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RECOMMENDED DIETARY ALLOWANCES FOR GENOMIC STABILITY

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Several micronutrients (vitamins and minerals) are required as co-factors in DNA synthesis, DNA repair, DNA methylation and apoptosis. Some notable examples include (a) folic acid and vitamin B12 required for maintenance methylation of DNA and the synthesis of dTTP from dUTP, thus prevent the misincorporation of uracil into DNA, a highly mutagenic and chromosome-breaking event, (b) niacin, is essential in the form of the coenzymes NAD and NADP which act as a substrate for polyADPribose polymerase (PARP), an enzyme thought to facilitate efficient DNA repair and telomere length regulation and (c) zinc, apart from its antioxidant role as a co-factor in Cu/Zn SOD, it is required in its stabilizing role of the DNA-binding domain of p53 (residues 102-292) and thus is essential for apoptotic response to DNA damage. Optimal levels in a test-tube or in tissue culture have been defined for some of these micronutrients with regard to prevention of oxidative damage to DNA, optimal DNA repair or apoptotic activity. However, the real challenge is to define the level of intake of these micronutrients to prevent DNA damage *in vivo*. Recent studies in humans, including those from our laboratory on (a) folate/vitamin B12 and genomic stability and (b) polymorphisms in folate metabolising enzymes and genomic stability, will be reviewed. Some of these studies suggest that our ability to damage genes by inappropriate diet may be as important as mutation induced by exogenous chemicals and radiation. The current recommended dietary allowances (RDAs) of minerals and vitamins are designed for the prevention of diseases of deficiency. It is time for a concerted research effort to define RDAs on the basis of optimal genomic stability because the link between DNA damage and degenerative disease is becoming more evident.