

Abstract

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DNA damage from micronutrient deficiencies is likely to be a major cause of cancer.

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BACKGROUND: A deficiency of any of the micronutrients: folic acid, Vitamin B12, Vitamin B6, niacin, Vitamin C, Vitamin E, iron, or zinc, mimics radiation in damaging DNA by causing single- and double-strand breaks, oxidative lesions, or both.

FINDINGS: For example, the percentage of the US population that has a low intake (<50% of the RDA) for each of these eight micronutrients ranges from 2 to >20%. A level of folate deficiency causing chromosome breaks was present in approximately 10% of the US population, and in a much higher percentage of the poor. Folate deficiency causes extensive incorporation of uracil into human DNA (4 million/cell), leading to chromosomal breaks. This mechanism is the likely cause of the increased colon cancer risk associated with low folate intake. Some evidence, and mechanistic considerations, suggest that Vitamin B12 (14% US elderly) and B6 (10% of US) deficiencies also cause high uracil and chromosome breaks.

DISCUSSION: Micronutrient deficiency may explain, in good part, why the quarter of the population that eats the fewest fruits and vegetables (five portions a day is advised) has about double the cancer rate for most types of cancer when compared to the quarter with the highest intake. For example, 80% of American children and adolescents and 68% of adults do not eat five portions a day.

CONCLUSION: Common micronutrient deficiencies are likely to damage DNA by the same mechanism as radiation and many chemicals, appear to be orders of magnitude more important, and should be compared for perspective. Remedying micronutrient deficiencies should lead to a major improvement in health and an increase in longevity at low cost.

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