

## CHAPTER 10

# Rethinking information and education strategies for the fight against obesity in the light of behavioral and brain sciences

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Research reveals that the brain and its interactions play a major role in the onset of obesity. If we have a better understanding of the mechanisms of the brain at work, there is hope that we can ultimately achieve more effective prevention, particularly through education, communication and information campaigns. These are still a primary tool for generating public awareness of the fight against obesity, and can be improved at very little cost thanks to the newly found knowledge in behavioural and cognitive (neuro)science. Such improvement can be achieved through types of initiative that are tailored to the target audience, the primary of which is children.

### 1. The complex aetiology of obesity

Obesity is caused by a number of interacting factors<sup>4</sup>: biological, psychological, cultural and environmental.

#### 1.1. The major importance of the brain

It is difficult to establish exactly how each factor contributes to obesity, but it is estimated that **genetic factors could be responsible for 25% to 40%<sup>5</sup> of the cases**. Cases of monogenic<sup>6</sup> obesity are rare, and a large number of genes have been

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<sup>4</sup> The body mass index (BMI) equals weight divided by height squared. A person is considered as overweight if their BMI is between 25 and 29.9, obese if it is greater than or equal to 30 and morbidly obese if it is greater than 40.

<sup>5</sup> Bouchard C., Pérusse L., Rice T. and Rao D. C. (2003), "Genetics of human obesity", in Bray G.A. and Bouchard C., *Handbook of Obesity*, 2<sup>nd</sup> edition, Marcel Dekker, New York.

<sup>6</sup> In general, such cases appear very early and are morbid, and involve the brain's system for regulating satiety via the metabolism of one of its hormones, leptin. This is produced in adipose tissue and is involved in reducing body fat, increasing the basic rate of metabolism and hormonal balance in general.

identified that might be involved at various levels: the metabolism of lipids, the regulation of food intake, the expenditure of energy or the associations made in the brain between pleasure and reward.

Any links that might exist between genetics and brain activity are being increasingly taken into account in the fight against obesity. For that matter, a study, the result of collaboration between 80 international scientific and medical research institutions and involving over 90,000 people, identified six new genetic risk factors giving a predisposition to weight gain, five of which are related to the brain<sup>1</sup>. Brain functions regulating appetite and energy balance are thought to be of primal importance. According to the author of the study, Cristen Willer from the University of Michigan, *“this suggests that certain people may simply be programmed to eat too much”*<sup>2</sup>.

In the same way, a study published in 2008 showed that allelic variations in a gene known as FTO (*Fat Mass and O-associated*), could mean a certain genetic predisposition to obesity<sup>3,4</sup>. This gene, which operates in the region of the hypothalamus, particularly in connection with the regulation of appetite and glycaemia, changes eating habits, especially decisions on the type of food eaten. The “loss of control” in terms of consumption would then be a preference for food high in energy value, sugar and fat.

These results support the concept of **the major role of the brain in obesity**, given that most of these genes operate in the brain. Neuroscience data could enable us to **have a better understanding of the brain-related component of obesity** and incorporate this information in future prevention plans.

## 1.2. Please, please me: obesity, reward and addiction

The wide range of genes identified as risk factors is mirrored by the various theories put forward to explain obesity. Although **the hypothesis based on metabolism**, which considers that an obese person has to eat more because of a greater energy requirement, has still not been verified, a **hypothesis based on the seeking of “brain” reward** or pleasure to eat is being has recently gained acceptance in the neuroscientific field. Eric Stice and his team at the Oregon Research Institute are in fact offering a new way of explaining excessive food intake and hunger in people suffering from obesity: **the need for greater quantities of food to feel pleasure when eating**.

When one swallows food that one likes, the brain releases **dopamine**, a neurotransmitter that is involved in the reward circuit of the brain (*Box n°12*). The degree of pleasure linked to food consumption is therefore strongly connected to the amount of

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<sup>1</sup> C. H. Willer *et al.* (2009), « Six new loci associated with body mass index highlight a neuronal influence on body weight regulation », *Nature Genetics*, volume 41(1), p. 25-34.

<sup>2</sup> AFP (2008) « Le cerveau responsable de l'obésité ? » “Is the brain responsible for obesity?”, *Le Monde*, edition December 15 issue.

<sup>3</sup> Cecil J. E., Tavendale R., Watt P., Hetherington M. M. and Palmer C.N.A. (2008), « An obesity-associated FTO gene variant and increased energy intake in children », *The New England Journal of Medicine*, vol. 359, 2558-2566.

<sup>4</sup> Predisposition does not signify direct causality. This means that there is such a thing as a favourable genetic platform and that, in fact, the person might be more inclined towards obesity because of an environment that causes obesity, for example. But it is also possible for a person with these genetic characteristics not to become obese.

dopamine released, especially in a certain area of the brain called the striatum. Using this behavioural work and the BMI, Eric Stice and his collaborators have shown that, in obese people, the response to dopamine and the sensation of pleasure are reduced by a lower number of dopamine receptors in the striatum.

This involvement of the reward circuit in obese people is comparable at certain points with addictive mechanisms identified in smokers and gambling addicts. Furthermore, consuming too rich a diet over several years leads to the exposure of the human body to the effects of habituation and tolerance, which are already recognised in the intake of medication and drug usage, for example. For several years now, the American Association of Psychiatry has pushed for obesity to be included in the **field of psychology and mental problems**, prioritising the **addictive component**. Such an approach would seem to attract two major risks. Firstly, that of giving yet another negative label to obese people already suffering from the public perception and opinion of their pathology and numerous types of discrimination<sup>1</sup>. Secondly, that of sending the wrong message: if an addiction must be stopped, the fight against obesity implies a change of eating habits and physical activity not to stop eating!

#### Box n° 12

##### Should you feed your pleasure with too much fat and sugar?



As determined by the most recent INPES health and nutrition barometer<sup>2</sup>, the representation of how the French eat has changed radically over the last few years: the pleasure gained from the taste of food has become more important. This observation, which is rather pleasing at the outset, is not without its consequences for the choice of food we eat, as evinced by the preference revealed for buying sugary and/or fatty foods. The work of American neuroscientist Amy Naleid has shown a strong correlation between repeated food intake and the concentration of sugar or maize oil in the substance consumed<sup>3</sup>. This tendency increases when sugar is combined with fats because the

dopamine system in the brain becomes overactive. Moreover, the results lead to the conclusion that the ingestion of multi-sensory foods, i.e. those activating different sensory channels via their texture, appearance, composition, smell and temperature, tending to reinforce the operation of the reward circuit in the brain. It remains to be seen whether such increased pleasure can cause an addiction to this type of food, or whether in fact cognitive restriction and the sense of the forbidden drive people to excess consumption, which is comparable to different types of dependency<sup>4</sup>.

### 1.3. Other factors implicated in the onset of obesity

However, genetic factors alone cannot explain the significant increase in the prevalence of obesity observed over the last fifteen years or so. There are several

<sup>1</sup> See Chapter 8.

<sup>2</sup> Escalon H., Bossard C. and Beck F. (dir.) (2009), *Baromètre santé nutrition 2008 (Health and Nutrition Barometer 2008)*, Saint-Denis, INPES, coll. Baromètres santé, 424 p.

<sup>3</sup> Naleid A. M. *et al.* (2008), "Deconstructing the vanilla milkshake: The dominant effect of sucrose on self-administration of nutrient-flavor mixtures", *Appetite*, 50(1), p. 128-38.

<sup>4</sup> Parker Poppe T. (2009), "How the food makers captured our brains?", *New York Times*, June 23 issue.

major economic and social factors at work<sup>1</sup>: **major changes in lifestyle** are often suggested, especially concerning **eating habits and styles**, and the **much more sedentary life** of individuals. Such changes are the major targets of preventive information and education strategies (*Box n°13*).

**Box n° 13**  
**Promoting physical activity:**  
**using original campaigns as first steps**

To be effective, campaigns promoting physical activity must **try to reach individuals in their daily life**. To this end, the “**Canada on the move**” campaign of 2004 encouraged taking daily walks via health messages broadcast over the media, but also via the commercial distribution of pedometers in packs of cereal and a public Internet search platform. Canadians were asked to “*take 2,000 steps a day*” and “*donate their steps to research*” whilst being able to see the results of their efforts via the national count carried out on the dedicated site. The initiative was conclusive, as 3.5 times more people with the pedometers did the recommended 10,000 a day six months after the campaign, which was a real sign that there had been a true lifestyle change<sup>2</sup>.

Similar to the “*pédibus*” initiative in France - the “**Walk Once a Week**” programme was introduced into **English schools** in 2005: children and their parents were asked to commit to walk to school once a week. The success of the project lies in the fact that it gives an incentive, as children record progress as they go along and win prizes for their class results. In the London region, an increase of 30% was seen in trips to school made on foot. Encouraged by the success of this programme, which was initially focused on London and its immediate suburbs, the British Ministry of Health announced on the 26<sup>th</sup> of January 2010 that an additional fund of £800,000 would be made available to extend it to 900 more schools located in areas particularly concerned about child obesity and excess weight.

All of these campaigns are based on the fact that exercise is accessible to all, with a **limited number of physical, time and financial constraints**, and on social norms. The more people there are who join in the programme, the more difficult it is for individuals to opt out<sup>3</sup>.

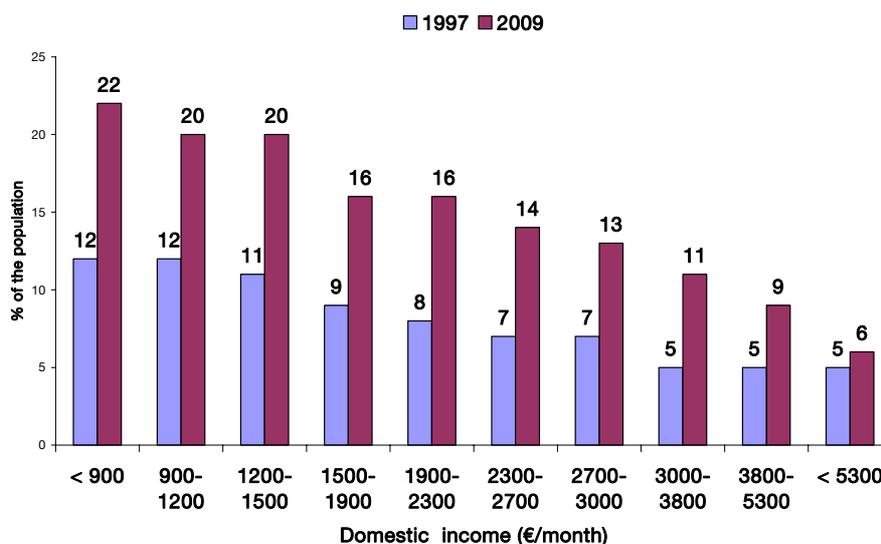
**Obesity and overweight occur at all levels of the social scale, but there are major disparities** across socio-cultural categories (with a greater prevalence in manual workers and employees compared to senior managers), levels of education (**less educated groups** are more affected) and income. Thus, it has been observed that the difference in the prevalence of obesity in adults as a function of income level increased between 1997 and 2009. The linear reduction in the percentage of obesity as a function of the increase in income level signifies the “**social gradient of obesity**” (*Figure n° 19*). Social status would seem to have a powerful influence on the attention paid to health and body, and therefore *in fine* on receptiveness to medical and nutritional information.

**Figure n° 19: Development of the prevalence of obesity in adults over the age of 18 in France between 1997 and 2009 as a function of income level**

<sup>1</sup> For a summary, see Poulain J.-P. (2009), *Sociologie de l'obésité (Sociology of obesity)*, Paris, PUF.

<sup>2</sup> Craig C.L., Tudor-Locke C., Bauman A. (2007), “Twelve-month effects of Canada on the Move: A population-wide campaign to promote pedometer use and walking”, *Health Education Research*, vol. 22, n° 3, p. 406-413.

<sup>3</sup> Cf. Chapter 2.



Source: Obépi (2009)

However, aside from social status, it is above all *social development* that is the appropriate factor to explain people being overweight. Thus, work-related stress, unemployment and the **onset of financial insecurity and social exclusion** have a considerable effect. These factors are often accompanied by a change in eating habits, which can be explained by both the relatively high cost of healthy products and sporting activity, and also the loss of a daily routine and the need to compensate for stress and daily worries etc.

## 2. Improving public communication and information strategies

### 2.1. Previous campaigns have been somewhat half-hearted

For around a decade, information campaigns on obesity have mainly played the **health card**. Launched in 2001 for a period of five years, the first “National nutritional health programme” (PNNS) was primarily aimed at improving **the health of the whole population through nutrition**. This initiative included public communication and information campaigns. A campaign boasting the benefits of eating fruit and vegetables every day was devised in 2001, and another one promoting the benefits and practicality of doing 30 minutes of physical activity per day rounded off the communication initiative in 2004<sup>1</sup>.

On another front, the law dated the 9<sup>th</sup> of August 2004 relating to public health policy imposed **the introduction of health messages in food advertising for “drinks with added sugar, salt or sugar substitute and processed food products”**<sup>2</sup>. In 2007, The National Institute for Health Prevention and Education (INPES) carried out a survey on

<sup>1</sup> The PNNS 2 (2006-2010) is strongly committed to providing information and communications to the public.

<sup>2</sup> Implemented on 27 February 2007 by legal Decree and Order under the law relating to the public health policy dated 9 August 2004 (Article 29).

the impact of these messages: welcomed by 87% of the people questioned, there was a **good reception**, ranging from 82% to 98 % depending on the slogan tested<sup>1</sup>.

However, other studies have fine-tuned the results, since they established that, when recorded, where the viewer look thanks to eye-tracking technology, the eye of the subject was hardly ever focused on the “eat and move” banner at the bottom of advertisements promoting a food product (*Figure n° 20*). Most **health banners** would prove to be **unsuitable**, as they are repetitive and dull, compared to the effects of **habituation** and **sensory over-stimulation** generated by the exciting and dynamic ads used to attract attention and create desire. And apart from this, their size, restricted within the small area imposed on industries by law, makes them difficult to read. This relative level of ineffectiveness is made even more negative by the fact that agri-food industries can avoid paying the tax that goes to the INPES by including these very messages<sup>2</sup>.

**Figure n° 20: Eye-tracking reveals the ineffectiveness of prevention banner in French ads for agri-food products**

*Each circle represents the place where the subject focuses his visual attention. The number indicates the strength of focus as the eye moves and the diameter is in proportion to the focus time. In this register, the subject never looks at the health banner underneath.*



Source : Médiamento©

INPES also recognises the **risk of confusion between the health message and the product being promoted**<sup>3</sup>, a problem raised by the UFC. What choice should be made before including the banners? In fact, in 2006, this association showed that, after viewing a TV advert for cereals high in sugar with the information banner “To stay healthy, avoid eating too many fatty, sugary and salty foods”, 68% of the adults surveyed thought that the manufacturer was boasting that the product was nutritionally balanced.

<sup>1</sup> INPES (2008), “Post-test of messages added to food ads for subjects aged 8 and over”.

<sup>2</sup> If no health message is added, the advertiser has to pay the INPES a contribution amounting to 1.5 % of the cost of the advert. According to available data, the tax has brought in very little revenue: 100,000 Euros in 2007 and 30,000 Euros for the first four months of 2008 – nowhere near the “900,000 to 3 million Euros” that the INPES counted on receiving in 2008. See also Chapter 8.

<sup>3</sup> For example, consider a fruit yoghurt as one of the five necessary daily portions of fruit and vegetables.

To make the messages more effective, we therefore need to **vary content, form and design** during the ads. Also, to prevent it being misunderstood and having to compete against the product being promoted, the health message should appear on the screen on its own and be read out by a range of different voices.

Finally, **improving the message and making it more memorable does not necessarily bring about a change in consumer behaviour**. Thus, only 18% of people surveyed by the INPES said that they had started to change their eating habits, and of these over three quarters did this after the onset of health problems. These results corroborate those of the Nutritional Health Barometer for 2008<sup>1</sup>: recognition of the fruit and vegetables “focus point” did increase from 2.5% to 28.1% between 2002 and 2008, but the proportion of French people who had consumed the recommended five portions on the day before the survey had only increased from 10% to 11.8 %<sup>2</sup>.

## 2.2. Broadcasting sensitive health messages

Broadcasting information messages on obesity is no easy task – for several reasons. Firstly, prevention strategies generally **have less impact** when they are not aimed at stopping a behaviour (such as smoking), but only at **changing it** (eating better, moving more). Where food is concerned, the problem lies in “*broadcasting multiple complex messages on nutrition*”<sup>3</sup>. Everyone accepts that tobacco is a danger to health, but **the concept of bad foods is still contested**, as, for some people, it is determined by the way people eat (quantity, frequency, food combination) and physical habits. And, while the strategy behind the fight against tobacco is aimed at making tobacco addiction socially unacceptable, the same cannot be applied to obesity, as there would be a risk of isolating a sector of the population who already suffer from considerable discrimination.

Secondly, contrary to what some public health professionals actually believe, informing those affected should not simply involve encouraging them to make more sensible health choices. The behavioural sciences show that **the decision-making processes related to consumption cannot be explained according to the dictates of standard economic theory**. Individuals have a tendency to under-estimate the long-term risks. In addition to this, the effects of an **environment that causes obesity** (attractive advertisements, fast food available everywhere<sup>4</sup>, etc.) on decisions about what to eat are obvious, especially in people who are overweight, who show a greater sensitivity to environmental prompts than that of the rest of the population. Nutrition specialists talk of the “**external food sensitivity**” (EFS) when defining the factors that

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<sup>1</sup> Escalon H., Bossard C. and Beck F. (dir.) (2009), *Nutritional Health Barometer for 2008*, INPES, coll. Health Barometers, 424 p.; [www.inpes.sante.fr/CFESBases/catalogue/pdf/1270.pdf](http://www.inpes.sante.fr/CFESBases/catalogue/pdf/1270.pdf).

<sup>2</sup> However, this observation requires fine tuning. Via descriptive and highly varied analyses (logistical regressions with adjustments for sex, age, level of education, revenue per unit of consumption, region and size of residential area), the INPES has shown a significant link between recognition of the focus point and having achieved this the day before daily intake number. Thus, 14.6% of individuals aged 19 to 75 who said that you need to eat at least five fruits and vegetables per day to remain in good health, against 10.0 % who did not know this.

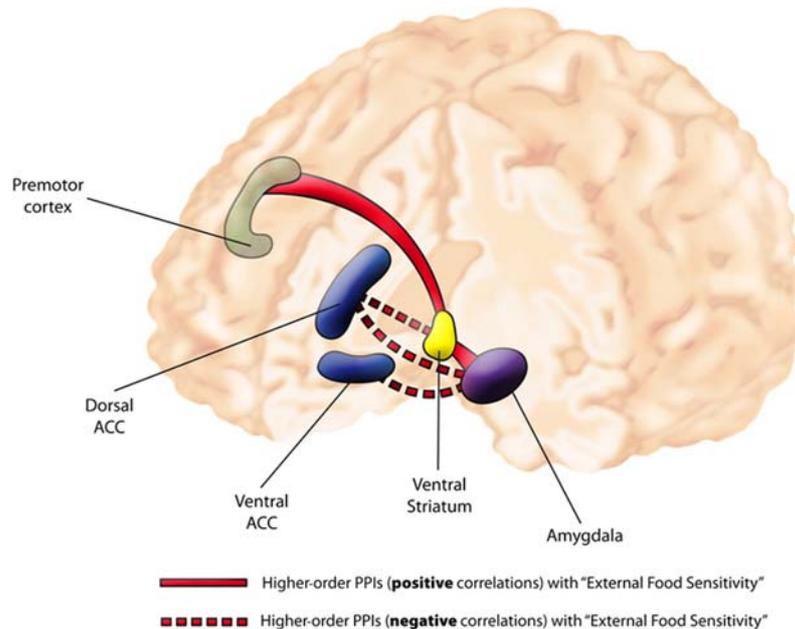
<sup>3</sup> Vanchieri C. (1998) “Lessons from the tobacco wars edify nutrition war tactics”, *Journal of the National Cancer Institute*, 90 (6), p. 420-422.

<sup>4</sup> Paquet C., Daniel M., Knäuper B., Gauvin L., Kestens Y. and Dubé L. (2010), “Interactive effects of reward sensitivity and residential fast-food restaurant exposure on fast-food consumption”, *American Journal of Clinical Nutrition*, volume 91(3).

show no evidence of intrinsic hunger mechanisms (triggered by metabolic requirements), but still lead to food intake.

While the sensory characteristics of a food, such as flavour,<sup>1</sup> smell or even texture, contribute to the pleasure of eating, **cognitive contextual factors may also play an important role** (Box n°14). A team of researchers at the University of Cambridge looked into the neural correlates of ESN in order to gain a better understanding of the role of communications by agri-foods groups in the obesity epidemic<sup>2</sup>. The authors used “*psychophysiological interaction (PPI) to address how the physiological connectivity (coupling) between pairs of regions is affected by psychological context*”. Using an MRI scanner, researchers showed that food presented in an enhanced context leads to changes in certain the brain’s functional connectivity<sup>3</sup>: one of these can be attributed to emotional and motivational states evoked by the sight of appetising food, and the other may reflect getting ready to make the movements necessary to grab the food and eat it (Figure n°21).

**Figure n° 21: Exchange of information between different parts of the brain as a function of external sensitivity to food.**



Source : Passamonti et al. (2008) *Journal of Neuroscience – Society for Neuroscience*©

This study illustrates how **the enhanced presentation of a food in an advert** changes the activity of areas in the brain that contribute to **preparing for motor action** and the **sensation of pleasure** when eating.

<sup>1</sup> Representations of flavour in the brain are mainly located in the insular cortex, frontal operculum and the orbitofrontal cortex.

<sup>2</sup> Passamonti L. et al. (2009), “Personality predicts the brain’s response to viewing appetizing foods: The neural basis of a risk factor for overeating”, *Journal of Neuroscience*, 29, p. 43-51.

<sup>3</sup> The connectivity observed is classed as functional, and does not always correspond to anatomical connections between these areas of the: between the amygdala and the ventral striatum and between the ventral striatum and the premotor cortex respectively.

#### Box n° 14

### The pleasure of eating - words have weight

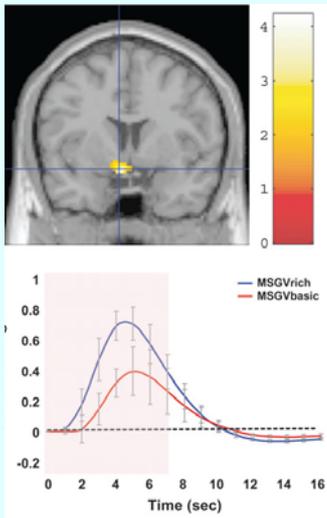


Figure n° 22 : Change in brain activity when ingesting food as a function of its description  
(Oxford Press©)

When developing an awareness campaign, as for any initiative involving communication, the choice of words is of primary importance. A recent experiment might suggest some new avenues for assessing how to communicate and promote a balanced diet. Researchers at the University of Oxford<sup>1</sup> have shown that, when food was ingested, activity in areas of the brain contributing to the pleasure of eating was greater if the intake of food was accompanied by the mention of positive words (“rich and delicious flavour” instead of “boiled vegetable water”). Thus, presenting the food as having a “delicious flavour” stimulates significantly greater activity in the ventral striatum than if it is simply described as “vegetable bouillon” (Figure n° 22). We learn two things from these results. This can be applied so that **foods highest in calories are given a “neutral” presentation in advertising**. They also suggest that **talking about fruit and vegetables in an appetising way would certainly be more effective in persuading consumers to eat them five portions of fruit and vegetables a day**.

There is no way that we could classify this conclusion as “evidence”, but it is still hardly ever applied in promoting a balanced diet. This approach still focuses too often on the nutritional qualities of food, rather than on it being pleasurable to eat.

The third limitation is that these methods of intervention have contrasting effects on populations, as they are **more effective when directed at populations that already aware of the problem**<sup>2</sup>, an observation which is not limited to the fight against obesity. The people most affected are the last to be reached by these campaigns (families who are not very aware of nutrition, younger children or overweight children<sup>3</sup>), which serves to **increase health inequalities** (Box n° 15).

**The risk of adverse effects** can clearly be identified as an explanation of this difficulty in persuading individuals who are reluctant right from the start – especially if a message **raises the concept of guilt, is dogmatic, stigmatising or causes anxiety**. If it is advisable to avoid a reaction of defence and denial, the reverse, a **message that is too consensual and without any notion of personal responsibility, is equally to be avoided**, as it will not have a motivational effect. It is therefore advisable to choose any words used with care.

<sup>1</sup> Grabenhorst F., Rolls E. T. and Bilderbeck A. (2008), “How cognition modulates affective responses to taste and flavor: Top-down influences on the orbitofrontal and pregenual cingulate cortices”, *Cerebral Cortex*, 18, 1549-1559.

<sup>2</sup> The categories identified in this way are women, well educated people with high socio-professional status, eating few products outside a balanced diet and with a lower proportion of overweight children.

<sup>3</sup> Other data, a study by Ayadi and Ezan (2008) of children aged 8 to 12 shows that health messages might well be remembered, but have not been able to change behaviour, as they are not very attractive or much fun.

In addition to this, a study by Todd Hare and Colin Camerer of the California Institute of Technology shows that prefrontal cortex activations differ in accordance with whether individuals are able to resist the temptation of tasty-looking dishes and choose healthier ones<sup>1</sup> or not. For those who are, taste and health criteria activate a cerebral network governing self-control, which then impacts on a network involved in decision-making. For those who aren't – "irrational gluttons", **the taste criteria get the upper hand**. It is therefore not enough to simply put forward health arguments in a systematic approach in order to have an effect on individuals most affected. Conversely, **enhancing the presentation of diet foods, making them more palatable<sup>2</sup> and devising food and cookery education** that would help people to fully appreciate the flavour would seem to be advisable.

#### Box n° 15

##### Obesity and socio-economic inequality

Disadvantaged populations show a greater prevalence of obesity than the rest of the population. It would be appropriate to consider the impact of prevention campaigns on social health inequality: do they constitute an effective way of reducing this, or do they only make the existing disparities wider? A study by Corine Delamaire at the INPES looked into how communication campaigns were received by disadvantaged populations<sup>3</sup>.

It would seem that nutritional focus points (such as "5 portions of fruit and vegetables per day") are all viewed in the same way, but **health messages are viewed and accepted to varying degrees depending on socio-economic category**. So, almost twice the number of manual workers consider that messages are supplying new information but likewise, **2.5 more consider that they raise the concept of guilt and 5 times more consider that they create anxiety**, probably in connection with a feeling of not being able to put them into practice. So, various studies reveal two aspects of food consumption in homes with modest income: **an under-consumption of fresh products and an over-consumption of fatty, salty and sugary foods**. It is generally acknowledged that the price of healthy food is a barrier to consumption, but other factors should be taken into consideration: the extended cooking time, the loss of daily routine with inactive people, eating habits influenced by strong cultural traditions and psychological factors (the problems of daily life push people towards fatty foods, which help quell anxiety or replace affection). In order to develop effective obesity prevention campaigns aimed at disadvantaged persons, it **would seem essential for us to have a greater knowledge of their social backgrounds**.

### 2.3. Nutrition labelling: a necessity, but not panacea

Nutritional information and education can also be delivered by labelling products, helping consumers to choose according to general or specific recommendations. Even though basing obesity prevention campaigns solely on the energy factor is doomed to failure, such is the importance of the **social, economic and affective aspects** of food, these initiatives are useful, and even more so if they are improved.

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<sup>1</sup> Hare T., Camerer C. and Rangel A. (2009), "Self-control in decision-making involves modulation of the vmPFC valuation system", *Science*, vol. 324, n° 5927, p. 646-648.

<sup>2</sup> "Said of a nice-tasting food".

<sup>3</sup> Delamaire C. (2007), « Facteurs socioéconomiques et perception des campagnes de communication du PNNS » ("Socio-economic Factors and perception of the communication campaigns of the PNNS"), Paris Food Day, session 4.

Widespread throughout many countries, the nutrition labelling system currently **all looks the same in terms of form and content**. The “Proposed European ruling on consumer information for foodstuffs<sup>1</sup>” of the European Parliament and Council is aimed at making nutritional information compulsory and standardising symbols<sup>2</sup>.

The European Food Information Council (EUFIC) ran a study in supermarkets in six European countries to compare consumer behaviour in relation to nutrition information<sup>3</sup>. After taking an average of 30 seconds to consider before making a purchase, **the French took the least time to find out this information**, with a figure of only 8.8 %, as against 16.8% for Europe. These figures are lower still when you only look at products purchased for pleasure, which are already known to be not part of a healthy diet.

In addition, according to data from the 2008 health and nutrition barometer, of the 44.1 % of individuals aged 15-75 who say that they read nutrition information on packaging either systematically, now and again or rarely, 45.7 % found the information difficult to read.

Such observations lead one to consider what the ingredients of an effective recipe for nutrition information might be (*Box n° 16*). The same study by the EUFIC reveals that French consumers prefer to see labels giving **recommended daily intake (RDI)** rather than nutrition tables. Also, a “ruler”- type **coloured graphic representation**, as for the RDI, is both more attractive and easier to understand<sup>4</sup>.

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<sup>1</sup> Proposal adopted on the 30<sup>th</sup> of January 2008;  
[http://agriculture.gouv.fr/sections/thematiques/alimentation/comprendre-informer/informer/informer4149/downloadFile/FichierAttache\\_3\\_f0/proposition\\_reglement\\_informati\\_on\\_consommateur\\_janvier\\_2008.pdf?nocache=1264774550.71](http://agriculture.gouv.fr/sections/thematiques/alimentation/comprendre-informer/informer/informer4149/downloadFile/FichierAttache_3_f0/proposition_reglement_informati_on_consommateur_janvier_2008.pdf?nocache=1264774550.71) .

<sup>2</sup> This is set to replace the two European directives on the subject: directive 2000/13/CE, which defines a certain number of essential rules concerning the labelling of provisions and directive 90/496/CEE of the Council, which establishes that “*nutritional labelling is only compulsory if nutritional or health claims are made on the product, and can otherwise be provided by manufacturers on a voluntary basis*”.

<sup>3</sup> Grunert K. G. and Kills J. M. (2008), “Pan-European consumer research on in-store behaviour, understanding and use of nutrition information on food labels, and nutrition knowledge”,

<sup>4</sup> Drichoutis A. C., Lazaridis P. and Nayga R. M. (2006), “Consumers’ use of nutritional labels: A review of research studies and issues”, *Academy of Marketing Science Review*, n° 9.

### Box n° 16 “Super-inform me”?



The *Washington Post* site offers its readers a “fast-food Calorie counter”<sup>1</sup>.

Moving on from the products themselves, fast-food restaurants could also be made to show the **Calorie content of their menus**, as some brands already do. In fact, for the first time, one study<sup>2</sup> indicates that such an initiative can **change parental behaviour in choosing meals for their children**. Following an experimental protocol, two groups were identified from parents of children aged 3 to 6 years: one having access to a menu giving nutritional information, and the other not. Parents ordered for their children and themselves. It would seem that, on average, the “informed” parents ordered food for their children containing 102 calories less. On the other hand, far from setting a good example in a typical “do as say don’t do as I do” fashion, the adults were a lot less sensible when it came to themselves, and the parents who had the nutritional information and changed the order for their children didn’t do the same for theirs!

Elsewhere, the application, advocated many times<sup>3</sup>, of a **“PNNS label”<sup>4</sup> certified by an independent “recommended” food organisation, could be effective**. Consumers are already used to seeing labels about the production quality of items to precise specifications, as is the case for organic production, for example. This proposal is of even more interest because of the cerebral deregulation that might lead some people to rate these foods too highly in terms of their usefulness, making them to eat too much of them, would be potentially compensated for by labels relating to cognitive strategies.

This logo should appear on the front of the product – the only surface looked at by over 60% of consumers – and be easy for young people to read. Aside from the reluctance of the agri-foods industry, **adding negative symbols, for example a red traffic light<sup>5</sup>**, is not very popular with consumers, who **see it as raising the concept of guilt** and too much like “banned products”. In contrast to this, since 1989 Sweden has had a **logo in the form of a green lock to identify the healthiest products<sup>6</sup>** (*Figure n° 23*). This system has been rolled out as a common reference across Scandinavian countries, and has been a really successful initiative because the people there have the greatest awareness of labelling systems in Europe.

<sup>1</sup> Counter: [www.washingtonpost.com/wp-srv/flash/health/caloriecounter/caloriecounter.html](http://www.washingtonpost.com/wp-srv/flash/health/caloriecounter/caloriecounter.html).

<sup>2</sup> Tandon P. S., Wright J., Zhou C., Rogers C. B. and Christakis D. A. (2010), “Nutrition menu labelling may lead to lower-calorie restaurant meal choices for children”, *Paediatrics*, appearing soon.

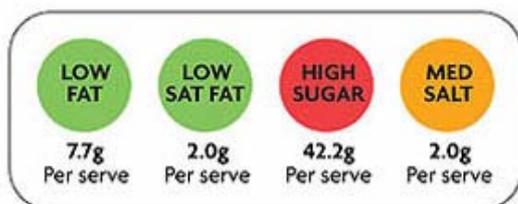
<sup>3</sup> Especially in the parliamentary report by the mission on the prevention of obesity presented by Valérie Boyer en 2008; [www.assemblee-nationale.fr/13/rap-info/i1131.asp](http://www.assemblee-nationale.fr/13/rap-info/i1131.asp).

<sup>4</sup> “National nutritional health programme”.

<sup>5</sup> The Food Standards Agency (FSA) set up a « traffic light » nutrition labelling system in 2007. For each of the key nutrients– lipids, saturated fats, carbohydrates and salt – an indication is given if it contains a low (green), average (amber) significant (red) amount.

<sup>6</sup> The lock indicates the most balanced food items (containing the least lipids, saturated fatty acids and trans fats, glucides and sodium, and containing the most fibre) for a given category (dairy products, meat, fish, ready meals, fruit, vegetables, cereals, etc.).

**Figure n° 23: Examples of current labelling systems for food products in the United Kingdom (A) Sweden, Norway and Denmark (B)**



(A) Source: Food Standards Agency



(B) Source: Livsmedelsverket

### 3. Early intervention to support specific prevention campaigns for children

#### 3.1. The necessity for early prevention strategies

Prevention policies for young children are certainly expensive to implement, but they are justifiable because they are really effective in the long term. A study by the OCDE established that strategies targeted at child obesity have effects that are measurable around forty years after implementation<sup>1</sup>. A number of major arguments show the importance of **acting from a younger age in the fight against obesity**.

First of all, it is hard to move on from being obese or overweight, which is why prevention is preferable in order to avoid onset. This strategy is also based on biology-based arguments. In fact, there is a strong correlation between the BMI at the age of 6 and the same in adulthood, which is specifically explained by the considerable capacity for the formation of adipose cells in early childhood.

Additionally, there is a **progressive deregulation of the system of satiety**: children moderate themselves spontaneously in their first years, but become increasingly sensitive to environmental signals transmitted by products. Thus, it is thought that towards the age of 5, larger portions can mean a general increase in food consumption<sup>2</sup>. This kind of information cannot but encourage us not only to **limit the size of portions offered** by the agri-foods industry, but also to **require packaging of non-healthy food to have a more sober appearance**<sup>3</sup>.

Elsewhere, early intervention is required, as it is during childhood that the **process of learning about taste in a social context** takes place. The mere fact of offering a product to children regularly increases their preference for it, and it is during the first

<sup>1</sup> Cf. OCDE (2009), "Improving lifestyles, tackling obesity: the health and economic impact of prevention strategies", *OECD Health Working Papers*, n° 48.

<sup>2</sup> Fomon S. J., Filer L. J. Jr, Thomas L. N., Anderson T. A. and Nelson S. E. (1975), "Influence of formula concentration on caloric intake and growth of normal infants", *Acta Paediatrica Scandinavica*, 64, p. 172-181.

<sup>3</sup> Chandon P. and Ordabayeva N. (2008), "Supersizing in 1D, downsize in 3D: Effects of spatial dimensionality on size perception and preferences", *Journal of Marketing Research*, XLV, p. 739-753, .

six years that appetite and taste can still be modulated<sup>1</sup>. It is therefore advisable to make the range of food consumed by young children as wide as possible during this period.

In parallel to this, early intervention with children can help in accessing certain populations of parents who are not traditionally aware of information campaigns, especially if they come from disadvantaged backgrounds. In fact, we can observe a **process of transfer from children to their parents** that could bring changes to the eating habits of the whole family.

### 3.2. The sensitivity of children to images: risk factors...

**More time spent in front of the TV** means **more time staying sedentary** and encourages **young people to snack**. Also, **increased exposure to advertisements** can bring about an even greater change in their eating habits<sup>2</sup>. Numerous studies reveal that children are particularly sensitive to the impact of images, mainly due to the considerable plasticity of their brains, sometimes referred to as a **“brain like a sponge”**. This increased receptivity is a potential danger in that it can be exploited by agri-foods industries, who regard children as a preferred target market.

In fact, ads influence the choice of young people in terms of brand, and change their perception of taste and their preferences. This phenomenon is more marked in **overweight children, as they are more sensitive to food advertising** than non-food advertising, and seeing an advert increases consumption more than in those with a normal BMI<sup>3</sup>, hence the **risk of a cumulative effect**.

A recent experiment carried out in children aged 5 demonstrates the influence of fast food brands: when eating totally identical meals but with different packaging, children said they preferred the food that had supposedly come from a leading brand, known for its widespread advertising campaigns<sup>4</sup>. Moreover, this effect was not limited to “junk food”, since it was also observed with carrots.

**Using the obvious attraction that children have to these brands (and products)** to encourage them to eat a more balanced diet would seem to be appropriate here. However, faced with the extent of the problem, some people recommend more ambitious measures, such as **limiting the exposure of children to advertising, but also to promotional items** through restrictive legal provisions (*Box n° 17*).

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<sup>1</sup> Fox M. K., Pac S., Devaney B. and Jankowski L. (2004), “Feeding infants and toddlers study: What foods are infants and toddlers eating?“, *Journal of the American Dietetic Association*, 104 (1 Suppl. 1) : S22-S30.

<sup>2</sup> Martin C. K., Coulon S. M., Markward N., Greenway F. L. and Anton S. D. (2009), “Association between energy intake and viewing television, distractibility, and memory for advertisements”, *American Journal of Clinical Nutrition*, 89 (1), p. 37-44.

<sup>3</sup> Halford J. C. G., Gillespie J., Brown V. *et al.* (2004), “Effect of television advertisements for foods on food consumption in children”, *Appetite*, 42, p. 221-225.

<sup>4</sup> Robinson T. N. *et al.* (2007), “Effects of fast food branding on young children’s taste preferences”, *Archives of Paediatrics & Adolescent Medicines*, 161(8), p. 792-797.

### Box n° 17

#### Is the banning advertising for food during TV programs for kids the solution?

The merit of a possible ban on food advertising before, during and after youth programming is the subject of controversy<sup>1,2</sup>. The rejection by the National Assembly of the amendment moving in this direction after a long and difficult debate in 2008 is an important sign.

The stakeholders opposed to such an initiative emphasize the lack of any impact observed in the countries that have put this measure in place, such as the United Kingdom in 2007, for example. Besides, there is the risk of the adverse effect of the development of hidden advertising via the strategy of “hidden placement” and the moving of this kind of advertising to other time slots. Faced with the impossibility of protecting children against all risks, the challenge is rather to teach them how to deal with them. Plus, the loss in financial gain would be considerable for TV stations, especially those such as Gulli, which declared in 2008 that its food advertising represented 30% of revenue.

However, a number of experts say that they are in favour of this type of ban<sup>3</sup>, the effects of which will only be felt in the long term, and only if accompanied by other measures aimed at changing an environment that encourages obesity (especially through taxation policy<sup>4</sup>). Given the considerable amount of time that children spend in front of the TV, “educating against the risks” is not enough on its own, and parents should not be asked to take full responsibility for it. Finally, with regard to the economic arguments, some people suggest that we allow advertising for products that are recommended for consumption and develop partnerships with agri-foods industries in this respect.

In the recent monograph entitled “Enfants, télévision et poids” [Children, television and weight], the Louis Bonduelle Foundation<sup>5</sup> pays a substantial amount of attention to scientific results that underline the role of advertising in the incidence of obesity. Numerous scientific studies on thousands of individuals across different continents are reviewed. In particular, this monograph indicates that calculations made by the US national office of economic research<sup>6</sup> indicate that banning this type of

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<sup>1</sup> Naucourt R. (2009), “Obésité infantile: la publicité en accusation” (“Childhood obesity: publicity to blame”), *Le Monde*, February 18<sup>th</sup> issue,

<sup>2</sup> On this subject, see also two articles recently published that present opposing opinions: Kelly C. (2010), “Lutte contre l'obésité infantile: Les paradoxes de la télévision, partenaire d'une régulation à la française” (“Fight against childhood obesity: The paradoxes of television, partner to a French regulation”), *Le Monde*, February 17 issue, and Bourdillo F, Hercberg S. (2010), “Lutte contre l'obésité: soyons cohérents!” (“The fight against obesity: let us be consistent!”), *Le Monde*, February 25 issue,.

<sup>3</sup> On March 9<sup>th</sup>, 2010, around 20 learned societies from the medical and sporting sectors officially requested that, based on the available scientific data, the debate on the regulation of TV advertisements for certain foods at peak children's viewing times should be reopened. Amongst the signatories were the French Public Health Association (SFSP), the French Pediatrics Association (SFP), the French Association for Studies and Research on Obesity (Afero), the French Nutrition Association (SFN), the French Cardiology Federation (FFC), the National Association for the Prevention of Alcoholism and Addictions (ANPAA) and the french Federation of Health Education Committees (FNES).

<sup>4</sup> On this subject, read the work of Pierre Dubois of the INRA, according to which an increase of 10% in the price of products in the “junk food” category would reduce child obesity by a quarter and overweight in children by over 28%.

<sup>5</sup> De Reynal B. (2009), “Enfants, télévision et poids” (“Children, television and weight”), Louis Bonduelle Foundation, 11 p.

<sup>6</sup> The National Bureau of Economic Research ; [www.nber.org/papers/w11879](http://www.nber.org/papers/w11879).

advertising could reduce the number of obese and overweight children by over 10 % in children aged 3-11 and 12% in children aged 12-18<sup>1</sup>.

### 3.3. ...and solutions

The considerable impact of images on children is a good reason to hope that an effective communication campaign will have a greater effect on this population. From this perspective, we need to look to provide solutions for the unfitness for purpose of current messages aimed at young people, as they take less notice of written than visual information, and hardly interest in the issue of health.

In the USA, the Active Life Movement association has developed an obesity prevention campaign using graphics showing children's super heroes deformed by the consumption of fizzy drinks and other sugary products linked to obvious inactivity (*Figure n°24*). The campaign received widespread praise for its form (innovative graphic design), but the content was criticised, because it was considered to be degrading to overweight people. Another issue raised was that it would be harder to understand for younger children, as they would not see the link between dietary imbalance and changes to the body.

Figure n° 24. The “Keep obesity away from your child” campaign



Source: Active Life Movement<sup>2</sup>

This concept of using the persuasive elements traditionally used in children's advertising, including the use of familiar characters, attractive colours and humour, should even be applied outside campaigns that are strictly focused on health – in educational media, for example (*Box n°18*).

A recurrent cartoon character working as a cook and interacting with another character promoting physical activity and sports could have a positive effect, just as has been achieved in other areas such as environment, DIY and English lessons, as a fun, non-prescriptive teaching method<sup>3</sup>. Neuroscience experimentation might also be in a position to improve the impact of cartoons – also bringing tools and

<sup>1</sup> Chou S.-Y., Rashad I. and Grossman M. (2008), “Fast•food restaurant advertising on television and its influence on childhood obesity”, *The Journal of Law and Economics*, volume 51(4), p. 599–618,

<sup>2</sup> <http://activelifemovement.org/>.

<sup>3</sup> This is one of the proposals made by the Strategic Analysis Centre on 28 October 2009 when heard by the Commission for the prevention and management of obesity set up by the President of France;

[www.elysee.fr/documents/index.php?mode=view&lang=fr&cat\\_id=8&press\\_id=3205](http://www.elysee.fr/documents/index.php?mode=view&lang=fr&cat_id=8&press_id=3205).

**knowledge necessary for evaluating** a range of elements: the image showing attachment to the hero, the number of important messages to be included in each episode, the right points at which to do it, etc.

#### Box n° 18

##### The French food charter

On 18 February 2009, a Charter designed to “promote healthy food and physical activity in programmes and advertisements broadcast on television” was signed by a great number of stakeholders in the audio-visual sector in France (TV stations, producers’ and authors’ unions, representatives and advertisers) and the public authorities. They signed up to this commitment for a period of five years, against a background where a continued increase in childhood obesity forced everyone to take their share of responsibility and contribute to the fight against such a scourge.

Under this Charter, advertisers are committed to improving the quality of food advertising under the watchful eye of the ARPP (French advertising standards authority) and to finance short programmes for young audiences. For their part, TV stations have to offer preferential rates to media prevention campaigns, help put the spotlight on the [mangerbouger.fr](http://mangerbouger.fr) site and broadcast programmes that promote good diet and exercise habits. This type of system therefore depends on the sector's voluntary involvement and self-regulation, a system that has already proved beneficial, but which also has limitations, in the field of corporate social responsibility, for example.

The *Conseil supérieur de l’audiovisuel* (CSA) is tasked with monitoring compliance with the Charter and evaluating results. A year after its launch, the CSA has produced an initial assessment of this system and applauded the effectiveness of the commitment of the various signatories. Aside from its symbolic value, the Charter has made concrete progress. Over 600 hours of fun educational programming have been broadcast via TV stations, far exceeding the initial target set of between 340 and 470 hours per year. In addition to this, 37 short food and sports awareness programmes have been broadcast using well-known children’s characters. Moreover, in accordance with the Charter, the ARPP published the “Code on dietary behaviour” in September 2009, setting down professional ethical regulations for the content of food advertisements aimed at young people.

Finally, **campaigns outside the domestic environment also need support, especially in schools.** Requiring school meals to be balanced and ensuring that this does not increase the price, organising regular cooking sessions, or highlighting the principles of nutrition as part of lessons that are more generally related to health education, are also avenues that offer some promise. All of these initiatives need to be organised in an entertaining way to hold the attention of younger ones and ensure that they are remembered more effectively<sup>1</sup>.

\* \* \*

Information and awareness campaigns are still an **essential tool** in obesity prevention. More and more people are saying that they are well informed about food, mainly via the media, and less and less via health professionals. However, they might

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<sup>1</sup> The exhibition “Bon appétit: l’alimentation dans tous les sens” (“Bon appetit: food in all senses”) at the Cité des Sciences from the 2<sup>nd</sup> of February 2010 to the 31<sup>st</sup> of January 2011 invites people to discover “*food in a celebratory, playful and educational way*”; [www.cite-sciences.fr/francais/ala\\_cite/expositions/bon-appetit/](http://www.cite-sciences.fr/francais/ala_cite/expositions/bon-appetit/).

be informed, but consumers are still not changing their eating habits. The latest advances in behavioural and brain sciences can help to improve the effectiveness of prevention against obesity and overweight by reshaping health messages to make them clearer and more motivating. Whether it be health banners at the bottom of advertisements, nutrition information on packaging, the promotion of physical activity or educational materials for children - all kinds of communication strategies can benefit from what the behavioural neuroscience have to offer. Nevertheless, a preventive approach to obesity based solely on invoking individual responsibility would have limited impact. It would be advisable to achieve **a better balance between individual social approaches and educational initiatives and changes to the immediate environment**



PREMIER MINISTRE



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# Improving public health prevention with behavioural, cognitive and neuroscience

Supervised by  
Olivier Oullier and Sarah Sauneron

Rapports et documents

# Improving public health prevention with behavioural, cognitive and neuroscience

Report handed to Nathalie Kosciusko-Morizet, Secretary of  
State for Strategic Planning and the Development of the Digital  
Economy

Supervised by Olivier Oullier et Sarah Sauneron



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