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Diet-gene interactions underlie metabolic individuality and influence brain development: implications for clinical practice derived from studies on choline metabolism.

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Abstract

One of the underlying mechanisms for metabolic individuality is genetic variation. Single nucleotide polymorphisms (SNPs) in genes of metabolic pathways can create metabolic inefficiencies that alter the dietary requirement for, and responses to, nutrients. These SNPs can be detected using genetic profiling and the metabolic inefficiencies they cause can be detected using metabolomic profiling. Studies on the human dietary requirement for choline illustrate how useful these new approaches can be, as this requirement is influenced by SNPs in genes ofcholine and folate metabolism. In adults, these SNPs determine whether people develop fatty liver, liver damage and muscle damage when eating diets low in choline. Because choline is very important for fetal development, these SNPs may identify women who need to eat morecholine during pregnancy. Some of the actions of choline are mediated by epigenetic mechanisms that permit 'retuning' of metabolic pathways during early life.

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