

Novel Approach for Food Safety Evaluation. Results of a Pilot Experiment To Evaluate Organic and Conventional Foods

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Abstract

There is evidence that organic food often contains relatively high amounts of natural toxic compounds produced by fungi or plants, whereas corresponding conventional food tends to contain more synthetic toxins such as pesticide residues, but only a few studies have evaluated the impact of their consumption on health. This study proposes a novel approach to evaluate the potential health risk of organic compared to conventional food consumption, that is, the assay of sensitive markers of cell function in vulnerable conditions. The markers utilized were intestinal and splenic lymphocyte proliferative capacity and liver acute-phase reaction, both responding to the presence of toxins. The vulnerable conditions in which body defenses can be less efficient were weaning and protein-energy malnutrition. This study reports the results of a pilot experiment on one sample of eight varieties of organically and conventionally grown wheat. Weaned rats were assigned to two groups fed conventional (CV) or organic (ORG) wheat for 30 days. Each group was divided in two subgroups of well-nourished (WN) or protein-energy-malnourished (PEM) rats. For each rat, the lymphocyte proliferation was assayed by [³H]thymidine incorporation after stimulation of cells with a mitogen, in a culture medium containing either commercial fetal calf serum (FCS) or the corresponding rat serum (RS) to mimic the in vivo proliferative response. The acute-phase proteins (albumin, transthyretin, transferrin, ceruloplasmin, retinol-binding protein) were measured in plasma by Western blotting and immunostaining with specific antibodies. The proliferative response of lymphocytes cultured with FCS and the amount of acute-phase proteins of rats fed the ORG wheat sample, either WN or PEM, did not differ from those of rats fed the CV wheat sample. However, the proliferative response of lymphocytes cultured with RS was inhibited in PEM-CV compared with PEM-ORG. The content of mycotoxins was highest in the organic sample, and therefore the immunotoxic effect was probably due to other contaminants in the CV wheat. **In conclusion, these results indicate that the conventional wheat sample tested represented a higher risk for lymphocyte function than the wheat sample organically grown, at least in vulnerable conditions.**

Keywords: Organic wheat; conventional wheat; lymphocyte proliferation; acute-phase proteins; rats