

# The Absorption Theory

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**Abstract:** Obesity is classically considered a worldwide epidemic disease and as one of the most important causes of morbid-mortality in many countries.

Medical science explains obesity and bases its treatment in the following mathematical equation that enunciates Calories consumed from food as a consequence of calories expended and calories transformed in fat and stored.

This work puts challenged this equation and proposes arguments based on the evolution of the human beings which includes the importance of the relation between hunger and satiety.

Like in any other endocrine systems, it is proposed the existence of an hypothalamic hormone that regulates the volume of the adipose tissue through the leptin action.

Regulation of the body weight should be based on the equilibrium of the energetic saving capacity, nutrient absorption and nutrient storage.

Our proposal is that the energetic system of abundance regulates the relationship between hunger and satiety; and explains why slim people that eat large amounts of food do not gain weight, why people that have harmful eating habits gain weight and why some people maintain a stable overweight along vast periods of time.

Following these precepts it is propose that treatments for obesity should be based on the physiological model that includes not only the calories ingested-expended ratio, but also aspects that regulates satiety and modulate the size of the adipose tissue as happened with our ancestors.

## INTRODUCTION

### The dream of eating without gaining weight

If we could shrink enough to adopt the size of a cell, we will be able to analyze in detail a human body, and we would be able to see the limits of each cellular individual and their interrelation with the molecules and atoms. As we become even smaller, we may visualize molecules' interaction: bonds, separations, attractions, blockings and the whole dynamics ruled by physical, chemical and mathematical laws that do not admit exceptions. The only way to explain or predict events at this level is to know the laws involved.

We may state that the production of inter, intra or extra cellular events is still ruled by molecular interactions that, in turn, are commanded by the same mentioned laws.

If our normal size is restored, we will see a human body composed of tissues, organs and systems, each of them with a specific function. All the body functions have at last, the same objectives: the preservation, reproduction and continuity of the human species on the planet.

In order to meet these objectives, body systems inter-relate themselves and submit to a severe control process of their functions to keep the homeostasis. This interrelation is ruled by cellular events, which depend on molecular phenomenon that again are also ruled by the laws above mentioned.

Therefore, we may assume that all the past, present and future events in our bodies could have been explained or predicted if we know all the laws involved.

The problem is that we still do not know all the laws, only a few of them. Therefore, this lack of knowledge might leads to a wrong diagnosis and treatment. To solve this problem, this unawareness is

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usually replaced by statistic information and if this data is unable to explain certain situations, the events are classified as “miracles”. Examples of these miracles are the cases of individuals that survive to extreme conditions, even when these situations are out of the limits of the well known laws.

If we knew the laws that are involved in those cases, we would explain the individual’s survival. Most of the biological events are caused by multiple causes; hence this fact demonstrates that we still do not know all the laws involved and I might take a while to do so.

This paper will focus on obesity, which is considered a worldwide epidemic disease and as one of the most important causes of morbid-mortality in many countries.

Medical science explains obesity and bases its treatment in the following mathematical equation:

$$\text{Calories consumed from food} = \text{calories expended} + \text{calories transformed in fat and stored}$$

In our opinion, when a mathematical equation is applied to explain a biological process, then all the variables involved should be considered, since these equations are ruled by two laws: variables involved cannot be left out of the equation and there should not be exceptions because the exception may destroys the rule.

If we do not take in mind these two issues, we will obtain an erroneous explanation about the biological processes involved.

The mathematical equation for the obesity presents three conclusions:

- 1) When people consume more calories than they expend, the excess calories are converted into fat and stored in the adipose tissue, producing weight gain and obesity.
- 2) When people consume the same amount of calories as they expend, they maintain the same body weight
- 3) When people consume fewer calories than they expend, they take the missing calories from the adipose tissue and lose weight [1,2,3].

However, this equation does not consider other important items like:

- 1) Feces, which contain calories and are daily eliminated
- 2) Calories consumed by bacteria in the intestinal flora
- 3) And the unexplained cases of those people who eat without controlling the calories they consume and even though, they do not gain weight.

Most of the healthy people who do not control what they eat and they do not measure calories in the food they consume.

We can infer that it is highly improbable that they consume exactly the same amount of calories as they expend every day.

We could say that they might consume fewer calories than they expend. However, in that case they would suffer from some disease associated to the lack of essential substances such as vitamins, fatty acids, amino acids, iron, etc. [4,5]

Therefore, healthy thin sedentary people who systematically consume excess calories, seems to be an exception to the equation that explains obesity. In a way, they could be considered as the main characters of a miracle, since the equation used, based on well known laws, does not explain their condition.

All human beings need minimum daily nutritional requirements to maintain their body functioning and if those requirements are not satisfied, the organism functions could be affected and diseases may occur. For example, lack of iron or vitamin B12 produces anemia [6].

Amino acids or fatty acids considered essentials are not synthesized by the body and they depend only on food intake[7].

If an individual consumes fewer calories than the expended or exactly the same amount, he or she will also need to consume the exactly same amount of essential nutrients such as minerals, amino acids or essential fatty acids (for the construction of proteins and other structural or functional molecules) in order to maintain body running. As everyone can imagine, this is highly improbable that this happens without a strict control of food intake[8].

Healthy thin people eat what they want, without controlling the amount of calories or essential nutrients, sometimes in excess and even though they do not gain weight or suffer from deficiency diseases. How can we explain this naked truth?

Physicians state that thin people expend more calories than obese people in the development of the same activities because they have a different metabolism. Indeed, they do not explain the molecular mechanisms that cause the differences, and the key of why this people do not gain weight, they are just not studied [9].

Success of thin people does not matter for nutritionists, since these individuals are the exception to the obesity equation and if they were considered successful examples, nutritionists would have to admit the equation that governs their discipline is a fraud. It would be a disaster! Hence, to avoid the disaster, they have to decline digging deeper into new concept digging deeper into new concepts and settle with the already known that consider this people as lucky exceptions or miracles of the nature that granted them the gift of “eating what they want, with no limit and no weight gain”

The laws that establish the equation under study, do not explain the failure of the diets followed with great efforts by obese people, that consume fewer calories than they expend and still they do not lose weight, or even worse, sometimes they gain much more weight).

These laws also don't explain those situations where people who gain weight during a period of time and then retain the weight gained (extra weight) for many years, achieve to slim down, except for those extra 6 or 7 kilos (overweight or stable obesity).

Another unexplained situation is the one of the pregnant women, who gains 10 or more kilos during the pregnant period, retaining the overweight after delivery.

Obesity treatment is also based the equation mentioned affecting either one, two or all components of the equation: a) decreasing the number of calories with a hypocaloric diet (600 daily calories); b) increasing the number of calories expended with physical activity and c) eliminating adipose tissue by surgery procedures.

However, most of these treatments failed or are drop out by patients, therefore, obesity is one of the diseases with highest rate of failure[10].

Obese patients arrive at the consultation eager to lose weight. In general, they present psychological problems, which make them lead to a poor quality life. The physician applies the equation under study and the treatment related to it.

However, if the equation is true and the treatment efficient, why so many people find difficulties to complete the treatment?

In other cases patients follow strictly the treatment with significant efforts; however they do not arrive to lose weight [11].

Other patients manage to lose weight after several weeks of efforts and prohibitions that generate great anxiety; however, when they start eating again normally they rapidly regain the weight they lost or even more [10].

We are convinced that in the case of obesity, with still lack of knowledge about physiopathology that explain the molecular mechanisms involved in this disease, and this is the main reason why the treatment fails. Therefore, why should we keep the mathematical equation of obesity that leads us to misdiagnosis and treatment failures?

We propose to consider an alternative formula with a physiological model based on six concepts that differs from the current paradigm:

- 1) The Human Energetic System is based on the abundance of water and food this fact is one of the causes of the evolution from early hominids to modern humans
- 2) All humans have the same body structure, hence they are equal
- 3) Not all the calories that we consumed are absorbed
- 4) The intestinal absorption is controlled by the Hypothalamus (appetite and satiety center)
- 5) The adipose tissue is not a storage tissue.
- 6) The Leptin substance does not regulate the energetic system; it should be called as the hormone of agility and has not a negative feedback role in the formation of adipose tissue, but it acts in its absence.

Let's analyze each one of these components in order to better understand the idea:

**1) The energetic human system is one of the elements that caused the evolution:** More than 15 million years ago, the African Continent had a tropical climate with huge rainforests. Primates lived in the trees, far from predators and they fed on abundant leaves and fruits. They must have been quite agile to swing from branch to branch of those trees [12, 13].

The energetic system of the primates is based on the constant consumption of food; they eat whenever they are hungry and this occurs several times a day. Thus, they do not need a big adipose tissue for energy reserve. The primates' adipose tissue only provides calories during the fasting period, between each feeding period. If arboreal primates suffered from obesity, they would lose agility to move around trees [14].

Approximately 8 to 15 million years ago, a huge cataclysm formed a mountain range extending from north to south along the Rift valley, from Ethiopia to Mozambique. After this event, Africa was divided into two regions:

- a) A western region that continued to receive wet winds and rains from the Atlantic Ocean
- b) An eastern region that could not receive them due to the presence of the mountain range. In this region, the climate became drier and vegetation changed from the rainforest to the savannah.

Primates reminded in the western region and continued their life in the rainforest and evolved to chimpanzees, gorillas and bonobos, always in the trees with abundant food during the whole year [15].

What happened to the east of the Rift Mountain Range?

At Rift Mountain the rainforest turned into savannah, trees became scarcer and primates had to come down from the trees onto land to find their food and shelter.

A primate species stood up and began to move on its hind legs. The vertical body position allowed them to see over the vegetation and know where to go to find food and prevent from the predator attack. Also, their free hands allowed them to carry objects, like food or elements to protect themselves, such as branches or stones [16].

This was the first step in the primate evolution to the east of the Rift. Those primates whose pelvis was modified to be able to move onto legs survived and multiplied giving rise to the first bipedal primate [12].

The anthropologist Brigitte Senut, from the Natural Museum of Paris, found fossilized bones in the region of the Baringo Lake, Kenya dated to 6 million years. With a fragment of femur and other rests of bones, Dr. Senut was able to determine that the individual was bipedal, 1,50 m height and weighed about 40 - 50 Kg. The teeth found were of the human kind. It was the first hominid found and was named Orrorín. The bones had circular marks, done by teeth from a carnivorous animal similar to a leopard. Orrorín had the same energetic system as its primate ancestors and was hungry several times a day. Bipedalism and the free hands allowed the species to survive for millions of years, probably feeding on vegetables and dead animals.

Several fossil records from other hominid species were found near Chad Lake; this species was named Toumai. Both species co-lived in Africa during 2 million years [17].

Draught in the eastern region of the Rift increased and the savannah became drier. This dry region extends from Ethiopia to Chad and South Africa. Water was scarce, vegetation changed and the sun turned the temperature extremely hot. Many species became extinct, but hominids, whose energetic systems were constantly demanding food became scavengers and started to feed on dead animals. They formed groups and with their free hands they could scare away undesired guests and take the prey [16,18].

They could satisfy their energetic system of abundance. Hunger and satiety allowed them to survive and the considerable increase in the protein consumption determined a new step in the evolution. The hominids like Orrorín and Toumai evolved into a new species: the Australopithecus, who fed basically on dead animals [18].

In 1973, Maurice Taïet and other anthropologists found fossil records in the north of Ethiopia, in the Afar triangle. They found 52 bones from a female who was named Lucy. She was 1,10m height, weighed 25 Kg. and was 20 years old. The species was named Australopithecus afarensis. Several fossil records from other Australopithecus were also found in different excavations; they were named africanus, robustus and anamensis. They co-lived during 3 million years in the east and south of Africa.

The teeth found allowed to assure that they were omnivorous; they ate vegetables and dead animals. High consumption of proteins allowed them to survive, grow bigger and evolve their brain [19].

Three million years ago a climatic phenomenon forced Australopithecus into the next step in the human evolution. With the glaciations, millions of liters of water were solidified, forming large polar ice caps and lowering ocean level, frequency of storms, and frequency of rain in the tropical regions, causing extreme droughts in eastern Africa [203].

The most advanced Australopithecus survived to this situation and discovered that on hitting a stone with another one, one of them broke and the new piece of stone resulted sharp-edged. They found that the sharp-edged stone cut their hands and therefore, they could cut meat. This finding transformed the Australopithecus into Homo habilis, the first human in the evolution line of primates. A clan of 6 or 7 people could feed for several weeks with 100 kg of meat, which could be cut with the new tool assuring Homo habilis food abundance again. Therefore, their energetic system of food abundance remained unchanged with no modification due to evolution. Due to this high protein consumption brain continued to develop [20, 21].

Homo habilis passed their knowledge from generation to generation and techniques improved millennium after millennium [22].

The paleanthropologist Yves Coppens, professor at College in France explains that the development and transfer of knowledge can be assessed by taking 1 Kg. of sharp-edged stone and measure the sharp edge along the evolution period. The result of the evaluation is as follows:

- 1 Kg. sharp-edged stone from 2 million years ago had 10 cm. of sharp edge
- 1 Kg. sharp-edged stone from half million years ago had 40 cm of sharp edge
- 1 Kg. sharp-edged stone from 50 thousand years ago had 200 cm. of sharp edge.

- 1 Kg. sharp-edged stone from 20 thousand years ago had 2.000 cm. of sharp edge

These results show the exponential advance in the efficiency in the development of Homo habilis tools, culture and feeding capacities [23].

The Homo habilis species had 50 % more brain than the Australopithecus. Like their ancestors they lived and moved in clans. They shared their knowledge and as a consequence they established close relationships within the clan and premises of articulated language arose. They were capable of facing large animals with their tools, and felt secure and explored new territories. As a consequence, two million years ago, humans left Africa and spread through Europe and Asia [24].

On leaving Africa, Homo ergaster new specie appeared, adapted to strolls and long journeys. Taller and slimmer, they were extraordinary walkers and they consumed fewer calories due to the longer distances walked. Their brain size continued to increase as well as their creativity. They invented new tools and discovered new social relationships and new feelings. During their journey they developed a feeling of consciousness of themselves, of the others and of the world (solidarity).

Humans spread quickly. They arrived to Europe, Near East and soon populated the whole Asia. They became hunters and incorporated meat to their diet during the whole year. Humans adapted to the new climatic conditions and to the new environments. They became then Homo erectus, who was no longer scavengers, but hunters; they killed to eat. They had efficient weapons and were organized in groups. When they lost their hair, they developed a cooling system with the sudoripar glands, which allowed them to run long distances in hot weather and subdue their preys, which fell due to a heat stroke.

As a consequence of the hunter capacity, Homo erectus ate more meat than their ancestors. Their brain size increased, reaching 1.000 cc. (more than twice as big as the brain of larger monkeys) [25, 26].

Homo erectus lived in China, Africa, the whole south of Asia and Europe for more than 1 million year. Cranium fossils, teeth and other bones of Homo erectus were found in a cavern in Zhoukoudian, near Beijing. This specimen was named Peking man, and was dated to 500 thousand years.

Soon Homo erectus was able to control the fire. This revolution took place at 800-500 thousand years ago. Homo erectus could cook meat, ate it and digest it better. One of the oldest European fossils was found in Spain by the Paleoanthropologist Juan Luis Arzuaga. The fossils correspond to six individuals with similar height and structure to those of modern humans. Their bones show marks of cuts produced by stone knives, flesh removed and eaten by cannibals. This species is known as Homo antecessor [27-28].

The next step in found in evolution trade was the Homo heidelbergensis. Their fossils are dated 400 thousand years ago and were found in Sierra Gran Dolina, Atapuerca, Spain. Fossils include the best preserved and complete cranium found up to the present day. The cranium is flattened, with a thick bony edge on the orbits and a jaw with no chin. The teeth are worn down and the crowns have almost disappeared. At the same time, there was a similar population in Africa.

The European population would evolve giving rise to Homo neanderthalensis and the African Homo sapiens about 200 thousand years ago. Both species co-lived when Homo sapiens arrived in Europe 40 thousand years ago. But this encounter lasted 10 thousand years because Neanderthals finally became extinct approximately 30 thousand years ago.

The Neanderthals had to survive glaciations that covered the north of Europe. They developed a robust contexture with large muscle mass, cranium with thick walls and short legs and forearm. Their nose was very wide and had a prominent superciliar arch. Neanderthals covered their body with furs, controlled fire and managed to be expert hunters of large animals. They were predators of predators. The cause of this species extinction is still unknown. However, we know that one species became extinct because their habitat changes. Climatic causes could have reduced the amount of preys. The Neanderthal men were so

specialized in hunting that perhaps when the remarkable reduction in the number of animals occurred they did not know how to replace the abundance of food they had before. Also they could suffer from diseases that along with a low birth rate conducted to an annihilation of their population [29].

The fact is that *Homo sapiens* would coexist in the same habitat with *Homo neanderthalensis* and the possible causes of their extinction did not affect *Homo sapiens*, who remained as the sole human species in Europe for 30 thousand years[30].

The *Homo erectus* who stayed in Africa evolved into the *Homo sapiens* 200 thousand years ago. Their brain size was the same as that of modern humans. Doctor Spencer Wells, a geneticist from Washington D.C. states: "...in my opinion the essence of humanity is creativity; the ability of imagining things that do not exist and make them happen and that includes language. We are our brain, our brain defines us, in fact, it is the only tool we have as a species. The brain helps us to adapt at a cultural level rapidly. The brain is something amazing. The step from archaic *Homo sapiens* to the creative *Homo sapiens* took place 40 thousand years. ..." [30, 31].

The eruption of Toba volcano occurred 74 thousand years ago in Indonesia. It was the most important eruption in the last 2 million years. The ashes of Toba volcano produced a volcanic winter that lasted 6 years. Over the next thousand years the climate dramatically changed. Europe and China became uninhabitable. The reduction in the global temperature gave rise to a glaciation. Doctor Wells also calculate that after this catastrophe human population was reduced to 1.000 or 2.000 individuals. This even meant a bottle neck in the population that reduced the variety of the human race. However, it produced a selection where the most capable and the most skilled individuals to face adversity survived [31]. According to Doctor Rebecca Kan the mitochondrial DNA determines that all modern humans descend from those 1.000 or 2.000 *Homo sapiens* who survived in the north of Africa and from that place spread to the whole planet. They crossed the Red Sea to Yemen, taking advantage of the decrease in the sea level caused by the glaciations. From Yemen they moved to Asia through the littoral and through the Mesopotamia, they crossed to the Middle East, and from there they re-populated Europe. From Asia they also crossed to Australia and to the South Pacific islands, and through the Bering Strait, they finally arrived in America [32].

In the Asian Mesopotamia they started growing and breeding plants and animals. Sedentary emerged as a way of life. This step forward allowed humans to settle down in fertile regions along the side of large rivers given rise to large civilizations. Once they felt sure they would obtain food, they focused on other tasks that helped the species to dominate and modify the environment all over the planet to allow an exponential increase up to 7 thousand million of individuals in our days.

### **Humans are the dominant species**

According to Paleoanthropologist Juan Luis Arzuaga: "...The most remarkable mystery of human evolution and the furthest boundary of investigation is the origin of human mind, because humans have conquered a series of mental abilities, which no other species posses. Among these exclusive human abilities, consciousness highlights. At he same time, we have the capacity to create the future and to make plans, that is, to build in some way our destiny. We have also developed a powerful technology and create symbols to communicate through them, in a language remarkably different from any other system of animal communication.

So far, we can conclude that the driving forces in human evolution from primates to modern humans were following topics:

- a) Bipedalism (free hands and larger view field)
- b) Incorporation of carrion into their feeding habits
- c) Increase in the size and complexity of the brain developed at the same time as the finger-thumb opposition

- d) Learning to protect themselves against stronger and faster predators
- e) Tool manufacture
- f) Fire control
- g) Transformation into hunters.
- h) Self-preservation after a natural catastrophe due to ability and intelligence
- i) The sedentarism

The energetic system of abundance, which is present in our DNA from the beginning of human evolution, was never modified. When climatic conditions were unfavorable and the amount of food decreased; human's intelligence found the way to obtain enough food, transferring their knowledge from generation to generation.

We believe that the energetic system of abundance caused the evolution from the first primates to modern humans. As this situation it did not change over the 10 million years so it encouraged individuals to achieve higher efficiency to obtain a "food abundance status". The only species that attained this higher efficiency was *Homo sapiens*, our ancestors, who left as legate to us the Energetic System of Abundance [33]. The rest of the species became extinct.

As long as we respect this system, we will be able to remain with normal weight, otherwise, we will expose to obesity.

**2) All humans have the same body structure, hence they are equal:** Studying the DNA of all modern people around the world, scientists confirm that all humans descend from the *Homo sapiens*, who lived in Africa 74 thousand years ago [34]. We may also assure that from that date, no deep evolutionary changes in any of our organ system has been performed. We have the same organs and hormonal and neuronal systems as those of *Homo sapiens*. Therefore, we could say that all humans have the same energetic system of abundance. We are hungry several times a day [34,35].

**3) Not all the calories we consume are absorbed:** If we then submit this people to a hypo-caloric diet in order to lose their extra weight, and we also assessed their daily activities and calculated the calories they eat and expend in a day, we will be able to classify them as "normal" or "abnormal" individuals [36].

When this intake of calories exceeds the one consumed, it is establishes by the classical equation, that we will soon be taking care of people with abnormal weight/obesity and we usually end to propose them a treatment. However, if they finally do not put weight, we won't treat them for being part of those lucky successful thin people.

But this proposal presents several contradictions: a) "successful" thin people who eat all they want and remain with a BMI (Body Mass Index) ranging between 20 and 25, and because they do not put on weight they are consider normal people. How do they behave when they feel hunger 3 or 4 times a day? 98,7 % of the surveys we have conducted these successful thin population revealed that each time they were hungry they eat until they feel satiated without controlling the amount of calories they consumed. Also, from daily activities data, we confirmed that these people consumed more calories than they did expend in a day. It is difficult to explain why they are thin?. Scientifics answered his dilemma classifying these individual as "high metabolism" organisms. How can they be normal with a "high metabolism"? In that case if they are normal, their metabolism should then be also normal. Following the logic equation we could say that in the obese people with "normal metabolism" their BMI and their excess of weight could be explain because their intake is greater than consumption [33].

To summarise this point we expose the following equation:

Successful thin people ..... normal BMI .....abnormal metabolism.

Obese people..... abnormal BMI.....normal metabolism.



The food consumed is digested by the enzymes of the saliva, stomach, intestine and pancreas. Once the food becomes basic nutrients, as carbohydrate and amino acids, it must impact against the intestinal mucosa and find a specific transporter, bind to it and penetrate in the intestinal cell. The chyme is then formed by all the molecules consumed and digested, complex undigested molecules, water, vitamins, minerals, that moves around the whole intestine helped by peristalsis.

If the absorption is higher than 98 %, almost all proteins and complex carbohydrates will be successfully digested. Also, for an efficient (98%) probability of impact against the epithelium cell membrane and the bind to the specific receptors, the number of receptors for the absorption should be enough. For example, at least 980 out of 1.000 molecules of proteins or carbohydrates arriving at the intestine will be successfully digested, and from this number, 100% should arrive at the periphery area of the chyme and find its specific receptor in the membrane of the epithelium cell, conveniently bind to it and then enter the cell cytoplasm. All this process occurs in the tour around the small intestine; since once they pass through the ileocecal valve towards the cecum, they will no longer be absorbed.

Regarding the lipids, once emulsified by the bile salts and digested by the enzymes, they must also impact the membrane of the intestinal epithelium cells. However, due to their high liposolubility they can pass through the membrane by simple diffusion, in favor of the gradient of concentration. Once inside the cell, the fatty acids produced by the digestion of the lipids together with the glycerol, became triglycerides and move out from the epithelium cell through the basal membrane and form chylomicron, which is transported by the lymph to the blood circulation.

Thus, dynamics of the fatty acid absorption needs enzymatic cell machinery capable to do all this work.

As a conclusion, we could say that the amount of food consumed is not important, since although more than 98% will be successfully digested and absorbed, the organism will also expend unlimited energy in the processes of digestion and absorption, regardless the amount of food consumed or the necessity of the calories involved. In the case that calories intake were more than the necessary for maintain body activities, they will be transformed into lipids in the liver and they will be stored in the adipose tissue. And if the adipose cells present are not enough to store them, new cells will be produced for all the lipids will be stored, wasting energy in this new process.

Besides, the organism will expend extra amount of energy in forming new capillary nets and supporting tissue to sustain the new adipocytes, and the rest of the body will expend more energy to support the weight of the new adipose tissue.

The contradiction is that all body systems are subjected to a nervous or endocrine control and tend to save energy. However, neither nutrient absorption nor adipose tissue formation seems to have an efficient control, since no matter what amount of food consumed or the volume of his adipose tissue formed, he will eat again and continue to waste energy, forming adipose tissue that will be harmful for him.

If this individual would be placed somewhere back in 10 million years of human evolution, he probably would die, since he would be an energy waster with no physical agility to run away from predators or hunt his prey. So, if obesity would not allow them to survive in their environment, but we know that they did so; we could say they did not suffer from this disease.

If they did not suffer from obesity, and we have the same DNA as them, why does our organism generate obesity and theirs did not?

Based on the concept of energy save and control of all the functions of the organism by the nervous system or the hormonal system, we should accept that absorption and formation of adipose are controlled.

It should also be accepted that not all 100% of the calories consumed are absorbed and that obesity could be produced by an error of information received by the brain, in relation on the amount of food available.

In order to eliminate contradictions, we might think that as long as the brain receives the information on food scarcity, the absorption increases; and on the other hand, if the brain receives the information on food abundance, the absorption decreases.

**4) The absorption is controlled:** To think in a physiological model that shed light to the current lack certainties and could explain all the vagueness and weakness of the classic theory; we should accept that it exists:

- a) A regulating nervous organ that receives stimuli to release its hormone.
- b) A structure to be regulated or a target organ for that hormone
- c) The stimulus that produces the release of the regulating hormone.
- d) A negative feedback circuit that blocks the release of the hormone.
- e) The active role of adipose tissue and its hormone Leptin in the digestion-absorption process and in the control systems.

Ghrelin, the hormone secreted by the empty stomach and the afferent pathways carrying stimuli generated by the gastric emptiness reached the Appetite Center of the Lateral Hypothalamus that regulates the absorption [37].

Since until now it remains unknown how the hypothalamus regulate the absorption, we believe in the existence of a hormone that we propose to denominate “Opetocine”. The release of “Opetocine” from hypothalamus, should have receptors either in cell surface or in the intracellular in the bowel epithelial cells directly or via a second messenger impacts on nuclear DNA and promote the synthesis of membrane transporters for the absorption of carbohydrates and amino acids, and stimulating the enzymatic machinery to synthesizes triglycerides from the fatty acids and the glycerol.

The negative feedback of “Opetocine” release would be caused by either Neurotransmission inhibitor released by neurons of the Satiety Center of the Ventromedial Hypothalamus (Nesfatine-1?), or by Leptin released from the adipose tissue that would have a negative modulating effect, inhibiting partially the “Opetocine” release.

The physiological mechanism of the model would be as follows: when the stomach is empty , it sends signals to the Appetite Center, that responds: a) sending signals to the cerebral cortex to make the sensation of hunger conscious and activate all actions destined to consume food and b) secreting “Opetocine”, that produces an increase in the intestinal absorption.

When the individual eats, he feel satiety because the distended stomach sends signals to the Satiety Center that responds sending signals to the cerebral cortex to make the sensation of satiety conscious and cause the individual to stop eating and also releasing neurotransmitters that may inhibit the release of “Opetocine” (Nesfatina-1?).

The inhibitory role of the leptin is given by the presence of scarce adipose tissue (in a normal BMI individual). So, in these cases leptin might partially inhibit the satiety center but the highest inhibition could be explain by the “Opetocine” released.

In those situations where food is abundant, as soon as the individual is hungry, he or she eats until satiated and the levels of “Opetocine” in blood could be low; hence, absorption is kept at its minimum expression (we could say than is a basal absorption). Thus, when the brain receives signals of food abundance, hungry only will last for a few minutes, and the absorption will remain basal and the adipose tissue will be keep at a normal volume.

However, if food is scarce, when individual feels hunger and he does not have enough food to eat, he will be able to eat just once or twice a day. Hunger sensation is prolonged over time and the release of

“Opetocine” will then increase, raising its concentration in blood and stimulating the increase in the absorption that will now be over the basal level. And because individual are still hungry and does not feel satiated, “Opetocine” release is not blocked. If this condition of hunger is prolonged overtime, the absorption is kept at a high level and the little amount of food the individual eats will be almost totally absorbed.

When fasting individual obtains abundant food again, during the first days of this new period of food restoration, the absorption will still be high and more nutrients than the necessary ones will be absorbed. These nutrients will become fat and will be stored in the adipose tissue, replacing nutrients lost in the period of food scarcity. The leptin that had reduced at this point its level due to a reduction in the adipose tissue, will then allow an extra increase of “Opetocine” due to the absence of the its blocking in the appetite center and will contribute to a higher increase in the absorption reaching its maximum capacity. When the adipose tissue recovered has a normal volume, leptin turns to its normal plasmatic level and blocking of the “Opetocine” release is reestablished (most of it due to satiety and part of it due to leptin). Thus, the individual will present: normal “Opetocine” level, basal absorption, normal leptin and normal volume of adipose tissue (scarce to allow agility).

The energetic system “of abundance” allows the individual to maintain an optimum weight and little adipose tissue, but enough to incorporate calories during the fasting period or during short periods when food is scarce. If food scarcity remains for a long time, the individual will exhaust the adipose tissue, then his organism will turn to protein degradation and if the energetic demand is still not satisfied, he will suffer from cachexia and die.

This physiological model explains why successful thin people do not gain weight although they consume more calories than they expend because they just do not absorb them. They maintained their absorption at a basal level, because they feel hungry for a short period of time and as a consequence, they will eat until they are satiated. Their adipose tissue has the minimum volume because they will never absorb calories in excess.

### **What happens when a successful lean person increases the energetic demand?**

The adipose tissue provides the calories the lean individual lacks. If the condition of increased demand remains over time, the adipose tissue will be exhausted the leptin level in blood will be reduced and part of the additional “Opetocine” will be released. The other part will be inhibited by the satiety they feel each time they eat and are not hungry). With the extra “Opetocine” released, absorption will increase and the energetic demand will be maintained due to the increase in the nutrients absorbed and not by the adipose tissue that was exhausted.

### **What happens when the energetic demand is stabilized?**

The increase in the absorption generates an excess of absorbed nutrients and a further transformation into fat, which will be stored in the adipose tissue. When this tissue increases its volume, the plasmatic level of leptin rises, and the block of “Opetocine” release due to leptin will finish. Thus, absorption becomes basal again and the adipose tissue recovers its normal volume.

### **Why do people gain weight?**

Because the brain receives erroneous signals of food scarcity and it increases the absorption unnecessarily.

People start to gain weight because they change their eating habits. They feel hungry for several hours. Consider an individual who wakes up after sleeping for 8 hours and 10 hours of fasting period, he gets up, eats something light (according to European or South American cultures) and then goes to work or school. By the mid morning, the individual eats but does not feel satiated, so at noon he will lunch after been

hungry for several hours. This process will increase “Opetocine” release, and by the lunch time he will be starving and will eat until satiated. As his absorption is increased, the individual will incorporate unnecessary calories, which will become fat and finally stored in the adipose tissue, generating over-weight and obesity. The levels of leptin will be also high, however as mentioned above the highest value of the “Opetocine” inhibition that promotes the leptin only partial, so “Opetocine” release won’t be avoid and the absorption will be increased. We should consider that leptin is efficient for being absent to recover adipose tissue and that its regulating effect on the adipose tissue volume needs the constant satiety for the “Opetocine” to be low.

The same situation will occur in the afternoon and at dinner time.

In summary, if an individual does not eat until satiated each time he will feel hungry, the brain will takes this situation as a food scarcity condition and will then maintain high levels of absorption.

### **What happens if an obese person goes on a hypocaloric diet to lose weight?**

In the first place, the obese person will feel the same or more hunger as he was previously feeling. Therefore, during the hypocaloric diet, the levels of “Opetocine” in blood should remain high or even increase. Hence, the absorption level will be high.

If the person follows the diet and complete it he will certainly lose weight, because although, what he eats will be totally or partially absorbed, it will not be able to fulfill and balance the energetic demands and will use his adipose tissue. The result is the weight loss after many hours of hunger and a high level of absorption. After losing weight, if the person ends to eat larger amounts of food again because he already met his goal, and most of the food consumed will be absorbed, his adipose tissue will rapidly increase gaining weight.

### **What treatment will be the right according to the physiological model proposed?**

Obese or overweight individuals should eat as successful thin people or as the Homo sapiens: four times a day, that is, each time they feel hungry and they should eat until they feel satiated. Although at the beginning they may gain weight because they had a high absorption level after a short period of time, their “Opetocine” level will decrease and the absorption will be at a basal level. The moment they stabilize their weight will indicate that the level of “Opetocine” is the lowest; hence, the best way to eliminate the remaining adipose tissue is increasing the energetic demand with physical activity.

This physical activity should produce stress, and promote lipid deposit mobilization in order to provide energy, recovering its normal level, as well as other variables of the model like blood “Opetocine”, absorption and leptin.

To not regain weight, individuals should eat taking into account the four meal times, feel satiety in each of them, so the level of “Opetocine” will not rise, absorption will be basal and the adipose tissue remains minimal, maintaining a normal BMI.

### **Stable overweight and obesity**

Due to changes in their lives or changes in their habits or timetables, some people gain weight and maintain those extra kilograms for many years. These people (at least in Latin culture) are employees or workers that usually skip lunch and go through hours of fasting, and finally arrive at dinner time with hunger. Hence, “Opetocine” level would remain high and consequently their absorption will be also high. No matter if they eat a little bit, all those calories will be absorbed, and the vicious cycle of overweight will perpetuate.

**5) The adipose tissue is not a storage tissue:** According to the physiological model proposed, it is clear that human's adipose tissue has not a deposit role, as it occurs in other species.

In humans, the adipose tissue stores lipids that will provide the lacking calories only for a few hours; during the fasting period, after sleeping, between meals, when intense physical activity is performed, or in the absence of one of the meals.

This is why, in people with BMI of 25, the adipose tissue shows its maximum size, according to the species. In overweight or obese people, the adipose tissue increased by error, since the human body survived and evolved with a system based on food abundance, with a basal absorption and minimum adipose tissue to provide energy just for few hours. The adipose tissue does not have negative feedback for its development because it is designed to be normal, reduced or to disappear.

**6) Leptin is the agility hormone:** Adipose like adiponectin, resistin and leptin, (adipose tissue-specific secretory factor -ADSF) . While the former ones have a role in glucose, fatty acid and LDL cholesterol levels, the last one –Leptin- actuates as a strong appetite suppressant.

Leptin is a hormone released by the adipose tissue to perform a negative feedback on hypothalamus. When fat mass increases, leptin levels increase, suppressing appetite until weight is lost. We proposed in this paper the existence of a linking molecule the “Opetocine” that will decrease its release due to this negative feedback. However, leptin is a modulating hormone, which inhibits only a part of that release.

Once food abundance is recovered or the energetic demand is reduced, hunger is satiated by leptin but the formation of new adipose tissue remains and adipose tissue mass will be recovered because the absorption is still high. Leptin blood levels start rising until blocking part of “Opetocine” release (the other part will be blocked by satiety). Thus, the increase in the absorption and growth of adipose tissue stop.

Primates and all the members of the evolution chain, even the Homo sapiens owe their evolution to the Energetic System of Abundance, because when food was abundant, they were strong healthy and agile due to adipose tissue scarcity. When food was scarce they had to use their intelligence to obtain abundance. Those who did not manage the extreme situation died due to malnourishment, and those who assure themselves abundant food, survived and passed to the next step in evolution.

Leptin avoids the increase of the adipose tissue and the loss of agility (together with satiety). Agility was essential for human's evolution to save their lives or to hunt their preys. That is why; in our opinion leptin should be considered the hormone of agility.

## CONCLUSION

We may conclude this text saying that like in other endocrine systems, it is not strange for hunger and satiety it exists a hypothalamic hormone that regulates the volume of the adipose tissue through the leptin action. In the present text we purposed to name that hypothalamic hormone as “Opetocine”.

Regulation of the body weight should be based on the equilibrium of the energetic saving capacity, nutrient absorption and nutrient storage.

Our proposal is that the energetic system of abundance regulates the relationship between hunger and satiety; and explains why slim people that eat large amounts of food do not gain weight, why people that have harmful eating habits gain weight and why some people maintain a stable overweight along vast periods of time.

We propose that treatments for obesity should be based on the physiological model. Also, we pull the attention on key substances that have a role within the energetic system: a theoretical substance proposed by our group, whose existence is linked to an increase in absorption and we called it “Opetocine”; and

leptin, which would reduce “Opetocine” secretion, regulates satiety and modulate the size of the adipose tissue.

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