PARENTAL NUTRITION: METHYL DONORS AND NUTRI-EPIGENOMICS.

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Abstract Body

Epigenetic is the study of heritable changes in gene expression that does not involve changes in the sequence of DNA. Epigenetic changes can be influenced by several factors including environment, lifestyle and nutrition. Parental nutrition status in the periconceptional period is one of the most significant external factors to achieve a good reproductive health. The DNA methylation is an epigenetic mechanism and a target in response to nutritional influences. Many studies confirm that a balanced micronutrients intake including B vitamins, folate, choline and methionine is necessary to get a correct DNA methylation pattern. Altered DNA methylation profiles can lead to changes in gene expression and produce critical consequences involved in the development and health of newborn. DNA methylation profile and epigenetic marks are established in early development and they depends on the dietary intake of methyl-donors in the periconceptional period. The universal methyl-donor is the S-adenosylmethionine (SAM), an intermediate substrate in the one-carbon metabolism, where it donates the reactive methyl group. Folate, betaine, choline, methionine and B vitamins act like cofactors on the enzymatic reactions in the SAM pathway. Therefore, an altered consumption of these micronutrients modify the number of methyl groups to carry out a proper DNA methylation and generate patterns depending on the amount of methyl groups available for the DNA methyltransferases. Current data suggest that an adequate intake of these micronutrients is essential for healthy offspring and correct gene expression. A new discipline emerges for the study of the dietary influence in gene expression, through changes in the epigenome: the nutri-epigenomics. Future research are needed to understand the link between DNA methylation, micronutrients intake and future consequences in the development stages. Define epigenetic biomarkers can help us to identify and prevent the risk and develop individual therapies such a nutritional interventions based on individual epigenetic profiles.