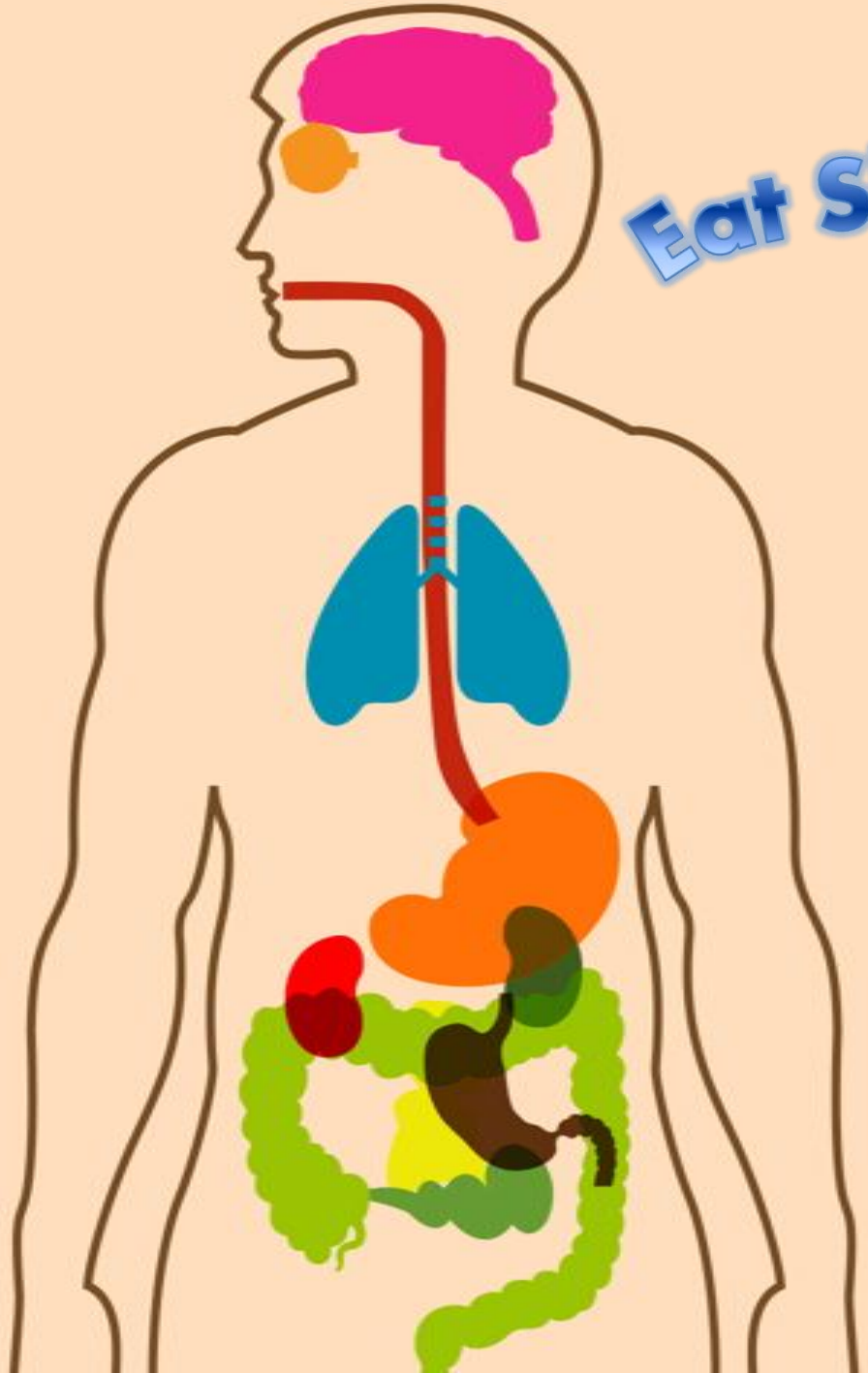


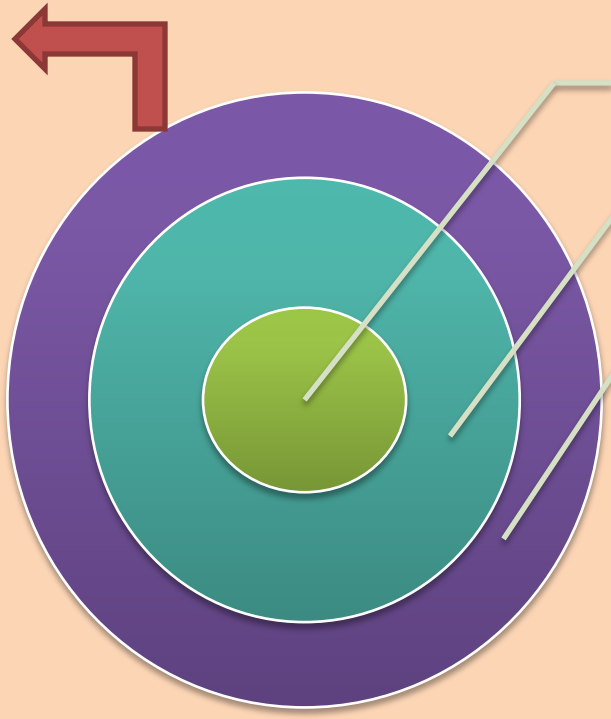
Eat Slower to Eat Better

A smart fork in search of a health movement

Student name : Salwa Kittaneh

Supervisor name : Alma Irshaid

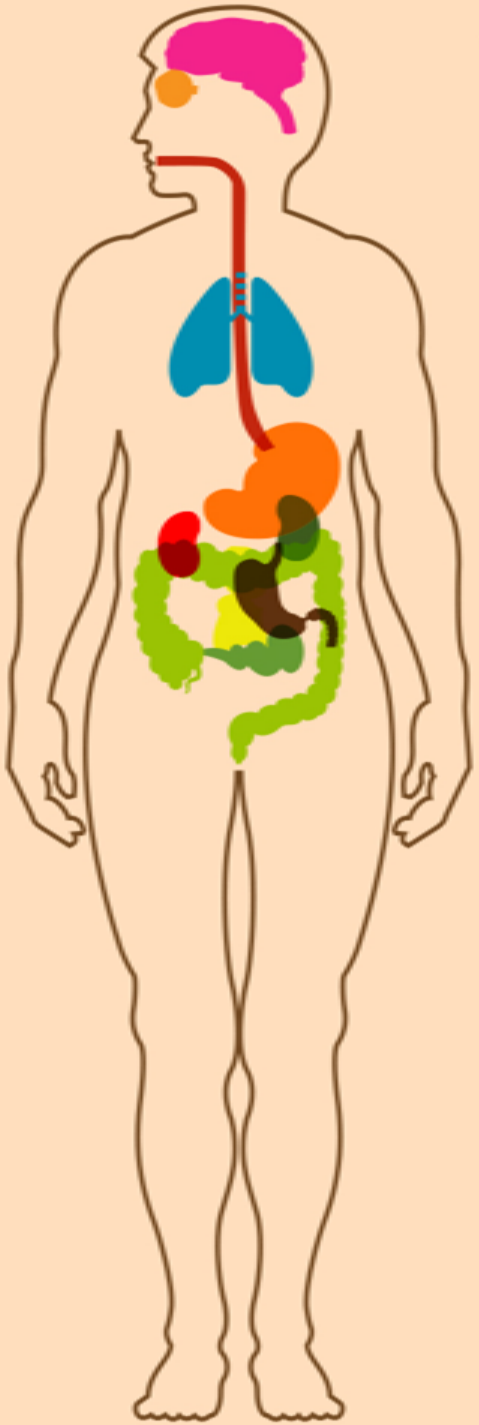
Statistics :



The number of obese people reached more than 42 million in the world

32 million of them in developing countries

In Palestine 17.9% of males and 25.9% of female concern from obesity



introduction

Eating behavior is a totally new scientific field.

Currently, we can only observe and describe eating patterns.

For example, we have noticed that people who seem to eat at a reasonable pace use the fork 60 to 75 times during meals lasting from 20 to 30 minutes.

The medical community widely supports the importance of eating more slowly since a series of scientific studies highlighted many negative effects related to eating meals too quickly:

WEIGHT GAIN

GASTRIC REFLUX

DIGESTIVE PROBLEMS

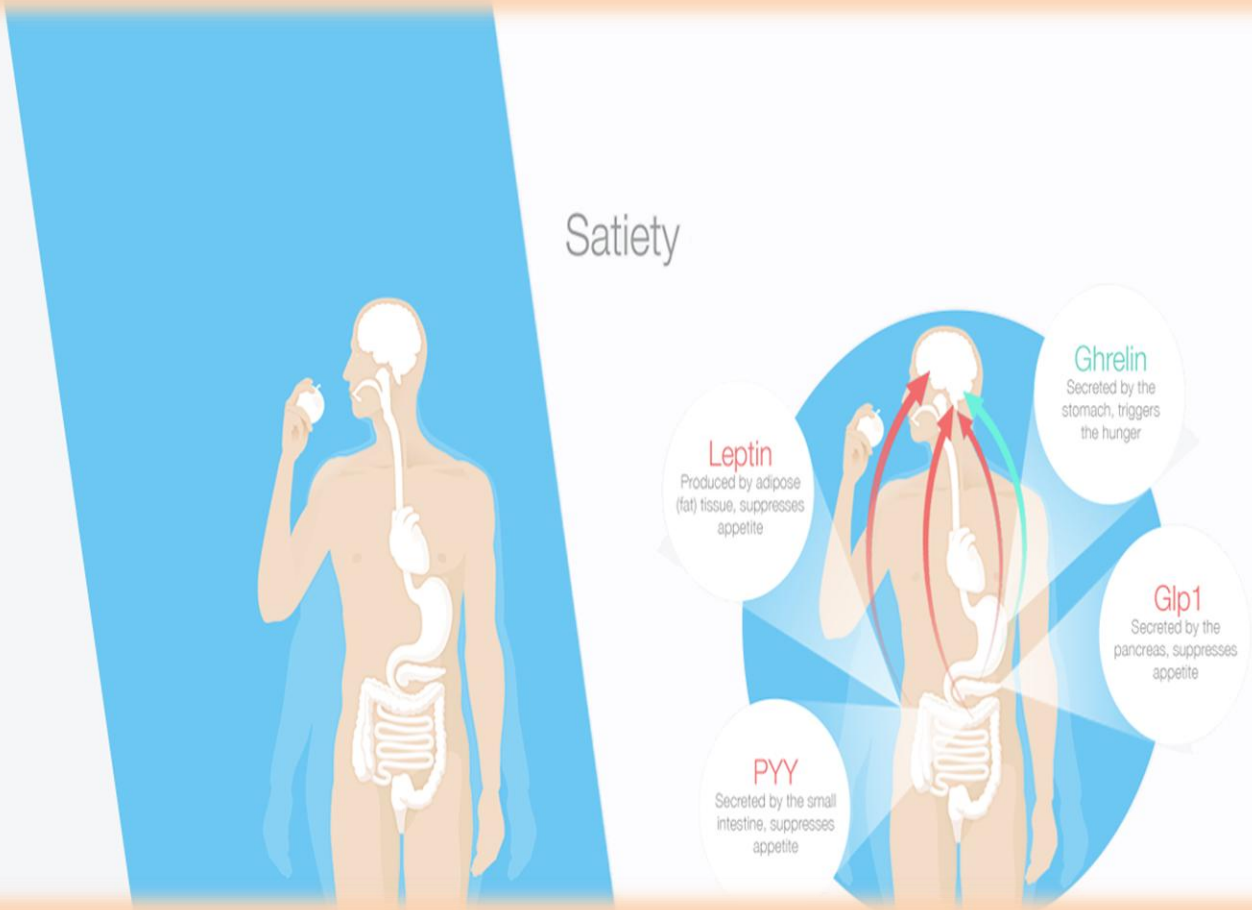
POSTOPERATIVE COMPLICATIONS

5 Signs You're Eating Too Fast & How It Can Affect Your Health :

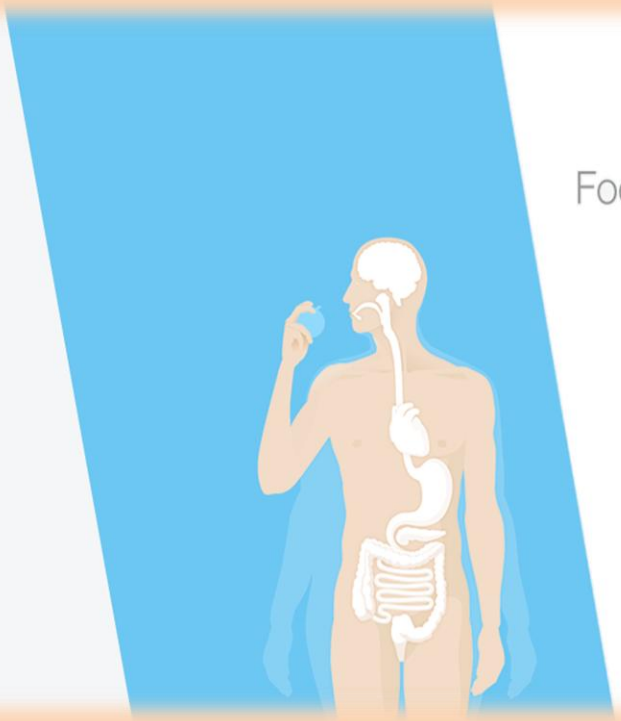
1. you are burping a lot

2. You feel uncomfortably full after every meal

3. You are dealing with reflux
4. You feel bloated
5. Heart burn



The medical studies show that eating slowly encourages the concentration of satiety hormones such as GLP1 and cholecystokinin.



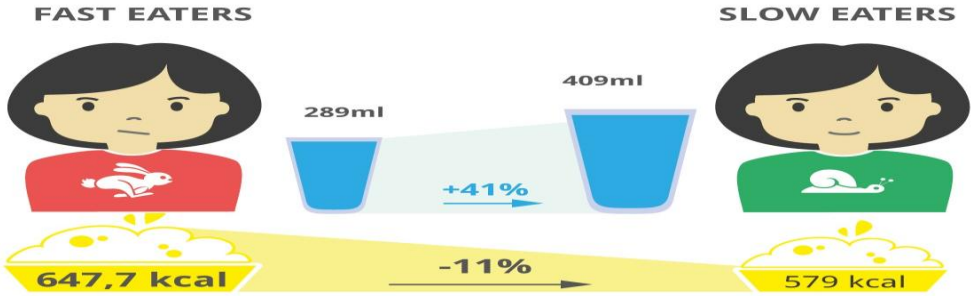
Food Intake

Even if energy intake is equal per meal absorption level is enhanced in slower eating .

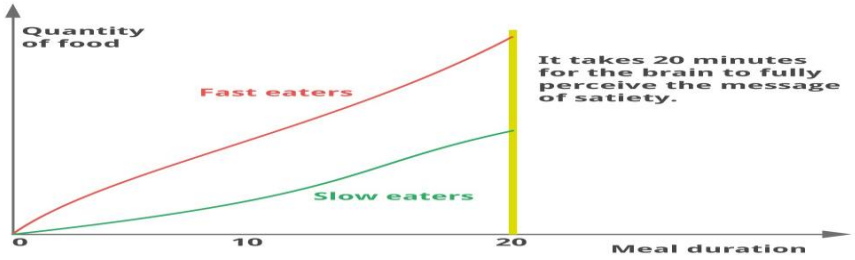
Higher risk of overweight for fast eaters

Physiology & metabolism

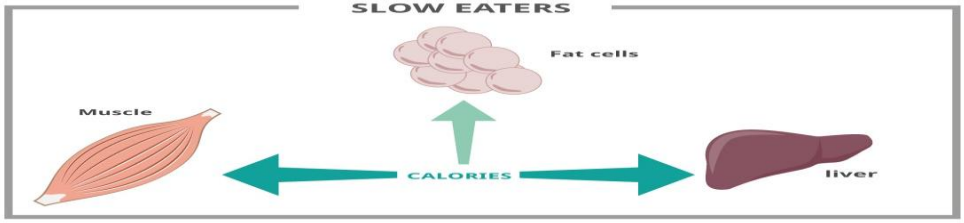
Eating slowly led to decreases in energy intake within meals in healthy women *

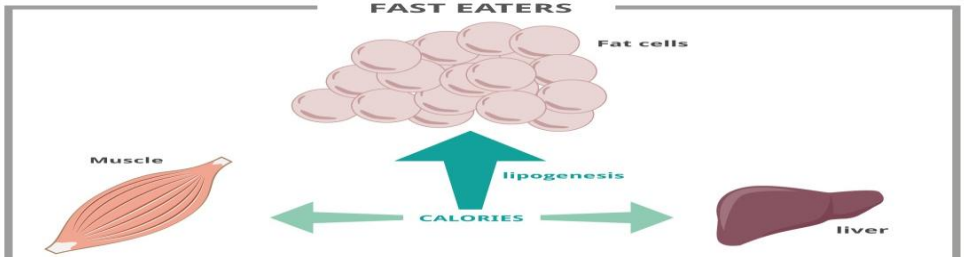


*Eating slowly led to decreases in energy intake within meals in healthy women. Andrade AM1, Greene GW, Melanson KJ. - 2008 Journal of the America Dietetic Association Jul;108(7):1186-91



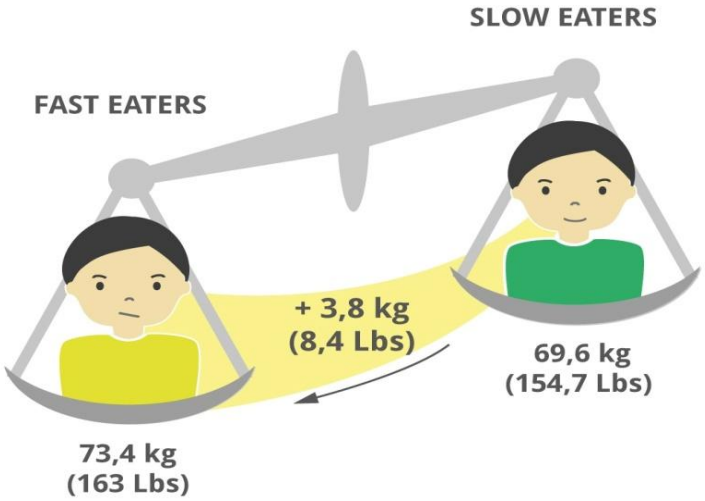
Body storage of calories intake





higher peak of calories intake, generates higher lipogenesis

Data & studies



The BMI of the male patients who ate quickly (average 25.4) were significantly higher than those of the patients who ate at a normal rate (average 24.4) or slowly (average 24.1). Illustration :

2011 - Journal of International Medical Research Jul-Aug;30(4):442-4. Takayama S, Sasaki T	422 patients with type 2 diabetes or hyperlipidaemia

In multiple logistic regression models, eating rate was significantly and positively associated with metabolic syndrome. Of metabolic syndrome components, abdominal obesity showed the strongest association with eating rate. The association of slow eating with lower odds of high blood pressure (men and women) and hyperglycemia (men) and that of fast eating with higher odds of lipid abnormality (men) remained statistically significant.

BMJ Open. Sep 5;4(9):e005241. Nagahama S, Mizoue T. - 2011	Study on: 56,865 participants

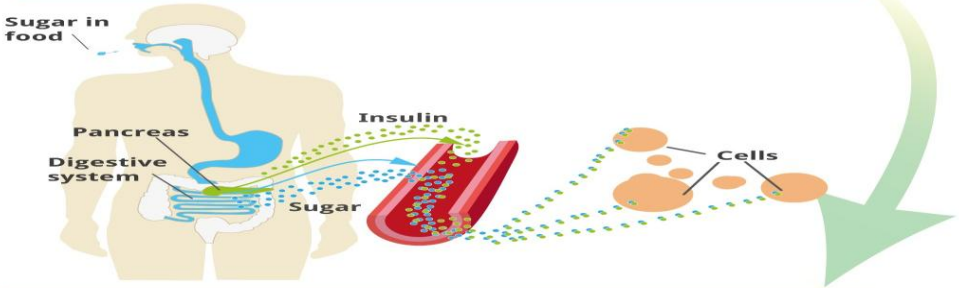
unhealthy eating « junk food » is very well known for being related to the risk of developing HTN, hyperglycemia and excess of cholesterol.

The medical studies demonstrates a strong correlation between the behavior which consists of « eating quickly » and the cardio metabolic risks.

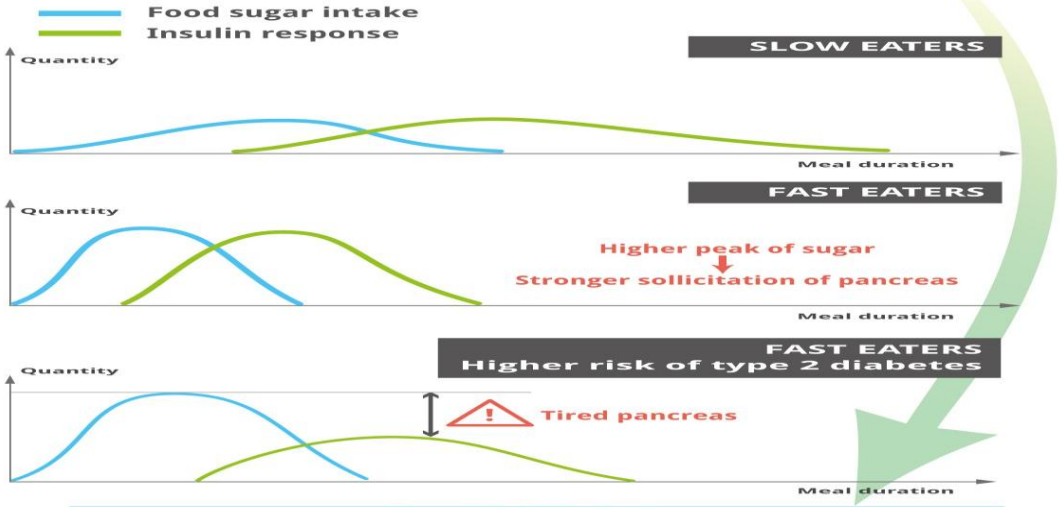
Fast eating increases risk of type 2 diabetes

Physiology & metabolism

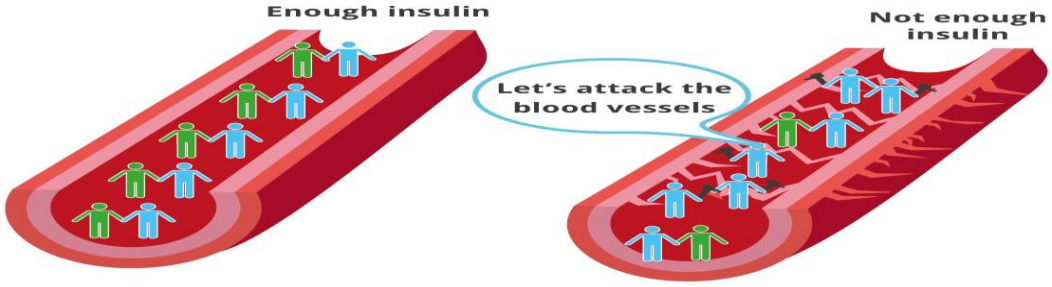
Insulin lowers sugar levels in bloodstream



Insulin response correlated to eating speed



Type 2 diabetes = high blood sugar levels over a prolonged period



Prolonged excess of sugar in bloodstream damages blood vessels

Data & studies

More risk of type 2 diabetes (OR = 2.52) was determined **for subjects eating faster** vs. subjects eating slower.

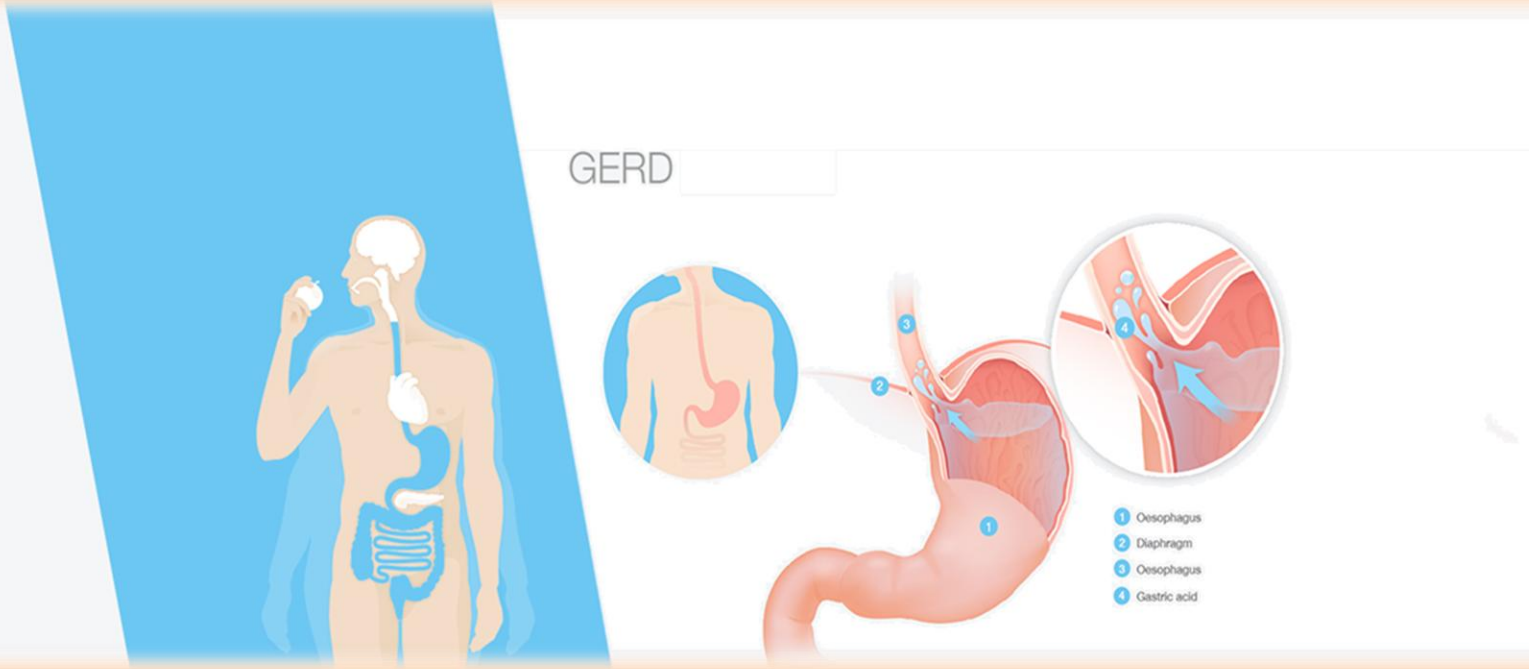
2013 Clinical Nutrition (Edinburgh Scotland) Apr;32(2):232-5 Radzevičienė L, Ostrauskas R.	702 people diagnosed with type 2 diabetes and non-diabetic

Blood pressure, lipid levels and **HbA(1c)** increase in association with eating rate.

Diabetologia. Jan;56(1):70 7 Ohkuma T, Kitazono T. - 2013	Study on: 7275 individuals

Eating speed was associated with the incidence of diabetes. Eating slowly could be an **acceptable lifestyle intervention** for the prevention of diabetes.

Metabolism: clinical and experimental Nov;61(11):1566-71 Sakurai M, Nakagawa H. - 2012	Study on: 2050 males

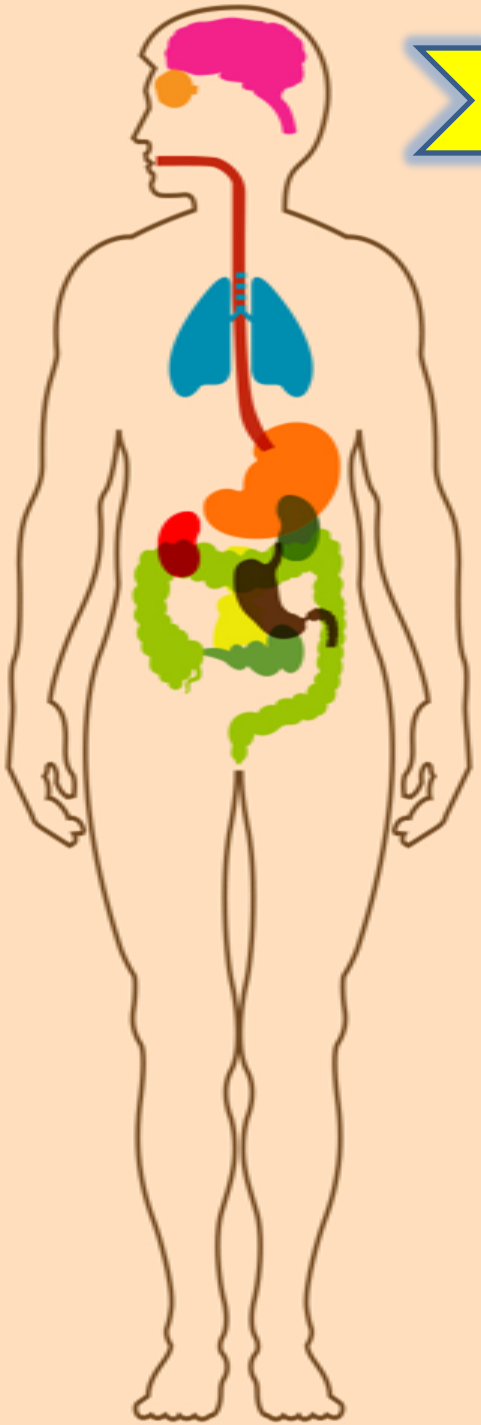


The (GERD) affects 20 to 30 % of the population.

Stomach burns, acid reflux, bitter taste in the mouth, sleep disorders

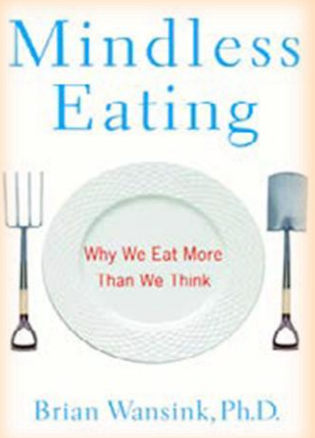
The GERD is characterized by the passing of acid reflux in the esophagus after meals.

The medical studies show that eating slowly enables to reduce significantly the number of reflux among the people concerned.



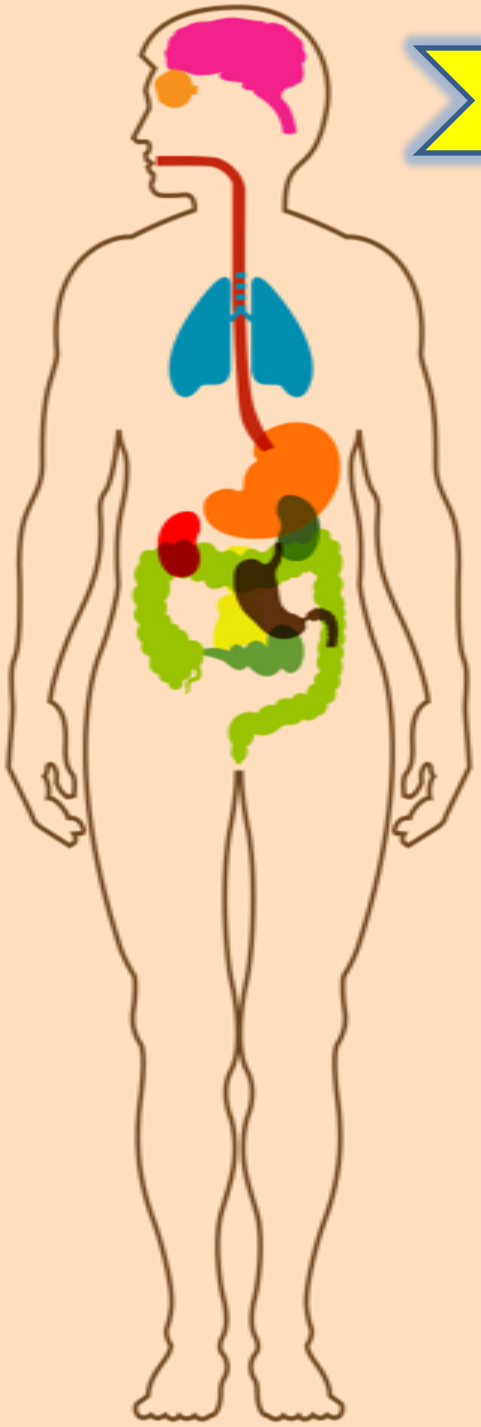
Portion size :

Professor Brian Wansink has based his interest on studying the way our immediate environment (supermarkets, packages, households, pantry, setting up, service) influences our food habits and preferences.

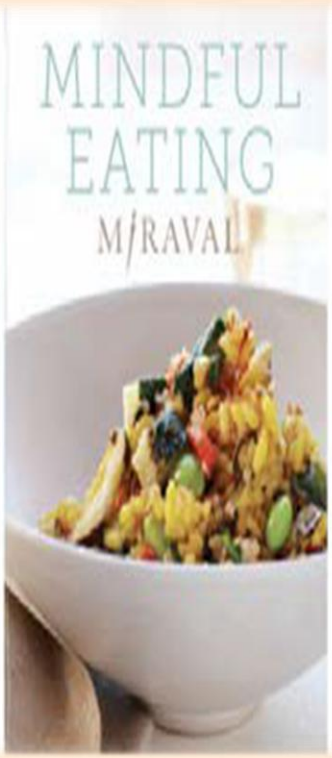


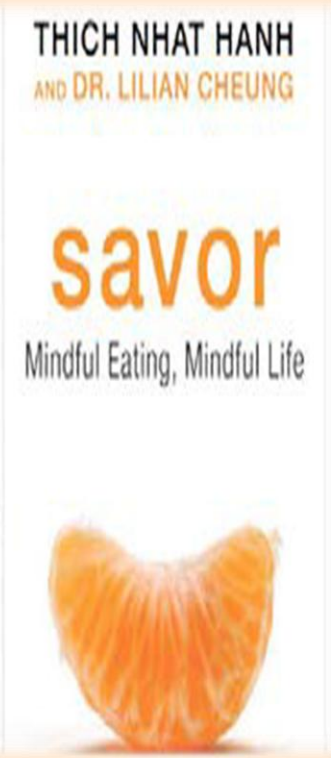
He puts forward that in order to eat better and less, some slight modifications need to be made in our homes and daily routines.

In his book Mindless Eating, Brian Wansink develops the idea that the best diet is the one we are unaware of following.



Mindful eating :





I choose
to eat slowly!
LESS CALORIES AND A BETTER DIGESTION

Less calories

It takes 20 minutes for the stomach to signal to the brain that it's full. Eat slowly, eat less.

%11fewer calories

Scientifically proven:
Slow/fast: Average difference of 11% fewer calories compared to fast eating
Eating slowly significantly reduces the number of calories consumed (fast: 646 calories, slow: 579 calories)

Reduce fatigue

A slower pace lets your body optimize metabolic processes in organs like the pancreas, liver, and intestines.

Increase alertness

Scientifically proven:
« Postprandial somnolence (i.e., food coma) is a normal state of drowsiness following a meal
caused by hormonal and neurochemical changes related to the rate at which glucose enters the bloodstream. »

Improve taste

The tongue and nose need time to detect flavors and smells. Chewing longer allows you to experience a broader range of flavors.

How we taste

Scientific explanation:
The more time in contact with your tongue and nose means a better chance to perceive taste and experience the overall enjoyment of your food.

Eat slowly, lose weight, feel great!

My project helps to alerts you with the help of indicator lights and gentle vibrations when you are eating too fast.

Every time you bring food from your plate to your mouth with your fork, this action is called: a "fork serving".

The fork also measures:

* **How long it took you to eat your meal.**
* **The amount of "fork servings" taken per minute.**
* **Intervals between "fork servings".**

This information is then uploaded via USB or Bluetooth to your phone or laptop.

Using the fork :

The device looks more or less like a regular fork, but its base is wider, almost like an electric toothbrush.

At the bottom there is a lights: a small bar that indicates how charged the battery is, and a circular indicator of your eating speed. In addition to vibrating every time you take a bite too quickly, the circular light will turn red. If you're eating at a good speed, which

means waiting 10 seconds between each bite, the light glows blue.

Product technical specifications & material, components & processes

Specs :

- **Length: 21 cm**
- **Width: 2.5 cm**
- **Height: 2 cm**
- **Weight: 46 gr**

Fork Handle :

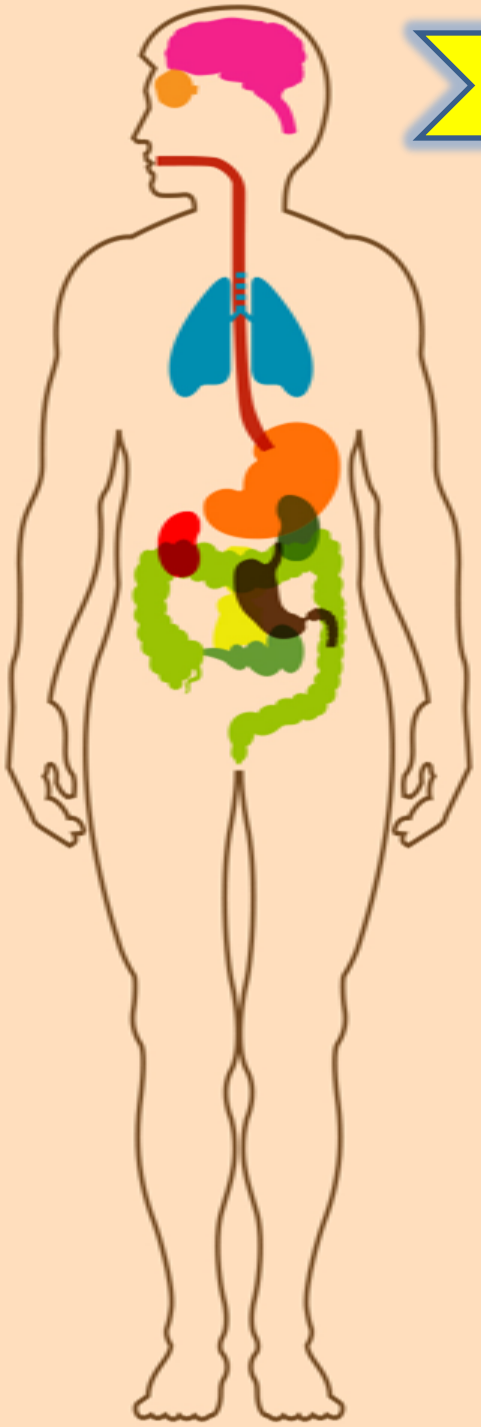
- **Fits both electronically and mechanically with the electronic key**

Electronic Key :

- **Micro USB connector**
- **Lithium Polymer Battery +5V**
- **Microcontroller: mini pro arduino**
- **Capacitive detection**
- **User feedback: 1 vibrating feedback + 1 LEDs**
- **2 alminume shell components**
- **Thermometer**

Patents: The technology is covered by four patents :

- **Measure of hand-to-mouth movement**
- **Capacitive detection**
- **Specific mechanical cooperation between the electronic key and fork**
- **Interaction between apps and data platform**



Frequently Asked Questions ?

I can eat slowly on my own ! Why should I use this fork ?

can I use my fork only from time to time ?

Is not the fork going to spoil my pleasure of eating ?

How much does the fork cost?

The fork is aimed at intelligent, healthy eating habits and overall well-being.

It is priced at U.S. $56 (200 ILS) and includes :

- **A Mobile App so you can check your progress from the road as well as from home.**

- **The fork device (Electronic parts).**

The Difficult I faced

- making an android application.
- Difficult to find electronic parts.
- Collecting obesity statistics in Palestine due to lack of reliable information.

My view of product development

- **A Coaching Program to eat smarter and healthier:**
helpful, useful advice, practical tips and balanced meal plans.

- **A fun Online Social Game to motivate you to implement these new smart eating habits with your loved ones.**

- **Using a 3d printer to make different color and more appropriate shapes of the fork .**

- **(Website) online dashboard where you can quickly retrieve and easily organize all your personal data on one central location.**

- **Count the calorie of your meal.**

Marketing

Today, most medical doctors understand the benefits of eating slowly .

- ✓ **Hospitals.**
- ✓ **Pharmacies.**
- ✓ **Nutrition centers.**
- ✓ **Online .**

Reference :

Andrade, A., Greene, G. and Melanson, K. (2008). Eating Slowly Led to Decreases in Energy Intake within Meals in Healthy Women. *Journal of the American Dietetic Association*, 108(7), pp.1186-1191.

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http://www.eatingslowly.com/medical-research-database/