

Improper diet linked to future health complications

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Vitamin E, an antioxidant found in eggs and many plant-based oils, including wheat germ, was positively associated with necrosis. Credit: David Goehring

A Telethon Kids Institute-led study has found low levels of plasma calcium, vitamin E (alpha-tocopherol) and lutein—micronutrients found in foods like spinach and eggs—to be associated with DNA damage in children.

Given that DNA damage accumulates with age, the research suggests the wrong diet could be predisposing some young people to [future health](#) problems.

"If [poor nutrition](#) in children should contribute to DNA damage in this important growth phase of life, then it may well contribute to risk of cancer and other diseases later in life," Professor Elizabeth Milne says.

"In fact, it could be that poor nutrition in childhood has an even greater negative impact on future health through DNA damage than it does later on."

During childhood a significantly higher proportion of cells are in the DNA synthesis stage and could

be more sensitive to micronutrient inefficiency.

Micronutrients are needed to synthesise nucleotides involved in DNA replication and repair.

Children could also face greater risks from damaged DNA due to higher rates of cell replication, meaning a faulty copy of DNA would begin replicating early on, increasing the number of faulty cells which could turn cancerous in adulthood.

The study examined associations between 16 blood micronutrients and biomarkers for DNA damage and cytotoxicity in 462 children aged three, six and nine years.

It found plasma calcium to be positively associated with necrosis (cell death) and micronuclei—small bodies on replicated cells that often contain only part of a chromosome.

However, Prof Milne says calcium is tightly regulated in the bloodstream and this observed association may not be due to dietary calcium intake.

Lutein, found in foods like kale and spinach, was positively associated with nucleoplasmic bridges—an abnormal nuclear structure indicating chromosome rearrangement.

Vitamin E, an antioxidant found in eggs and many plant-based oils, including wheat germ, was positively associated with necrosis.

But too little was associated with nucleoplasmic bridges and apoptosis—programmed cell death, in which a cell effectively commits suicide.

Researchers suggest Vitamin E's unexpected positive association with [cell death](#) could be driven by inflammation.

The study complements recent research in adults showing associations between moderate deficiencies or excess in folate, vitamin B12 and zinc and DNA damage in white blood cells—damage equivalent to that of radiation workers exposed to ionising radiation doses well above their annual exposure limit.

The findings reinforce the importance of a healthy diet in childhood.

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