Natural toxins from plants in the Nordic diet - a risk for the consumer?

Pilegaard, Kirsten

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in 8 European centres. Diogenes found that an ad libitum diet with a modest increase in protein and a modest reduction in GI led to maintenance of weight loss (1). Furthermore, the obese children in the families spontaneously lost weight even though they were not given instruction on lifestyle change but simply altered their diet (2).

Lack of focus on gastronomic properties of the diet can lead to lack of compliance and dietary adherence, and consequent increased drop-out during weight maintenance after weight loss (3). The OPUS project (Optimal well-being, development, and health for Danish children through a healthy New Nordic Diet (NND)) is a 5-year multidisciplinary research project that aims to define and test a regional diet (NND) bridging health, palatability and sustainability. Combining the optimal nutrient composition from Diogenes with gastronomy to make the diet more palatable is the keystone in the development of NND. NND is based on regional products such as barley, cabbage, fish, berries and game.

OPUS consists of two intervention studies: a controlled intervention study, using the supermarket model providing all foods free of charge, in overweight adults with slight metabolic derangement (n=147), and a school intervention study with 800 children, 8–10 years old, with provision of meals covering about 40% of energy intake.

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Kirsten Pilegaard

Division of Toxicology and Risk Assessment, National Food Institute, Technical University of Denmark

Around 415 species are considered major food plants in Europe. A majority of these species are cultivated. Breeding often reduces the level of inherent toxic constituents in plants. For example rapeseed oil was unfit for human consumption before the level of erucic acid was reduced to a safe level. Tradition has taught us not to eat other plant parts than the potato tuber and not to ingest e.g. green potatoes due to their higher level of glycoalkaloids.

A more experimental approach to plant use e.g. ingestion of raw or less cooked plant parts have given rise to intoxications. Lately acute toxic effects (vomiting and diarrhoea) were observed after ingestion of raw, ripe elderberries in smoothies.

Use of plants collected from the wild may introduce new risks for acute or long-term toxic effects. Flowers from coltsfoot have recently been described as edible in a cookbook. However, the plant contains hepatotoxic pyrrolizidine alkaloids and flower buds were carcinogenic in a feeding study in rats.

Mistaken identity has caused intoxications, even with deadly outcome, in other European countries when leaves from autumn-crocus or from lily-of- the-valley were ingested instead of wild garlic.

Conclusion: A wish for using food plants in non-traditional ways or for introduction of wild plants into the Nordic diet may pose new risks for the consumers. Little information on the toxic constituents may exist and data on potential toxic effects may be limited or lacking. Information on the fact that natural is not synonymous with safe is highly important.

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Lessons from MitoHealth.How marine ingredients may attenuate metabolic disorders at the molecular level

Rolf K Berge

Institute of Medicine University of Bergen, N-5020 Bergen, Norway

The aim of the Mitohealth has been to investigate health effect of food from marine resources. The emphasis has been on oils from marine resources and marine peptides processed from fish by-products and to identify which components and molecular species that will beneficially affect metabolic disorders.

Animal models have been used to study how such bioactive compounds may regulate intestinal function and absorption and to identify relevant molecular mechanisms and the role of specific genes by using gene modified mice. Additionally, epidemiological studies have been included to investigate the relationship between diet and disease development.

Studies in rodents have shown that it is possible to differentiate between fish oil and krill oil, and that enzymatic hydrolysis of fish proteins may result in products with different metabolic effects. It has been found that marine peptides tend to decrease the feed efficiency, which may be related to effects on intestinal absorption or energy expenditure. Mice experiments have shown that fish oil and krill oil have differential effects on lipid and glucose metabolism. Studies on gene expression indicate that fish oil and krill oil affect genes involved in fat metabolism differently, suggesting that they reduce plasma lipids at least partly via different mechanisms. This can be related to the molecular structures of the lipid molecules in these oils.

In spite of intensive research, the molecular mechanisms translating the effects of omega-3 fatty acids into changes in gene expression are not completely clarified. To get insight