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Nutritional modulators of epigenetic inheritance

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In mammals, the example for epigenetic inheritance is the yellow agouti mouse, an epigenetic biosensor for nutritional and environmental changes. These fat and yellow mice owe their appearance to epigenetic modification that removes methyl groups from the normally methylated agouti gene. In a developing mouse fetus, if the above modification occurs shortly after fertilization, the baby mouse may exhibit the yellow fur and obese phenotype with greater risk of developing metabolic syndrome, CVDs and diabetes. However, the genetic code remains unchanged from normal mice. In one study, researchers altered the nutrient intake to serve as methyl group donors in mouse mothers, to cause methylation or demethylation of the agouti gene. Increased supplementation of choline, betaine, folic acid and vitamin B12 in the diet of pregnant yellow agouti mice was able to decrease the incidence of deleterious phenotypes in offspring, by donating methyl group and allowing for the remethylation of the agouti gene. If these mice be born with the agouti phenotype, they can pass that deleterious epigenetic trait in their offspring, regardless of their diet during pregnancy. This landmark study indicates that nutrients can cause phenotypic changes which can pass on through cell division and mating to the offspring due to their possible influence on (natural) selection. It is possible therefore to say; that we are what we eat and what our parents ate, and potentially what our grandparents ate which would be modification of the old Sanskrit saying '*Aham Annam*' from the ancient Vedas (5000BCE). It may be also important to emphasize advances in Astro-chronobiology particularly; time of eating, accordingly, therefore we are not only 'what we eat' but also 'we are when we eat' and when our father and grandfather were eating as it is regulated by clock gene present in every cell. There is a need to study the effects of low ω-6/ω-3 ratio diet, arginine, taurine, cysteine, coenzyme Q10 on the re-methylation of the agouti gene and their effects on phenotypic variations. However this mode of inheritance needs to penetrate more than a few generations before it earns a place in evolutionary concept.