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# Potatoes and risk of type 2 diabetes

## Consider preparation method and replacement food when assessing health risks

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The potato is a carbohydrate rich tuberous vegetable that traditionally has been used as a staple in many food cultures. Compared with other carbohydrate rich comestibles such as rice, potatoes also have a lower environmental impact, including low carbon dioxide emissions, terrestrial acidification, eutrophication, and freshwater use.[1] Amid a global climate crisis and with our food system contributing 21-37% of global greenhouse gas emissions,[2] potatoes could be considered for reintroduction as a more environmentally sustainable carbohydrate source, provided the health impacts and preparation methods are appropriately addressed. But because of their high carbohydrate content, and resulting increasing effect on blood glucose,[3] potatoes have been linked to a higher risk of type 2 diabetes. Although previous reviews have found no clear evidence of an association,[4] in its 2019 report, the EAT-Lancet Commission argued that potato intake increases the risk of type 2 diabetes and other health risks and recommended the intake of whole grains instead, putting health concerns at the centre of the debate.[5] However, neither the preparation method for potatoes nor specific foods that potatoes would replace were considered, both of which are central to evaluating the overall health impact of potatoes.

In a linked study, Mousavi and colleagues (doi:10.1136/bmj-2024-082121) comprehensively investigated the association between intake of potatoes prepared by different methods (boiled, baked, or mashed versus French fries) and type 2 diabetes in three large US cohorts.[6] The cohorts followed more than 205 000 health professionals in the US with repeated dietary intake assessments every four years over almost four decades, documenting more than 22 000 people with incident type 2 diabetes. In addition, the authors performed an updated systematic review and meta-analysis of this association. Overall, both the cohort analysis and the meta-analysis found no association between intake of boiled, baked, or mashed potatoes and risk of type 2 diabetes, whereas a higher intake of French fries was associated with a higher risk, highlighting the importance of evaluating the health effects of potato intake separately by preparation type. This finding also corresponds to the observed associations between high intake of ultra-processed foods and high risk of type 2 diabetes—French fries are often ultra-processed, whereas baked, boiled, or mashed potatoes are often minimally processed.[7]

While the association between intake of French fries is clear, the answer is more complicated for boiled, baked, or mashed potatoes. To estimate type 2 diabetes risk by substituting baked, boiled, or mashed potatoes with other foods, Mousavi and colleagues performed substitution analyses in the three US cohorts.[8] They found that replacing boiled, baked, or mashed potatoes with equal amounts of whole grains was associated with a lower risk of type 2 diabetes, whereas replacing them with refined grains, white rice, or brown rice was associated with a higher risk. Replacing with different types of vegetables was not associated with type 2 diabetes risk. These findings suggest that the association between intake of boiled, baked, or mashed potato and type 2 diabetes may depend on what foods they replace. For individuals who consume boiled, baked, or mashed potatoes as a staple carbohydrate source, this dietary habit might help to reduce intake of refined grains and should be encouraged. If feasible, however, partial substitution with whole grains could offer additional metabolic benefits. Conversely, if boiled, baked, or mashed potatoes are consumed as vegetables, dietary changes may not be necessary, provided these potatoes are a part of a balanced and diverse vegetable intake.

A lower risk of type 2 diabetes related to substituting boiled, baked, or mashed potatoes with whole grains was supported by meta-analysis. However, these findings are based on statistical modelling of observational data rather than the intervention studies that directly evaluate the health effects of replacing potatoes with whole grains. Besides, the meta-analyses relied on indirect methods rather than the substitution analysis directly, and the methodology for estimating such substitution effects remains to be standardized.[9 10] Nevertheless, replacing French fries with whole grains, refined grains, non-starchy vegetables, starchy vegetables, or legumes was associated with a lower risk of type 2 diabetes.

Other limitations should be acknowledged. First, owing to the observational nature of the study, causal inference cannot be established, and measurement error is inevitable when measuring food intake with food frequency questionnaires. Second, most participants were health professionals of European ancestry with high educational attainment, whose potato intake amount, cooking methods, and overall health profiles differ from those of individuals from other racial/ethnic or social backgrounds.

Are potatoes back on the plate? Well, it depends. Two key considerations are important when guiding the public or informing policy: the food should be defined clearly (eg, the method of potato preparation), as should be the type of carbohydrate rich food to be replaced by minimally processed potatoes.[11] With their relatively low environmental impact and their health impact, potatoes can be part of a healthy and sustainable diet, though whole grains should remain a priority. Future cohort studies from more diverse

populations that account for both preparation methods and substitution analysis are needed. In addition, future meta-analyses should extend beyond comparisons limited to whole grains.

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