

Psychophysiology of eating

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Hunger

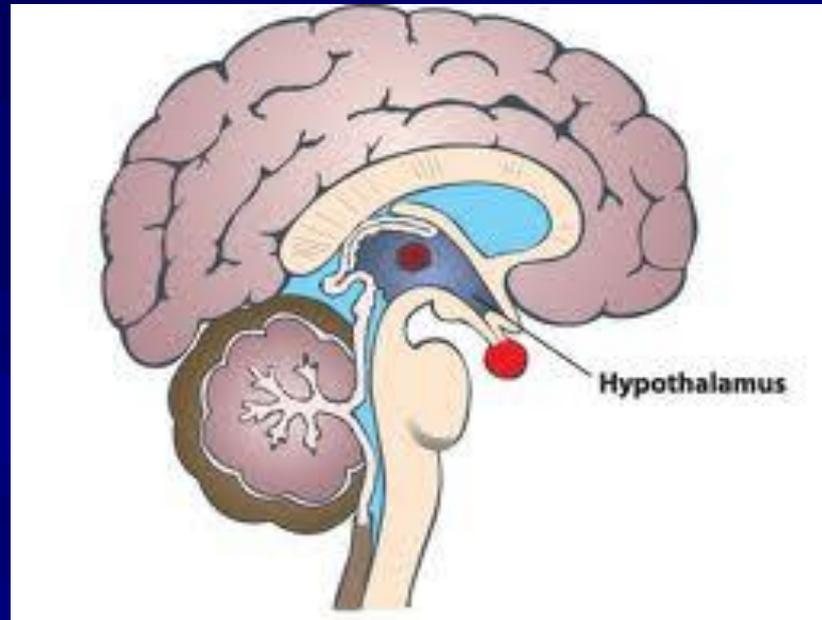
- Hunger can be a strong motivator .
- In people on semi starvation diets much of their thinking and dreaming is about food .
- Depletion of nutrients from the body, activates homeostatic mechanism to release stored food .
- When the body stores are diminished to a point that the automatic homeostatic mechanism can't cope, the whole body is mobilized to seek food .
- Internal signals of hunger : empty or aching pain in the stomach with feeling of weakness .
- External signals : odor and sight of food , habits, social .



Regulatory centers in the hypothalamus

- Regulation of food is crucial to life that we have several homeostatic controls .
- Hypothalamus , located in the base of the brain connected directly to other parts of CNS, has very rich blood supply (readily affected by chemical state of the blood).
- Two hypo. Areas influence food intake .
 - The lateral hypothalamus(LH) initiates eating .
 - Ventromedial hypothalamus(VMH)inhibits eating
- There are two control systems integrated in the hypothalamus :





Short term control of food intake

Variables which influence the hypothalamic control of immediate appetite: blood-sugar level, stomach fullness and body temperature.

- Low sugar and insulin injection . increase food intake, injection of glucose inhibit eating .
- Hypo. Contains (gluco-receptors) cells sensitive to the rate at which glucose passes through.
- Gluco-receptors in VMH and LH respond differently to the glucose level in the blood .



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- Digestion is a slow, eating is stopped long before it is transformed to sugar.
- A full stomach signals to the brain that food is in the way .
- If food is injected directly to the stomach of hungry animals, and allowed to eat freely, they eat much less .
- If food is removed from the stomach of a satiated animal it will eat to compensate for the loss only.
- Apparently distension of the stomach stimulate VMH and inhibit further eating .



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- An empty stomach produces periodic contractions of the stomach wall (hunger Pangs) this stimulate LH to initiate eating.
- A third short term control mechanism is body temperature .
 - Most animals and humans eat less in a warm environment than in a cold one.
 - Cooling of the brain has similar effect .
 - LH responds to low brain temp. and VMH to high brain temp.



Long term control of food intake

- Most wild animals maintain about the same weight through their lifetime.
- It is more difficult for humans to do so because their eating is influenced by emotional and social factors .
- The hypothalamus appears to regulate a delicate system which stabilizes weight over time .
- Rats with damaged VMH overeat and become obese to a point, then slow down eating. If diet is restricted they go to their original weight, if they allowed to eat freely again they overeat and go back to their obese weight .
- If force-fed and become super obese then eat freely they reduce their intake and return to their obese weight .



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- Some correlates of body weight must act on the VMH to influence food intake .
- Autopsies of animals with VMH lesions indicate that the amount of fatty acids in the blood is influential .
- In contrast rats with lesions in the LH refuse all food and water for some time after the operation and will die if not artificially fed ,after few weeks they resume eating and drinking on their own ,but stabilize at a lower weight level .
- These findings indicate that the VMH and the LH have reciprocal effects on the (set point) for body weight .
- Beside the hypo. Which plays a crucial regulatory role other brain areas like the limbic system and brain stem nuclei involved in smell and taste of food play a role too .



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- The hypothalamus can be more accurately described as a critical link between higher and lower brain areas that regulate eating behavior rather than the areas containing feeding and satiety centers .



Obesity

- Is a major health problem .
- A popular view is that it stems from unresolved emotional problems .
- Research has failed to isolate a personality type specific to obese people .
- Current research on obesity consider the situational factors that leads to overeating, what cues prompt a person to eat? And how do obese persons differ in their responses to these cues .



Factors that influence eating

- Responsiveness, to food cues, the sight, aroma and taste affect how much and when we eat .
- Research suggest that obese people are more responsive to such cues (inherited ?).
- Taste appears to be particularly important to obese people (ice cream test).
- Obese people are also highly responsive to the sight of the food (bright light test).
- Overweight individuals often report that their eating is increased when they are tense or anxious, in contrast with normal weight individuals (film viewing).



Conscious restraints of eating

- Overweight individuals are more likely to be dieting than normal-weight ones ,this is probably the cause of their responsiveness to food .
- Research results classify people to (restrained eaters) and (unrestrained eaters) regardless of their weight .



Exercise and eating

- The level of body energy expenditure is critical to the weight control .
- Energy expenditure depends on :
 - General activity level and exercise .
 - The basic metabolic rate (the energy needed to maintain minimal body functions
- Basal metabolism accounts for about two thirds of a normal-weight person's energy expenditure



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- For the overweight ,energy expenditure is inhibited because the metabolic rate is lower in fat tissue than in lean tissue .
- Metabolic rate is decreased during food deprivation, both of these factors work against the effort of obese to lose weight.
- Physical activity accounts for about one third of normal energy expenditure, but it plays more critical role in the amount of energy expenditure by an overweight person .
- Exercise is critical in weight loss, not only because it burns calories, but also because it helps to regulate normal metabolic functioning .



Behavior modification and weight control

- Awareness of the individual of the factors that lead to overeating and trial of changing them (daily record of eating).
- Behavior therapy + drugs, best results .
- Short-term weight loss is easy, but the ability to keep weight off permanently depends on establishing self-control over eating habits .



In conclusion

- Obesity results from the interplay of genetic, metabolic, psychological, and environmental events , the importance of each varies from individual to individual .
- Despite the complexity of the problem, weight control is possible, in most cases.



THANK YOU

