Reasons why galactose is good for you

Key facts

- Galactose is a vital structural element and serves as a key source of energy, especially in neonates [2,3,6].
- In normal conditions, galactose is quickly and almost completely metabolized to glucose in the liver.
- Galactose serves as a substrate for cerebrosides, gangliosides and mucoproteins in the brain and nervous system, which supports its neural and immunological role [2,3,6,7].
- Sources of galactose are not limited only to lactose-containing foods. Galactose is also present in legumes and some fruits and vegetables [5,6,10].
- The human body has the ability to produce galactose endogenously [2,6].
- Evidence shows that galactose in its oligosaccharide bound form has prebiotic properties [16].
- Galactose has been shown to have therapeutic potential, especially in disorders affecting brain function such as Alzheimer's [13,14] as well as nephrotic syndrome [15].
- Free galactose is detrimental only in the case of Galactosemia, a genetic disorder that prevents the processing of galactose, thereby leading to toxic levels [18, 21].

What is galactose?

Galactose is a simple sugar that is normally transformed in the liver before being used up as energy. This sugar is quite abundant in human diets and helps in a number of functions.

Galactose sources

- The main dietary source of galactose is lactose from milk and yogurt, which is digested to galactose and glucose
- Foods containing small amounts of free galactose include low-lactose or lactose-free milk, certain yogurts, cheeses, creams, ice creams and other foods artificially sweetened with galactose. Plain natural foods (fruits, vegetables, nuts, grains, fresh meats, eggs, milk) usually contain less than 0.3 g galactose per serving

Essential source of energy

Because galactose is a precursor to glucose production, it is an important energy-providing nutrient. This is essential during the early developmental stages of mammalian infants, when they are exclusively dependent on milk [6].

Therapeutic role of galactose

Galactose has recently been reported to be beneficial in the management of a number of diseases, particularly those affecting brain function [2]. The conversion of galactose to amino acids in the brain requires ammonia equivalents as a substrate. Galactose plays a potentially useful role in removing these neurotoxic compounds from the brain in patients suffering from hepatic encephalopathy or Alzheimer's disease [13]. Dementia is associated with dysfunction of the insulin-receptor system, followed by decreased glucose transport to and subsequent metabolism in brain cells. As galactose is transported to the brain, it can act as an alternative source of energy owing to its metabolism to glucose[14]. Daily oral galactose administration has also been shown to be a promising new, non-toxic therapy for the treatment of resistant nephrotic syndrome [15].

Galactose as a prebiotic

Galactose is present in the so-called raffinose-family of oligosaccharides (RFOs) and galactose oligosaccharides (GOS) [16,17]. These prebiotic oligosaccharides have been found to provide beneficial effects in the gastrointestinal tract of humans not only by stimulating growth of selected members of the intestinal microflora but also through their anti-adhesive activity. GOS specifically were found to inhibit infections by enteric pathogens [17].

Challenges ahead

Galactosemia

The human body is normally able to metabolise galactose efficiently. Dietary restriction of galactose may be indicated to resolve the symptoms of Galactosemia. This is a serious condition, particularly during the neonatal period, that affects a number of organ systems, including the liver and brain.

The "detrimental effect" of galactose might thus only be evident in the rare cases of genetic disorders where individuals cannot metabolise galactose.

Galactose and ageing

The usage of chronic daily injections of D-galactose to induce ageing in animal models has been reported in some studies [19]. This has led to some doubt about the health effect of dietary galactose and consequently the health effects of milk [1]. However, this effect of galactose in ageing is seen only in animal studies where the galactose was given subcutaneously. Thus, the same effect is not achieved when galactose is ingested orally.

On the contrary, studies with chronic oral administration of galactose have not shown detrimental effects but rather beneficial effects of galactose on learning and memory ability.

Conclusion

Galactose is crucial in human metabolism, with an established role in energy delivery. There is strong evidence of the potential therapeutic benefits of galactose.

References

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