



## TACKLING CHILDHOOD OBESITY HOW TO MAKE CHILDHOOD LIFESTYLE HEALTHIER?

The worldwide prevalence of obesity continues to rise in adults and children. Alarmingly, morbid obesity is the fastest growing subcategory of childhood obesity. Prevention and treatment of childhood obesity may be more effective if started early and if it is organized comprehensively.

In this issue of the Global F&V Newsletter, colleagues from the European Childhood Obesity Group give some insight into how to make childhood lifestyle healthier. Marie Laure Frelut and Margherita Caroli highlight the importance of the first 1000 days of life and give recommendations for optimized nutrition before and during pregnancy, during lactation, infancy and toddlerhood, with special reference to later health outcomes. Andrea Vania reminds us of the specific needs and peculiarities of adolescence in regard to the development of a healthy lifestyle. Finally, David Thivel sums up the main messages to consider when it comes to physical activity and physical fitness in children and adolescents with obesity.

Clearly, there is a need to share and exchange knowledge and skills between all professionals involved (physicians, psychologists, nutritionists, geneticists, physical activity experts, nurses, economists, political stakeholders and others). Curbing the obesity epidemic will only succeed if recommendations are put into execution. Let us continue to make our own contributions – both when dealing with individual needs and on a societal level.

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**Review Egea sessions 3, 6 & 8  
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- ▶ **Session 3:** "The earlier the better- from pregnancy to breastfeeding to..."
- ▶ **Session 6:** "How to make childhood lifestyle healthier"
- ▶ **Session 8:** "Childhood obesity care"

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# Importance of the 1000 days of life to prevent chronic diseases

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In recent decades, the notable reduction in infectious diseases has been followed by an equally significant increase in chronic-degenerative diseases, such as the pandemic of obesity and diabetes<sup>1</sup>, cardiovascular diseases and tumors<sup>2</sup>, together with their progressive anticipation of the age of onset<sup>3</sup>. All this cannot be explained by the geno-centric genetics of the 20<sup>th</sup> century, nor by new eating habits and lifestyles alone, but by epigenetics and the theory of embryo-fetal origins of adult diseases (DOHaD)<sup>4</sup>.

## Nutrition during the first 1000 days: lasting and irreversible

In the epigenetic model the embryo-fetal genome expression is modified in response to the solicitations / information (in particular of nutritional origin) from the environment in which it is developing. These changes in expression may have positive or negative impacts later on in life.

So the first thousand days (from conception to completion of the second year of life), during which the implementation and development of the metabolic programming and biological and physical characteristics of the fetus and then of the child take place, are essential. Catching the mechanisms behind would allow both a better understanding of the epidemiological transition and the implementation of effective strategies for primary prevention and reversal of current epidemiological trends<sup>5</sup>.

Primary prevention, therefore, should be understood as the set of strategies aiming at reducing exposure to risk factors during embryo-fetal period up to the end of the first two years of life. As such it is the key period for improving health of millions of children and of future generations.

The impact of inadequate nutrition during this key period is a lasting phenomenon and likely to be partly irreversible, since it affects the development of organs and of metabolic pathways, up to the most complex and dynamic organ, namely the brain.

## The impact of parental nutrition and health status on child's health

An adequate formation of neuronal circuits and the correct availability of neurotransmitters are influenced by the adequate supply of nutrients and micronutrients to the fetus and then to the child in its first 1,000 days. An unbalanced maternal nutrition

with insufficiency / excess of some micronutrients, diseases such as obesity and type 2 diabetes in the parents (including the father), the presence of pollutants (heavy metals, endocrine disruptors, etc.) in food chains, in the atmosphere, and even in the gametes of the parents, may negatively influence the health status of the children and could be even transferred to the coming generations<sup>6</sup>. The range of epigenetic agents able to favor the development of chronic degenerative diseases, among which obesity is one of the most frequent, are not yet known. However some factors are already clearly identified<sup>7</sup>.

The mismatch between embryo-fetal programming and the impact of a high-calorie nutrition based on "junk food" in a rapidly changing environment is thought to play a key role.

## The influence of nutrition during the first year of life on child's future health and eating habits

An excess of protein intake in the first year of life is also a potential risk factor that seems to favor the occurrence of an early adiposity rebound followed by the development of obesity. Breastfeeding, because of the relatively low protein content of breast milk and its role in the regulation of the hunger-satiety system, is considered the main protective factor against obesity<sup>8</sup>. During the last trimester of pregnancy, the fetus is able, through its taste and smell receptors, to perceive the variations in taste of the amniotic fluid linked to its mother's food preferences and choices. The same phenomenon takes place after birth through breast milk. However, the infant fed with formula, is exposed to a monotonous taste and may not like foods that differ from the flavor of the formula at the time of weaning<sup>9,10</sup>.

Although the existence of a single period of "programming" of taste or of different sensory periods of "reprogramming" is not yet certain, after the age of 3-4 years, eating habits / patterns tend to remain quite stable<sup>2,11</sup>.

**Therefore, pregnant women and nursing mothers must consume a healthy and varied diet, rich in fruit and vegetables that facilitate through early programming the later liking and consumption of healthy foods at the time of weaning and beyond. Such strategy is the key to the transmission and maintenance of health from generation to generation.**

▶ **Review: ML. Frelut's presentation:** Dietary diversification- a natural need

▶ **Review M. Caroli's presentation:** Complementary feeding - which model?

## References

1 Burgio E. Obesità infantile. Cause genetiche e ambientali. *Il Pediatra* 2012;4:35-40.

2 Kaatsch P. Epidemiology of childhood cancer. *Cancer Treat Rev.* 2010 Jun;36(4):277-85. doi: 10.1016/j.ctrv.2010.02.003.

3 Gluckman PD, Hanson MA. Developmental origins of disease paradigm: a mechanistic and evolutionary perspective. *Pediatr. Res.* (2004); 56:311-17.

4 Burgio E. Ambiente e Salute. Inquinamento, interferenze sul genoma umano e rischi per la salute. Capitolo 7 Verso un nuovo "Paradigma": Epigenetica e Rivoluzione Epidemiologica del XX Secolo (PARTE B) CG Edizioni Medico Scientifiche (Torino) (2013) pag 61-67.

5 Junien C. Epigenetics In Transgenerational Responses To Environmental Impacts: Facts and Gaps. <https://ebook.ecog-obesity.eu/chapter-biology/epigenetics-in-transgenerational-responses-to-environmental-impacts-facts-and-gaps/>.

6 Koletzko B, Brands B, Poston L, Godfrey K, Demmelmair H. Early nutrition programming of long term health. *Proceedings of the Nutrition Society* 2012; 71, 371-78.

7 Caroli M & Vania A. Weaning Practices and Later Obesity. <https://ebook.ecog-obesity.eu/chapter-nutrition-food-choices-eating-behavior/weaning-practices-later-obesity/>.

8 Short and long term effects of breastfeeding: a systematic review. *World Health Organization* 2013.

9 Mennella JA. Ontogeny of taste preferences: basic biology and implications for health. *Am J Clin Nutr.* 2014;99:S704-711.

10 Ventura AK, Worobey J. Early influences on the development of food preferences. *Curr Biol.* 2013;23:R401-8.

11 Dominguez PR. Flavor exposure during sensitive periods of development as a key mechanism of flavor learning: implications for future research. *Am J Clin Nutr* 2011;93:909-10.

# Adolescence, “the revolution age”: How to make it a healthy revolution?

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*Adolescence is a long period of time, during which many aspects of the youth's life will change dramatically: there will be rapid growth (7-14 cm/yr, across 2-4 yrs) but not at a steady velocity, nor at the same time for all; and there will be pubertal and sexual development. The body is often ready for changes, the brain often not yet: all schemes must be remodelled, the break of symmetry requires a reorganization, a precise position taken (even in exaggerated forms) in front of life.*

## Changes from early to late adolescence

During **early adolescence** (puberty, 10-11 to 14 yrs), the ability to consider health risks linked to incorrect life-styles is extremely reduced.

During (**second**) **adolescence** (15 to 17-18 yrs), the search for independence, and the need and search for peers may have a strong influence on life-styles.

Finally, in **late adolescence** (18 to 20-21 yrs and beyond) thoughts are dominated by the search for independence and for social acceptance, which may negatively influence general behaviour and adherence to healthy life-styles.

Does this include nutrition as well? Unfortunately, yes: eating includes biochemical, physiologic and relational aspects, with these ones outdistancing all the others, becoming of major importance, and driving the feeding behaviour with a power stronger than ever seen before and after. Blending together relational and physiologic aspects may lead to an explosive mix.

## Changes in individual eating choices during adolescence

**Individual eating choices** have now greater importance: teens want and need more autonomy and independence, and ask to control their choices about food. However, their vulnerability (once mediated by parents) is still a high one: there is active control, but also lack of knowledge, while they “think” they know everything.

Adolescents think they have enough information (58% “sufficiently”/“well” informed) about their food, but 77% get the information from internet, TV, friends, family ...or packaging, while only 23% get the information from school or health figures. Other data confirms these findings: 76% chose a drink “for its taste”, and only 22% “knowing its content”.

Knowing everything means that old family traditions can be refused, while, thanks to an aggressive marketing, eating **fast food** or **junk food** becomes attractive, no matter the fact that the habit of consuming (regularly) these foods reduces the perception of the importance of eating healthier foods, such as fruits, vegetables and legumes. Major eating issues in

adolescence? They introduce too much energy, animal proteins, sugars, hidden fats, sugar- and non sugar-sweetened drinks and too little complex carbohydrates, fruit and vegetables, legumes, sea products, milk, yogurt.

## How to transform a potentially bad revolution into a healthy one?

This “**eating rebellion**” implies that nutrition is no longer a family ritual but something to share with peers, and also an identifying part of the self.

It is difficult to tell what can contrast this trend and transform a potentially bad revolution into a healthy one. It is easier to identify the most likely unsuccessful aspects, mainly adults' tendency to:

- transfer their way of seeing life to the adolescent,
- not try to understand his/her way of thinking,
- picture frightening scenarios about future health,
- stimulate the adolescent to follow sage adults' example,
- point to a more “adequate” peer (usually not the most popular one) as an example.

But the youth is not the only person facing and coping with changes: parents and family, peers, school and doctors share the same issue. All of them should cooperate, in accordance with their role/age/responsibility, and knowing their limits, to give rise to the adult which, in embryo, the adolescent contains, and to mould a possibly devastating revolution.

- **Families** should be aware that any adolescent searches and finds affective and expressive spaces in the peers' group, not (or not only anymore) inside the family. But families can offer positive examples, and can continue to give and keep rules (first of all for themselves!), something that is needed as much as it is fought by the adolescent.

- **Teens** should be made aware that their need of being accepted is such a disorienting emotion that they rarely feel “right”, so they search for cultural models of identification among peers: teens can dive into the peers' group and can camouflage themselves in as many aspects as they can think of ...no matter how extravagant (or conformist!) these aspects might be. Peers will accept peers for what they are: a person(ality) and a body.

- **School** can contribute: in the canteen, making unhealthy food possible but difficult to get, while making healthy choices easily available; at the vending machines, substituting unhealthy foods with healthier ones.

- **Doctors** must learn to be teachers without teaching, to be an expert without showing off, to listen much more than to speak, to ask for shared strategies, instead of dictating them.



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▶ Review A. Vania's presentation: Adolescence "the revolution age": how to make a healthy revolution?

# From Physical Activity to Physical Fitness

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The development of obesity is characterized by an imbalance between energy intake and energy expenditure. As the main modifiable component of total energy expenditure, physical activity is a key parameter for effective weight loss strategies. Making people, and particularly patients with obesity, engage in physical activity remains however highly difficult, especially due to their low level of physical fitness.

## Adolescents with overweight/obesity have lower physical activity level

Physical activity is defined as any body movement generated by the contraction of skeletal muscles that raises energy expenditure above resting metabolic rate, and is characterized by its modality, frequency, intensity, duration and context of practice. In 1985, Caspersen defined exercise as a subcategory of physical activity that is planned, structured, repetitive, and that favors physical fitness maintenance or development<sup>1</sup>. Importantly, individuals are classified as physically inactive when they do not reach physical activity guidelines<sup>2</sup>. Children and adolescents with overweight and obesity are usually presented with a lower physical activity level than their normal-weight counterparts. Using accelerometers to objectively measure physical activity, a lower level of physical activity and particularly activities of moderate-to-high intensity was effectively clearly shown in adolescents with overweight/obesity compared with aged-matched lean ones<sup>3</sup>. Lower physical fitness and higher rates of perceived exertion are mainly pointed out to explain this reduced engagement in physical exercise in this population.

## Low fitness level: a barrier to engage in regular physical activity

Obese children and adolescents usually have lower overall physical abilities and especially lower cardiorespiratory fitness (CRF) when compared to their normal-weight peers. This is mainly because of the increased effort required to move their larger body

mass and carry an excessive amount of body fat<sup>4</sup>. Although lower cardiorespiratory performances are observed in obese children and adolescents compared to those of lean children and adolescents when adjusted to body mass, absolute performances are similar or higher. These differences disappear when performances are adjusted to fat free mass, suggesting that muscle maximal oxidative ability is not impaired with obesity in youth<sup>5-6</sup>. Although absolute CRF are not different between lean and obese youth, this lower CRF observed when body weight is considered is of high importance for practitioners since patients will have to deal with their body weight during most interventions (and daily activities) and since the field tests usually used involve body weight. Although exercise training represent the best method to improve CRF in obese youth, their initial low fitness level is a barrier to their engagement in regular physical activity, contributing to the poor compliance usually observed in physical activity interventions<sup>7</sup>. Less is known regarding musculoskeletal fitness in youth with obesity. Flexibility, balance, coordination, joint range motion or muscle strength are the main components usually considered when assessing musculoskeletal fitness. Available evidence indicates that all these dimensions are impaired in children and adolescents with obesity with their lean counterparts showing better performances, which contributes to the higher exercise-related rate of perceived exertion and lower physical engagement observed in these youth.

Based on scientific and clinical evidences, but also on the field and daily experience of its members, the European Childhood Obesity Group (ECOG) recently published an Expert Opinion paper proposing the first steps that must be followed by practitioners when it comes to the evaluation and consideration of physical fitness in pediatric obesity<sup>8</sup>. It appears today necessary for practitioners to identify, using simple methods, the potential physical limitations that might compose barriers to physical activity in these kids. Then the patients must be referred to exercise physiologists and/or professors of adapted physical activity, in order to properly diagnose these impairments and propose adapted interventions.



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## ▶ Review D. Thivel's presentation: From physical activity to physical fitness"

### References

1. Caspersen CJ, et al. Physical Activity, Exercise, and Physical Fitness: Definitions and Distinctions for Health-Related Research. *Public Health Report* (1985) 100 (2): 126-131.
2. O'Malley G. & Thivel D. Physical activity and play in children who are obese: the European Childhood Obesity Group ebook. (2016)
3. Page A, et al. Physical activity patterns in nonobese and obese children assessed using minute-by-minute accelerometry. *Int J Obes (Lond)*. 2005 Sep;29(9):1070-6.
4. Dupuis JM, et al. [Personal sports training in the management of obese boys aged 12 to 16 years]. *Arch Pediatr*. 2000; 7: 1185-93.
5. Watanabe K, et al. Relationship between body composition and cardiorespiratory fitness in Japanese junior high school boys and girls. *Ann Physiol Anthropol*. 1994; 13: 167-74.
6. Goran MI. Energy metabolism and obesity. *Med Clin North Am*. 2000; 84: 347-62.
7. Quinart S, et al. [Sports counseling for overweight children]. *Arch Pediatr*. 2010; 17: 894-5.
8. O'Malley G, et al. Physical Activity and Physical Fitness in Pediatric Obesity: What are the First Steps for Clinicians? Expert Conclusion from the 2016 ECOG Workshop. *Int J Exerc Sci*. 2017