Behandling af børn og unge gennem vækst og udvikling

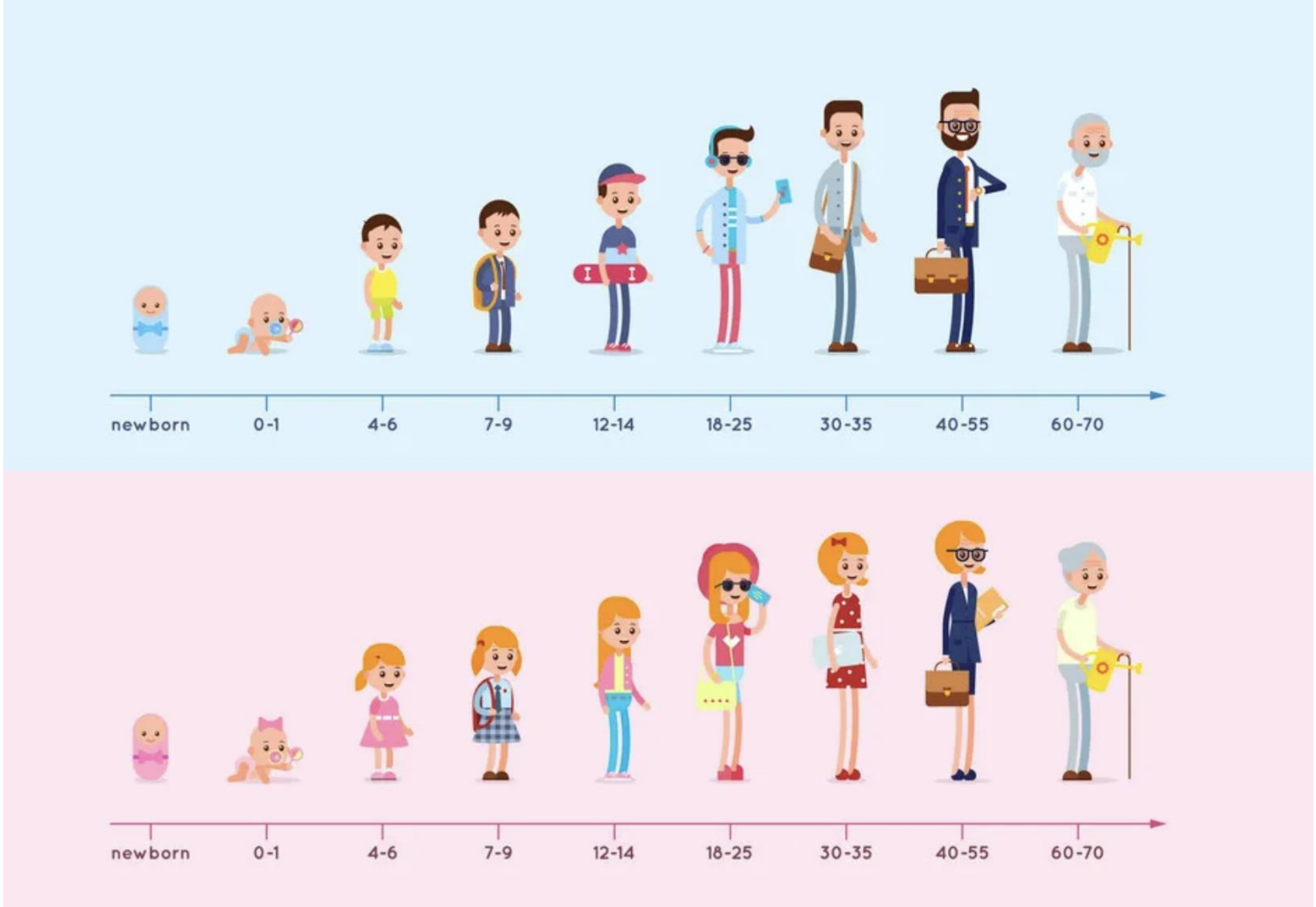
Louise Aas Holm, Læge og ph.d.-studerende

Enheden for Børn og Unge med Overvægt, Holbæk Sygehus

Novo Nordisk Foundation Center for Basic Metabolic Research

Årskonference Holbæk-modellen

Nyborg 31. oktober 2023


newborn
0-1
4-6
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newborn
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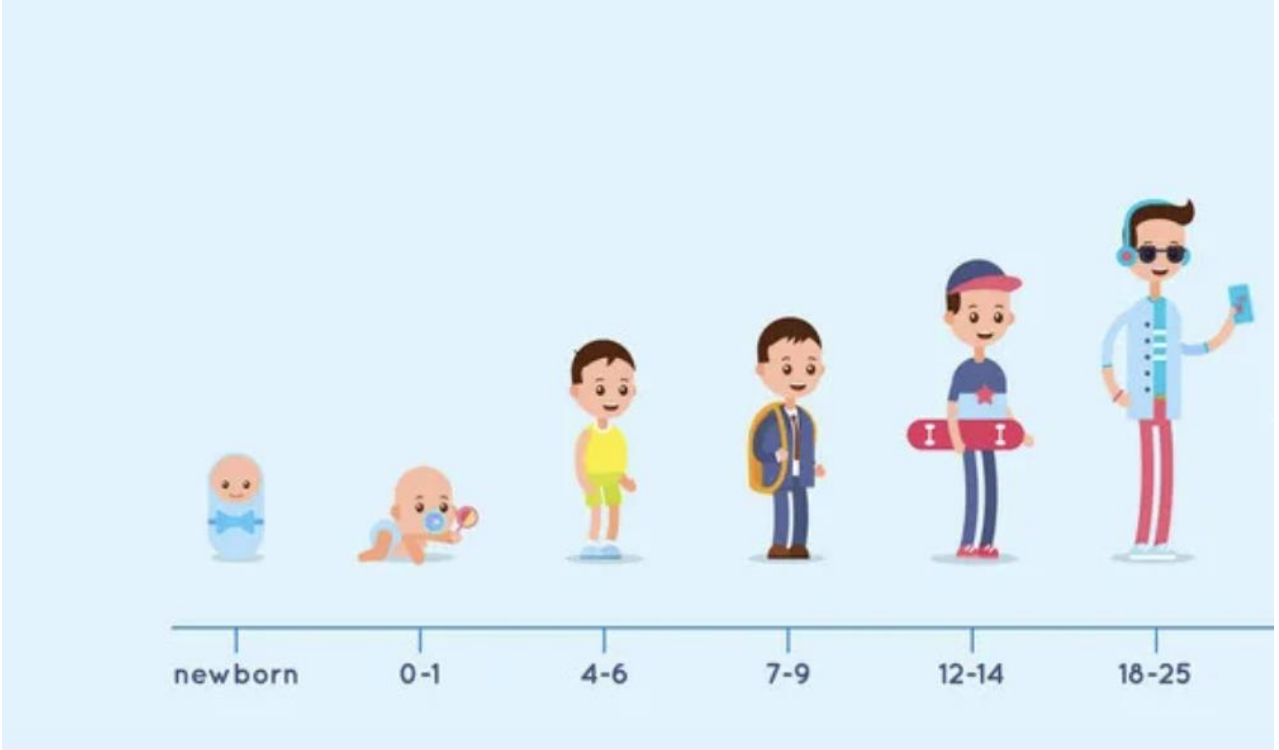
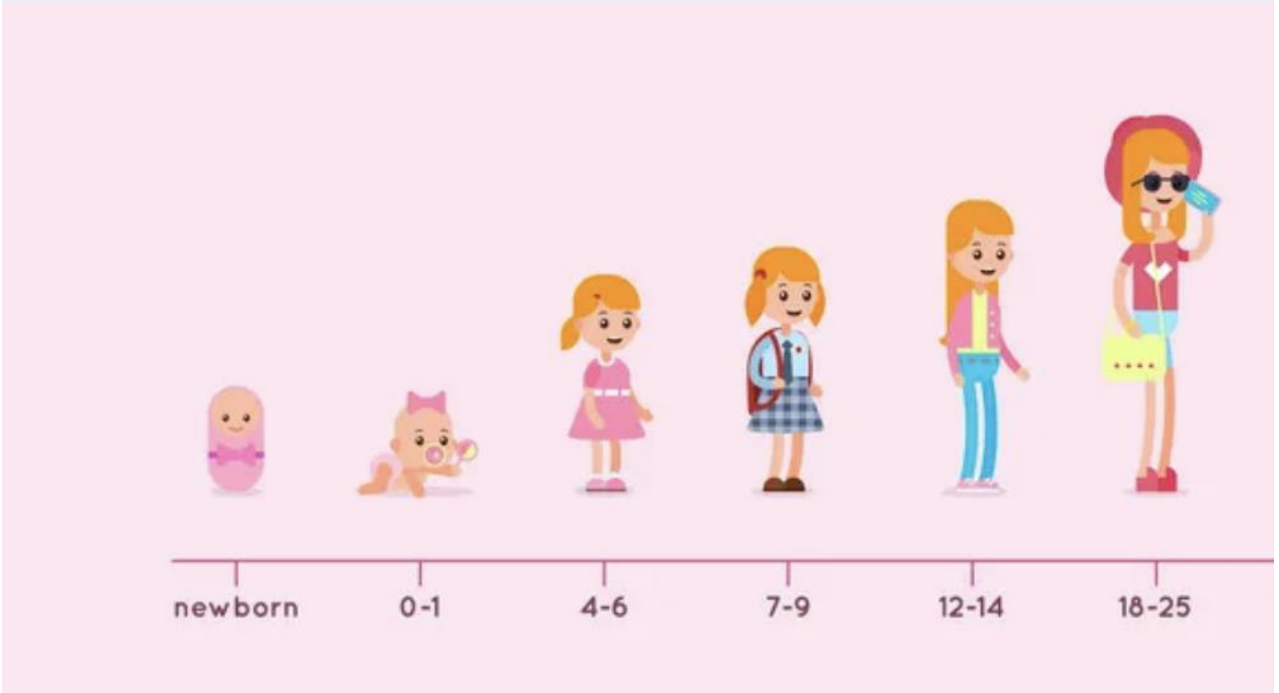




Den pædiatriske population

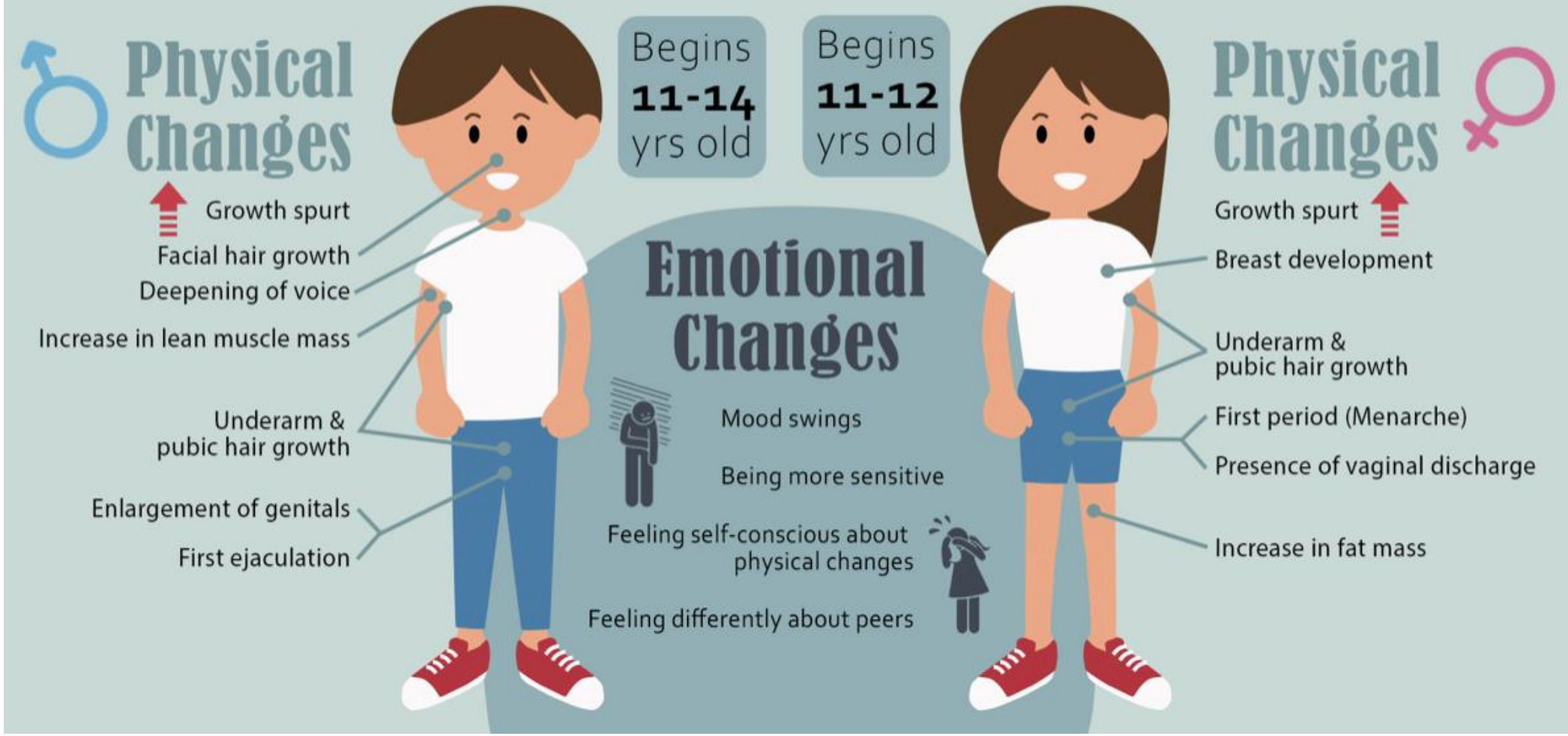
- Fra fødsel til det unge voksenliv
- **Milepæle**
  - Motorik– Fin og grov
  - Sociale færdigheder
  - Sprog
  - Funktion i institution/skole
  - Psykologisk udvikling

- **Vækst**
  - Ikke lineær vækst
  - Højde og vægt som vigtige mål
  - Hovedomfang bruges hos små børn
  - De er et surrogatmål for trivsel

- **Transition**
  - Transition fra at være afhængig til at blive uafhængig
  - Udvikling af identitet inklusiv seksualitet

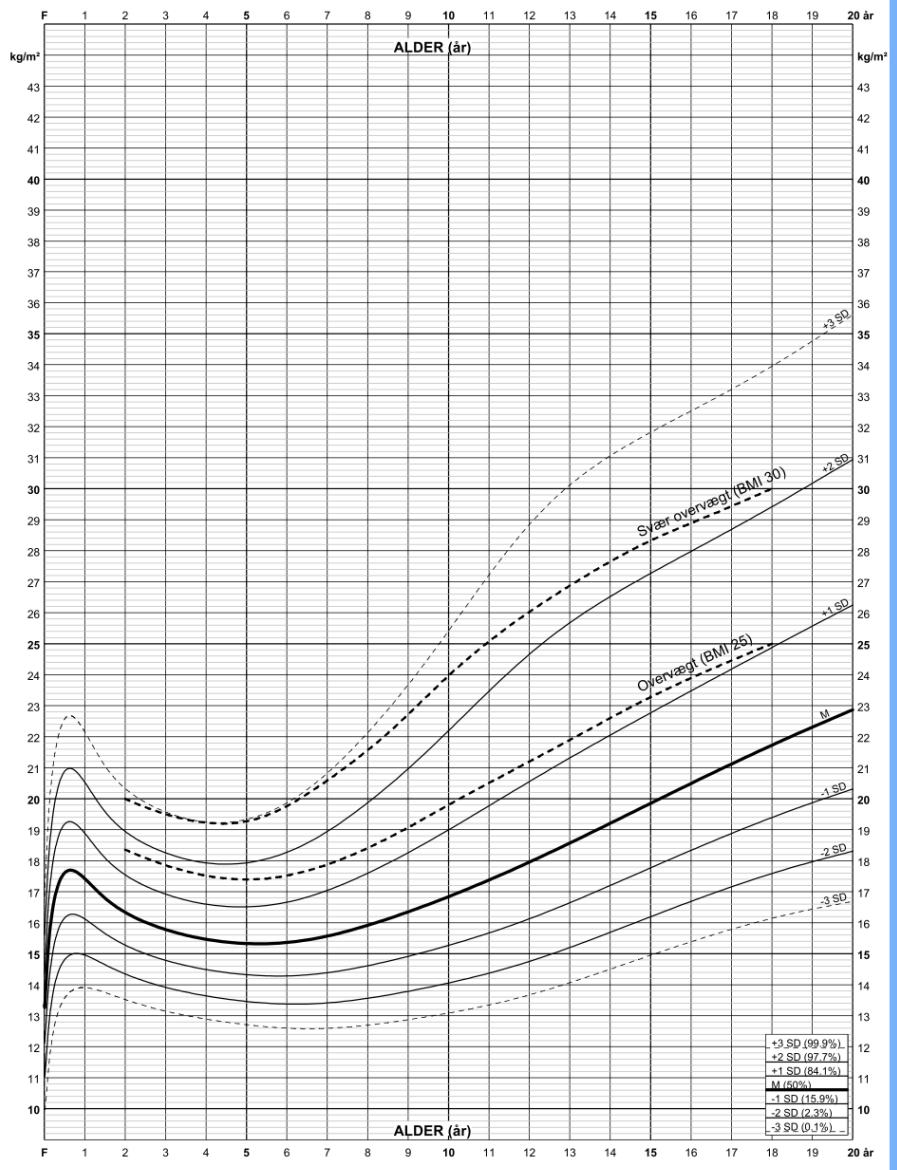
- **Biologisk modning**
  - Puberteten
  - Betydelige kønsforskelle

What HAPPENS during puberty?



CPR nummer	Efternavn	Fornavn	Fødselsdato	Køn
				Dreng ♂

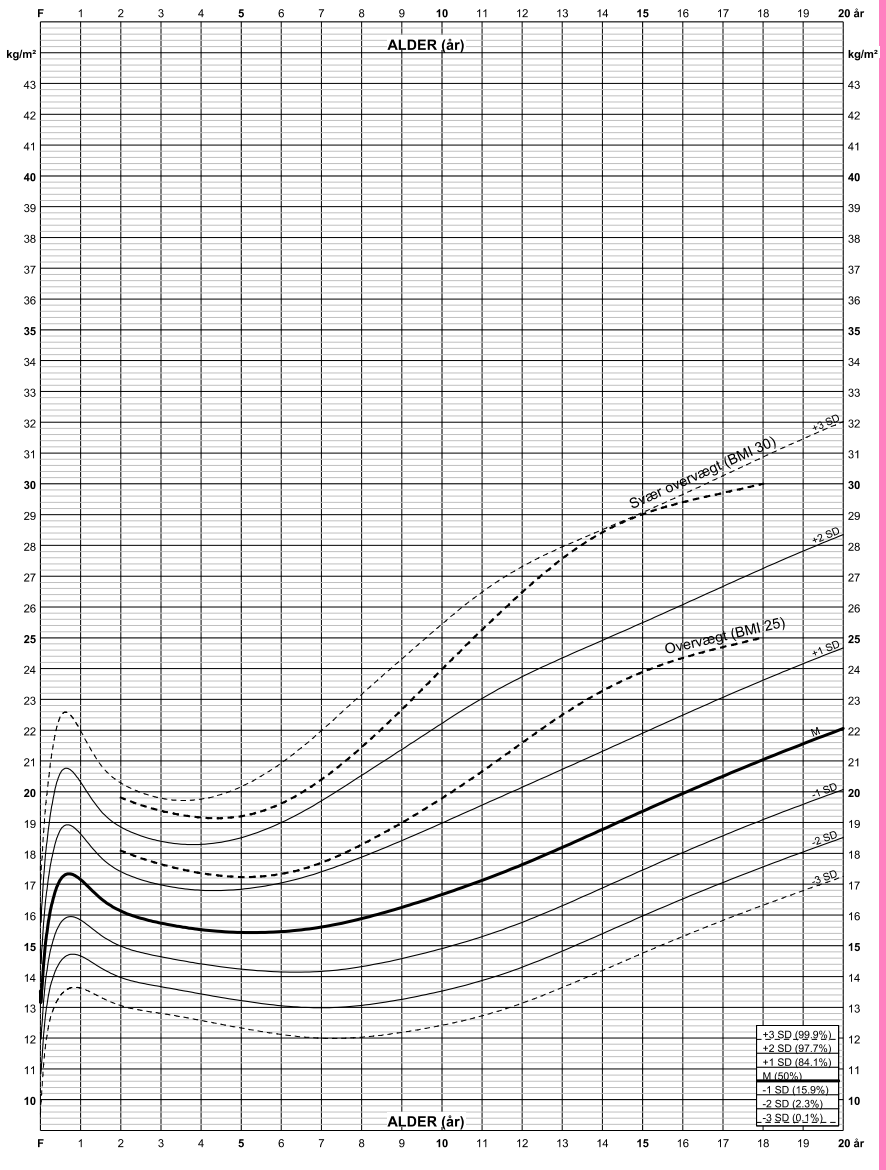
BMI for alder, fødsel til 20 år



Tinggaard J et al. Acta Paediatr Scand 2014.
Cole TJ, Lobstein T; Pediatr Obes 2012; 7: 284-294.

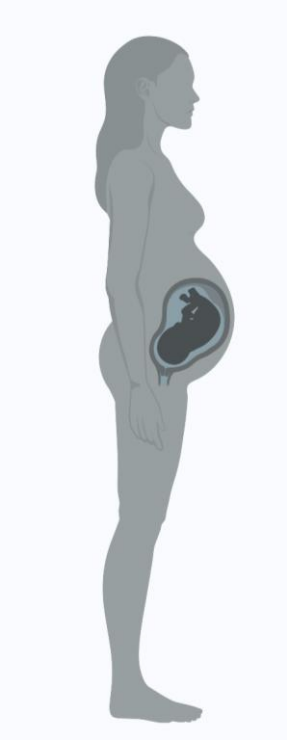
CPR nummer	Efternavn	Fornavn	Fødselsdato	Køn
				Pige ♀

BMI for alder, fødsel til 20 år



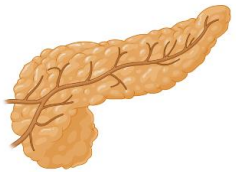
Tinggaard J et al. Acta Paediatr Scand 2014.
Cole TJ, Lobstein T; Pediatr Obes 2012; 7: 284-294.

Hvornår anlægges potentialet for vækst og risikoen for fremtidig sygdom?



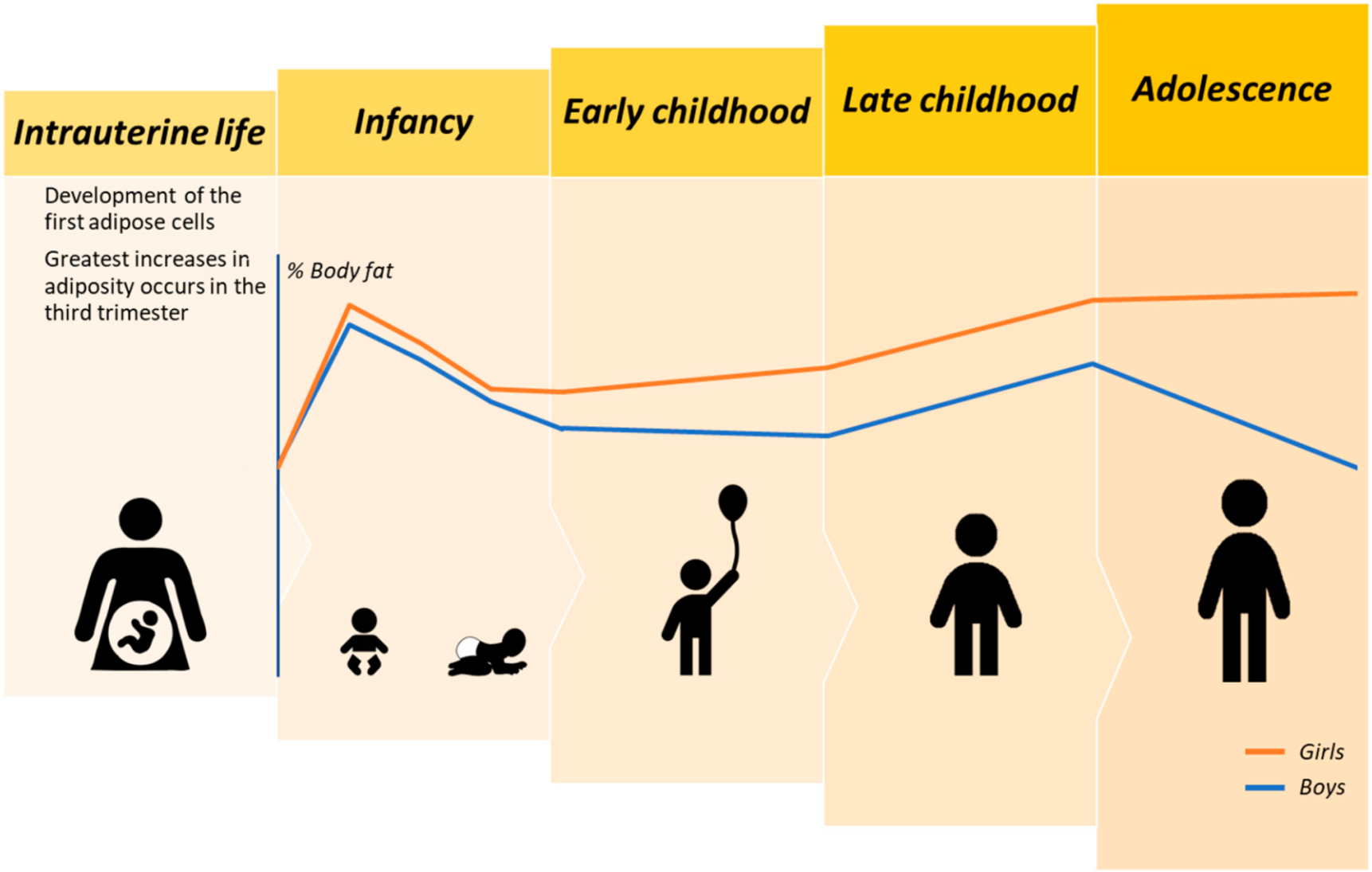
Fostertilstanden

- En kritisk periode hvor væv og organer dannes
- Mangelfuld ernæring til fosteret => permanente ændringer i fosterets fysiologi og metabolisme
- **Barker's hypotese**: Disse programmerede ændringer disponerer fosteret til sygdomme i fremtiden (fetal programming)
- Et studie har blandt andet vist en markant øget mortalitet forårsaget af koronarsygdom blandt individer med lav fødselsvægt sammenlignet med høj fødselsvægt.
- Lav fødselsvægt er også vist associeret til blodtryk i voksenlivet og forekomst af metabolisk syndrom.
- Et lavt ponderalt index er associeret til 3 gange øget forekomst af type 2 diabetes.
- Individer med lav fødselsvægt og som udvikler overvægt har den største risiko for koronarsygdom, hypertension og type 2 diabetes.



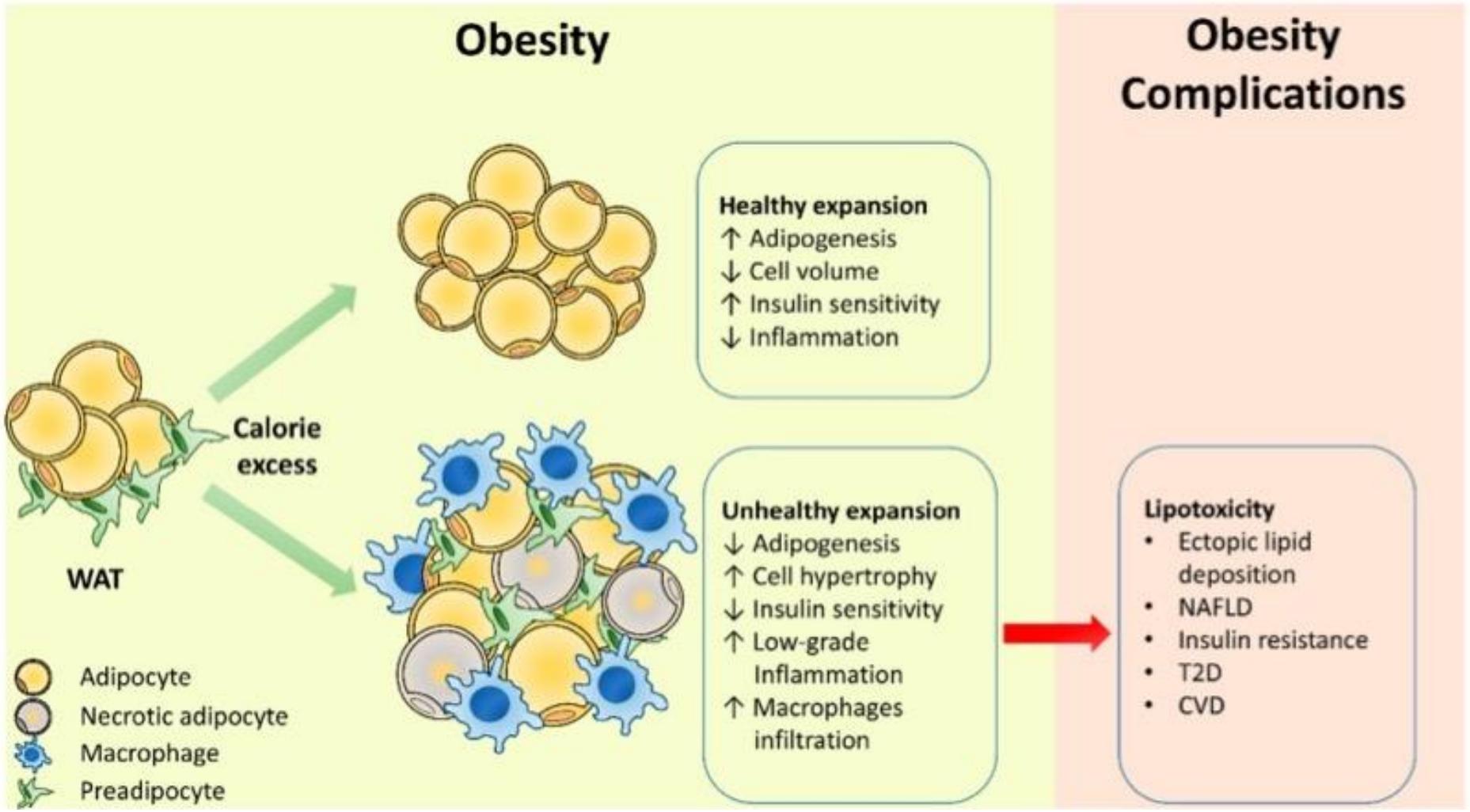
Kwon et al. Obstet Gynecol Sci 2017;60(6):506-519

Fedtvævets udvikling i barndommen



Orsso CE et al. Nutrients. 2020 Sep 8;12(9):2735.

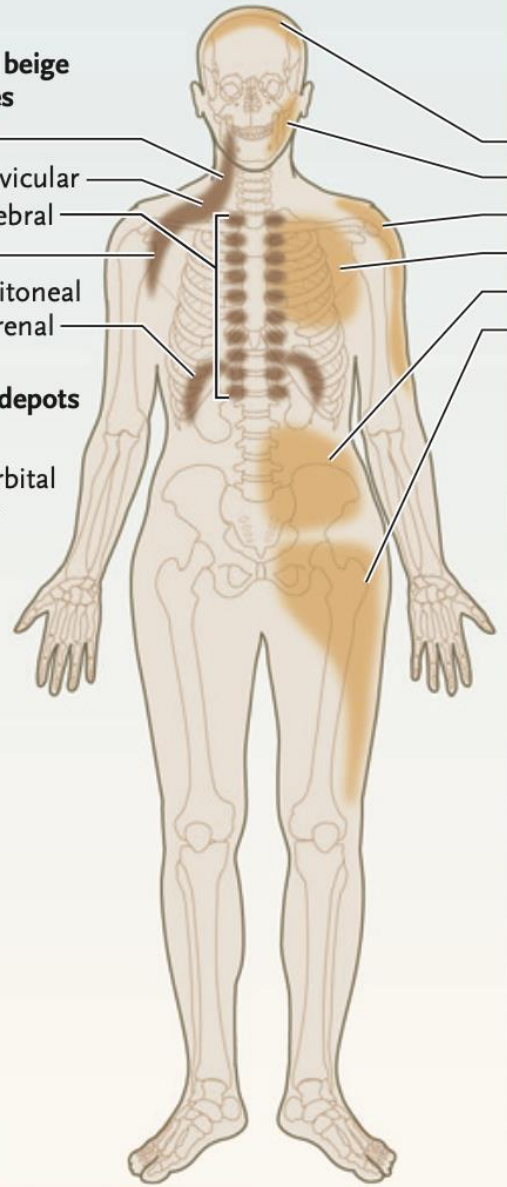
Hvad sker med fedtvævet når man udvikler overvægt?



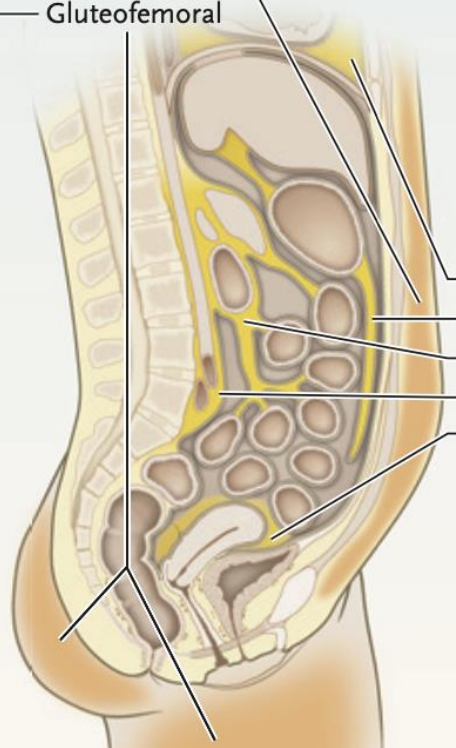
Longo *et al, Int. J. Mol. Sci.* **2019**, *20*(9), 2358

A Human Adipose-Tissue Depots

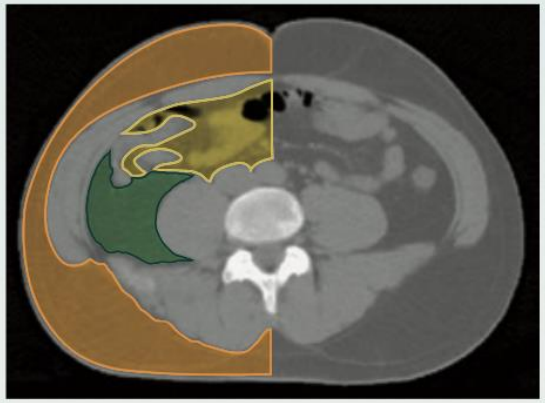
Frontal View



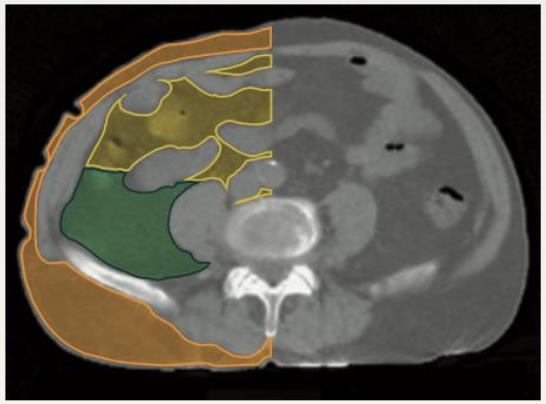
Sagittal View



Axial View



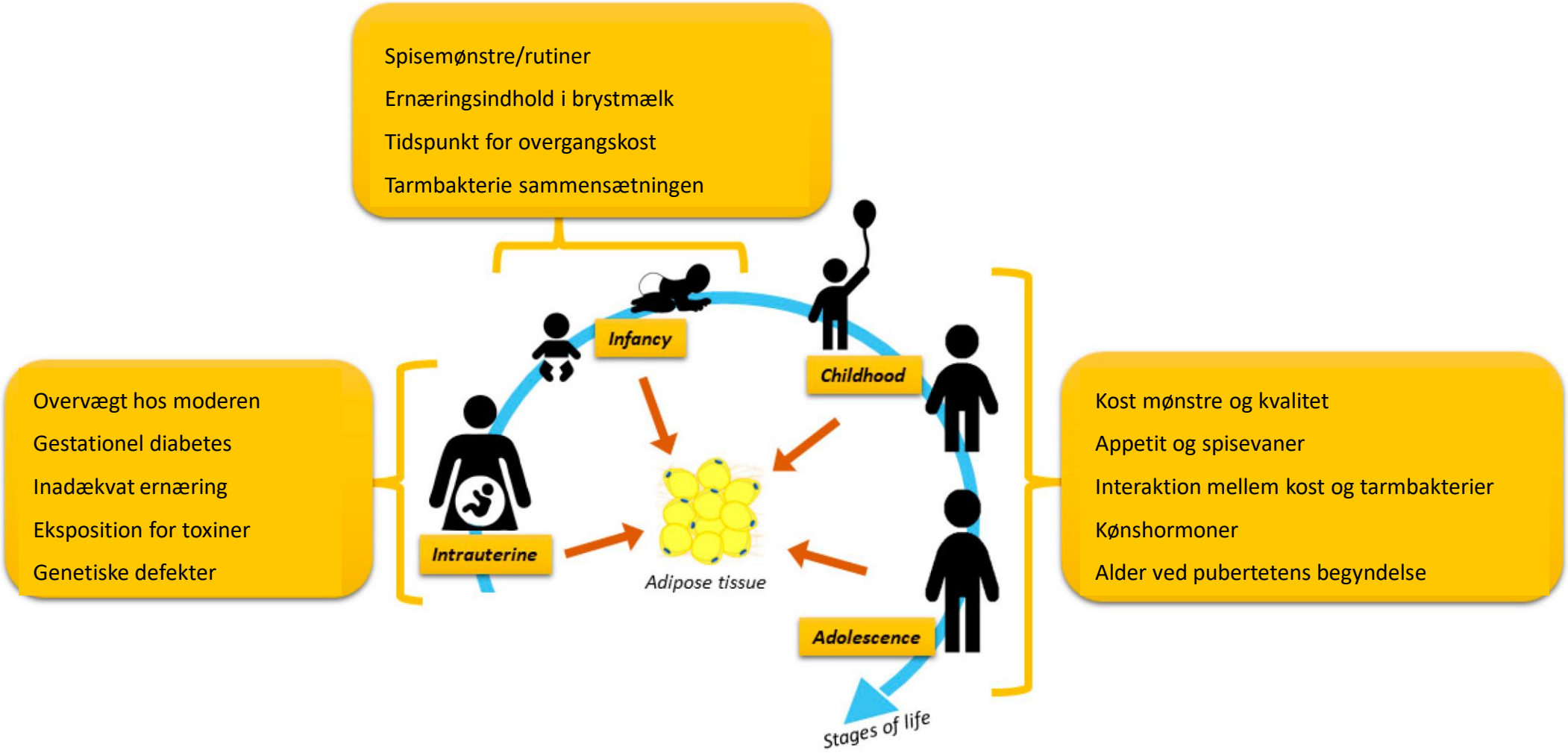
Age	37 yr
Waist circumference	91 cm
Visceral fat	98 cm^2
Subcutaneous fat	274 cm^2



Age	82 yr
Waist circumference	91 cm
Visceral fat	190 cm^2
Subcutaneous fat	162 cm^2

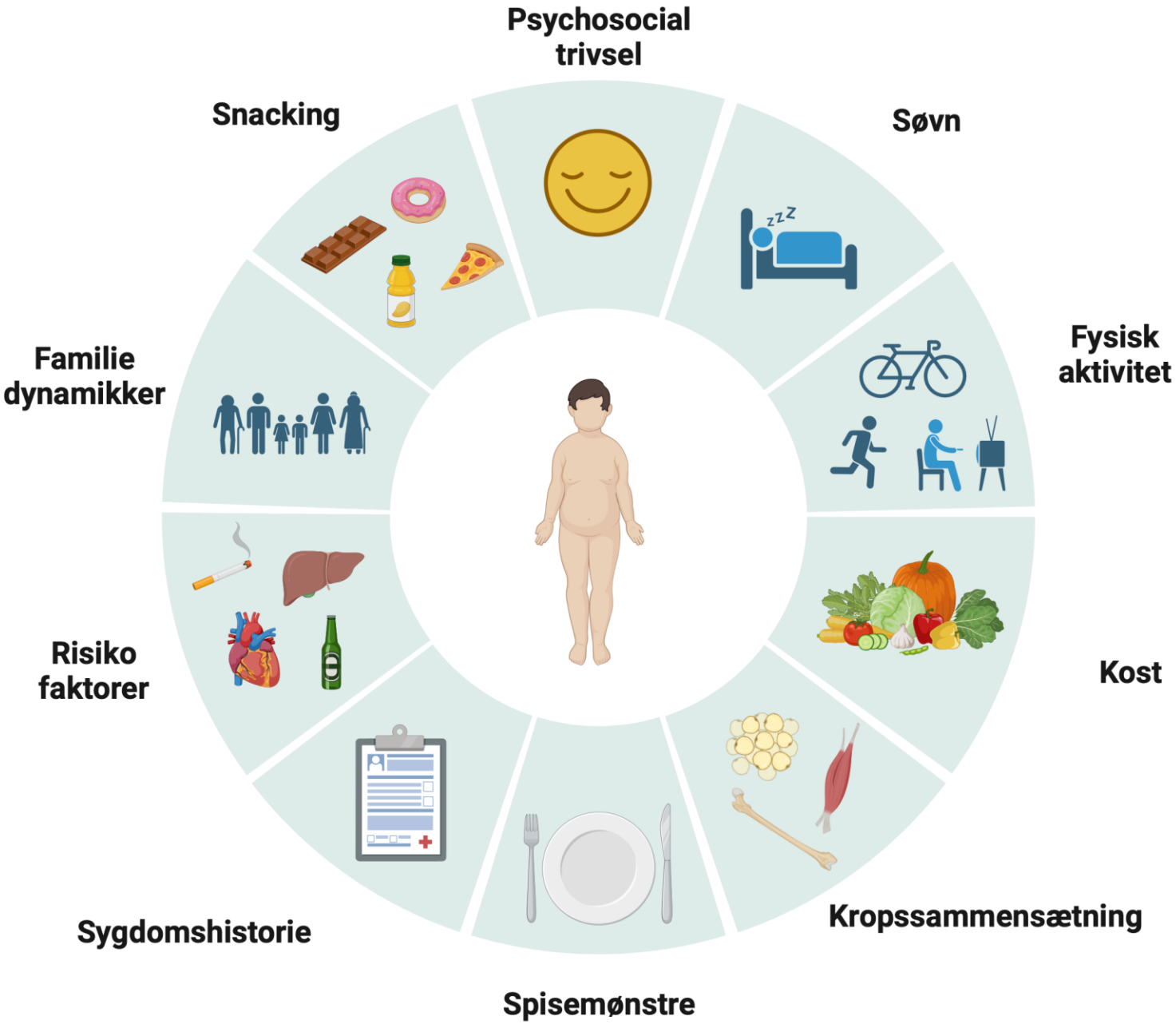
Cypess AM, N Engl J Med 2022;386:768-79

Hvad kan påvirke fedtmassen i barndommen?

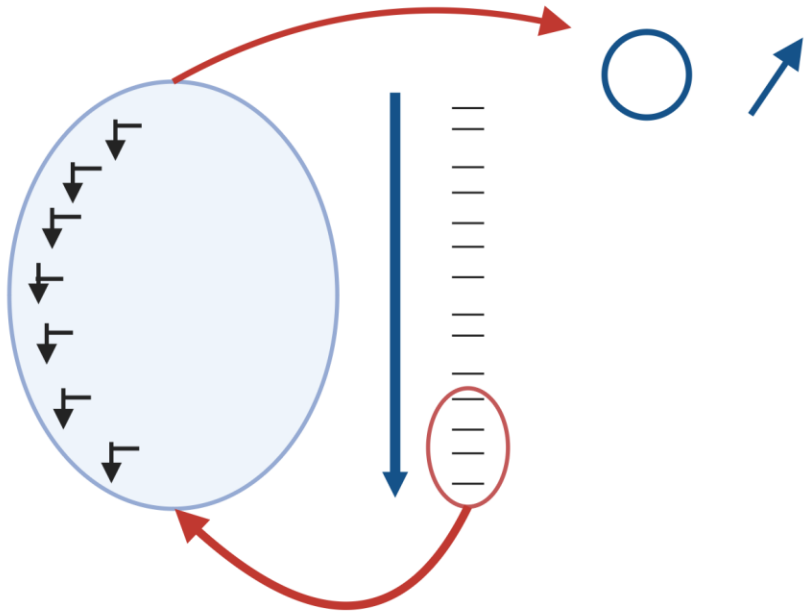


Oversat figur fra Orsso CE et al. Nutrients. 2020 Sep 8;12(9):2735.

Holbæk-modellen



Systematisk og familie baseret behandling



- Studie af 876 børn og unge
- **68%** reducerede deres BMI SDS efter en gennemsnitlig behandlingstid på 1.8 år.
- Disse ændringer var førte også til forbedringer i kropssammensætningen og niveauet af forskellige fedtstoffer i blodet.
- **64%** reducerede deres fedt masse med gennemsnitligt **5.6%**
- De samlede ændringer viste at **90%** enten
  - Reducerede deres BMI SDS, fedt procent eller procent af fedt på truncus
  - Øgede deres fedt fri masse eller
  - Forbedrede et eller flere af deres fedtstoffer i blodet

PLOS ONE

RESEARCH ARTICLE

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

Tenna Ruest Haarmark Nielsen[1,2]*, Cilius Esmann Fonvig[1,2,3], Maria Dahl[1], Pernille Maria Mollerup[1], Ulrik Lausten-Thomsen[1,4], Oluf Pedersen[2], Torben Hansen[2], Jens-Christian Holm[1,2,4]

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OPEN ACCESS

Citation: Nielsen TRH, Fonvig CE, Dahl M, Mollerup 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

Editor: Joseph Devaney, GeneDx, UNITED STATES

Received: February 23, 2017

Accepted: December 18, 2017

Published: February 14, 2018

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 ($p = 9.7*10^{-6}$). 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

Nielsen TRH et al. (2018) PLoS ONE 13(2): e0190576.

Johanne Lind Plesner, Maria Dahl, Cilius Esmann Fonvig, Tenna Ruest Haarmark Nielsen, Julie Tonsgaard Kloppenborg, Oluf Pedersen, Torben Hansen and Jens-Christian Holm*

Obesity is associated with vitamin D deficiency in Danish children and adolescents

https://doi.org/10.1515/jpem-2017-0246
Received June 24, 2017; accepted October 31, 2017; previously published online December 4, 2017

Abstract

Background: Sufficient serum concentrations of vitamin D are required to maintain bone health during growth. The aims of this study were to determine whether vitamin D deficiency is more prevalent among children and adolescents with obesity compared to their normal weight peers and to identify clinical and biochemical variables associated with vitamin D deficiency.

Methods: One thousand four hundred and eighty-four children and adolescents with overweight/obesity and 2143 population-based controls were recruited from the Danish Childhood Obesity Biobank. Anthropometric variables and fasting concentrations of serum 25-hydroxy vitamin D (25-OH-D), plasma parathyroid hormone (PTH), calcium and phosphate were assessed at baseline. Vitamin D deficiency was defined as serum 25-OH-D concentrations <30 nmol/L. Linear and logistic regressions were used to identify variables associated with vitamin D deficiency.

Results: A total of 16.5% of the children and adolescents with obesity (body mass index [BMI] standard deviation score [SDS] > 2.33) exhibited vitamin D deficiency, with an odds ratio (OR) 3.41 (confidence interval [CI]: 2.27–5.71; $p < 0.0001$) for being vitamin D deficient compared to their normal weight peers. BMI-SDS was independently and inversely associated with serum 25-OH-D concentrations. Other independent risk factors for vitamin D deficiency were being older than 14 years (OR: 2.39; CI: 1.28–4.48; $p = 0.006$), more than 4 daily hours of screen time (OR: 4.56; CI: 2.59–8.05; $p < 0.0001$) and blood sample assessment during winter-spring (OR: 6.44; CI: 4.47–9.26; $p < 0.0001$).

Conclusions: Vitamin D deficiency was common among Danish children and adolescents with obesity. The degree of obesity was independently associated with lower serum 25-OH-D concentrations.

Keywords: body mass index; calcium; childhood obesity; parathyroid hormone; vitamin D deficiency.

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Introduction

Childhood obesity has been associated with low circulating serum concentrations of 25-hydroxy vitamin D (25-OH-D), and vitamin D deficiency has been shown in the range of 17%–57%, depending on how vitamin D deficiency is categorized [1–4]. This might be associated with an unfavorable lifestyle [5]. It has been proposed that fat-soluble hormones, including vitamin D, are sequestered in the adipose tissue, resulting in a decreased bioavailability [6].

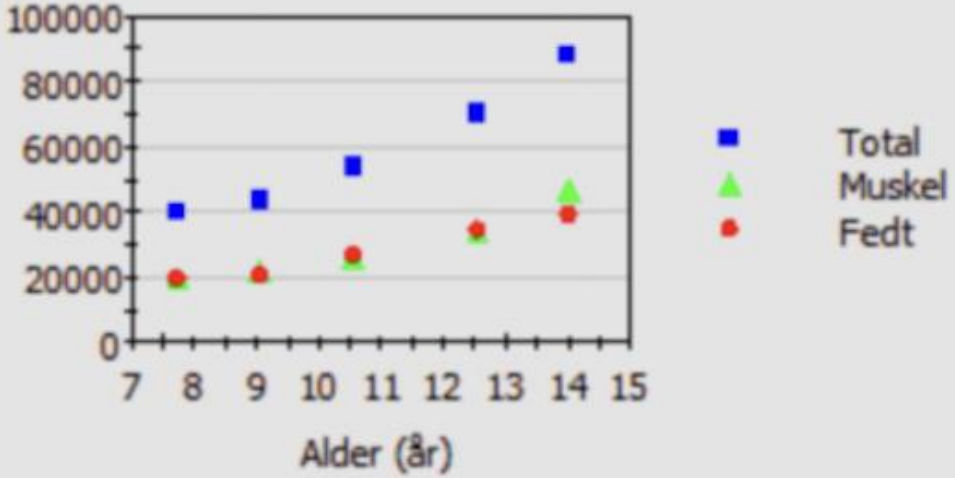
Sufficient serum concentrations of vitamin D and calcium are needed to maintain bone health and avoid childhood diseases such as rickets [7, 8]. Furthermore, epidemiologic studies suggest that vitamin D may protect against diseases such as colorectal cancer, type 2 diabetes and cardiovascular disease [9–11]. While a causal link between vitamin D deficiency and immune disorders is yet to be established, 1,25-dihydroxyvitamin D (1,25-OH-D_2) seems to be involved in the regulation of pathways that promote the innate immune response, while suppressing the adaptive immune response [12].

Sammensætning (Forstærket analyse)

dt)	Centil	Total vægt (kg)	Fedt (g)	Muskel (g)	BMC (g)
,6	-	32,45	14.355	17.155	944,9
,6	-	46,09	21.090	24.201	800,2
,2	-	94,05	40.445	51.144	2.466,0

diagram: Ingen data for
rop [TBLH].
pulation undersøttede ikk
r Pædiatrisk Helkrop.

Sammensætningstrend: TBLH

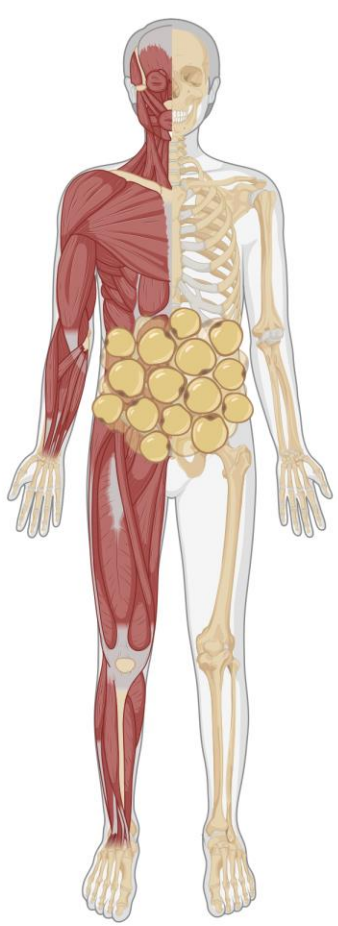


bineret NHANES/Lunar) Trend: TBLH (Forstærket analyse)

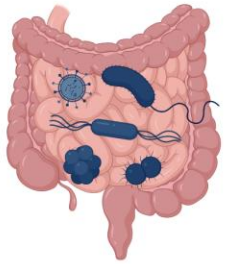
Væv %Fedt)	Centil	Total vægt (kg)	Væv (g)	Fedt (g)	Muskel (g)	BMC (g)	Fedtfri (g)
45,4	-	88,01	85.988	39.080	46.908	2.023,0	48.931
50,5	-	70,25	68.763	34.738	34.025	1.482,7	35.508
50,9	-	54,19	53.093	27.008	26.085	1.100,0	27.185
...	...	...	...	...	...	...	...
50,0	-	40,12	39.321	19.655	19.665	798,1	20.463

16.5% har for lavt D-vitamin

Fremtidige studier i The HOLBAEK Study

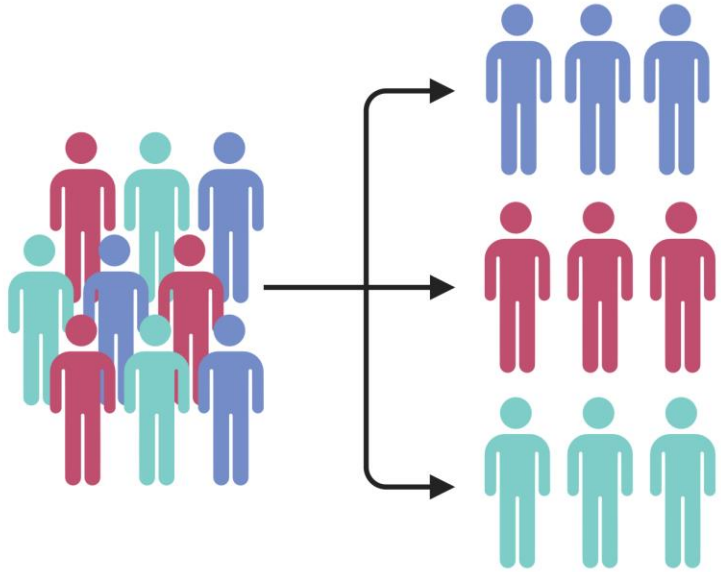


Genetik



Tarmbakterier/
vira

Fedtstoffer/
proteiner



Spørgsmål?