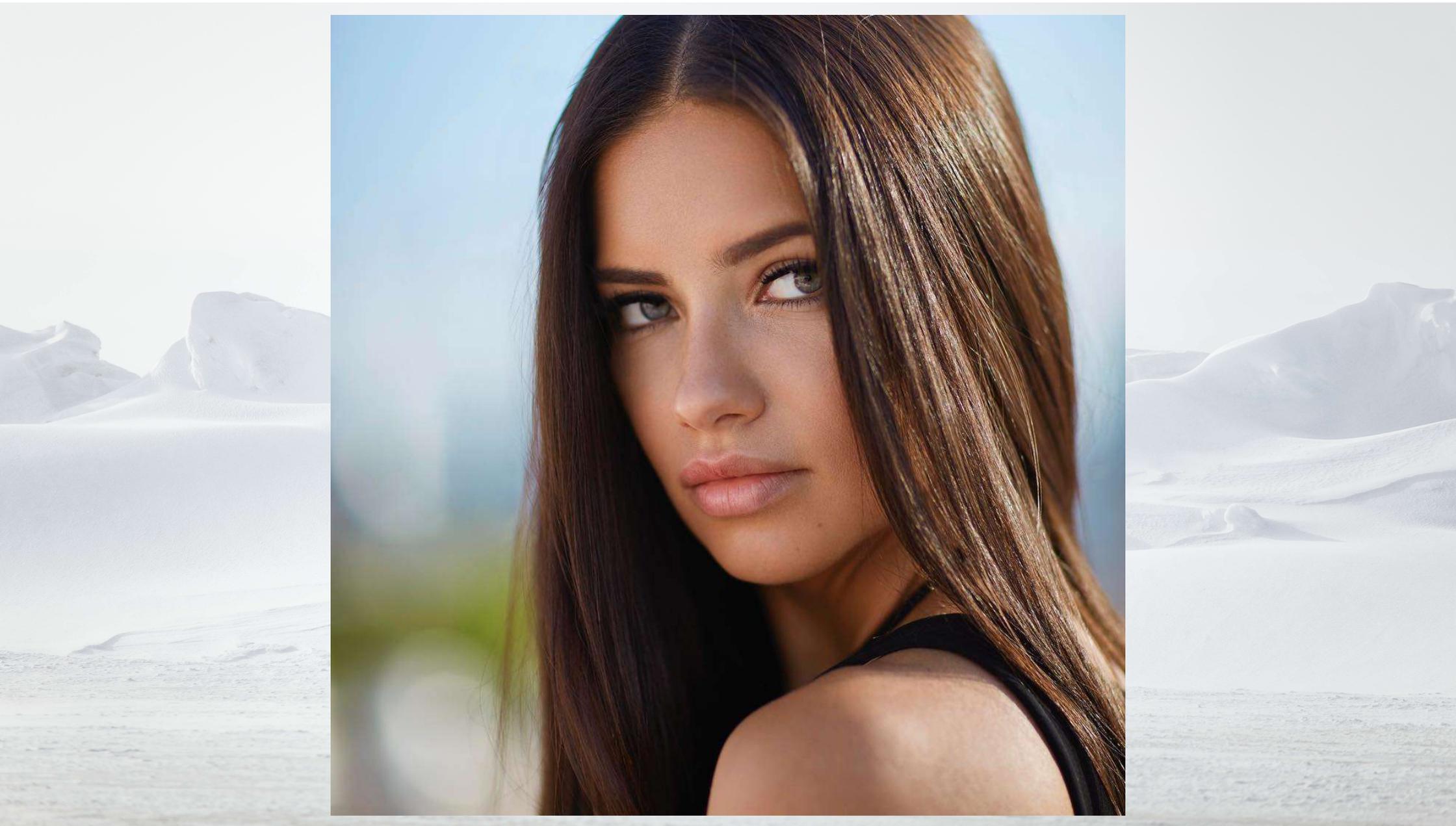
Professor Nathalie Farpour-
Lambert
President, EASO

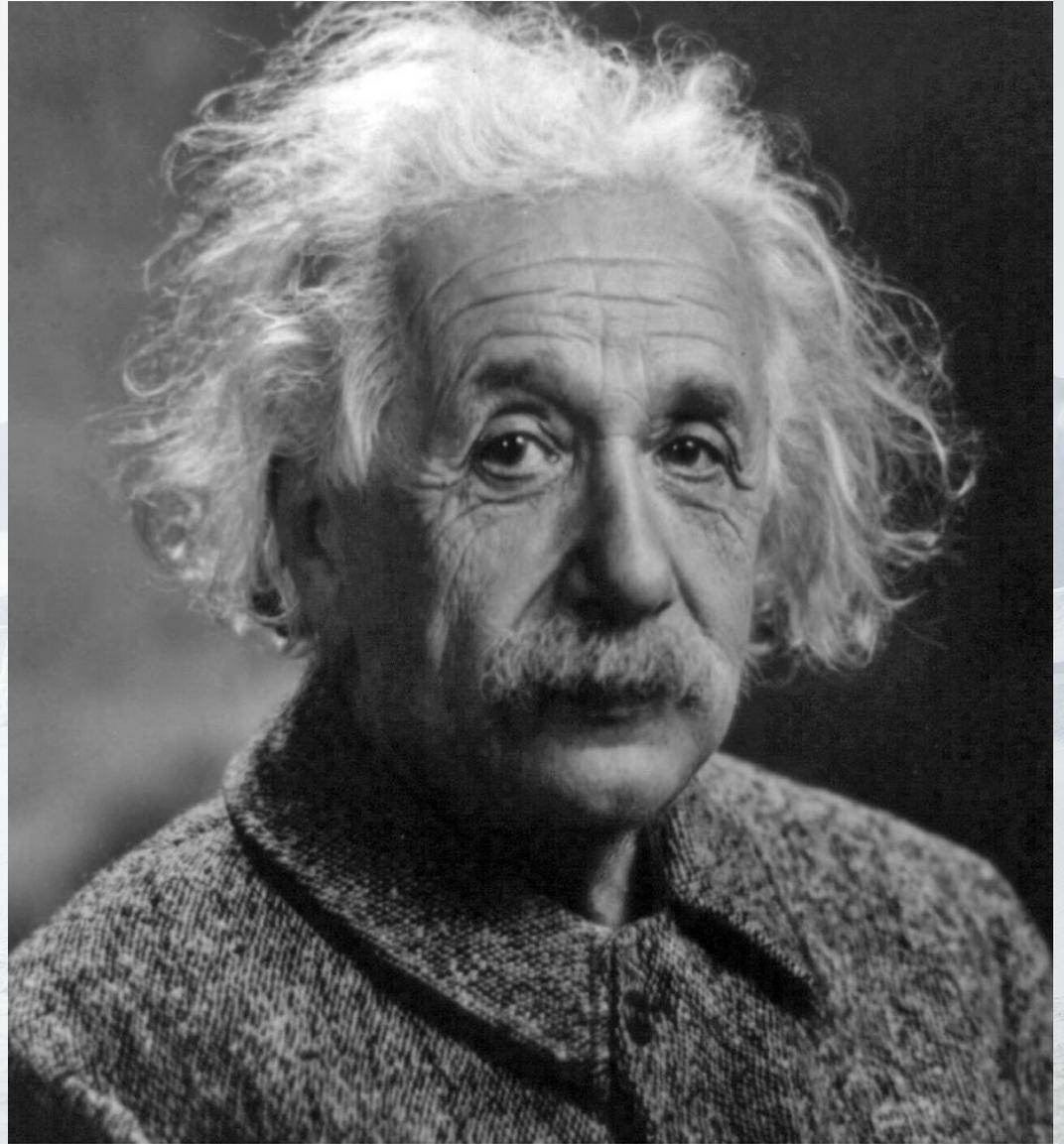
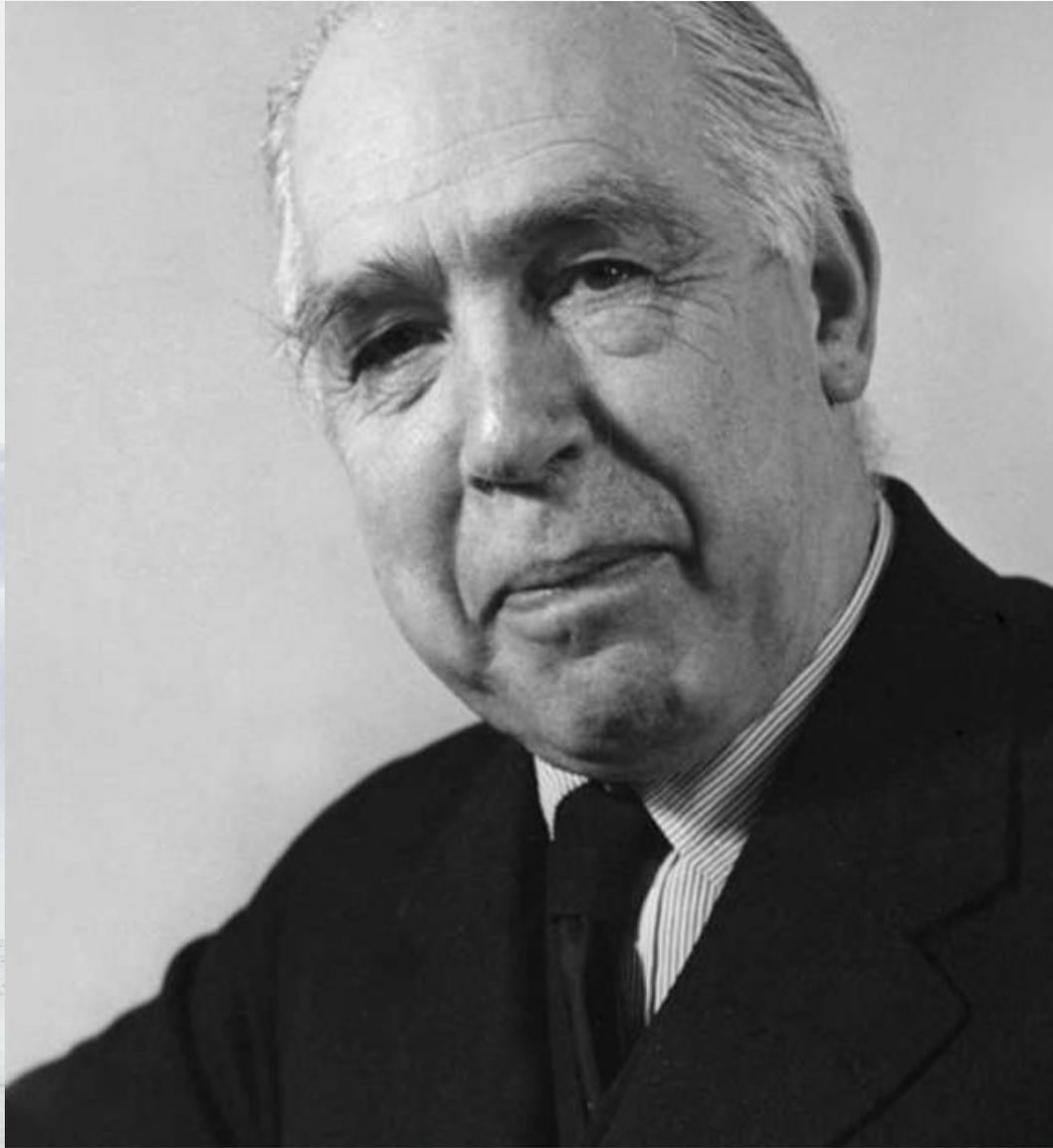
Mr Euan Woodward
Executive Director, EASO

On behalf of the EASO COTF and Executive Committee.

REGION
SJÆLLAND















Manufacturer: Pastella

Product: Pastella vegetable
pasta with 40% vegetables

Convicted of: misleading
information, wrongfull
communication, false
advertising, 2017

Torsdag d. 23. feb. 2017 - kl. 14:09

162

Dette uhyre populære pasta-produkt er fup

Fødevarekontrollen er efter en af de højest placerede chefer i den danske fødevarerindustri. Han har pralet af produkt, der vildleder forbrugere

JEG ER GLAD OG YDMYG

En af de højest placerede personer i den danske
fødevarerindustri pralet af snydeprodukt

Orklas topchef,
Tino Bendix, er
helt tavs om
fup-produktet
Pastella Grøntsagsbånd.
PR-FOTO





Manufacturer:
Frankly Juice

Product: Fruit juice
preventing
arteriosclerosis,
psoriasis,
rheumatism and
alzheimers

Convicted of:
misleading
information,
adverse influence

Lørdag d. 29. dec. 2018 - kl. 00:11

105

Juice-konger får bøde for vilde kræft- påstande

De påstod, at juice kunne virke mod kræft, forkalkning i hjernen, psoriasis, gigt og alzheimers





Danæg får bøde for Fitness Æg: "Rent bullshit"

Manufacturer: DanÆg

Product: Fitness Æg

Convicted of: misleading information, Marketed a product to have healing powers, 2018





Torsdag d. 27. dec. 2018 - kl. 06:56

292

Aldi i Danmark afsløret i fupnummer: - Vi har tabt

Discount-kæden påstod i strid med sandheden, at mælken var garanteret gmo-fri



REGION
SJÆLLAND

Manufacturer: Aldi

Product: GMO free milk

Convicted of: misleading
information, not possible to make
milk 100% genetically altered,
2018



”Snup en Snickers”

Fødevarerindustrien bruger hvert år milliarder på at fremstille og promovere fødevarer der smager sødt, fedt og salt.



Chipsforbrug: Danskerne forbruger af chips er steget med 20 procent over de sidste fire år. Viser analyse fra Coop.

Vi spiser flere og flere chips

Danskerne elsker chips, og det gælder især de lavtlændede forbrugere.

Forbruget af chips er steget med knap 20 procent over de seneste fire år, viser tal fra Coop Analyse.

I 2011 brugte hver husstand i Danmark 353 kroner på chips, saltstænger og lignende. Væksten skyldes blandt andet den voksende udvalgte.

»Over de seneste fem år har der været en pæn stigning i salget, som blandt andet skyldes, at der er kommet nye alternativer ind på markedet, og at producenterne er kommet med mange nye produkter», siger Jens Juul Nielsen, informationsdirektør i Coop.



Usundt: Supermarkedernes tilbudsaviser kritiseres for at have tilbud på for mange usunde fødevarer

Tilbudsaviserne er spækket med usunde fødevarer

Hver tredje fødevarer på tilbud er usund. Ekspert kritiserer markedsføringen.

På forsiden af denne uges tilbudsavis fra Kjøkken er der tilbud på chokoladebarer, hindbærsmiler og vin.

Er man blevet fristet til at bladre videre, fortsætter de usunde fødevarer med at fylde godt op på de glitrende sider med tilbud på bagerens flødekager, kiks, chips og is, skumbananer og p-tærter, chokoladepåder, slikposer, øl og sprut. På den måde lokker de fleste tilbudsaviser kunderne i butikken.



Usunde fødevarer fylder mere i indkøbskurven

Arkivbillede. Foto: Brian Bergmann / Scanpix Danmark

Salget af usunde fødevarer er steget markant det seneste år. Supermarkeder mener ikke, at de har skylden.

Det kan godt være, at salget af økologiske grøntsager har det bedre end nogensinde før, men der ryger også mange usunde varer på kassebåndet i de danske supermarkeder.

Ifølge tal fra analysevirksomheden Nielsen, som [Politiken](#) har gennemgået, er salget af eksempelvis sodavand steget med 6,3 procent fra 2015 til 2016.



REGION
SJÆLLAND

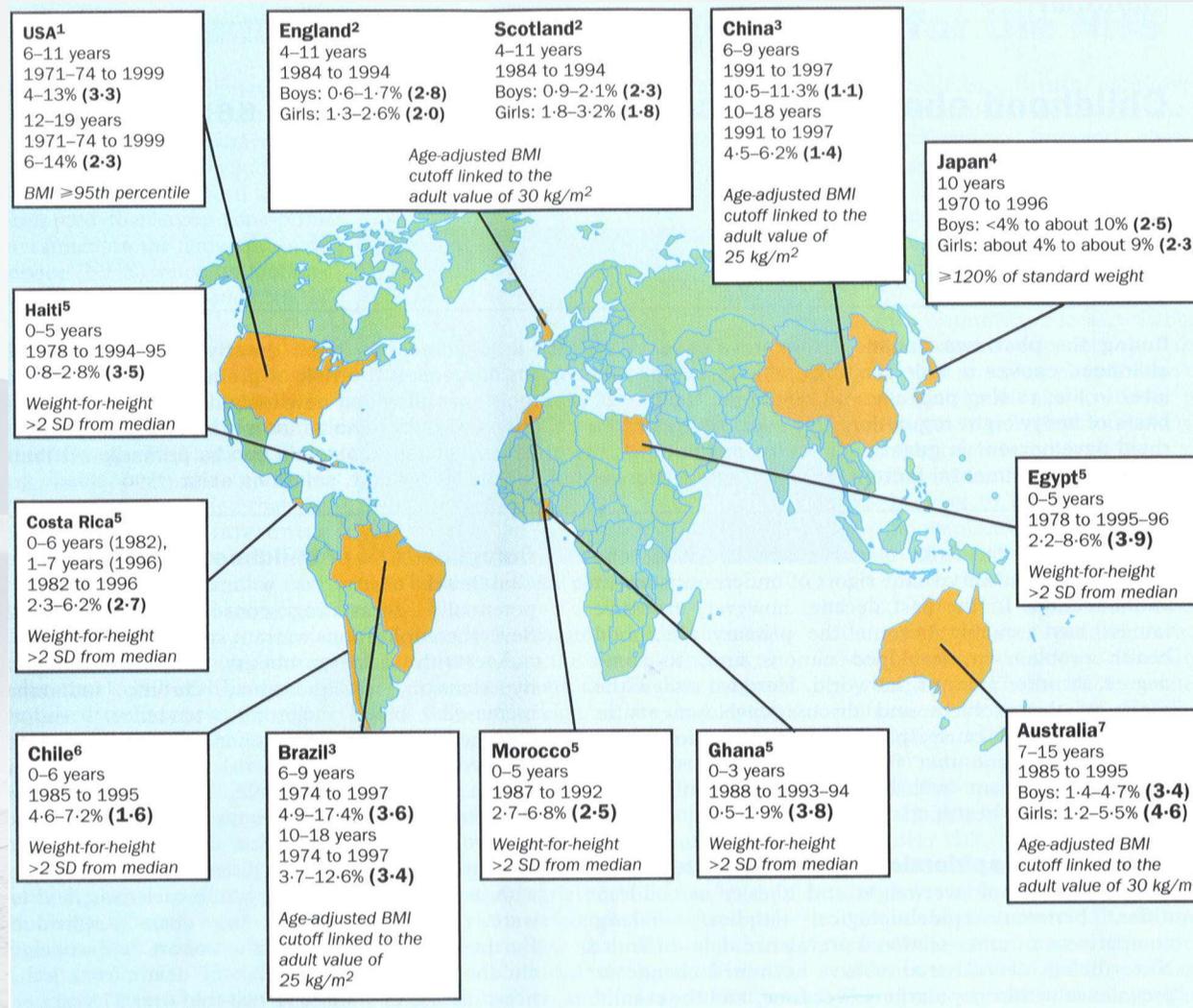


- vi er til for dig

REGION
SJÆLLAND

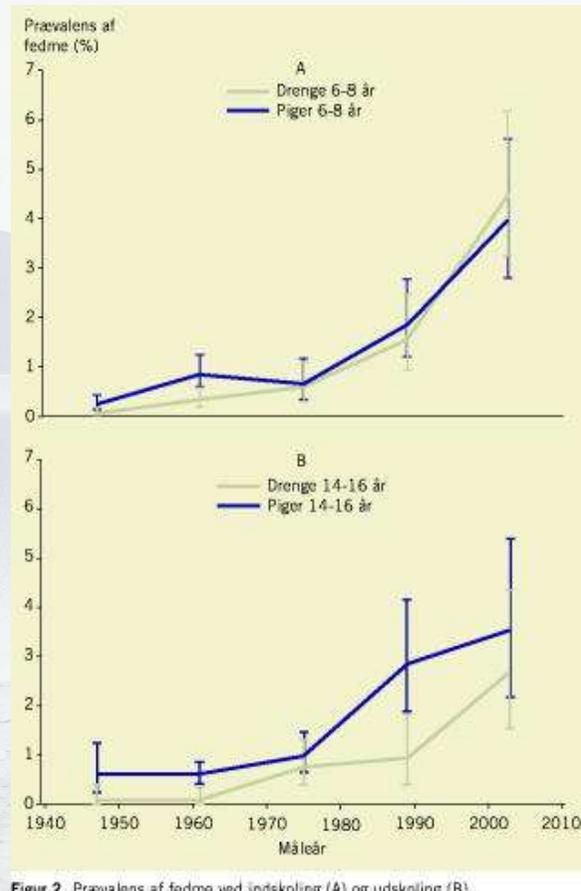


Sundhedsprofil 2017



Ebbeling CB et al. Lancet 2002;360:473-82

Obesity development in Copenhagen school children 1947-2003



Figur 2. Prævalens af fedme ved indskoling (A) og udskoling (B).

Pearson et al. Ugeskr Laeger. 2006. 168-182.

6-8 yr old; increased with
20 times ♀
115 times ♂

14-16 yr old; increased
with
6 times ♀
39 times ♂

WHO

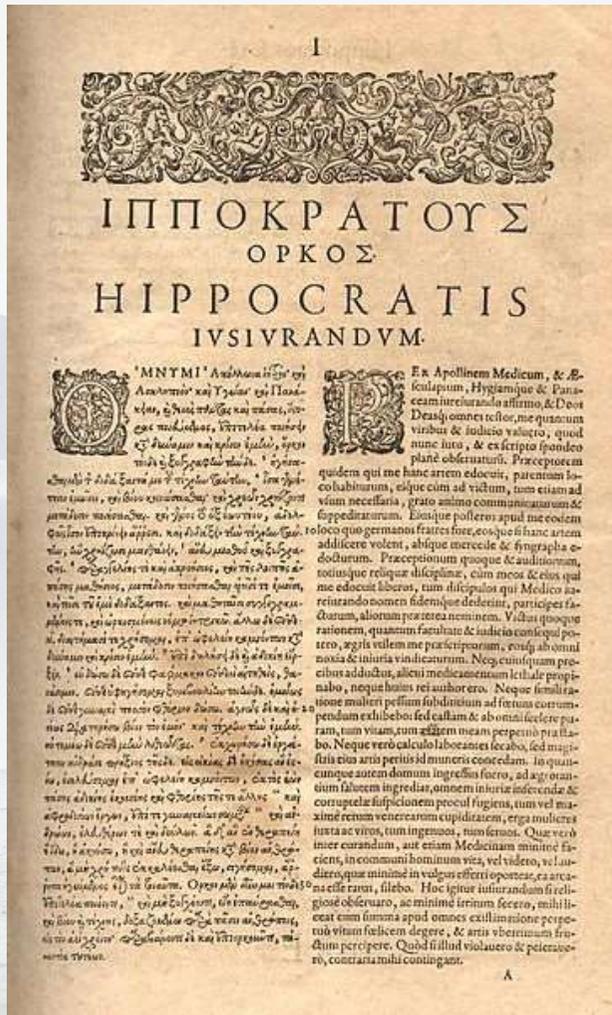
International Journal of Obesity (2008) **32**, S120–S126; doi:10.1038/ijo.2008.247

WHO recognition of the global obesity epidemic

W P T James¹

¹London School of Hygiene and Tropical Medicine, International Obesity TaskForce, London, UK
Correspondence: Professor WPT James, IASO offices, Lower Ground Floor 28, Portland Place,
London W1B 1DE, UK. E-mail: JeanHJames@AOL.com

The recognition of obesity as a disease was in theory established in 1948 by WHO's (World Health Organization) taking on the International Classification of Diseases but the early highlighting of the potential public health problem in the United States and the United Kingdom 35 years ago was considered irrelevant elsewhere. The medical profession disregarded obesity as important despite the new evidence and WHO data set out in the 1980s.



AMA Declares Obesity Disease



AMA Declares Obesity

Today can now be declared one the most monumental days in healthcare, since the war on tobacco was started. The AMA American Medical Association has declared Obesity a disease.

The group of doctors voted in their annual meeting today with an overwhelming majority of support. While the immediate benefits are not still clear what is known is that there will now be a larger focus on treating and studying obesity. Other changes down the line could include better insurance coverage for the treatment of obesity.

CMA recognizes obesity as a disease

by Pat Rich

10/9/2015

The Canadian Medical Association (CMA) has declared obesity to be a chronic medical disease requiring enhanced research, treatment and prevention efforts.

At the recent meeting of the CMA Board of directors, overwhelming support was given to a resolution to this effect that had been referred to the Board for consideration from the August General Council meeting.

“It is important for health care providers to recognize obesity as a disease so preventive measures can be put in place and patients can receive the appropriate treatment,” said CMA President Cindy Forbes.

“This move by the CMA speaks to the importance of addressing obesity and dealing with the stigma that is often associated with the condition.”

“We need to strongly alter the course of the problem,” said Board member Dr. Adam Steacie who brought the issue forward.

He said recognizing obesity as a disease may precipitate a shift in thinking of obesity as just a lifestyle choice to a medical disease with an obligation to treat it as other diseases. Steacie acknowledged that there is divided opinion as to whether obesity should be considered a disease but said it meets the definition because it decreases life expectancy and impairs normal functioning of the body; also, it can be caused by genetic factors.

Several other prominent medical and health organizations, including the American Medical Association, have declared obesity a chronic disease.

The resolution was referred from General Council in part because of concerns about the limitations of using body mass index (BMI) as the measure for diagnosing obesity.



Obesity as a disease

Oxford Medical Dictionary

- ‘A disorder with a specific cause (which may or may not be known) and recognizable signs and symptoms; any bodily abnormality or failure to function properly, except that resulting directly from physical injury (the latter, however, may open the way for disease)’.
- Multiple established specific causes
- The circular logic of defining obesity by its signs of elevated anthropometric values (such as BMI, waist circumference, or percent of body fat) seems problematic to some yet is shared by multiple conditions in the medical nomenclature
- Are characterized by increased tendency towards tissue-specific resistance to the actions of insulin, increased mechanical stress on joints, and impaired cardiovascular function. These may manifest as abnormal glucose tolerance, dyslipidemia, varying degrees of hypertension, orthopedic complications, and the presence of early atherogenesis. Importantly, childhood obesity is commonly associated with a reduced quality of life and impaired social functioning of the child.



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Clinical Information

Childhood Obesity Is a Chronic Disease Demanding Specific Health Care – a Position Statement from the Childhood Obesity Task Force (COTF) of the European Association for the Study of Obesity (EASO)

Nathalie J. Farpour-Lambert^a Jennifer L. Baker^{b, c} Maria Hassapidou^d
Jens Christian Holm^e Paulina Nowicka^f Grace O'Malley^g Ram Weiss^h

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Obesity prevention

Obesity is a chronic relapsing disease, which in turn acts as a gateway to a range of other non-communicable diseases, such as diabetes, cardiovascular diseases and cancer.



ЕВРОПЕЙСКИ ПАРЛАМЕНТ PARLAMENTO EUROPEO EVROPSKÝ PARLAMENT EUROPA-PARLAMENTET
EUROPÄISCHES PARLAMENT EUROOPA PARLAMENT ΕΥΡΩΠΑΪΚΟ ΚΟΙΝΟΒΟΥΛΙΟ EUROPEAN PARLIAMENT
PARLEMENT EUROPÉEN PARLAIMINT NA HEORPA PARLAMENTO EUROPEO EIROPAS PARLAMENTS
EUROPOS PARLAMENTAS EURÓPAI PARLAMENT IL-PARLAMENT EWROPEW EUROPEES PARLEMENT
PARLAMENT EUROPEJSKI PARLAMENTO EUROPEU PARLAMENTUL EUROPEAN
EURÓPSKY PARLAMENT EVROPSKI PARLAMENT EUROOPAN PARLAMENTTI EUROPAPARLAMENTET

Info

Fedme skal anerkendes som en sygdom

Europæerne bliver federe og federe, og overvægt udgør en af de største sundhedsfarer i dagens Europa. Omkring 27 % mænd og 38 % kvinder er overvægtige i Europa, og fænomenet breder sig med samme hast som i USA i begyndelsen af 1990'erne. I den forbindelse anbefaler Europa-Parlamentet, at fedme bliver officielt anerkendt som en kronisk sygdom.

Lægeløftet

- en etisk forpligtelse



- Ordentlighed og omsorg overfor ALLE mennesker uanset deres baggrund
- Hjælper mennesker med behov, men pålægger ikke andre den viden man har uden det er deres ønske
- Tavshedspligt ift. de erfaringer man får i sit virke som læge
- Følge med i lægevidenskabens udvikling og være nysgerrig på ny forskning
- Følge de retningslinjer der er i lægefaget

Lægeløftet

Efter at have aflagt offentlig prøve på mine i de medicinsk-kirurgiske fag erhvervede kundskaber, aflægger jeg herved det løfte, til hvis opfyldelse jeg end ydermere ved håndsækning har forpligtet mig,

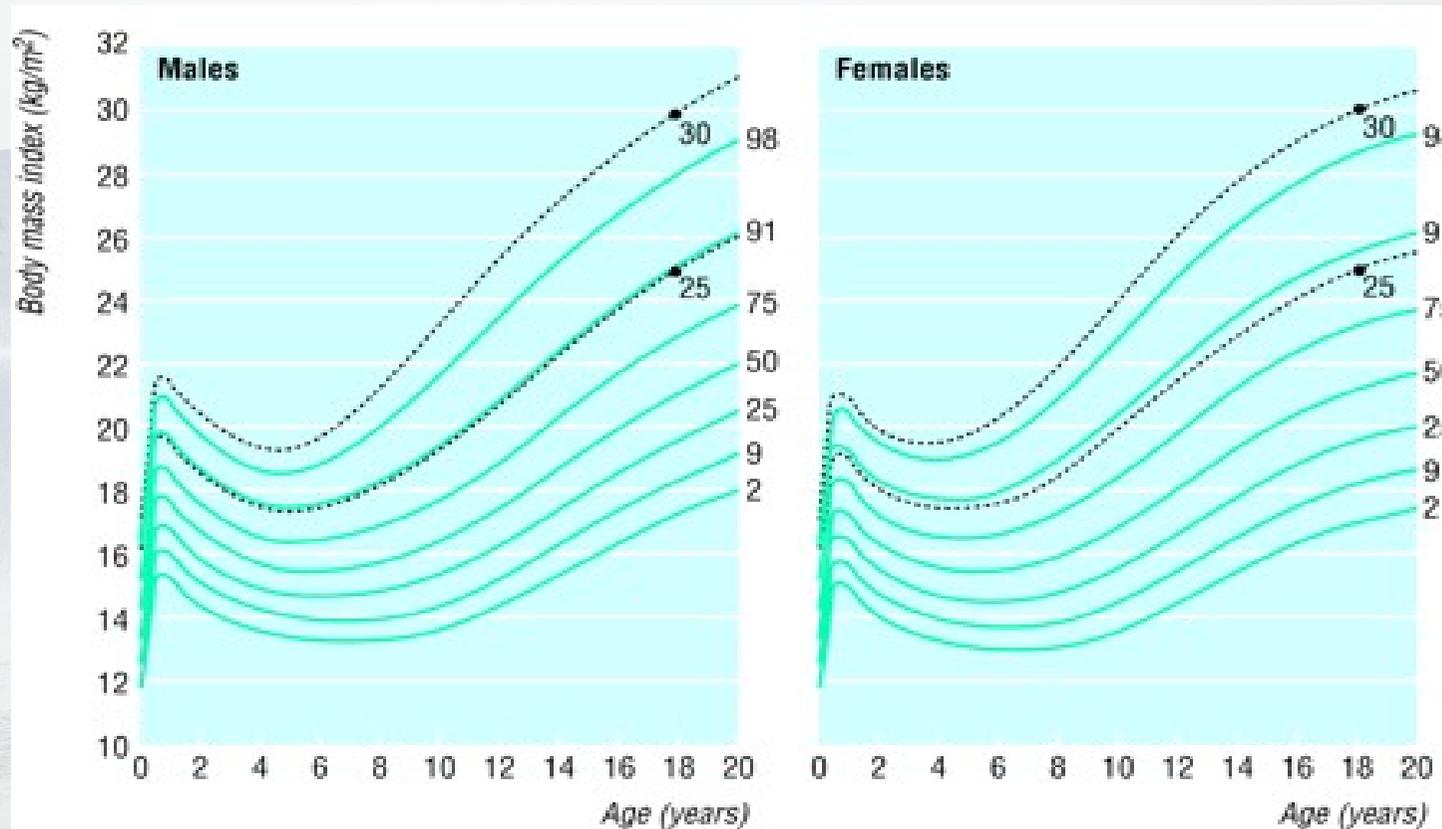
- *at jeg ved mine forretninger som praktiserende læge stedse skal lade det være mig magtpåliggende, efter bedste skønnende at anvende mine kundskaber med flid og omhu til samfundets og mine medmenneskers gavn,*
- *at jeg stedse vil bære lige samvittighedsfuld omsorg for den fattige som for den rige uden persons anseelse,*
- *at jeg ikke ubeføjet vil åbenbare, hvad jeg i min egenskab af læge har erfaret,*
- *at jeg vil søge mine kundskaber fremdeles udvidede og*
- *i øvrigt gøre mig bekendt med og nøje efterleve de mig og mit fag vedkommende anordninger og bestemmelser.*

I de nye anbefalinger er det vigtigt at **anerkende de mange og alvorlige komplikationer** der er til overvægt allerede i barnealderen: psykosociale problemer, som f.eks. mobning og lavere livskvalitet, men også fysiske komplikationer, som f.eks. type 2-diabetes, forhøjet blodtryk, søvnapnø og fedtlever og endnu mere vigtigt, at man **anerkender de genetiske og fysiologiske årsagskomponenter**, og at **ansvaret for overvægt flyttes fra den enkeltes skuldre til et samfundsmæssigt problem**. Endvidere er udviklingen af overvægt og svær overvægt et **resultat af en række individuelle (genetiske, fysiologiske og adfærdsrelaterede) og samfundsmæssige (f.eks. prisen på og tilgængeligheden af sunde/usunde mad- og drikkevarer, næringsstofindholdet i mad- og drikkevarer, portions- og emballagestørrelse, rammerne for stillesiddende adfærd og deltagelse i fysisk aktivitet, diskrimination og stigmatisering) faktorer**, er der **behov for en bred og åben debat om stigmatisering og en målrettet indsats for at udbrede forståelsen af**, at udviklingen af svær overvægt er et samfundsmæssigt problem, der fordrer **samfundsmæssige løsninger**, og **ikke alene er et individuelt anliggende og den enkeltes ansvar**.



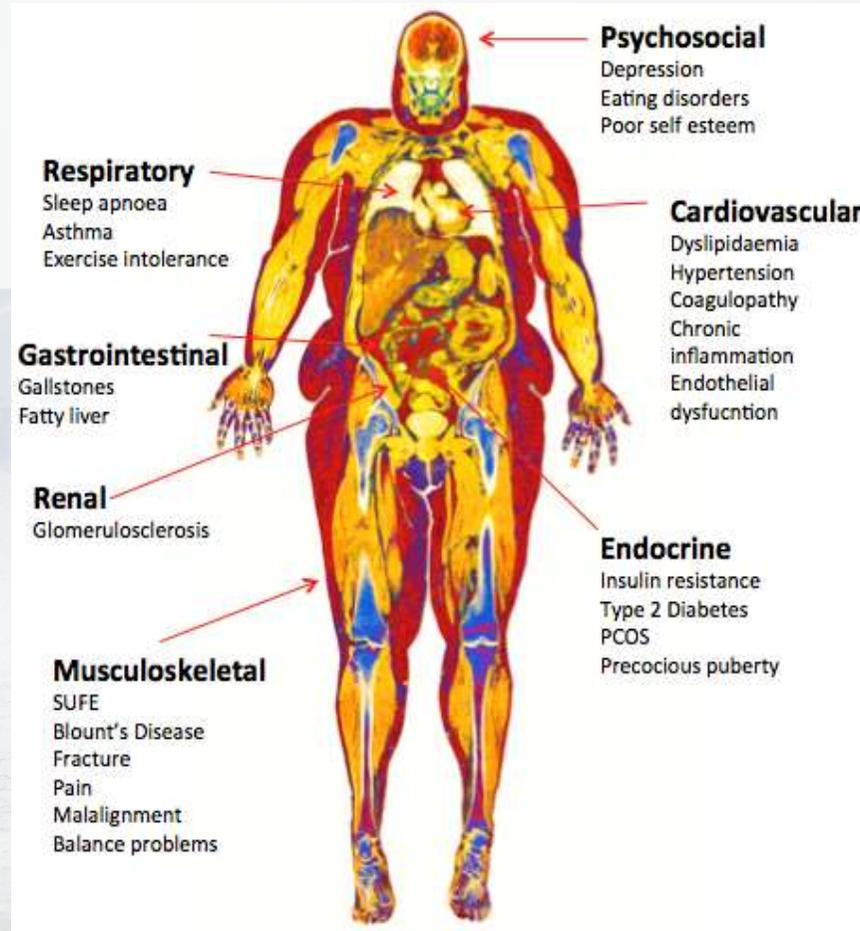


Definition of obesity





Obesity related Complications



Courtesy of Grace O'Malley, PhD, The Children's University Hospital, Dublin, Ireland



Cancer

282.137 patients

-  increase in BMI of 5 kg/m² was associated with cancer in the esophagus, large bowel, kidney, and thyroid.
-  increase in BMI of 5 kg/m² was associated with cancer in the uterus, gall bladder, esophagus, and kidney.
-  association between an increase in BMI and cancer in the rectum and malignant skin cancer.
-  as well as cancer in the breast (postmenopausal), large bowel, pancreas and thyroid.
- and leukemia, multiple myeloma and non-Hodgkin lymphoma in both genders

Renehan, A *et al.* Body-mass index and incidence of cancer: a systematic review and meta-analysis of prospective observational studies, *Lancet*, 371 (2008) 569-78.



Translational impact of obesity as a disease

**Priority to investigate and treat in daily
clinical practice**

**HCP is responsible for treatment according
to the Hippocratic oath**

HCP has competences / Patient has disease

Impact on communication in many ways





FEED ON
EYE









RESEARCH
SJÆLLAND







REGION
SJÄLLAND

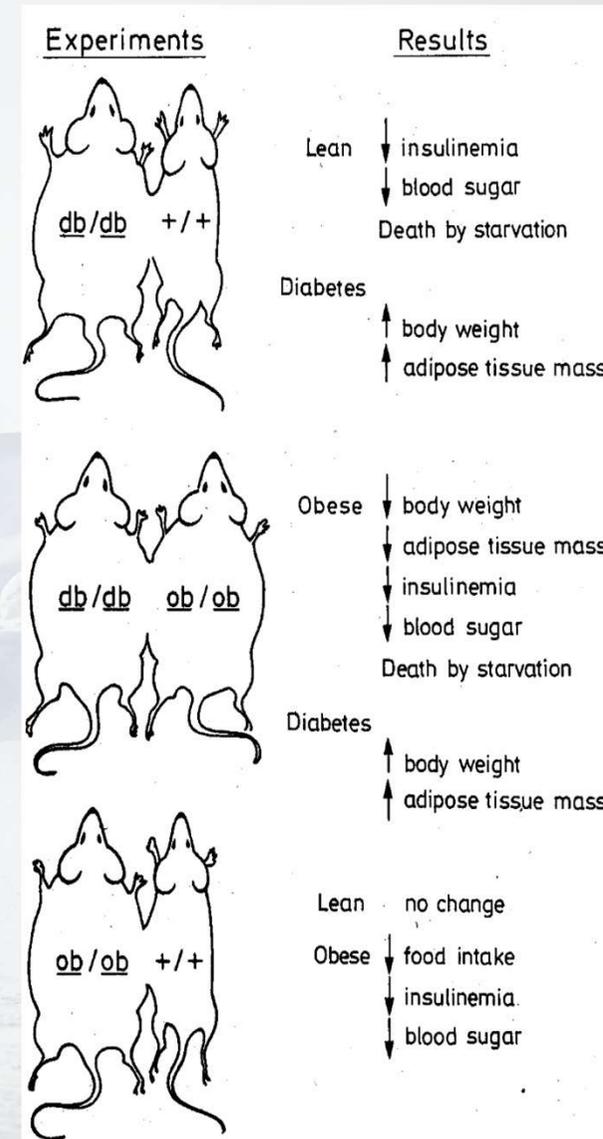






Phenotypes of the ob/ob and db/db mice

- Hungry
- Obese
- Insulin resistant
- Impaired growth
- Hypothermic
- Hypoactive
- Infertile
- Cortisol \uparrow , T3/T4 \downarrow
- Immune-incompetent



Coleman DL. Diabetologia 1978;14:141-8.

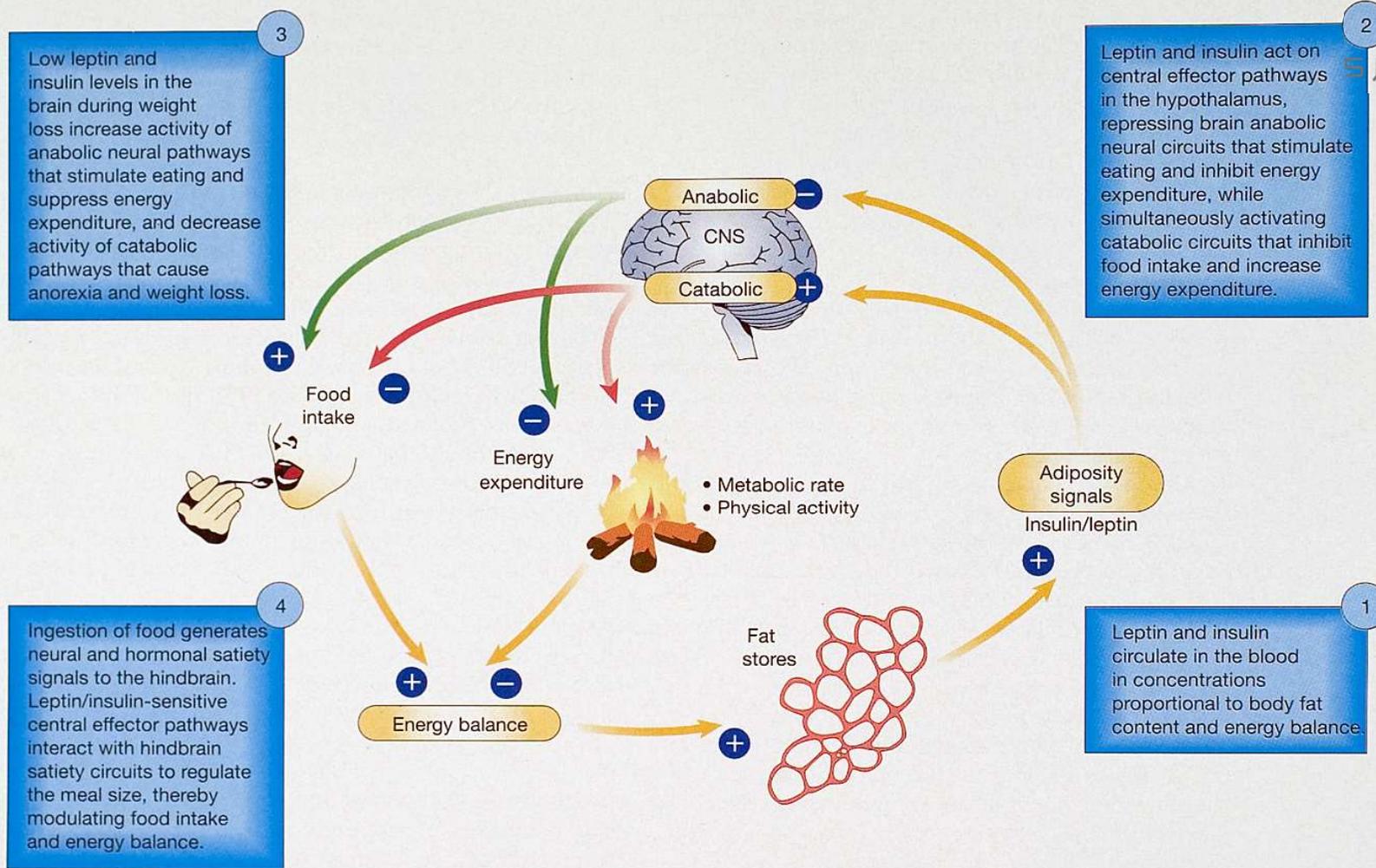


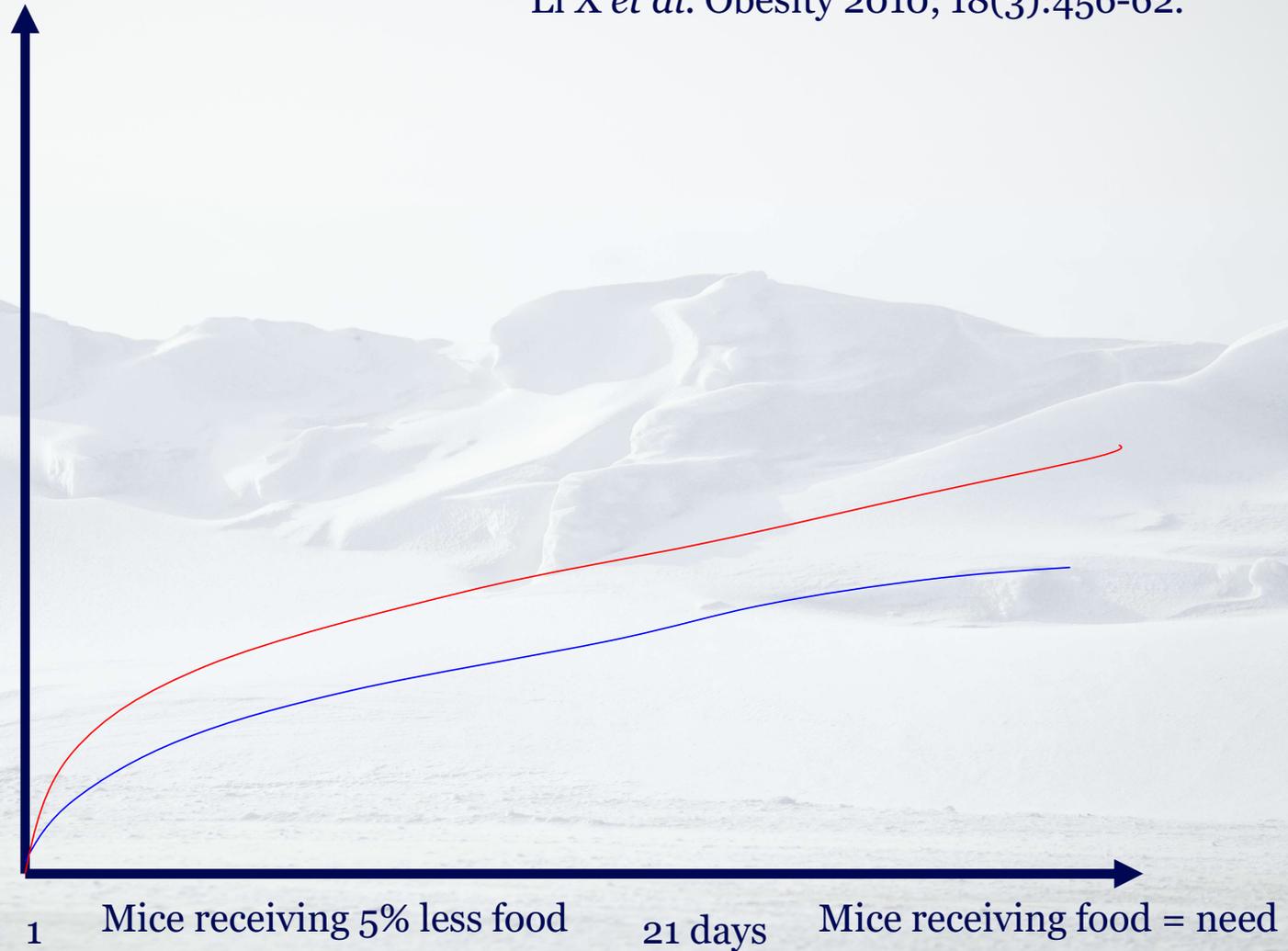
Figure 1 Model showing how a change in body adiposity is coupled to compensatory changes of food intake. Leptin and insulin are adiposity signals, secreted in proportion to body fat content, which act in the hypothalamus to stimulate catabolic, while

inhibiting anabolic, effector pathways. These pathways have opposing effects on energy balance (the difference between calories consumed and energy expended) that in turn determines the amount of body fuel stored as fat.



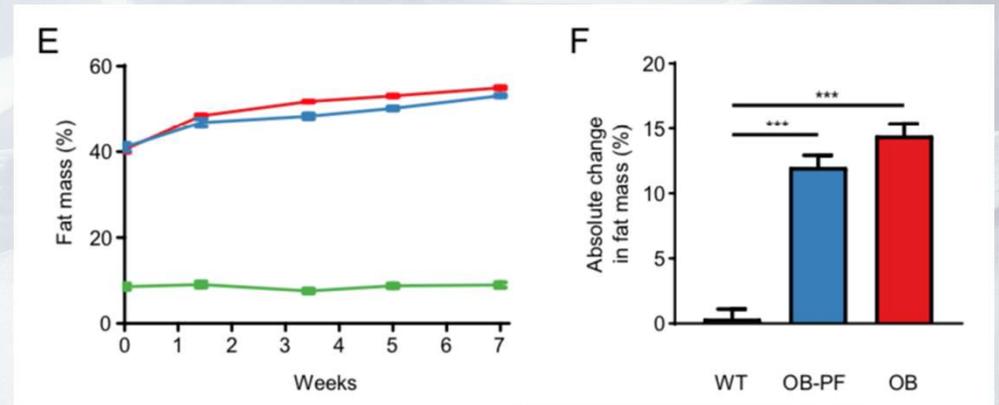
Li X *et al.* Obesity 2010; 18(3):456-62.

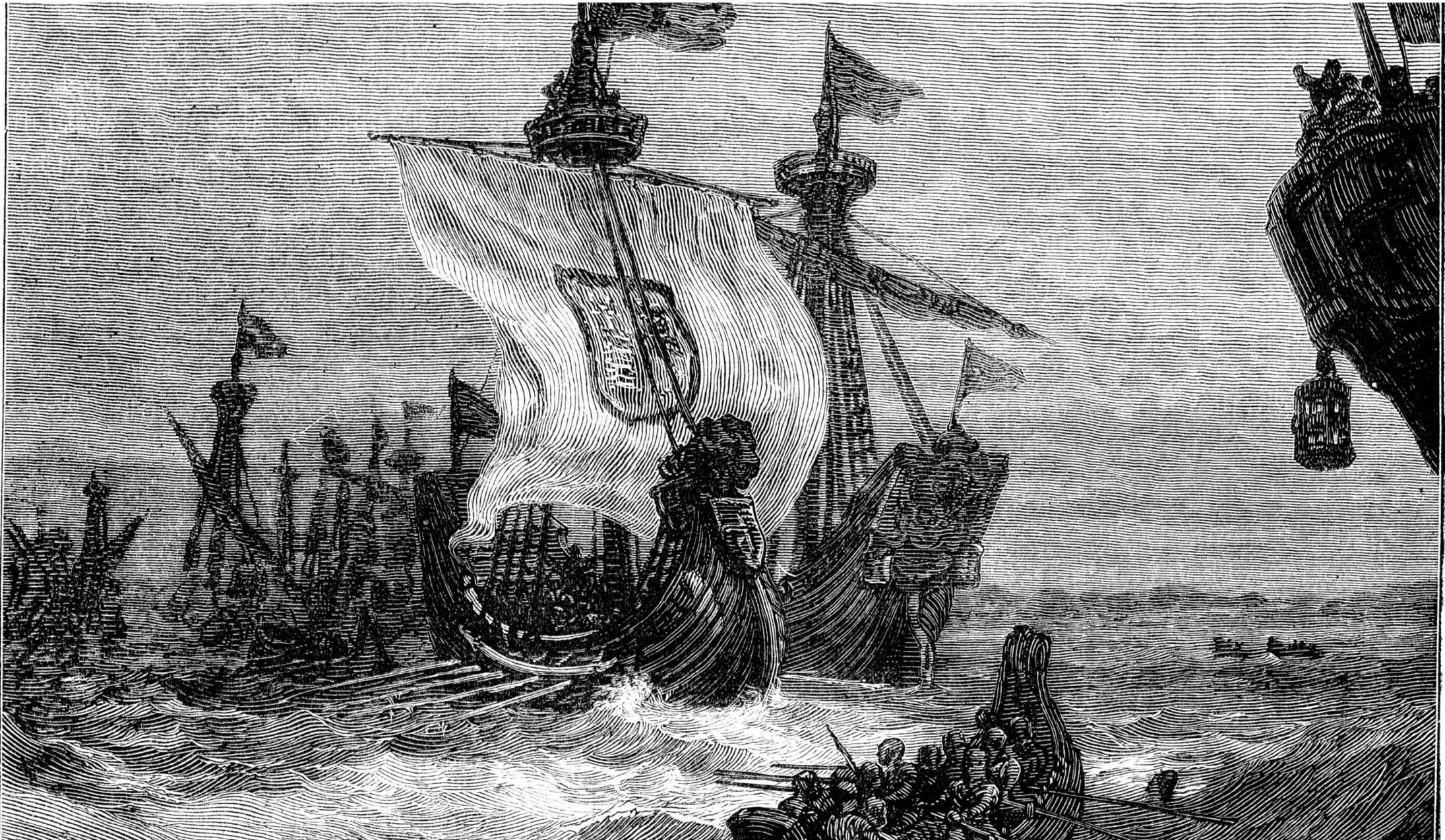
Fat mass



Impaired glucose metabolism and altered gut microbiome despite calorie restriction of ob/ob mice

- Pair-fed ob/ob mice exhibited even more compromised glucose metabolism and maintained strikingly similar high body fat percentage at the cost of lean body mass.









Negative energy balance?

- *Induces* comprehensive neuroendocrinological adaptations
- Energy balance is not just a passive balance, but instead an *active asymmetric* biological function to ensure and secure sufficient energy to demands in the future
- Fat and energy regulation is able of being "*energy efficient*"
- *Be careful* about expectations/prejudice since you really dont know what is going on in the individual patient

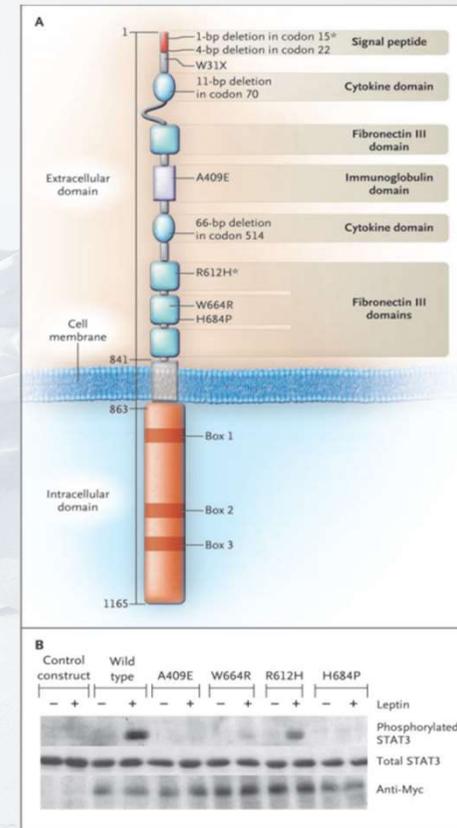


Lucas



Constantly hungry to a degree where he feels he is starving to death

-Totally leptin resistant-



Rev 2	12/15/06
Author	Farnrop
Fig. #	1
Title	Deficiency of the Leptin Recept
ML	
DE	Phomister
Artist	Williams

AUTHOR PLEASE NOTE:
Figure has been redrawn and type has been reset, please check carefully



Neuroendocrinological adaptation against weight loss provide

Translation which explains weight regain

Self-identification in most patients

We don't know what the challenge is individually

Be humble and serious with your patient



Translational impact of fat mass regulation

As many as possible treatment plan points from the start!

Integrated energy balance regulation; I.e. not just focus on nutrition and activity, but also specifically inactivity, picky eating, sugar dependency, disturbed eating, child upbringing and more

Not just a diet, actually in principle food intake ad libitum!

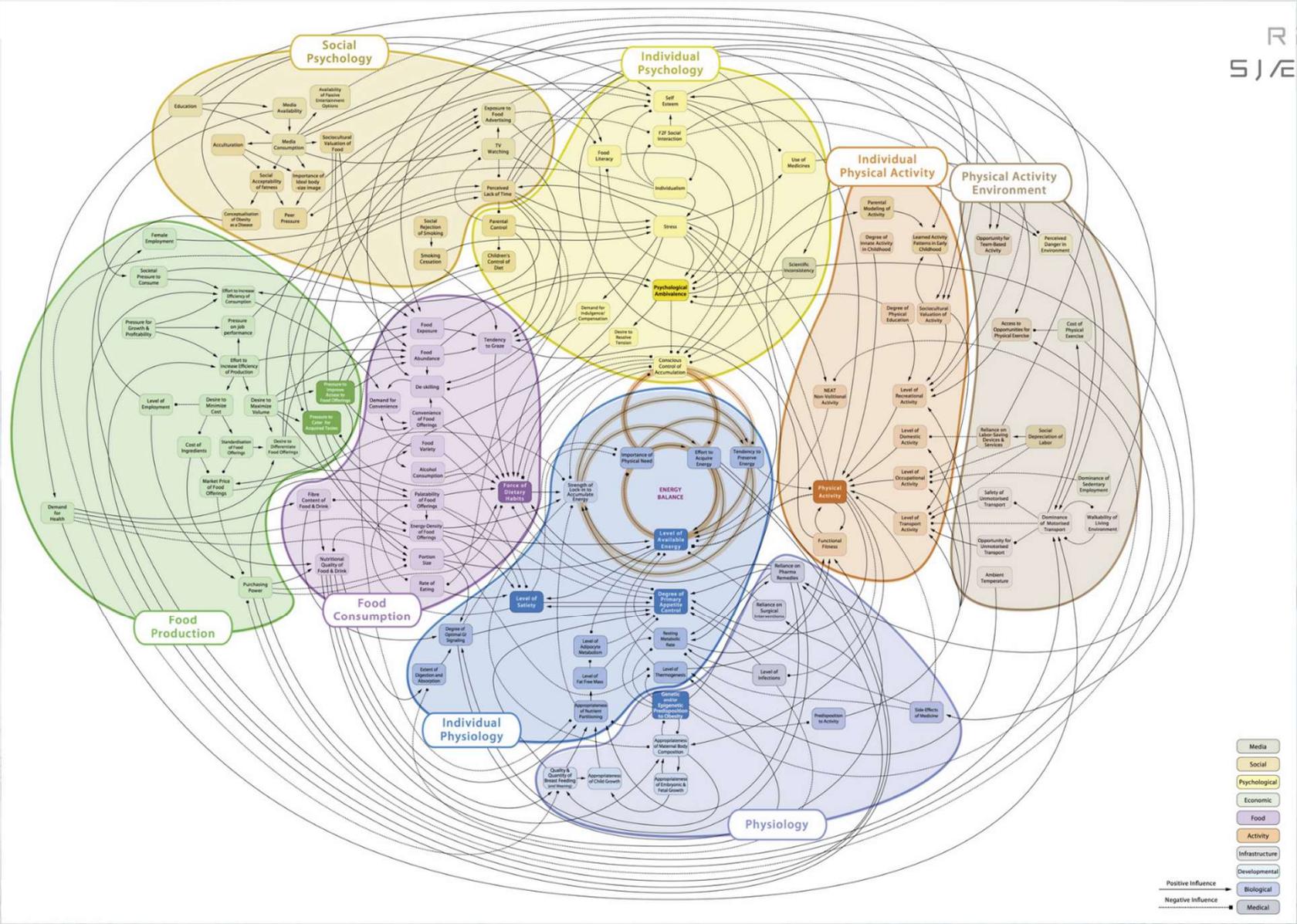
Caloric restriction through growth and development!

Avoid undereating! Regarded as counterproductive

Motivation!

Understanding of underreporting!







Fish trap





The Children`s Obesity Clinic

BMI above 99% percentile
for age and gender

Age between 3-22 years

No selection criteria



[Pediatrics](#). 2007 Dec;120 Suppl 4:S164-92.

Expert committee recommendations regarding the prevention, assessment, and treatment of child and adolescent overweight and obesity: summary report.

[Barlow SE](#)¹; [Expert Committee](#).

Abstract

To revise 1998 recommendations on childhood obesity, an Expert Committee, comprised of representatives from 15 professional organizations, appointed experienced scientists and clinicians to 3 writing groups to review the literature and recommend approaches to prevention, assessment, and treatment. Because effective strategies remain poorly defined, the writing groups used both available evidence and expert opinion to develop the recommendations. Primary care providers should universally assess children for obesity risk to improve early identification of elevated BMI, medical risks, and unhealthy eating and physical activity habits. Providers can provide obesity prevention messages for most children and suggest weight control interventions for those with excess weight. The writing groups also recommend changing office systems so that they support efforts to address the problem. BMI should be calculated and plotted at least annually, and the classification should be integrated with other information such as growth pattern, familial obesity, and medical risks to assess the child's obesity risk. For prevention, the recommendations include both specific eating and physical activity behaviors, which are likely to promote maintenance of healthy weight, but also the use of patient-centered counseling techniques such as motivational interviewing, which helps families identify their own motivation for making change. For assessment, the recommendations include methods to screen for current medical conditions and for future risks, and methods to assess diet and physical activity behaviors. For treatment, the recommendations propose 4 stages of obesity care; the first is brief counseling that can be delivered in a health care office, and subsequent stages require more time and resources. The appropriateness of higher stages is influenced by a patient's age and degree of excess weight. These recommendations recognize the importance of social and environmental change to reduce the obesity epidemic but also identify ways healthcare providers and health care systems can be part of broader efforts



Danish clinical guidelines for examination and treatment of overweight and obese children and adolescents in a pediatric setting

Anders Johansen, Jens-Christian Holm, Seija Pearson, Mimi Kjærsgaard, Lone Marie Larsen, Birgitte Højgaard, Dina Cortes

This guideline by the Obesity Committee within The Danish Paediatric Society has also been approved by the Committees for Endocrinology, Gastroenterology, Cardiology, Neonatology and Nephro-urology within The Danish Paediatric Society, Danish Paediatricians Organization, The Danish Society for Diabetes in Childhood and The Danish Association for the Study of Obesity.

The Danish College of General Practitioners supports the referral criteria for pediatric evaluation. November 28, 2014.

Correspondence: Anders Johansen, Department of Growth and Reproduction, Copenhagen University Hospital Rigshospitalet, Blegdamsvej 9, 2100 Copenhagen, Denmark

E-mail: Anders.johansen.01@regionh.dk

ly among the youngest boys (11). Furthermore, recent data shows an approximately 10% prevalence of overweight and obesity among preschool children (12). In the Funen birth cohort from 2001, the prevalence of obesity in children was 1.9% of the children aged 2.5-3.5 years; 2.5% of those aged 3.5-4.5 years; and 2.5% in the group aged 4.5-5.5 years (12). In Copenhagen in 2007, the prevalence of obesity in 5-8 year old girls and boys was 3.7% and 2.6% respectively, whilst in 14-16 year old girls and boys, it was 4.7% and 4.2% respectively (13). In the 2010 "Schoolchildren Study" comprising a random sample of schools in Denmark 2-3% of the children aged 11, 13 and 15 years were obese based on a BMI calculated from the children's self-reported height and weight (14).

It was soon discovered that a previous Portuguese guideline for



Multidisciplinary Clinic

Paediatrician: first contact, tailored plan

Dietician: advices according to guidelines

Nurses: advice, counseling and support

Psychologists: Family based / individual consultations

Social workers: social support according to need

Secretaries: booking, journals, calls, etc.

Research assistants: blood testing, data entry in database, quality control



Definition

Body Mass Index (BMI) = $\text{weight (kg)} / [\text{height (m)}]^2$

Overweight; BMI above 90 percentile for age and sex

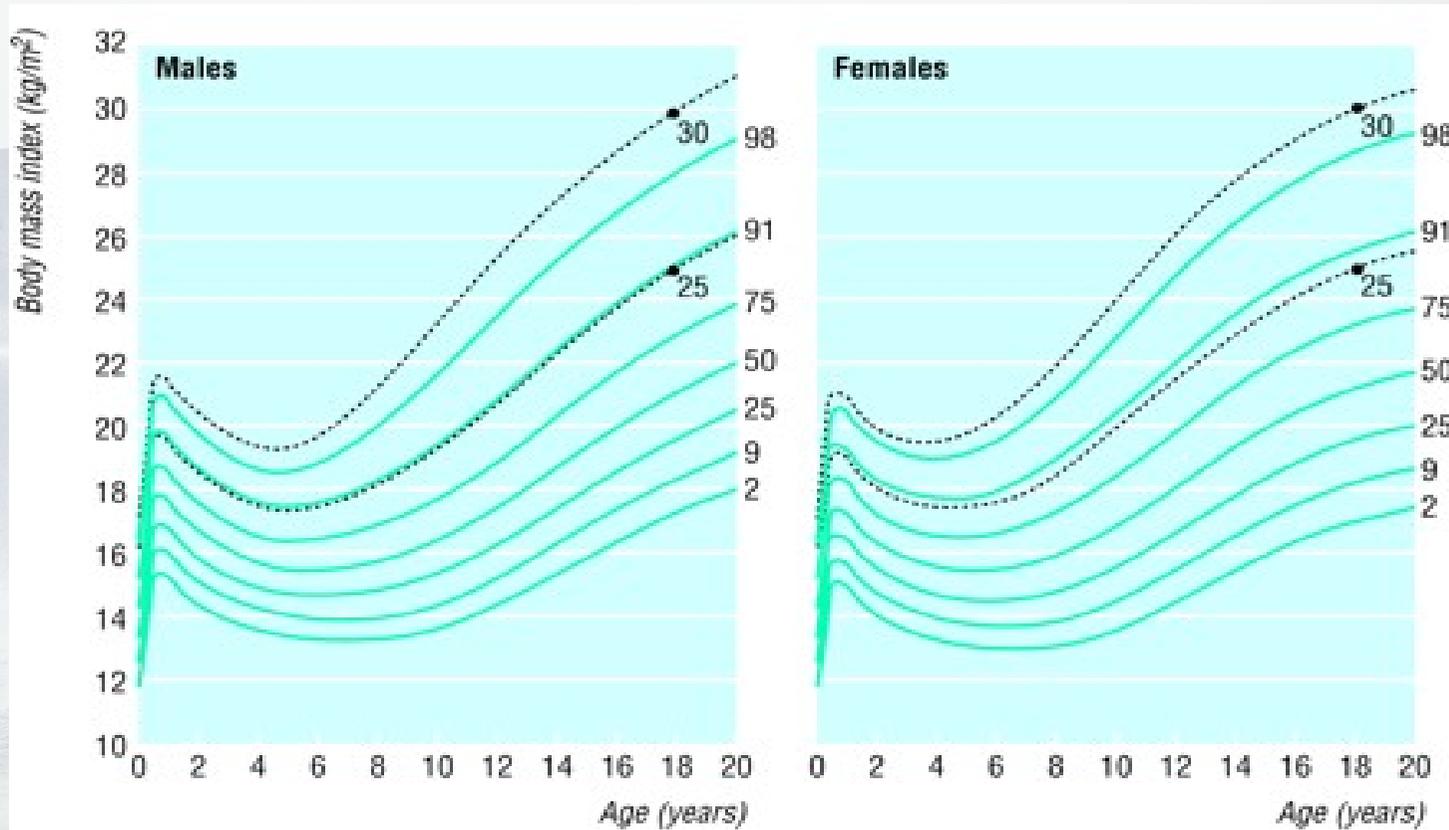
Obesity; BMI above 99 percentile for age and sex

Overweight; IsoBMI above BMI 25 extrapolated

Obesity; IsoBMI above BMI 30 extrapolated



Definition of obesity





In-patient admittance

7 pages questionnaire history

Physical exam

Anthropometry

PEDsQL and VAS

DEXA

24 hour BP

MRS

Blood samples



Indication for evaluation and treatment of obesity



Iso BMI of 30 (Obesity)

or

Iso BMI of 25 (Overweight) and one of the following complications



Complicated obesity 1

- Suspicion of specific medical cause
- Dyscrine features
- Slow height growth
- Late psychomotoric development
- Persistent overeating / "binge-eating"
and search of food
- Rapidly increasing BMI



Complicated obesity 2

- Other complications; hypertension, dyslipidemia, elevated liver enzymes, insulin resistance, prediabetes, T2DM, PCOS, obstructive sleep apnoea.
- Familial disposition for 2 or more of; T2DM, hypertension, dyslipidemia, metabolic syndrome, heart disease, obesity



Symptoms

- Sleep, snoring apnea
- Shorter sleep time, daytime sleepiness
- Headaches
- Shortness of breath, exercise intolerance, wheezing, cough
- Vague recurrent abdominal pains
- Heartburn, dysphagia, regurgitation, chestpain, epigastric pain
- Abdominal pain, distension, flatulence, fecal soiling, enuresis, encopresis
- Upper right quadrant pain, clicky pains, epigastric pains, vomiting
- Polyuria, polydipsia
- Oligomenorhea, dysfunctional uterine bleeding
- Hip, groin pains, painful or waddling gait
- Knee pain
- Foot pain
- Flat affect or sad mood, loss of interest/pleasure, worries/fears
- Body dissatisfaction, school avoidance, poor self-esteem, social problems, isolation
- Hyperphagia, eating out of control, binge, bulimia
- Striae, rash, irritation, acne, pigmentation



History 1

- Pregnancy, delivery, breast feeding, early growth
- Other diseases, antibiotics, obesity debut, earlier treatment
- Predisposition to obesity, hypertension, dyslipidemia, type 2 diabetes, cardiovascular disease , obesity
- Ethnicity / consanguinity with risk of disease
- Headache, ((pseudo)tumor cerebri, hypertension), daily somnolence and snoring (sleep apnoea)
- Stomach pains (constipation, psychogene, gall bladder stones, steatosis)
- Pains in hip/knees/ankles (epifysiolyse, arthrosis, fractures)
- Girls after menarche; irregular menstruation and/or hirsutism (polycystic ovaria syndrome)



History 2

- Nutrition and exercise; quality, frequencies, amounts (specific questioning) including organised/unorganised
- Medications (glucocorticoids, psychopharmacology, thyroid function)
- Addictions (tobacco increase insulin-resistance and risk of cardiovascular disease, alcohol can increase caloric intake)
- Social setting; school attendance, thriving, bullying, family structure and dynamics, school transportation,
- Sleep history. Apnea, sleep duration
- Psychosocial; depression, low self esteem, anxiety, bullying, isolation, inactivity



Examination 1

REGION
SJÆLLAND



- Height and weight, calculation of BMI (changes herein)
- Waist circumference (evaluation of treatment response).
Between hip and ribs. Important to measure with same technique
- Height and weight according to growth curves
- Calculation of target height according to genetic (parental) potential i.e. Girls; mean of parental height minus 6,5 cm and Boys; mean of parental height minus 6,5 cm
- Is the patient growing according to target height?
- Most children with simple obesity have a height at or above their target percentile for height and normal or advanced boneage



Examination 2

- Low height for age and overweight/obesity raise suspicion and medical concern of syndromes, chromosomal, and endocrinological evaluation
- Puberty staging a.m. Tanner, hirsutism
- Blood pressure (appropriate cuff, sitting position with support under the feet, laying down after 10 minutes rest, measurement repeated 3 times (until there is less than 5 mm Hg difference between the 2 latter measurements). If hypertensive; manual blood pressure measurement recommended and or 24 hour blood pressure surveillance



Examination 3

- Quality of life evaluation
- Adapted neurological examination (pathology in the hypothalamic area)
- Acanthosis nigricans with special attention towards the neck, axilla, and inguinal (often associated with insulin resistance)
- Striae, infections, psoriasis, HS



Blood sampling

- Thyroid status; TSH, fT₄, fT₃
- Sugar status; HbA_{1c}, blood sugar, maybe insulin
- Lipids; total cholesterol and fractions, triglycerides
- Liver enzymes; ALAT, alkaline phosphatase, bilirubin, GGT
- Calcium metabolism; PTH, ionised calcium, phosphate, albumin, and vitamine D
- If blood sampling is not taken in the fasting condition and shows elevated lipids or sugar status, then repeated in the fasting condition



Body composition



- DEXA scan (optimal)
- Alternatively impedance
- Measurement of fat and fat free mass and changes herein
- MRS



Special findings with indication for further evaluation 1

- Syndromatic obesity; Karyotype, Prader Willi syndrome, Bardet Biedel. Suspicion of monogenic obesity; MC4R (melanocortin 4 receptor), leptin and leptin receptor and others demands specific genetic investigations
- Hypertensio arterialis; elaborate as hypertensive patients according to guideline



Special findings with indication for further evaluation 2

- Vitamine D insufficiency; according to guideline
- Prediabetes; HbA_{1c} at 5,7-6,4% (39-47 mmol/mol) or several blood sugars between 5,6–6,9 mmol/l or an OGTT 7,8-11,0 mmol/l should be referred to paediatric diabetologist



Special findings with indication for further evaluation 3

- Pubertas praecox
- Pubertas tarda
- Hirsutism or irregular menses; Blood for 17-OH-Progesterone, testosterone, oestradiol, LH, FSH, and or ultrasonic evaluation of ovaries for PCOS
- Non-alcoholic steatosis; MR-spectroscopy or US
- Astma or other respiratory symptoms; spirometry
- Sleep apnoea; sleep investigation



Special findings with indication for further evaluation 4

- Lower extremities; pains and limited mobility; X-ray and relevant examination
- Rapidly developing obesity; think prolactin, ACTH, morning-cortisol and urine-cortisol (x 3 if possible), MR-scan of brain
- Low quality of life scoring; think contact to school, psychologist, or social worker
- Social difficulties/challenges; think contact to primary care, social worker, or psychologist



Tobacco and alcohol

- Stop smoking. Provide help and courses to stop smoking
- Passive smoking
- Alcohol not recommended before the age of 18 years and always less than 5 drinks per 24 hours according to the National Health Board
- Parental abuse

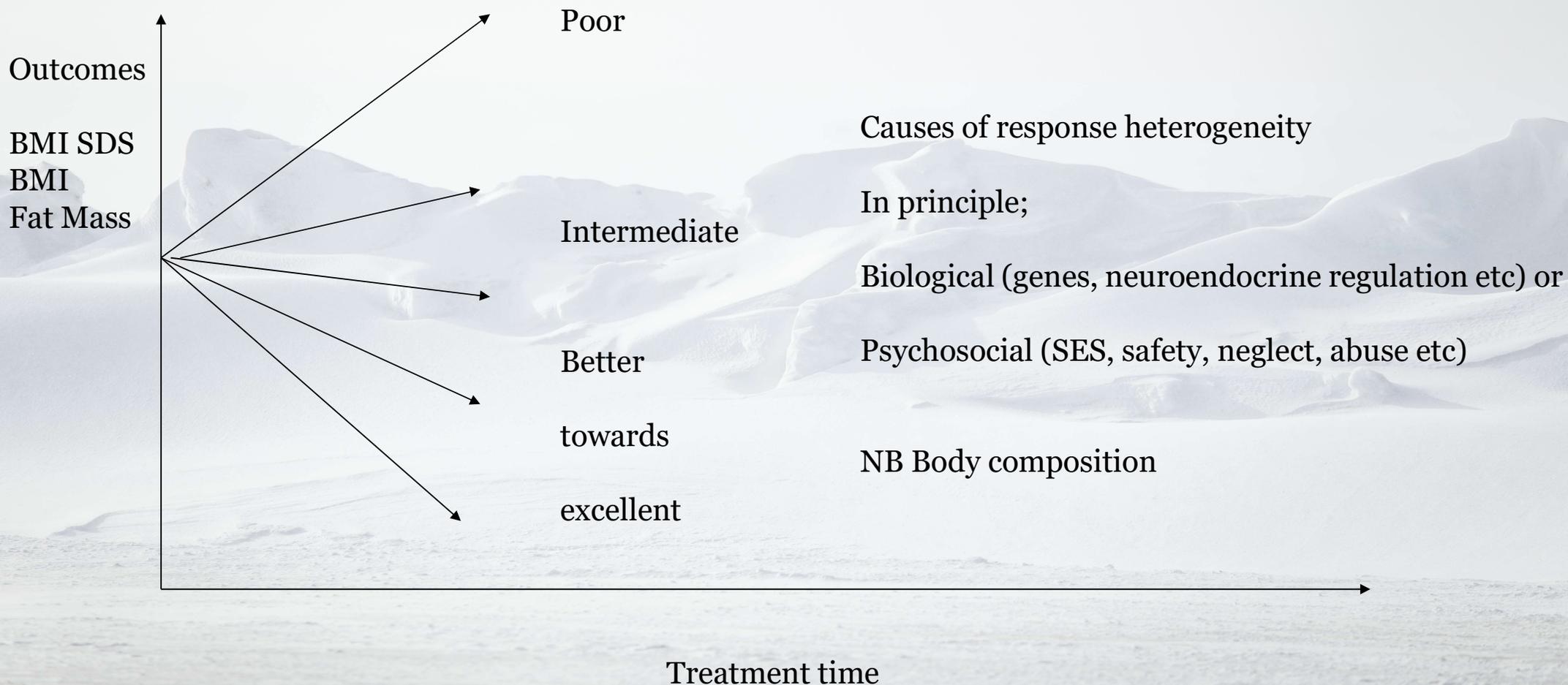
Follow-up assessments

- during growth and development

- History, symptoms, physical examination
- Degree of overweight/obesity, body composition
- Obesity related complications
- Quality of life
- Adherence to treatment
- Tobacco and alcohol
- Life functionality
- Genetic testing
- Guidance and care

Fat mass regulation

- expected treatment heterogeneity i.e. treatment responses



Novo Nordisk press release

26 March 2021

- Committee for Medicinal Products for Human Use (CHMP) European Medicines Agency has recommended the use of Saxenda® is expanded for the treatment of obesity in adolescents aged 12-17 years
- CHMP opinion referred to the European Commission
- Decision in May 2021. Approved in Denmark.
- Based on safety and efficacy of Liraglutide 3.0 mg
- Dose escalation over 4-8 weeks
- Sub-cutaneous daily administration
- Adjunct to lifestyle therapy

GLP-1

- Increases postprandial insulin level in a glucose dependent manner
- Reduces glucagon secretion
- Delays gastric emptying
- Reduce appetite and energy intake
- Hypothalamic effects

Liraglutide in an Adolescent Population with Obesity: A Randomized, Double-Blind, Placebo-Controlled 5-Week Trial to Assess Safety, Tolerability, and Pharmacokinetics of Liraglutide in Adolescents Aged 12-17 Years

Thomas Danne, MD¹, Torben Biester, MD¹, Kerstin Kapitzke, MD¹, Sanja H. Jacobsen, MSc², Lisbeth V. Jacobsen, MSc²,
Kristin C. Carlsson Petri, PhD², Paula M. Hale, MD³, and Olga Kordonouri, MD¹

Conclusions Liraglutide had a similar safety and tolerability profile compared with adults when administered to adolescents with obesity, with no unexpected safety/tolerability issues. Results suggest that the dosing regimen approved for weight management in adults may be appropriate for use in adolescents. (J Pediatr 2016;■■:■■-■■). Trial registration ClinicalTrials.gov: NCT01789086.

ORIGINAL ARTICLE

A Randomized, Controlled Trial of Liraglutide for Adolescents with Obesity

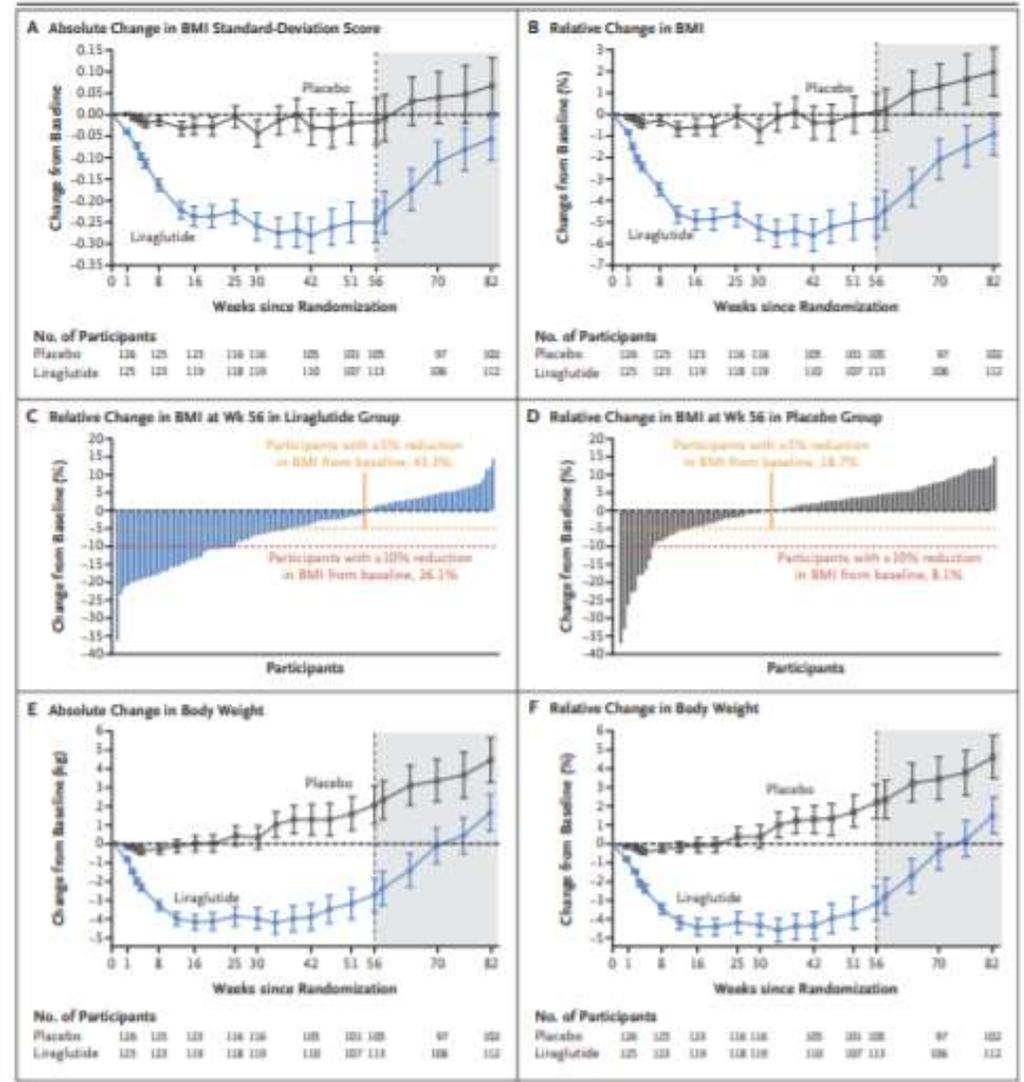
Aaron S. Kelly, Ph.D., Pernille Auerbach, M.D., Ph.D., Margarita Barrientos-Perez, M.D., Inge Gies, M.D., Ph.D., Paula M. Hale, M.D., Claude Marcus, M.D., Ph.D., Lucy D. Mastrandrea, M.D., Ph.D., Nandana Prabhu, M.Sc., and Silva Arslanian, M.D., for the NN8022-4180 Trial Investigators*

COUNSELING IN HEALTH NUTRITION AND PHYSICAL ACTIVITY

Participants received individualized counseling in healthy nutrition that was performed by a certified dietician and evaluated at every visit using a numerical rating scale.

Participants received individualized counseling in physical activity at every visit that was performed by site staff trained in physical activity counseling. Participants were encouraged to engage in 60 minutes of moderate- to high-intensity physical activity daily.

This article was published on March 31, 2020, at NEJM.org. DOI: 10.1056/NEJMoa1916038



5 participants receiving placebo (six events) dur... Events related to psychiatric disorders oc...

Table 3. Adverse Events during the Treatment Period.*

Event	Liraglutide (N=125)			Placebo (N=126)			P Value
	no. of partici- pants (%)	no. of events	events/1000 exposure-yr	no. of partici- pants (%)	no. of events	events/1000 exposure-yr	
Any adverse events	111 (88.8)	777	6187.8	107 (84.9)	627	5018.5	0.07†
Gastrointestinal adverse events	81 (64.8)	319	2540.4	46 (36.5)	121	968.5	0.001†
Serious adverse events‡	3 (2.4)	3	23.9	5 (4.0)	6	48.0	0.72§
Adverse events that led to treatment discontinuation	13 (10.4)	19	151.3	0	0	0	<0.001§
Adverse events that occurred in ≥5% of participants							
Nasopharyngitis	34 (27.2)	68	541.5	38 (30.2)	80	640.3	0.60¶
Nausea	53 (42.4)	101	804.3	18 (14.3)	25	200.1	<0.001¶
Headache	29 (23.2)	43	342.4	35 (27.8)	53	424.2	0.41¶
Vomiting	43 (34.4)	85	676.9	5 (4.0)	8	64.0	<0.001¶
Diarrhea	28 (22.4)	44	350.4	18 (14.3)	29	232.1	0.10¶
Upper abdominal pain	17 (13.6)	25	199.1	17 (13.5)	23	184.1	0.98¶
Oropharyngeal pain	11 (8.8)	11	87.6	15 (11.9)	18	144.1	0.42¶
Influenza	11 (8.8)	11	87.6	12 (9.5)	12	96.0	0.84¶
Gastroenteritis	16 (12.8)	22	175.2	6 (4.8)	9	72.0	0.02¶
Upper respiratory tract infection	11 (8.8)	14	111.5	11 (8.7)	16	128.1	0.98¶
Abdominal pain	10 (8.0)	15	119.5	11 (8.7)	15	120.1	0.83¶
Pyrexia	10 (8.0)	11	87.6	9 (7.1)	11	88.0	0.80¶
Dizziness	13 (10.4)	15	119.5	4 (3.2)	5	40.0	0.02¶
Dysmenorrhea	4 (3.2)	5	39.8	8 (6.3)	16	128.1	0.38§
Arthralgia	3 (2.4)	3	23.9	8 (6.3)	8	64.0	0.22§
Pharyngitis	4 (3.2)	5	39.8	7 (5.6)	7	56.0	0.54§

* Adverse events and serious adverse events that occurred from week 0 through week 56 among adolescents in the safety population are included in the table and presented with their preferred terms. Events were included if the date of onset was between the first day the trial drug was administered and 14 days after the last day the trial drug was administered, at the follow-up visit, or at the last trial visit.

† The P value was calculated with a negative binomial model. The number of events was analyzed with a negative binomial model with log-link function and the logarithm of the exposure time (1000 years) for which an adverse event is considered to be reported during the treatment period as an offset. The model included treatment, sex, region, baseline glycemic category, stratification factor for Tanner stage, and interaction between baseline glycemic category and stratification factor for Tanner stage as fixed effects.

‡ The following serious adverse events were reported in one participant each: postprocedural hemorrhage, myositis, and completed suicide in the liraglutide group; and appendicitis, pneumonia, acute cholecystitis, cholelithiasis, and thrombophlebitis in the placebo group.

§ The P value was calculated by means of Fisher's exact test on the basis of the number of participants.

¶ The P value was calculated by means of Pearson's chi-square test on the basis of the number of participants.

Expected indications

- 12-17 years
- Iso BMI of 30, and or related complications
- Poor response to lifestyle alone
- Adjunct to obesity management!
- Identify those in need!
- Safety and side effects!
- Duration and cost!
- Treatment effect after termination of GLP-1!

Stopping rules

- Considerations from FDA/EMA
- 5 (or 10) % weight loss required to continue!
- Body composition during growth and development!
- Patients difficult to treat are offered suboptimal management solutions?
- Response patterns i.e. genetics GRS/PGRS
- Success criteria, move beyond BMI

Article Contents

Abstract

Materials and Methods

Results

Discussion

Conclusions and Future
Directions

Abbreviations

Acknowledgments

Additional Information

Data Availability

CORRECTED PROOF

Fasting Plasma GLP-1 Is Associated With Overweight/Obesity and Cardiometabolic Risk Factors in Children and Adolescents

Sara E Stinson, Anna E Jonsson, Morten A V Lund, Christine Frithioff-Bøjsøe,
Louise Aas Holm, Oluf Pedersen, Lars Ängquist, Thorkild I A Sørensen,
Jens J Holst, Michael Christiansen, Jens-Christian Holm, Bolette Hartmann,
Torben Hansen 

The Journal of Clinical Endocrinology & Metabolism, dgab098,
<https://doi.org/10.1210/clinem/dgab098>

Published: 17 February 2021 **Article history** ▾



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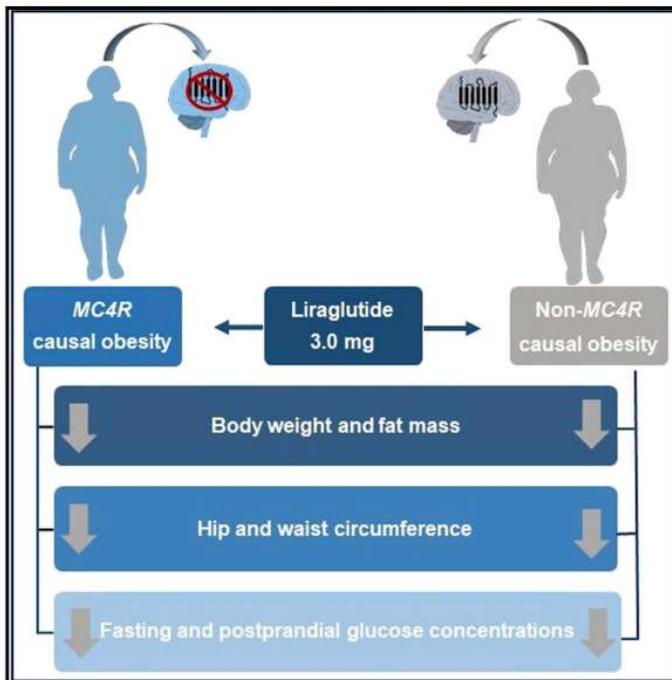
Conclusion

Overweight/obesity in children and adolescents is associated with increased fasting plasma total GLP-1 concentrations, which was predictive of higher CMR factors.

Cell Metabolism

Patients with Obesity Caused by Melanocortin-4 Receptor Mutations Can Be Treated with a Glucagon-like Peptide-1 Receptor Agonist

Graphical Abstract



Authors

Eva W. Iepsen, Jinyi Zhang, Henrik S. Thomsen, ..., Jens J. Holst, Jens-Christian Holm, Signe S. Torekov

Correspondence

epwi@sund.ku.dk (E.W.I.),
torekov@sund.ku.dk (S.S.T.)

In Brief

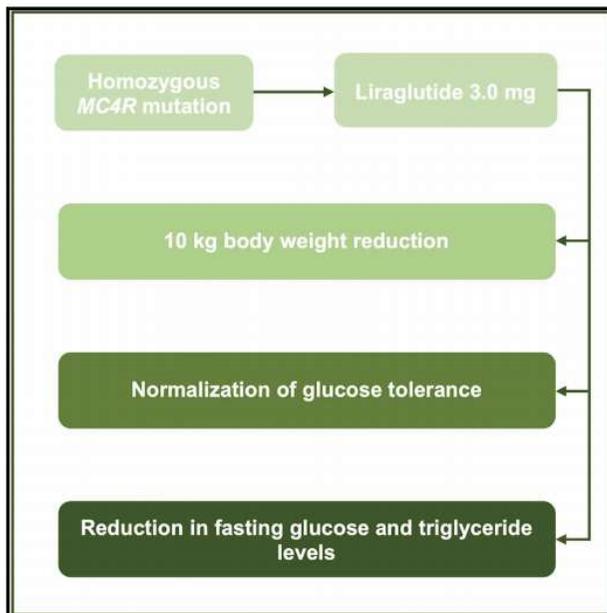
Iepsen et al. show that the diabetes and obesity drug liraglutide, which has appetite-suppressing effects, caused weight loss in obese patients with mutations in the appetite-regulating *melanocortin-4 receptor (MC4R)*. These results show that the appetite effects of liraglutide are independent of the MC4R pathway and offer therapeutic opportunities for patients with MC4R causal obesity.

Highlights

- Fully functional MC4Rs are not required for GLP-1 RA-mediated weight loss
- Liraglutide caused a 6% weight loss in patients with MC4R mutations and controls
- Fat mass, waist circumference, and glucose concentrations improved with treatment
- Liraglutide is an effective treatment of the most common form of monogenic obesity

GLP-1 Receptor Agonist Treatment in Morbid Obesity and Type 2 Diabetes Due to Pathogenic Homozygous Melanocortin-4 Receptor Mutation: A Case Report

Graphical Abstract



Authors

Eva W. Iepsen, Christian T. Have, Simon Veedfald, ..., Jens-Christian Holm, Torben Hansen, Signe S. Torekov

Correspondence

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torekov@sund.ku.dk (S.S.T.)

In Brief

In this case report, Iepsen et al. show that the GLP-1 RA liraglutide induces a weight loss of 10 kg and normalization of glucose tolerance in a woman homozygous for pathogenic *MC4R* mutation. Thus, the appetite-reducing effects of liraglutide are preserved in *MC4R* causal obesity and independent of the *MC4R* pathway.

Highlights

- Liraglutide induces weight loss in a woman homozygous for pathogenic *MC4R* mutation
- Glucose tolerance normalized and fasting glucose and triglyceride levels reduced
- *MC4R* is not required for GLP-1 RA-mediated weight loss
- Liraglutide is an effective treatment for the most common form of monogenic obesity

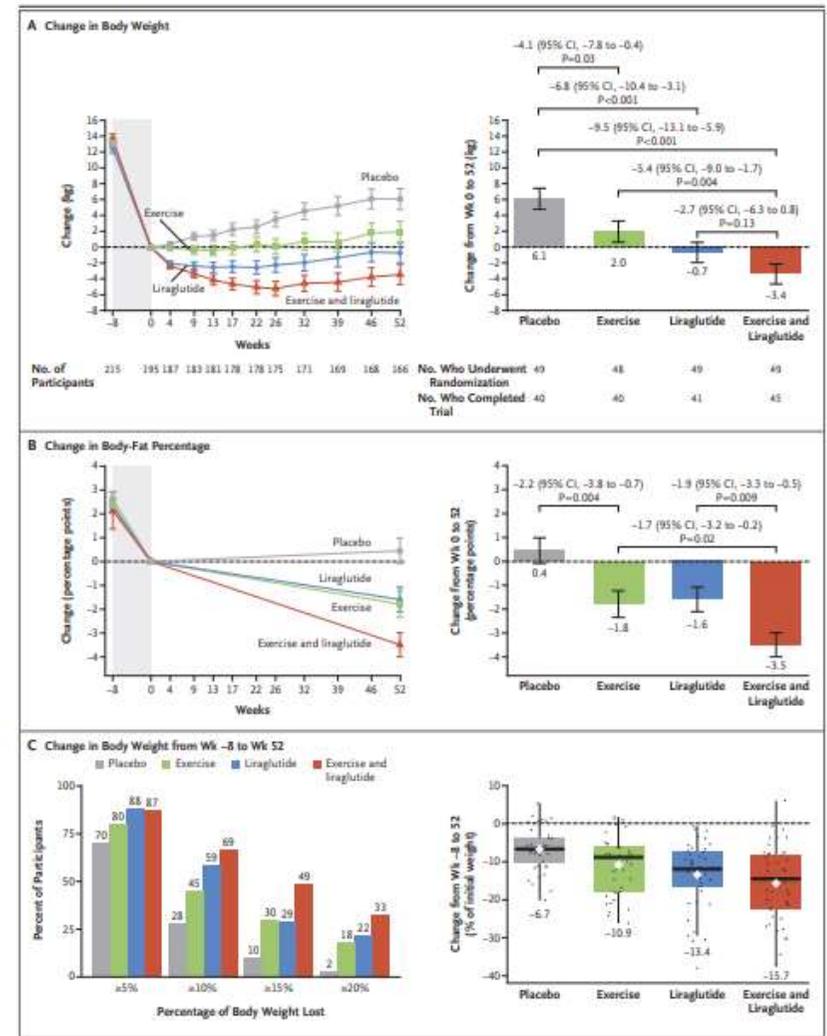
ORIGINAL ARTICLE

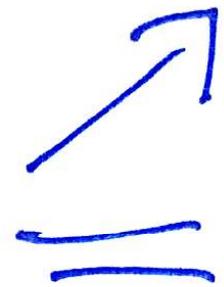
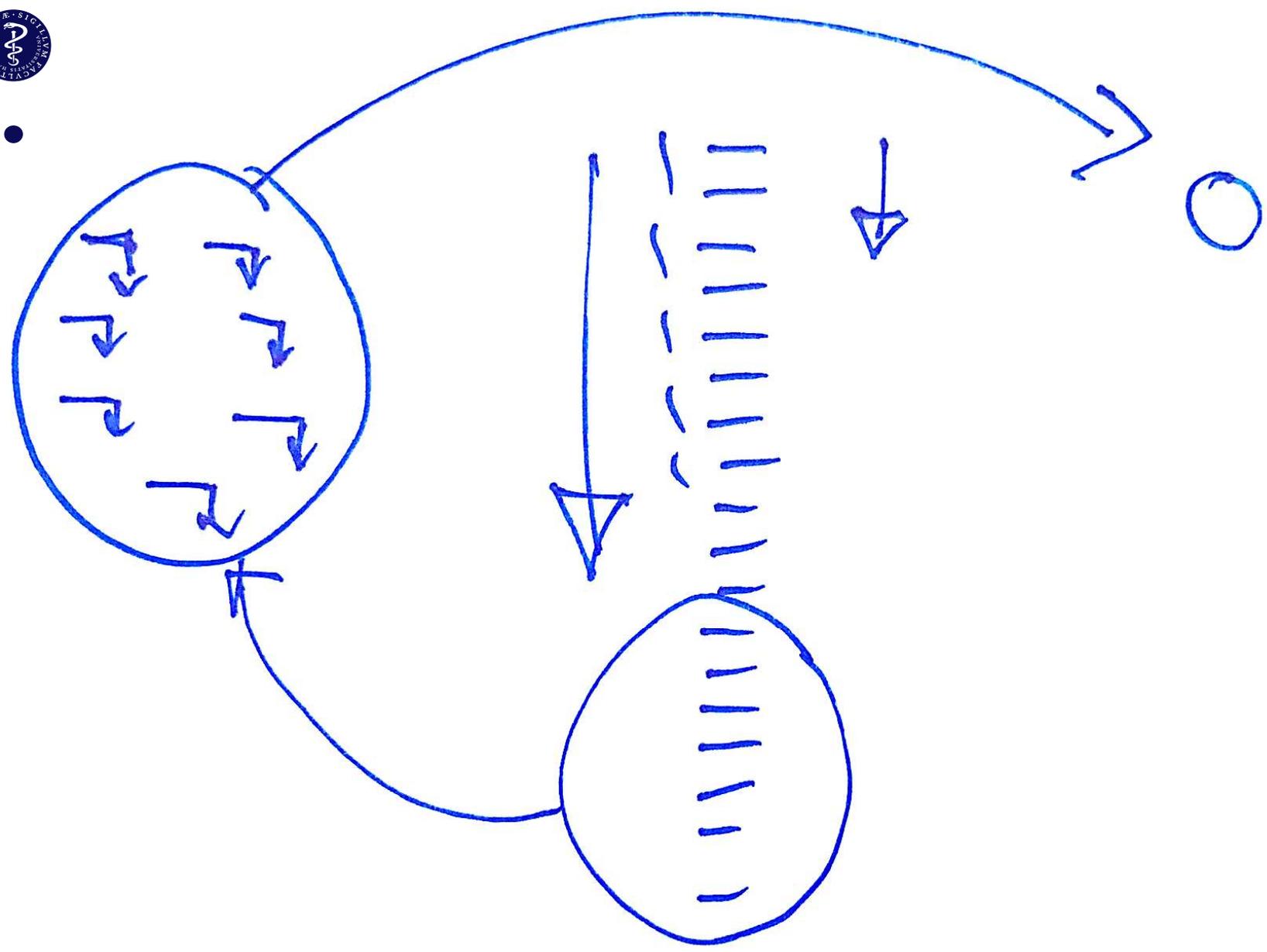
Healthy Weight Loss Maintenance with Exercise, Liraglutide, or Both Combined

Julie R. Lundgren, M.D., Ph.D., Charlotte Janus, Ph.D., Simon B.K. Jensen, M.Sc., Christian R. Juhl, M.D., Lisa M. Olsen, M.Sc., Rasmus M. Christensen, B.Sc.Med., Maria S. Svane, M.D., Ph.D., Thomas Bandholm, Ph.D., Kirstine N. Bojsen-Møller, M.D., Ph.D., Martin B. Blond, M.D., Ph.D., Jens-Erik B. Jensen, M.D., Ph.D., Bente M. Stallknecht, M.D., D.M.Sc., Jens J. Holst, M.D., D.M.Sc., Sten Madsbad, M.D., D.M.Sc., and Signe S. Tørekov, Ph.D.

CONCLUSIONS A strategy combining exercise and liraglutide therapy improved healthy weight loss maintenance more than either treatment alone.

N Engl J Med 2021;384:1719-30.
DOI: 10.1056/NEJMoa2028198





- According to the Convention on the Rights of the Child (CRC) by the UNICEF;
- this reality is unacceptable because all children should be able to receive medical care when it is needed: ‘States Parties recognize the right of the child to the enjoyment of the highest attainable standard of health and to facilities for the treatment of illness and rehabilitation of health. States Parties shall strive to ensure that no child is deprived of his or her right of access to such health care services’



Questionnaire

- 160 questions in 15-20 minutes
- Flow and rhythm induce acceptance and trust
- Identify most obstacles initially
- Answers are not/or less constructed
- 15-20 minutes to establish treatment plan



Plan items

1. *Eat breakfast*
2. *Avoid high fat and sugar refined products*
3. *Eat cereals, dark bread with low fat meats rich in vitamins and minerals*
4. *Lunch; avoid high fat and sugar products*
5. *Eat dark bread with low fat meats / vegetables*
6. *Afternoon; avoid various high fat and sugar intakes*
7. *Controlled eating similar to breakfast*
8. *Dinner; avoid high fat diets*
9. *Instead low fat meats, complex carbohydrates, vegetables*

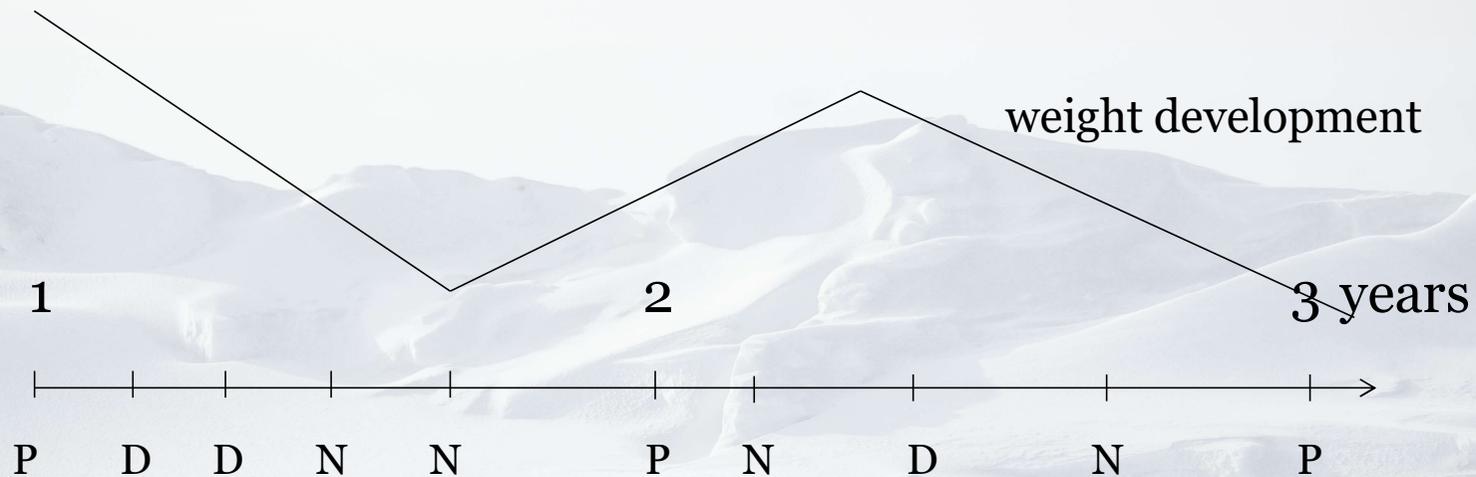


Plan items

10. *Fast food reduced to once monthly*
11. *Sweets once weekly*
12. *Snacking once weekly*
13. *Soda, juice, ice-tea etc one weekly; 1/2 l in total*
14. *Fruit; max 2 per day*
15. *Transportation to school; walking or bicycling*
16. *TV/PC reduced to 2 hours daily*
17. *TV/PC not before 5 o`clock pm*
18. *Organized sport*



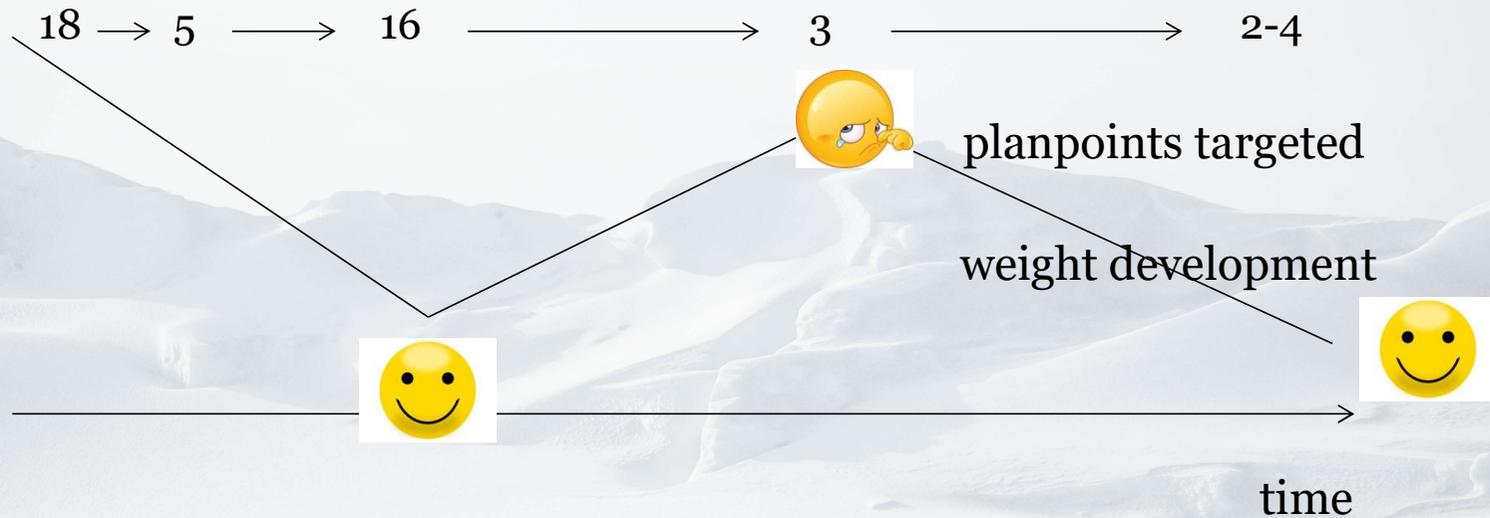
Treatment course



- 5.5 hours of hcp time per patient/year in secondary sector and 4.5 in the primary sector



Treatment dynamics

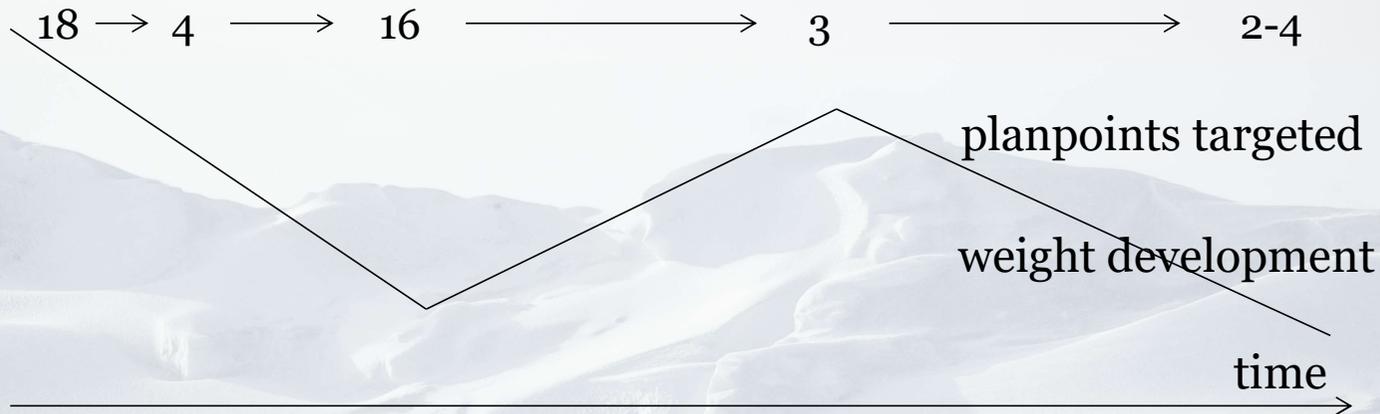


Identify those issues that troubles the patient and family quickly and focus target on those difficult issues in the forthcoming consultations

Patient makes treatment plan to ones own choices based on nessecity/suffering



Motivating techniques



induce shame, guilt and self blame

Holm JC. Behandlerbladet Diabetes. Behandleren kan gøre sig skyldig i mislykket vægttab. 2017



Authenticity and self-identification

- Neutral communication introduce adaptation against weight loss as an external cause of obesity, thus reduce guilt and shame, allow taboos
- Treatment obstacles are easily understood and causes no blame, focus on external factors
- All treatment points are essential in weight loss
- Introduce empowerment and self-awareness
- Compromises will burden the patient/child`s weight development
- Process development over time to integrate and establish a lifestyle as *a new normal*
- Control the environment



Focused Pedagogy

- Based on true empathy, not HCP speculations or perceptions
- A wider HCP responsibility
- Initiate 10-25 plan items changes from start
- Without compromise during growth and development



Direct and indirect effects

- Direct effects securing daily family based habits providing efficient sleep, nutrition, activity, development, education, and safety according to the **UNICEF criteria** of a healthy life during childhood
- Indirect effects secure well-being and thriving which induce family involving process development to guard the child, raising and parenting
- Parents aren't to blame
- Parents are the solution
- All parents want to guard their child
- Health care professionals act and take responsibility like in other chronic diseases in childhood
- All patients are highly motivated



Power and resistance respect autonomy

Resistance

- *Sarcasm*
- *Irony*
- *Excuses*
- *Explanations*
- *Intellectualisation*

- *Distraction*
- *Confusion*
- *Chaos*

Authority

- Set up borders/boundaries
- Change
- In character, authentic messaging

- HCP responsibility
- HCP resignation
- HCP excellence



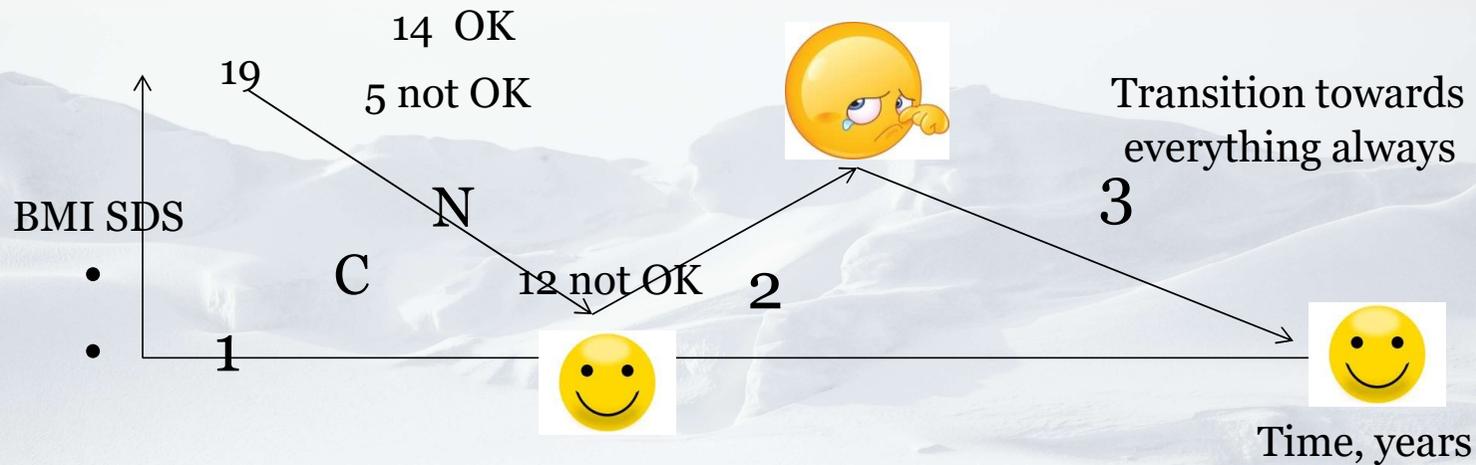
Double trouble

- *Challenges*; low social class, other ethnicity, deprived development, puberty, low IQ
- *Beliefs/Perceptions (HCPs / patients)*;
both parents should accompany the child, patient shall learn from own success, not measuring weight, a lot of psychosocial strain, expect less result with low SES, IQ
- *Double trouble*



The dynamics of weight loss

- Expected treatment outcome, process development



- Phase 1; weight loss by treatment plan
- Phase 2; compliance/ adaptation against weight loss
- Phase 3; realizing your reality and treatment need
- Induce process development within the family



TCOCT protocol

4-5 hours of HCP time per patient per year

Reduces the degree of obesity in 65, 75, 80 and 90% of children

- Møllerup, P., Gamborg, M., Trier, C., Bøjsøe, C., Nielsen, T. R. H., Baker, J. L., Holm, J.-C. The Childhood Obesity Treatment Protocol Adopted into a Community-Based Treatment Programme. *PLoS One*. 2017 Mar 6;12(3):e0173033. Most, S. W. *et al.* Adoption of the children's obesity clinic's treatment (TCOCT) protocol into another Danish pediatric obesity treatment clinic. *BMC Pediatrics* **15**, 13 (2015). Holm, J.-C. *et al.* Chronic care treatment of obese children and adolescents. *International Journal of Pediatric Obesity* **6**, 188–196 (2011). [Childhood obesity treatment: Effects on BMI SDS, body composition, and fasting plasma lipid concentrations](#). Nielsen TRH, Fonvig CE, Dahl M, Møllerup PM, Lausten-Thomsen U, Pedersen O, Hansen T, Holm JC.

Reduce degree of hypertension

Hvidt, K. N., Olsen, M. H., Ibsen, H. & Holm, J.-C. Effect of changes in BMI and waist circumference on ambulatory blood pressure in obese children and adolescents. *J. Hypertens.* **32**, 1470–1477 (2014).

Reduce degree of steatosis

Fonvig, C. E. *et al.* Multidisciplinary care of obese children and adolescents for one year reduces ectopic fat content in liver and skeletal muscle. *BMC Pediatr* **15**, 196 (2015).

Reduce degree of dyslipidemia

Nielsen, T. R. H. *et al.* Changes in lipemia during chronic care treatment of childhood obesity. *Child Obes* **8**, 533–541 (2012).

Reduce parental degree of obesity

Trier, C. *et al.* Effects of a Family-Based Childhood Obesity Treatment Program on Parental Weight Status. *PLOS ONE* **11**, e0161921 (2016).

Reduces appetite and bullying

Fonvig CE *et al.* Subjective evaluation of psychosocial well-being in children and youths with overweight or obesity: the impact of multidisciplinary obesity treatment. *Qual Life Res.* 2017 Dec;26(12):3270-3288

Independent on GRS / 15 genes

Fogh *et al.* Genetic Susceptibility for Childhood BMI has no Impact on Weight Loss Following Lifestyle Intervention in Danish Children. *Obesity*. 2018 Dec;30(12):2178-2184

Increases QoL body self-esteem

Møllerup, P. M., Nielsen, T. R. H., Bøjsøe, C., Kloppenborg, J. T., Baker, J. L., Holm, J.-C. Quality of Life Improves in Children and Adolescents during a Community-Based Overweight and Obesity Treatment. *Qual. Life Res. Int. J. Qual. Life Asp. Treat. Care Rehabil.* 2017 DOI: 10.1007

Primary and secondary sectors

Møllerup, P., Gamborg, M., Trier, C., Bøjsøe, C., Nielsen, T. R. H., Baker, J. L., Holm, J.-C. *PLoS One*. 2017 Mar 6;12(3):e0173033. Holm, J.-C. *et al.* Chronic care treatment of obese children and adolescents. *International Journal of Pediatric Obesity* **6**, 188–196 (2011).

Preliminary studies in adults (weight reduction in 80%)

Independent upon baseline degree of obesity and SES

Holm, J.-C. *et al.* Chronic care treatment of obese children and adolescents. *International Journal of Pediatric Obesity* **6**, 188–196 (2011).

Independent on familial predisposition

Nielsen, L. A. *et al.* The influence of familial predisposition to cardiovascular complications upon childhood obesity treatment. *PLoS ONE* **10**, e0120177 (2015).

Independent on impaired glucose metabolism

Kloppenborg JT *et al.* The effect of impaired glucose metabolism on weight loss in multidisciplinary childhood obesity treatment. *Pediatr Diabetes*. 2018 May;19(5):508-514

Independent on disordered eating

Disturbed eating behaviours do not impact treatment response in a paediatric obesity chronic care treatment programme. Fogh M, Holm JC. *Paediatr Child Health*. 2020 Apr;56(4):542-549. doi: 10.1111/jpc.14678. Epub 2019 Nov 6.

Independent on sugary intakes

Trier, C. *et al.* No influence of sugar, snacks and fast food intake on the degree of obesity or treatment effect in childhood obesity. *Pediatric Obesity* n/a-n/a (2016).

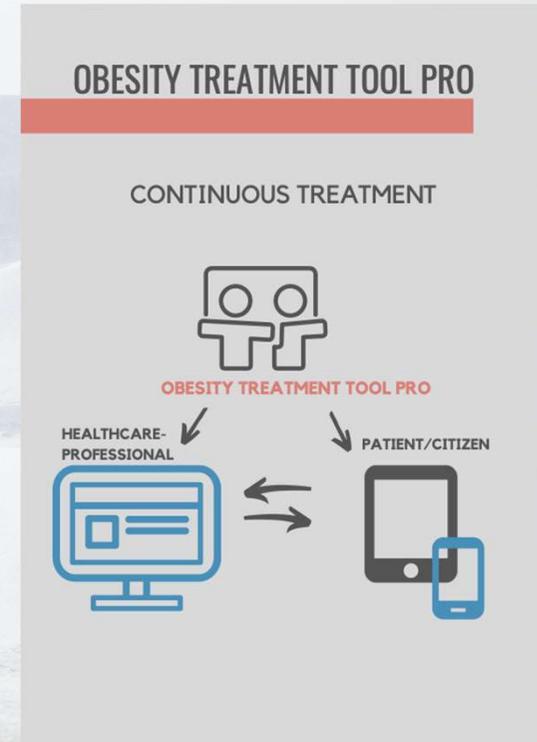


Dr Holm OBESITY TREATMENT TOOL PRO

PROFESSIONAL TREATMENT OF OBESITY

**THE ADVANTAGES
OBESITY TREATMENT TOOL PRO**

- Systematic evidence based model
- Individualised treatment plans
- Easier workflows in one solution
- Video-consultation
- Build-in quality assurance
- Online support
- Evaluation of results



Chronic care treatment of obese children and adolescents

Jens-Christian Holm, Michael Gamborg, Dorthe S. Bille, Helle N. Grønbaek, Leigh C. Ward & Jan Faerk
Int J Pediatr Obes Pages 188-196 | Published online: 02 May 2011

Abstract

Objectives. Clinically-relevant protocols for the treatment of childhood obesity are lacking. This study report results for a clinic-based structured treatment program for chronic childhood obesity. *Methods.* Patients were measured at baseline and for up to 24 months; there were no prior eligibility criteria. At baseline, height, weight, Tanner stages, testicular size, time of menarche, and social class of the parents were registered. A structured, tailored treatment plan including best-practice-based interventions was initiated. Height, weight, and pubertal development were measured at subsequent visits. *Results.* A total of 617 children or youths were included; 325 were girls and 292 were boys. At entry, the mean age was 11.6 years and the mean body mass index (BMI) standard deviation score (SDS) was 3.0. Seventy stopped treatment, 547 were in treatment, 125 had 1 examination, and 492 had two or more examinations, with a mean visit interval of six weeks. After 12 months, the mean BMI SDS decreased by 0.23 ($P < 0.0001$) in girls and by 0.32 ($P < 0.0001$) in boys. After one year, the retention rate was 90.2%, and 68.7% had reduced BMI SDS. After two years, the retention rate was 75.0%, of which 62.5% had reduced BMI SDS. The reductions in BMI SDS were independent of baseline adiposity, age (in boys), puberty stage, and social class, but were dependent on sex, age (girls), and place of referral. *Conclusions.* This clinical obesity treatment was safe and effective in reducing BMI SDS independent of baseline adiposity, age (boys), or social class in these young people.

Reductions in hepatic steatosis in chronic care childhood obesity treatment

- 88 (31 %) of 287 overweight/obese children and adolescents
- 12 months of treatment: significant reductions in hepatic fat (especially in those exhibiting hepatic steatosis),
- independent of age, sex, pubertal stage, duration of treatment, changes in BMI SDS, baseline degree of obesity.

RESEARCH ARTICLE

¹H-MRS Measured Ectopic Fat in Liver and Muscle in Danish Lean and Obese Children and Adolescents

Cilius Esmann Fonvig^{1,2*}, Elizaveta Chabanova³, Ehm Astrid Andersson², Johanne Dam Ohrt¹, Oluf Pedersen², Torben Hansen^{2,4}, Henrik S. Thomsen^{3,5}, Jens-Christian Holm^{1,5}

Fonvig et al. *BMC Pediatrics* (2015) 15:196
DOI 10.1186/s12887-015-0513-6

BMC Pediatrics

RESEARCH ARTICLE

Open Access

Multidisciplinary care of obese children and adolescents for one year reduces ectopic fat content in liver and skeletal muscle



Cilius Esmann Fonvig^{1,2*}, Elizaveta Chabanova³, Johanne Dam Ohrt¹, Louise Aas Nielsen¹, Oluf Pedersen², Torben Hansen², Henrik S. Thomsen^{3,4} and Jens-Christian Holm^{1,4}



Original Article

Effect of changes in BMI and waist circumference on ambulatory blood pressure in obese children and adolescents

Kristian Nebelin Hvidt^{a,b}, Michael Hecht Olsen^c, Hans Ibsen^a, and Jens-Christian Holm^b

See editorial comment on page 1397

Background: Weight reduction has been accompanied with a reduction in clinic blood pressure (BP) in children and adolescents; however, the effect on ambulatory BP (ABP) is uncertain. The objective was to investigate the impact of weight changes on ABP in obese children and adolescents.

Methods: Sixty-one severely obese patients aged 10–18 years underwent lifestyle intervention at the Children's Obesity Clinic. Patients were examined with ABP monitoring at baseline and after 1 year of treatment (follow-up). To account for growth, BP and BMI were standardized into z scores, whereas waist circumference was indexed by height [waist/height ratio (WHR)].

Results: Patients experienced a reduction at follow-up in the degree of obesity [Δ BMI z score: -0.21 , 95% confidence interval (CI) -0.32 to -0.10 , $P=0.0003$; and Δ WHR: -0.02 , 95% CI -0.03 to -0.004 , $P=0.009$]. Δ 24-h, Δ daytime and Δ night-time SBP and DBP in mmHg and changes in equivalent z scores were related to Δ BMI z scores and Δ WHR. These relationships were reproduced in multiple regression analyses adjusted for relevant confounders, for example, a reduction in one BMI z score corresponds to a reduction in 24-h SBP by 6.5 mmHg ($P<0.05$). No relationship was found between changes in these anthropometric obesity measures and changes in clinic BP.

Conclusion: Changes in obesity measures were closely related to changes in ABP, but not to changes in clinic BP, in severe obese children and adolescents after 1 year of lifestyle intervention. The findings

INTRODUCTION

Obesity is associated with elevated blood pressure (BP) in children and adolescents [1,2], and weight reduction has been accompanied with a reduction in clinic BP [3–5]. Ambulatory BP (ABP) is the most precise measure to evaluate the BP burden [6–8], and weight-associated reduction in ABP has been related to a reduction in risk factors of cardiovascular disease in adults [9]. Knowledge is lacking on the effect of weight reduction on ABP in children and adolescents, and it is unknown whether changes in ABP are more closely related to changes in the degree of obesity when compared to changes in clinic BP.

Anthropometric and BP measurements over time during childhood are complicated by the influence of growth. However, actual measured values of BMI and BP can be standardized into z scores in respect to normative reference populations [10,11]. An ABP z score value of zero is the expected mean in respect to sex and height of the reference population [8,12]. Waist circumference – a surrogate for abdominal fat – can be indexed by height representing growth when comparing measurements over time [13–15].

The objective of the present study is to investigate whether weight changes are more closely related to changes in ABP than changes in clinic BP in severe obese children and adolescents after 1 year of lifestyle intervention.

METHODS

Design and patients

Recruitment period was from January 2011 to January 2012, and continued until 100 obese Caucasian patients were



Dyslipidemia

CHILDHOOD OBESITY
December 2012 | Volume 8, Number 6
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DOI: 10.1089/chi.2011.0098

ORIGINAL ARTICLE

Changes in Lipidemia during Chronic Care Treatment of Childhood Obesity

Tenna Ruest Haarmark Nielsen, M.D.,¹ Michael Gamborg, Ph.D.,²
Cilius Esmann Forvig, M.D.,¹ Julie Kloppenborg, M.D.,¹ Kristian Nebelin Hvidt, M.D.,^{1,3}
Hans Ibsen, M.D., DrMedSci,³ and Jens-Christian Holm, M.D., Ph.D.¹

Conclusion: High lipid concentrations were associated with childhood obesity. The lipid profile improved during weight loss independently of the baseline BMI SDS and baseline lipid concentration.

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Dyslipidemia in Obese Children

N=240 obese children and adolescents
(Age 11.3 years[3.9-20.9], BMI SDS 2.96[1.17-5.54]).

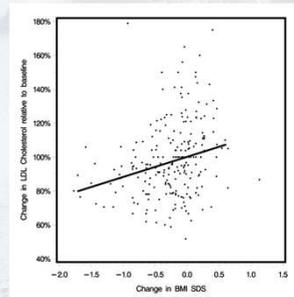
Prevalence of dyslipidemia **27.1%**

Dyslipidemia improved with weight loss: **OR 0.37**

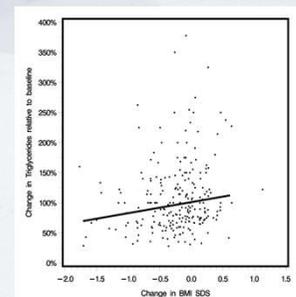
per BMI SDS, $P = 0.014$ over median 12.9 months (adjusted for age, sex, and baseline BMI SDS)

Weight loss was associated with a decrease in the concentrations of

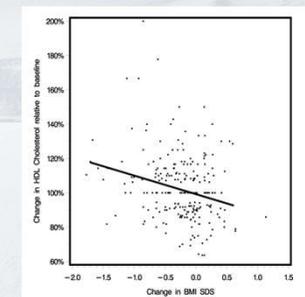
↓ TC ($P = 0.0005$)
↓ LDL ($P < 0.0001$)
↓ non-HDL ($P < 0.0001$)
↓ TG ($P < 0.0001$)
↑ HDL ($P < 0.0001$)



LDL



TG



HDL

Nielsen TRH, Gamborg M, Fonvig CE, et al. Changes in lipidemia during chronic care treatment of childhood obesity. *Child Obes Print.* 2012;8(6):533-541.

RESEARCH ARTICLE

Effects of a Family-Based Childhood Obesity Treatment Program on Parental Weight Status

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Table 2. Changes in parental body mass index of the parents of 664 children included in obesity treatment.

	Mothers				Fathers			
	N	% of total	Delta-BMI, kg/m ²	<i>p</i> ^a	N	% of total	Delta-BMI, kg/m ²	<i>p</i> ^a
All	606	100	-0.5 (-0.8;-0.2)	0.0006	479	100	-0.4 (-0.6;-0.2)	0.0007
Normal weight	183	30	0.8 (0.5;1.1)	<0.0001	96	20	0.6 (0.3;0.8)	0.0001
Overweight	195	32	-0.4 (-0.7;-0.0)	0.04	191	40	-0.4 (-0.6;-0.1)	0.01
Obese	228	38	-1.7 (-2.3;-1.0)	<0.0001	192	40	-0.9 (-1.4;-0.5)	0.0001

Data are given as means with 95% confidence intervals unless stated otherwise.

Normal weight: BMI below 25 kg/m². Overweight: BMI equal to or above 25 kg/m² but below 30 kg/m². Obese: BMI equal to or above 30 kg/m²

^a Paired t-test was used to calculate the *p*-values.

doi:10.1371/journal.pone.0161921.t002



Subjective evaluation of psychosocial well-being in children and youths with overweight or obesity: the impact of multidisciplinary obesity treatment

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Abstract

Purpose To investigate the effects of a multidisciplinary childhood obesity treatment programme on subjective evaluations of psychosocial well-being and quality of life.

Methods This longitudinal observational study included 1291 children, adolescents and young adults, 6–22 years of age, with overweight or obesity. At entry and after 2–82 months of obesity treatment, the patients evaluated the following domains of psychosocial well-being on a visual analogue scale: quality of life, mood, appetite, bullying, motivation for weight loss and body image satisfaction. The degree of overweight was calculated using a body mass index (BMI) standard deviation score (SDS) at each visit.

Results At entry, the mean BMI SDS was 2.81 (range: 1.35–6.65, 95% confidence interval (95% CI): 2.44–3.18). After a median of 14 months of treatment, the median reduction in BMI SDS was 0.29 (95% CI: 0.26–0.31, $p < 0.0001$). Improvements were observed in the domains

of quality of life, mood, appetite, bullying and body image satisfaction ($p < 0.0001$). Larger reductions in BMI SDS were associated with greater improvements in the domains of quality of life ($p = 0.001$), mood ($p = 0.04$) and body image satisfaction ($p < 0.0001$), independent of BMI SDS at entry. However, improvements in psychosocial well-being were also observed in those increasing their BMI SDS ($n = 315$).

Conclusions In a large group of children and youths, psychosocial well-being improved during a multidisciplinary childhood obesity treatment programme, irrespective of the degree of obesity at treatment entry. Greater reductions in BMI SDS were associated with greater improvements in psychosocial well-being, but even in the group increasing their BMI SDS improvements were observed.

Keywords Appetite · Body image · Bullying · Motivation · Paediatric obesity · Quality of life

Electronic supplementary material The online version of this article (doi:10.1007/s11136-017-1667-5) contains supplementary material, which is available to authorized users.

Cilius Esmann Fonvig and Sophie Amalie Hamann have contributed equally to this work.

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Abbreviations

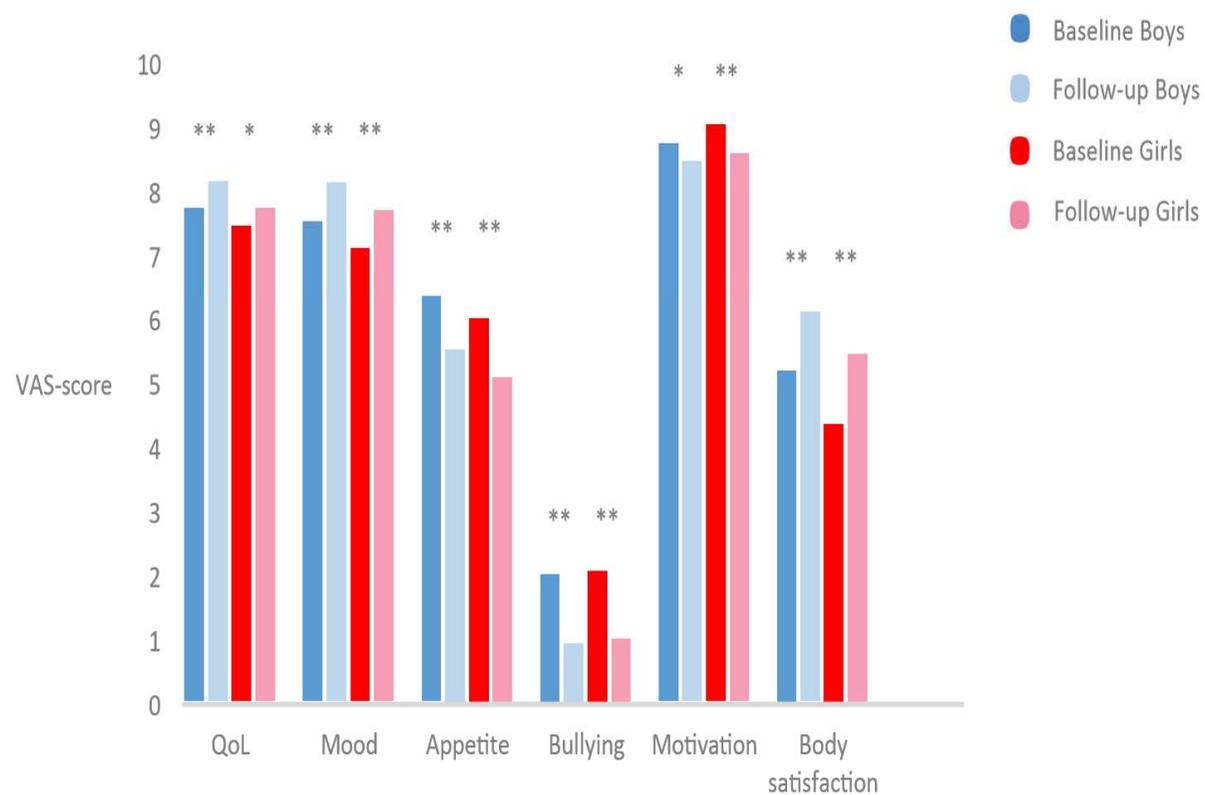
BMI	Body mass index
HRQoL	Health-related quality of life
QoL	Quality of life
SDS	Standard deviation score
TCOCT	The children's obesity clinic treatment
VAS	Visual analogue scale

Introduction

The development of paediatric obesity is influenced by a wide range of factors including genetic predisposition [1], sedentary behaviour [2], unfavourable diet [3], socioeconomic status [4, 5] and health-related quality of life



Figure 1. Changes in psychosocial well-being during childhood obesity treatment



* $p < 0.01$

** $p < 0.0001$



RESEARCH ARTICLE

Childhood obesity treatment; Effects on BMI SDS, body composition, and fasting plasma lipid concentrations

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Citation: Nielsen TRH, Fonvig CE, Dahl M, Møllerup PM, Lausten-Thomsen U, Pedersen O, et al. (2018) Childhood obesity treatment; Effects on BMI SDS, body composition, and fasting plasma lipid concentrations. PLoS ONE 13(2): e0190576. <https://doi.org/10.1371/journal.pone.0190576>

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Data Availability Statement: The data in this study is from The Children's Obesity Biobank, a part of the part of the research activities in TARGET (www.target.ku.dk), and BIOCHILD (www.biochild.ku.dk). The ethical approval limits the individual-level data availability, and prohibits the authors from making the minimal data set publicly available. Data are available from the corresponding author (Tenna Ruest Haarmark Nielsen) upon ethical approval from the Regional Ethical Committee of Region Zealand and requires a data processing agreement between the researcher and The Danish Childhood Obesity Biobank. The steering committee of The

Abstract

Objective

The body mass index (BMI) standard deviation score (SDS) may not adequately reflect changes in fat mass during childhood obesity treatment. This study aimed to investigate associations between BMI SDS, body composition, and fasting plasma lipid concentrations at baseline and during childhood obesity treatment.

Methods

876 children and adolescents (498 girls) with overweight/obesity, median age 11.2 years (range 1.6–21.7), and median BMI SDS 2.8 (range 1.3–5.7) were enrolled in a multidisciplinary outpatient treatment program and followed for a median of 1.8 years (range 0.4–7.4). Height and weight, body composition measured by dual-energy X-ray absorptiometry, and fasting plasma lipid concentrations were assessed at baseline and at follow-up. Lipid concentrations (total cholesterol (TC), low-density lipoprotein (LDL), high-density lipoprotein (HDL), non-HDL, and triglycerides (TG)) were available in 469 individuals (264 girls). Linear regressions were performed to investigate the associations between BMI SDS, body composition indices, and lipid concentrations.

Results

At baseline, BMI SDS was negatively associated with concentrations of HDL ($p = 6.7 * 10^{-4}$) and positively with TG ($p = 9.7 * 10^{-5}$). Reductions in BMI SDS were associated with reductions in total body fat percentage ($p < 2 * 10^{-16}$) and percent truncal body fat ($p < 2 * 10^{-16}$). Furthermore, reductions in BMI SDS were associated with improvements in concentrations of TC, LDL, HDL, non-HDL, LDL/HDL-ratio, and TG (all $p < 0.0001$). Changes in body fat percentage seemed to mediate the changes in plasma concentrations of TC, LDL, and non-HDL, but could not alone explain the changes in HDL, LDL/HDL-ratio or TG. Among 81

RESEARCH ARTICLE

Open Access

Adoption of the children's obesity clinic's treatment (TCOCT) protocol into another Danish pediatric obesity treatment clinic

Sebastian W Most^{1*}, Birgitte Højgaard¹, Grete Teilmann^{1,4}, Jesper Andersen^{1,4}, Mette Valentiner¹, Michael Gamborg² and Jens-Christian Holm^{3,4}

Abstract

Background: Treating severe childhood obesity has proven difficult with inconsistent treatment results. This study reports the results of the implementation of a childhood obesity chronic care treatment protocol.

Methods: Patients aged 5 to 18 years with a body mass index (BMI) above the 99th percentile for sex and age were eligible for inclusion. At baseline patients' height, weight, and tanner stages were measured, as well as parents' socioeconomic status (SES) and family structure. Parental weight and height were self-reported. An individualised treatment plan including numerous advices was developed in collaboration with the patient and the family. Patients' height and weight were measured at subsequent visits. There were no exclusion criteria.

Results: Three-hundred-thirteen (141 boys) were seen in the clinic in the period of February 2010 to March 2013. At inclusion, the median age of patients was 11.1 years and the median BMI standard deviation score (SDS) was 3.24 in boys and 2.85 in girls. After 1 year of treatment, the mean BMI SDS difference was -0.30 (95% CI: -0.39 ; -0.21 , $p < 0.0001$) in boys and -0.19 (95% CI: -0.25 ; -0.13 , $p < 0.0001$) in girls. After 2 years of treatment, the mean BMI SDS difference was -0.40 (95% CI: -0.56 ; -0.25 , $p < 0.0001$) in boys and -0.24 (95% CI: -0.33 ; -0.15 , $p < 0.0001$) in girls. During intervention 120 patients stopped treatment. Retention rates were 0.76 (95% CI: 0.71; 0.81) after one year and 0.57 (95% CI: 0.51; 0.63) after two years of treatment. Risk of dropout was independent of baseline characteristics. Median time spent by health care professionals was 4.5 hours per year per patient and the mean visit interval time was 2.7 months. The reductions in BMI SDS were dependent on gender, parental BMI, and family structure in girls, but independent of baseline BMI SDS, age, co-morbidity, SES, pubertal stage, place of referral, hours of treatment per year, and mean visit interval time.

Conclusions: The systematic use of the TCOCT protocol reduced the degree of childhood obesity with acceptable retention rates with a modest time-investment by health professionals.

Keywords: Adolescence, BMI, Child, Obesity, Puberty, Treatment



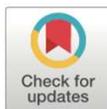
RESEARCH ARTICLE

A hospital-based child and adolescent overweight and obesity treatment protocol transferred into a community healthcare setting

Pernille Maria Møllerup^{1*}, Michael Gamborg², Cæcilie Trier^{1,3}, Christine Bøjsøe^{1,3}, Tenna Ruest Haarmark Nielsen^{1,3}, Jennifer Lyn Baker^{2,3}, Jens-Christian Holm^{1,3,4}

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Citation: Møllerup PM, Gamborg M, Trier C, Bøjsøe C, Nielsen TRH, Baker JL, et al. (2017) A hospital-based child and adolescent overweight and obesity treatment protocol transferred into a community healthcare setting. PLoS ONE 12(3): e0173033. doi:10.1371/journal.pone.0173033

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Data Availability Statement: All relevant data will be within the papers Supporting Information files after acceptance.

Funding: The study was funded by the Region of Zealand, the Region Zealand Health Scientific

Abstract

Background

Due to the pandemic of child and adolescent overweight and obesity, improvements in overweight and obesity treatment availability and accessibility are needed.

Methods

In this prospective study, we investigated if reductions in body mass index (BMI) standard deviation scores (SDS) and waist circumference (WC) would occur during 1.5 years of community-based overweight and obesity treatment based upon an effective hospital-based overweight and obesity treatment protocol, The Children's Obesity Clinics' Treatment protocol. Height, weight, and WC were measured at all consultations. Changes in BMI SDS and WC were analyzed using linear mixed models based upon the repeated measures in each child.

Results

From June 2012 to January 2015, 1,001 children (455 boys) were consecutively enrolled in the community-based treatment program. Upon entry, the median age was 11 years (range: 3–18), and the median BMI SDS was 2.85 (range: 1.26–8.96) in boys and 2.48 (range: 1.08–4.41) in girls. After 1.5 years of treatment BMI SDS was reduced in 74% of the children. BMI SDS was reduced by a mean of 0.38 (95% confidence interval (CI): 0.30–0.45,



Community-Based Childhood Obesity Treatment

Based on The Children's Obesity Treatment (TCOCT) Protocol Conducted by nurses and dietitians at 8 health care centres across Denmark.

Study period: June 2012 to January 2015

**N =1.001 children and adolescents
(455 boys)**

Inclusion criteria:

- Age: 3–18 years
- Overweight or obesity (BMI >85th percentile, Danish reference charts³)

No exclusion criteria

Reductions in BMI SDS:

**After 1 year of treatment
74% reduced their BMI SDS.**

Boys: - 0.35 BMI SDS, $p < 0.0001$

Girls: - 0.22 BMI SDS, $p < 0.0001$

Regardless of age, degree of obesity, and pubertal development stage upon entry. Regardless of socioeconomic status in girls. Boys with low socioeconomic status reduced BMI SDS by 0.1 less per year.

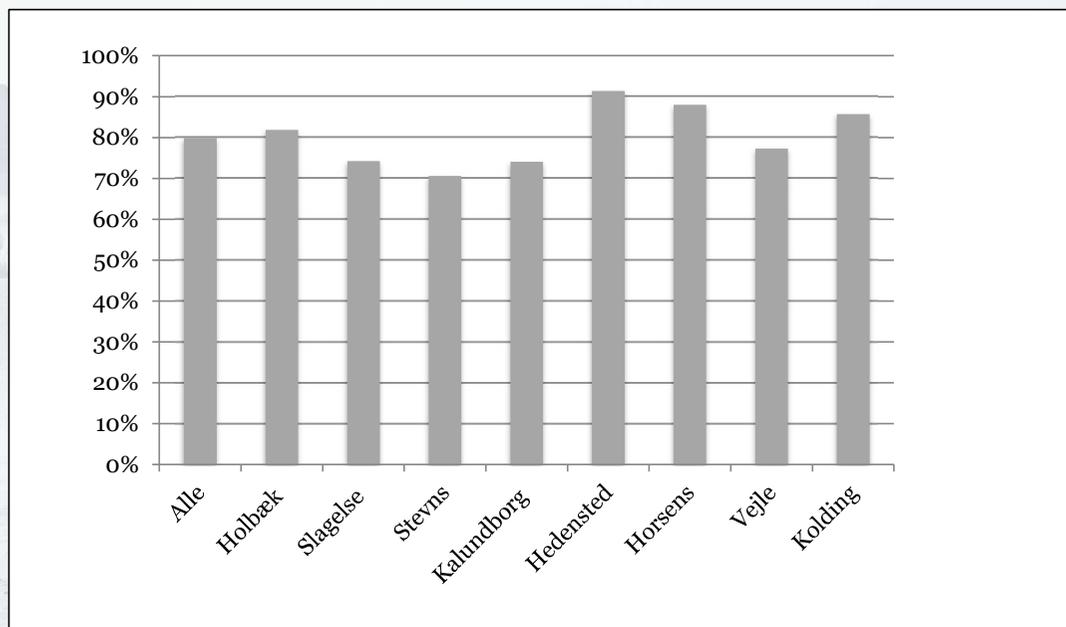
Mollerup P, Gamborg M, Trier C, Bøjsøe C, Nielsen T, Baker J, Holm J-C: **A Hospital-based Childhood Obesity Treatment transferred In to a Community-based Treatment..**

Time cost: An average of 4.5 consultation hours/child/year.



Results from the communities

Percentage of children with reduced BMI SDS





Quality of life improves in children and adolescents during a community-based overweight and obesity treatment

Pernille M. Møllerup¹ · Tenna R. H. Nielsen^{1,2} · Christine Bøjsøe^{1,2} · Julie T. Kloppenborg^{1,3} · Jennifer L. Baker^{2,4} · Jens-Christian Holm^{1,2,5}

Accepted: 13 January 2017
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Abstract

Purpose The quality of life is compromised in children and adolescents with overweight or obesity. The aim of this study was to evaluate whether the quality of life improves during a community-based overweight and obesity treatment, and whether improvements depend on reductions in the degree of obesity.

Methods Quality of life was assessed using the Pediatric Quality of Life Inventory (PedsQL) 4.0 in children and adolescents aged 3–18 years with overweight or obesity [body mass index (BMI) \geq 85th percentile] upon entry into a community-based chronic care overweight and obesity treatment based upon The Children's Obesity Clinic's Treatment protocol, and upon follow-up after 10–30 months of treatment. Height and weight were measured at each consultation and converted into a BMI standard deviation score (SDS).

Results Upon entry, 477 children (212 boys) completed a PedsQL, and 317 (143 boys) completed another PedsQL after a median of 13 months of treatment. Quality of life improved ($p < 0.001$), regardless of sex, age, and pubertal development stage upon entry ($p \geq 0.108$). Greater reductions in BMI SDS and high socioeconomic status were associated with greater improvements in the quality of life ($p \leq 0.047$). However, improvements also occurred in children and adolescents with low socioeconomic status or who increased their BMI SDS ($p < 0.001$).

Conclusions Improvements in quality of life occurred in children and adolescents during a community-based overweight and obesity treatment, even in children and adolescents who increased their BMI SDS. Thus, improvements may be due to the treatment itself and not exclusively to reductions in BMI SDS.

Trial registration Clinicaltrials.gov, ID-no.: NCT02013843.

Keywords Adolescent · Child · Community health services · Obesity · Overweight · Quality of life

Abbreviations

BMI Body mass index
PedsQL Pediatric Quality of Life Inventory
QoL Quality of life
SDS Standard deviation score
TCOCT The Children's Obesity Clinic's Treatment

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Quality of life in childhood obesity treatment

Quality of life assessed using PedsQL 4.0 at entry into treatment and at follow-up after >10 months of treatment.

Inclusion criteria:

- Completing PedsQL 4.0 at entry
- Attending a consultation >10 months after entry

A total score consisting of a physical, emotional, social, and school score were calculated.

Results:

N = 477 were included and 317 completed the PedsQL at follow-up after 13 months (10–30 months)

All scores improved significantly ($p < 0.0001$)

The total score improved by a mean of 4.1 points.
(95% CI: 2.9–5.4, $p < 0.001$)

63% of the children improved their total score by a mean of 10.3 points (95% CI: 9.2–11.3, $p < 0.001$)

The total score improved even in children increasing in degree of obesity (2.9 points, 95% CI: 0.5–5.3, $p = 0.02$)

Mollerup P, Gamborg M, Trier C, Bøjsøe C, Nielsen T, Baker J, Holm J-C: A Hospital-based Childhood Obesity Treatment transferred into a Community-based Treatment. Quality of Life Research.

**ORIGINAL ARTICLE**

Reductions in blood pressure during a community-based overweight and obesity treatment in children and adolescents with prehypertension and hypertension

PM Mollerup¹, U Lausten-Thomsen¹, CE Fonvig^{1,2}, JL Baker^{2,3} and J-C Holm^{1,2,4}

Due to the pandemic of childhood obesity and thus obesity-related hypertension, improvements in treatment availability are needed. Hence, we investigated whether reductions in blood pressure (BP) would occur in children with overweight and obesity exhibiting prehypertension/hypertension during a community-based overweight and obesity treatment program, and if changes in body mass index (BMI) are associated with changes in BP. The study included 663 children aged 3–18 years with a BMI \geq 85th percentile for sex and age that entered treatment from June 2012 to January 2015. Height, weight and BP were measured upon entry and every 3–6 months. BMI and BP s.d. scores (SDSs) were calculated according to sex and age, or sex, age and height. Prehypertension was defined as a BP SDS \geq 1.28 and $<$ 1.65. Hypertension was defined as a BP SDS \geq 1.65. Upon entry, 52% exhibited prehypertension (11.9%) or exhibited hypertension (40.1%). After 12 months (range: 3–29) of treatment, 29.3% of the children with prehypertension/hypertension were normotensive. Children with systolic prehypertension/hypertension upon entry reduced their systolic BP SDSs by 0.31 (95% confidence interval (CI): 0.70–0.83, $P < 0.0001$). Children with diastolic prehypertension/hypertension upon entry reduced their diastolic BP SDSs by 0.78 (95% CI: 0.78–0.86, $P < 0.0001$). BMI SDS changes were positively associated with BP SDS changes ($P < 0.0001$). Nonetheless, some children reduced BP SDSs while increasing their BMI SDSs, and prehypertension/hypertension developed in 23.3% of the normotensive children despite reductions in BMI SDSs ($P < 0.0001$). These results suggest that community-based overweight and obesity treatment can reduce BP, and thus may help improve treatment availability.

Journal of Human Hypertension advance online publication, 11 May 2017; doi:10.1038/jhh.2017.36



Human Molecular Genetics, 2016, Vol. 25, No. 2 389–403

doi: 10.1093/hmg/ddv472

Advance Access Publication Date: 24 November 2015

Association Studies Article



ASSOCIATION STUDIES ARTICLE

Genome-wide association analysis identifies three new susceptibility loci for childhood body mass index

Abstract

A large number of genetic loci are associated with adult body mass index. However, the genetics of childhood body mass index are largely unknown. We performed a meta-analysis of genome-wide association studies of childhood body mass index, using sex- and age-adjusted standard deviation scores. We included 35 668 children from 20 studies in the discovery phase and 11 873 children from 13 studies in the replication phase. In total, 15 loci reached genome-wide significance (P -value $< 5 \times 10^{-8}$) in the joint discovery and replication analysis, of which 12 are previously identified loci in or close to *ADCY3*, *GNPDA2*, *TMEM18*, *SEC16B*, *FAIM2*, *FTO*, *TFAP2B*, *TNNI3K*, *MC4R*, *GPR61*, *LMX1B* and *OLFM4* associated with adult body mass index or childhood obesity. We identified three novel loci: rs13253111 near *ELP3*, rs8092503 near *RAB27B* and rs13387838 near *ADAM23*. Per additional risk allele, body mass index increased 0.04 Standard Deviation Score (SDS) [Standard Error (SE) 0.007], 0.05 SDS (SE 0.008) and 0.14 SDS (SE 0.025), for rs13253111, rs8092503 and rs13387838, respectively. A genetic risk score combining all 15 SNPs showed that each additional average risk allele was associated with a 0.073 SDS (SE 0.011, P -value = 3.12×10^{-10}) increase in childhood body mass index in a population of 1955 children. This risk score explained 2% of the variance in childhood body mass index. This study highlights the shared genetic background between childhood and adult body mass index and adds three novel loci. These loci likely represent age-related differences in strength of the associations with body mass index.



LETTER

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REGION
Sjælland

Genome-wide associations for birth weight and correlations with adult disease

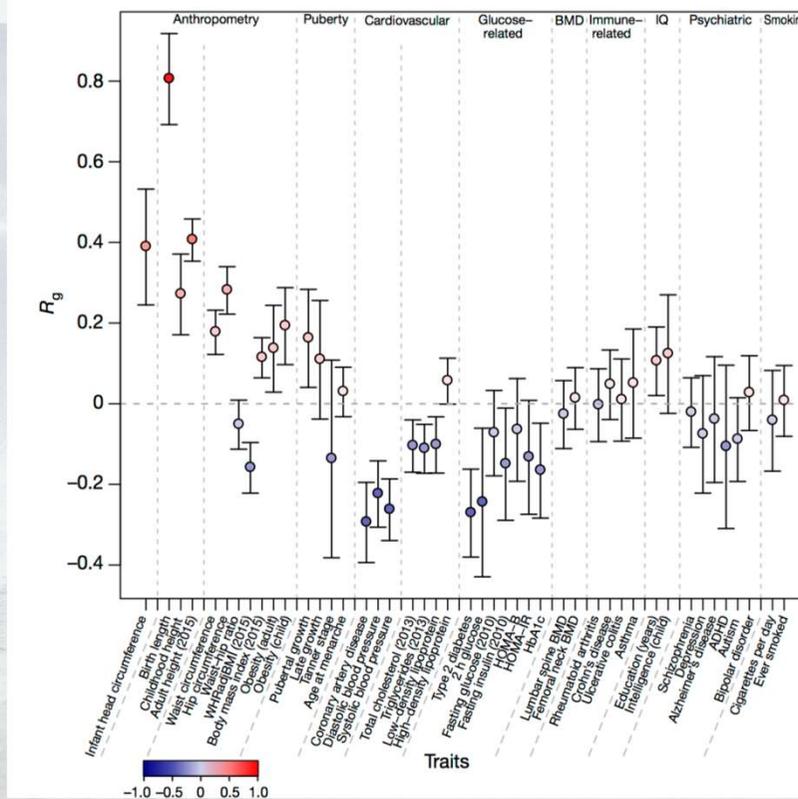


Figure 1 | Genome-wide genetic correlation between BW and a range of traits and diseases in later life. Genetic correlation (R_g) and corresponding s.e. (error bars) between BW and the traits displayed on the x axis were estimated using linkage-disequilibrium score regression (ref. 8). The genetic correlation estimates (R_g) are colour coded according to their intensity and direction (red for positive and blue for inverse correlation). WHRadjBMI, waist-hip ratio adjusted for body mass index; HOMA-B/IR, homeostasis model assessment of beta-cell function/insulin resistance; HbA1c, haemoglobin A1c; BMD, bone mineral density; ADHD, attention deficit hyperactivity disorder. See Supplementary Table 12 for references for each of the traits and diseases displayed.



Patients with Obesity Caused by Melanocortin-4 Receptor Mutations Can Be Treated with a Glucagon-like Peptide-1 Receptor Agonist

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SUMMARY

Pathogenic mutations in the appetite-regulating *melanocortin-4 receptor (MC4R)* represent the most common cause of monogenic obesity with limited treatment options. Glucagon-like peptide-1 receptor agonists (GLP-1 RAs) cause weight loss by reducing appetite. We assessed the effect of the GLP-1 RA liraglutide 3.0 mg for 16 weeks in 14 obese individuals with pathogenic *MC4R* mutations (BMI 37.5 ± 6.8) and 28 matched control participants

([bach et al., 2017](#); [Branson et al., 2003](#)), and a lower tendency for developing hypertension despite their obesity ([Greenfield et al., 2009](#)). As obesity is strongly associated with an increase in morbidity and mortality ([Berrington de Gonzalez et al., 2010](#); [Whitlock et al., 2009](#)), prevention and treatment of obesity is much needed. Only few studies have been reported regarding the ability of patients with monogenic *MC4R* mutations to lose weight with standard treatment modalities. Thus, in pediatric patients with pathogenic mutations, it has previously been shown that weight loss may be achieved by dieting ([Hainerová et al., 2007](#)), but the ability to maintain the weight loss is impaired ([Reinehr et al., 2009](#)). Results from bariatric surgery have shown

Genetic Susceptibility for Childhood BMI has no Impact on Weight Loss Following Lifestyle Intervention in Danish Children

Mette Hollensted^{1,2*}, Mette Fogh^{3,4*}, Theresia M. Schnurr^{1,2*}, Julie T. Kloppenborg³, Christian T. Have¹, Tenna Ruest Haarmark Nielsen³, Johanne Rask³, Morten Asp Vonsild Lund^{3,5}, Christine Frithioff-Bøjsøe^{1,3}, Mia Østergaard Johansen³, Emil Vincent Rosenbaum Appel¹, Yuvaraj Mahendran¹, Niels Grarup¹, Haja N. Kadarmideen⁶, Oluf Pedersen¹, Jens-Christian Holm^{1,3}, and Torben Hansen¹

Objective: This study aimed to investigate the effect of a genetic risk score (GRS) comprising 15 single-nucleotide polymorphisms, previously shown to associate with childhood BMI, on the baseline cardiometabolic traits and the response to a lifestyle intervention in Danish children and adolescents.

Methods: Children and adolescents with overweight or obesity ($n=920$) and a population-based control sample ($n=698$) were recruited. Anthropometric and biochemical measures were obtained at baseline and in a subgroup of children and adolescents with overweight or obesity again after 6 to 24 months of lifestyle intervention ($n=754$). The effects of the GRS were examined by multiple linear regressions using additive genetic models.

Results: At baseline, the GRS associated with BMI standard deviation (SDS) both in children and adolescents with overweight or obesity ($\beta=0.033$ [SE=0.01]; $P=0.001$) and in the population-based sample ($\beta=0.065$ [SE=0.02]; $P=0.001$). No associations were observed for cardiometabolic traits. The GRS did not influence changes in BMI SDS or cardiometabolic traits following lifestyle intervention.

Conclusions: A GRS for childhood BMI was associated with BMI SDS but not with other cardiometabolic traits in Danish children and adolescents. The GRS did not influence treatment response following lifestyle intervention.

Article | Published: 22 July 2019

Pediatrics

Genetic predisposition to higher body fat yet lower cardiometabolic risk in children and adolescents

Anna Viitasalo , Theresia M. Schnurr, Niina Pitkänen, Mette Hollensted, Tenna R. H. Nielsen, Katja Pahkala, Niina Lintu, Mads V. Lind, Mustafa Atalay, Christine Frithioff-Bøjsøe, Cilius E. Fonvig, Niels Grarup, Mika Kähönen, Anni Larnkjaer, Oluf Pedersen, Jens-Christian Holm, Kim F. Michaelsen, Timo A. Lakka, Terho Lehtimäki, Olli Raitakari, Torben Hansen & Tuomas O. Kilpeläinen

International Journal of Obesity (2019) | [Download Citation](#) ↓

Article | Published: 01 May 2019

Maternal and fetal genetic effects on birth weight and their relevance to cardio-metabolic risk factors

Nicole M. Warrington, Robin N. Beaumont, [...] Rachel M. Freathy 

Nature Genetics **51**, 804–814 (2019) | [Download Citation](#) 

Abstract

Birth weight variation is influenced by fetal and maternal genetic and non-genetic factors, and has been reproducibly associated with future cardio-metabolic health outcomes. In expanded genome-wide association analyses of own birth weight ($n = 321,223$) and offspring birth





Have the Danes cracked childhood obesity?

By Malcolm Brabant
BBC Health Check

🕒 8 November 2014 | [Health](#)





**DANISH TREATMENT MODEL
WORKS: 3 OF 4 CHILDREN
LOSE WEIGHT AND KEEP IT
OFF**

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FORSIDE

ALLE NYHEDER

FOTO

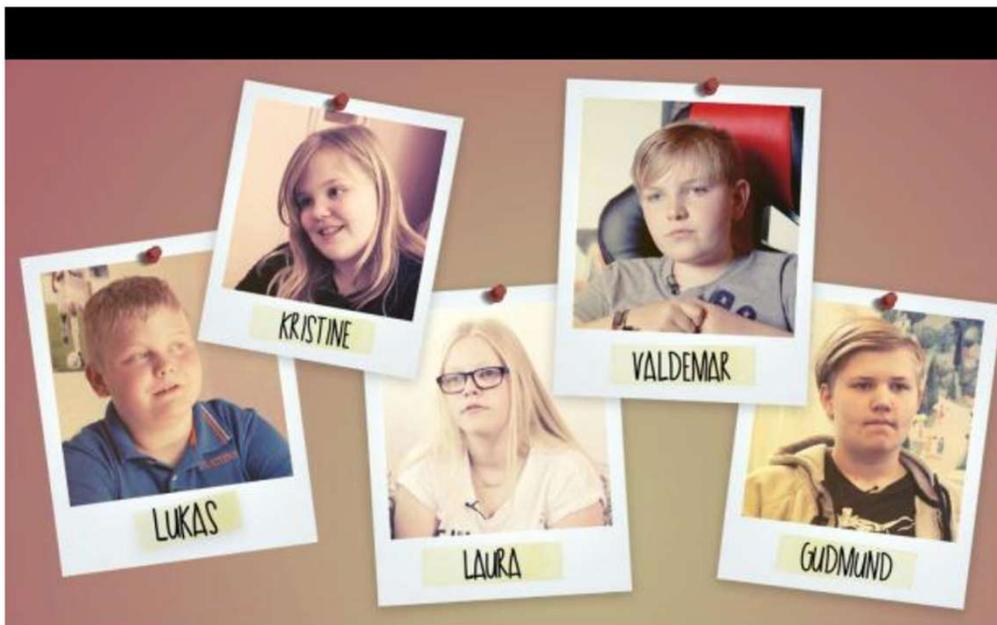
KONTAKT

IN ENGLISH

01. AUG. 2017 KL. 11.03 | OPDATERET 01. AUG. 2017 KL. 11.26

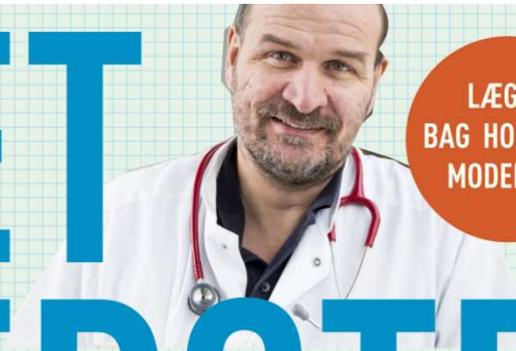
Ny reportageserie på DR1: Generation XL

En ny reportageserie på DR1 har igennem et år fulgt fem overvægtige børn og deres familier i kampen mod kiloene og mod et sundere liv. 'Generation XL' får premiere på DR1 tirsdag d. 15. august klokken 20.45.





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Disclosures

- Lecture fees and honoraria from Novo Nordisk
- Board member; Danish Association for the Study of Obesity
- Member Obesity Committee; Danish Paediatric Society
- Co-chair; The Childhood Obesity Task Force EASO
- Ex-Officio Executive Committee EASO
- Dr Holm Ltd provides training and treatment



Thank you very much for your attention



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