Smart Diaspora 2023

Revoluții și evoluții ale științelor omice în epoca postgenomică

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Metabolic disorders and hydroxybenzoic acids a genetic perspective

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Metabolic disorders and hydroxybenzoic acids a genetic perspective

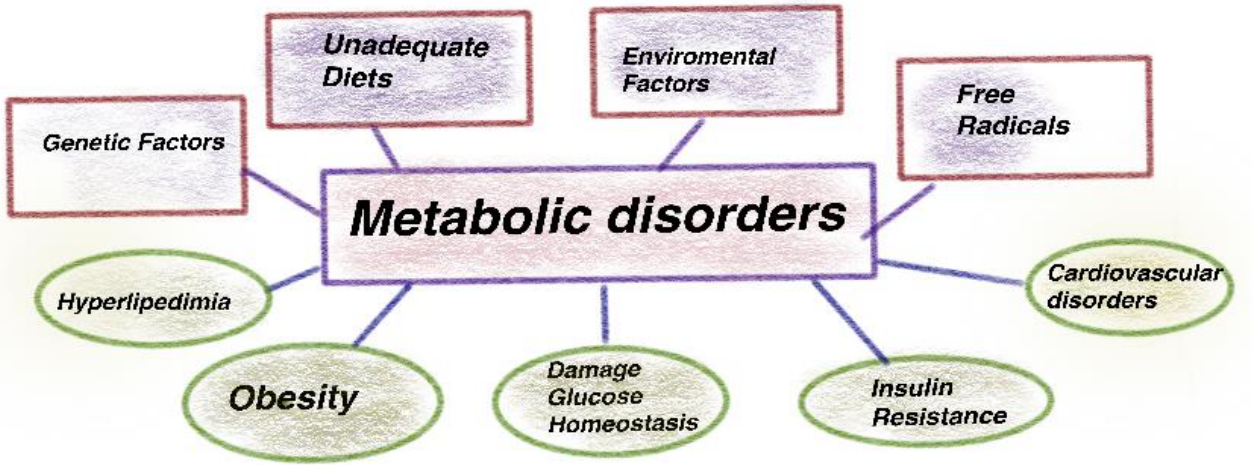
- Nowadays, **metabolic disorders** present an **ever-increasing challenge**.
- **The inadequate processing of micronutrients** characterizes such a disorder. As a result, their distribution is severely affected.

Metabolic disorders

- Generally, it can **affirm that all metabolic disorders/diseases** are based on the interactions **of environmental and genetic factors**, which is why they are multifactorial and quite complex.

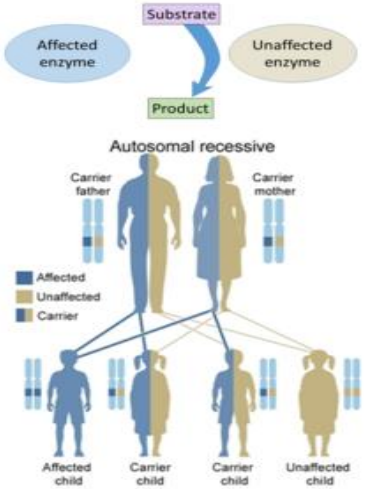
- **Specifically, regarding** metabolic disorders, everyone thinks that they are represented by obesity or metabolic syndrome, without knowing that it is a **variety of diseases** including, **type 2 diabetes, dyslipidemia, osteoporosis, atherogenic dyslipidemia, non-alcoholic fatty liver diseases (NAFLD),** and **inflammatory bowel diseases (IBD)** such as Crohn's disease and ulcerative colitis.

Metabolic disorders



Metabolic disorders

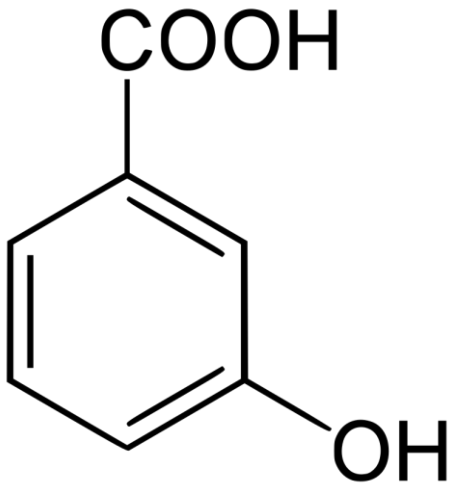
- They can be defined as **autosomal recessive anomalies**.
- Sometimes **metabolic disorders can be inherited** when a **defective gene can cause an enzyme deficiency**.



Source: https://en.wikipedia.org/wiki/Genetic_disorder

Metabolic disorders

- The most widespread worldwide are **obesity and Diabetes Type 2 (T2DM).**
- This paper provides **a genetic perspective on hydroxybenzoic acids in metabolic disorders.**



3-hydroxybenzoic acid
Source:https://en.wikipedia.org/wiki/3-Hydroxybenzoic_acid

Hydroxybenzoic acids and obesity

- There is more and more evidence showing that **different phenolic compounds** are used in **the prevention of obesity and type 2 diabetes**.
- Depending on **the phenolic rings**, polyphenols **are divided into several classes**.
- **Hydroxybenzoic acid and hydroxycinnamic acid** are simple phenols that have only one aromatic carboxylic acid.
- Many studies show that **some of the phenols**, including **p-hydroxybenzoic acid**, **reduce the risk of obesity** (Kumar et al., 2022).

Hydroxybenzoic acids and metabolic actions

- They are involved in the **inhibition of lipids oxidation** and in peripheral blood leucocytes **improve the DNA repair process** (El-Seedi et al., 2012).
- They can affect the genes **responsible for oxidation and acetylation** processes.
- The **acetylation process** is encoded by **arylamine N-acetyltransferase 1** (NAT1) **and arylamine N-acetyltransferase 2 genes** (NAT2).
- Due to the existence of NAT2 alleles with reduced functionality, there is a slow acetylating phenotype in the liver (Meyer and Zanger, 1997) .

Hydroxybenzoic acids and metabolic actions

- **Phenolic compound metabolism** is particular to each individual, due to the **variability of genes and enzymatic activity**.
- In Wistar rats, hydroxybenzoic acid intake caused a **significantly reduced weight.**
- This is achieved by **suppressing lipogenesis, improving insulin signaling, and decreasing the pro-inflammatory response.**

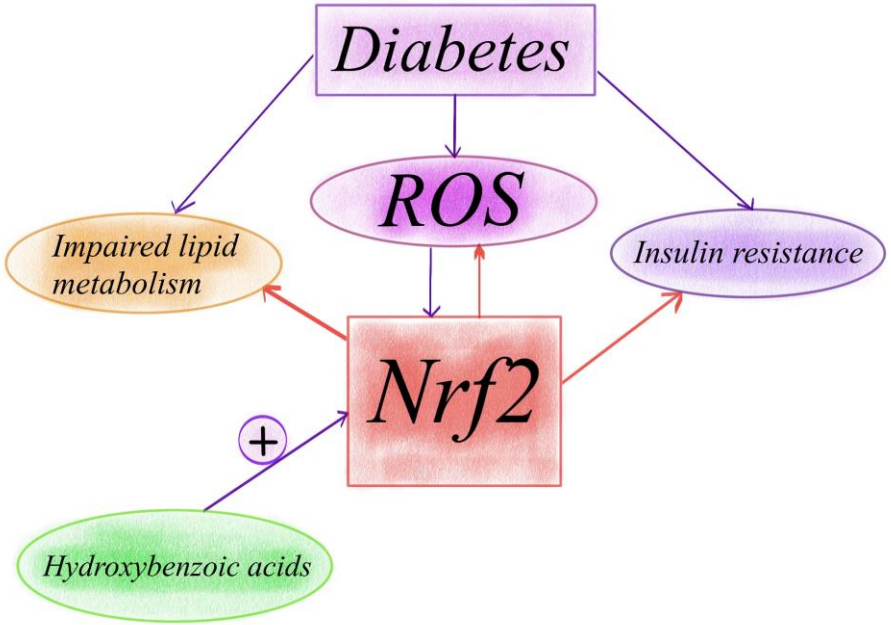
Hydroxybenzoic acids and type 2diabetes

- Some **hypoglycemic properties** of hydroxybenzoic acids are done through the inhibition pathways of glucagon and **Gastric inhibitory polypeptide (GIP)** (Franklin et al., 2011).
- The most important properties are those **to modify different signaling pathways** (Juurlink et al., 2014).
- It activates the **transcription factor Nrf2,** which is encoded by the gene nuclear factor**, erythroid 2 like 2 (NFE2L2)** (Rabbani et al., 2019).

Hydroxybenzoic acids and type 2diabetes

- In this way, **insulin sensitivity** in diabetes **can be improved and abrogate diabetes and obesity in mice** (Uruno et al., 2013).

- **The Nrf2 pathway** is involved **in the fight against reactive oxygen species** (Juurlink et al., 2014).



Hydroxybenzoic acids and type 2diabetes

- The Nrf2 is one of the most important factors **regulating oxidative and xenobiotic stress.**
- It improves arterial **hypertension, and the lesions caused by atherosclerosis.**
- Finally, hydroxybenzoic acids could be shown as a genetic perspective in different metabolic and related disorders by activating certain genes.

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„The greatest lesson in life is to know that even fools are right sometimes”

„He who dares, wins”

Sir Winston Churchill

Selective Refrences

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