Huge variation in consumption of food-derived microbes by Dutch adults: relevant for allergy prevention?

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Background: Exposure to (a diversity of) microorganism, amongst others through our diet, is one of the environmental exposures that potentially protect for the development of allergic disease. During recent decades the use of ready-to-use and highly processed foods has increased while on the other hand fresh products have gained popularity. This may have resulted in a shift and/or decrease in the total consumption of food-derived microbes. We hypothesize that non-pathogenic food-derived microbes induce potential probiotic-like effects and may be identified as novel determinants for the prevention of allergic disease.

Aim: To quantify exposure to food-derived microorganisms in Dutch adults.

Methods: In 34 Dutch adults (19-31 year) the food-microbial content of the diet was estimated and determined for the amount of and variation in 3 dominant groups of food-derived microbes: lactic acid bacteria (LAB), aerobic spoilers (AS) and yeast/moulds (YM). Based on expert assessments, a food-microbial load database was compiled for Dutch foods with minimum, best and maximum estimates of the amounts of LAB, AS and YM (CFU/g food). To estimate the microbial exposure to these three groups of microbes the amount of food consumed was assessed by three 24 hour dietary recalls and was multiplied by the microbial content per gram for each food for LAB, AS and YM. The estimations were then evaluated against duplicate food collection from the same population collected on one different day.

Results: 24 hour recalls: The estimated average total microbial exposure ranged from 5.5-11.6 log CFU/day, exposure to AS ranged from 3.6-11.4 log CFU/day, LAB from 6.7-11.5 log CFU/day and YM from 3.0-9.6 log CFU/day. Between person-variation mainly depended on the type of food consumed. Raw vegetables contributed most to variance in consumption of AS, fermented dairy to LAB and mould cheese and fresh fruits most to variance in consumption of YM. Within-person variation was larger than the observed between-person variation, influenced by storage conditions and food choice. Duplicate sampling: The microbial levels by duplicate sampling were all distributed within the range of levels estimated by 24 hour recalls.

Conclusion: In Dutch adults, the consumption of food-derived microbes within normal ranges varied with a factor 1.000.000. Whether these huge differences have clinical importance remains to be determined. Estimations through food consumption data need further validation.