10120 - Organophosphorus pesticide exposure to urban and suburban pre-school children with organic and conventional diets

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Organophosphorous (OP) pesticide exposure was assessed among children who consumed either mostly organic or mostly conventional diets. Children were recruited from two grocery stores in the Seattle metropolitan area: a local consumer cooperative specializing in organic foods and a large retail chain supermarket. Twenty-four hour urine samples were collected from 18 children with organic diets and 21 children with conventional diets aged two to five years. Urine samples were analyzed for five dialkylphosphate compounds. Information regarding demographics and residential pesticide use was gathered during parental interviews, and diet classification was confirmed based on food diaries. There were no differences in age, gender, weight, or reported residential OP pesticide use between the two groups. The two predominant metabolites, DMTP and DETP, were found in 88% and 86% of the urine samples, respectively. DMTP was found at significantly higher levels than the other four metabolites (mean = 24 μg/L; $p < .0001$). The average urinary concentration of DMTP was 9.5 times higher for children with conventional diets than for children with organic diets (41 μg/L vs 4.3 μg/L; $p = .003$). Individual dimethyl dose estimates were calculated for each child based on his urinary dimethyl DAP level assuming that all of his pesticide exposure came from either oxydemeton methyl, azinphosmethyl, phosmet, or malathion. Doses for children with conventional diets were significantly higher than doses for children with organic diets ($p = .001$). If all dimethyl OP pesticide exposure was assumed to be from azinphosmethyl, one child with an organic diet (6%) and eleven children with conventional diets (52%) would exceed the chronic daily reference dose for that chemical. These findings suggest that consumption of organic produce could reduce children's pesticide body burden to below toxicological benchmarks.

Abstract # 10137

Cancer Risk Assessment of Pesticides through Dietary vegetables in Korea

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This study was conducted to estimate the carcinogenic risk from ingestion of some carcinogenic pesticides(CPs) in vegetables sampled at a local agricultural market in Seoul.

After applying a hazard identification step, we selected four priority pesticides such as DDT, dieldrin, folpet and heptachlor epoxide. For the exposure assessment, their concentration of pesticides in vegetables were measured from randomly samples and estimated in their consumption of vegetables with several occations of scenarios which were concerned in the range of intake amount and the detection limits of analysis.

For the risk charactorization, we calculated the life-time average daily exposure (LADE) and the virtual safety dose

(VSD) as well as the excess cancer risk (ECR).

From 6% samples, the designated pesticides were determind in the range of 0.0006~0.09ppm, their LADE were 0.0009~0.0079ug/kg/day and the most conservative estimation of ECR were 1.1x10-8~5.5x10-5.

We concluded that the residue of CPs should be monitored and managed while the estimated ECRs were not serious at that moment.

Key words, carcinogenic pesticide(CP), life-time average daily exposure dose (LADE), virtual safety dose(VSD), excess cancer risk(ECR).

11100 - Conceptual Framework for Categorizing Young Children's Eating Behaviors

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Recent studies of total dietary ingestion of common indoor contaminants has demonstrated that young children's behaviors while eating can lead to a significant source of food contamination. The difference between children eating their food items with or without their hands which have come into contact with indoor surfaces contaminated by pollutants has been shown to be potentially significant, but has not been yet fully quantitated. Food items that are eaten with utensils will have less surface-to-food or surface-to-hand-to-food pesticide contamination compared to food items that are eaten with contaminated hands in contaminated environments. It has been observed from a recent field study that "messy" eaters have higher levels of contaminated food and urinary biomarker levels of diazinon as compared to "neat" eaters. "Messy" eaters had higher surface-to-food or surface-to-hand-to-food contact frequencies for most food items which resulted in higher levels of contaminated leftover food and higher urinary biomarker levels of the chemical metabolite under study. Determining the activity factor to categorize eating behaviors is one objective of an ongoing study to accurately model dietary exposure of young children. An intermediate objective is to use a surrogate food to measure hand-to-food transfers of pesticides to determine the effect of multiple touches. This will also be used to determine the activity factors that will distinguish three categories of eating behaviors.

Three categories of eaters, i.e., neat, messy, and in-between, are determined by analyzing videotapes of children eating. Statistical methods such as tree-based cluster analysis are used to identify other factors that affect children's eating behavior, including the nature of the food items, meal, children's age, gender, and general hygiene practices. Once these factors are identified, the ultimate goal will be to predict total ingestion for a child based on a dietary model, by collecting measurements of the contaminant on selected surfaces of the home and observations of the child's eating behaviors with surrogate food items. Pesticides will be measured from the surrogate food to determine transfers from surfaces and hands to the item to attempt to verify the categories of eaters.

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11102 - Use of Pharmacokinetic Modeling for Dietary Exposure Study Design and Model Evaluation

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It has been shown that young children have potentially higher dietary pesticide intake when they handle foods while eating. Foods become contaminated with pesticides from "dirty" hands and home surfaces. A dietary intake model has been developed to estimate the potential increase in pesticide exposure caused by food handling and the model prediction has been confirmed in the small-scale field study. However, modelers often struggle with the validity of models and often model validation using biomarkers is unsuccessful because of large intra- and inter-individual variabilities for exposures, metabolism, physiological parameters, multiple sources of the exposures, and laboratory measurement errors. In this work, we demonstrated how to efficiently conduct a field study with the appropriate study design guided by pharmacokinetic modeling to minimize these problems. We used the children's dietary exposure model to evaluate increased pesticide intakes. Our work indicated that a longitudinal study in which the subject can serve as his/her own control, proper selection of pesticides with a biological half-life in appropriate range, and homes with pesticide loadings at specified levels were important factors to design a successful field study to evaluate the children's dietary intake model. We also explored the effects of other exposure pathways such as exposures via inhalation and indirect ingestion from non-dietary sources to evaluate the model using urinary biomarkers.

We attempted to evaluate the dietary pesticide intake model using two methods: the left-over foods and urinary measurements in a small-scale longitudinal study that involved 3 young children. Exposed days that allowed normal dietary exposure caused by handling of the foods alternated with unexposed days to create a predicted zig-zag pattern in the urinary pesticide metabolite measurements. The left over food measurements demonstrated that the handled foods indeed had much higher pesticides than foods that were not handled by the children (P=0.007). The zig-zag pattern predicted by toxicokinetic modeling was also observed in actual urinary metabolite measurements of all of the 3 subjects, which indicates an observable increase in dietary pesticide intake caused by children's handling of the foods. Comparison of the predicted urinary measurements and actual measurements, however, indicated model over prediction or unmeasured exposure sources. Nonetheless, our work suggested substantial amounts of dietary pesticide intake resulting from young children's handling of the food that should not be neglected and the model provided a sound base for further fine-tuning.

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11113 - Inaccuracy of dietary assessment and reporting bias in the sample of university students

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Nutritional epidemiology is critically important in understanding of relations between nutrition and health. The usual problems are that the classic criteria for causation are often not met, because many dietary factors are weak and do not show linear dose-response relations. The most important problem has been the inaccuracy of dietary assessment.

In the present study the influence of body weight (BMI) on accuracy of records made by respondents about their energy intake and energy balance was analysed. 2.691 medical students (1.019 men, 1.672 women, mean age 22.28 ± 1.25 years) were examined. Energy intake (EI) was calculated from 24 hour recording food consumption, energy expenditure (EE) was calculated from 24 hour recording physical activity and index EI/BMM and EE/BMM was computed. Basal metabolic rate (BMM) was used as a criterion for verification of questionnaire data accuracy. Energy intake was more often overestimated by men (17.2 %) than women (13 %) and on the contrary energy intake was more underestimated by women (15.6 %) than men (11.7 %). Slim men (n=81) and women (n=424) had positive energy balance (3.4 MJ and 1.8 MJ), the highest energy intake index (1.92 and 1.82) and the lowest energy expenditure index (1.44 and 1.48). On the contrary overweight and obese men and women (n=205 and n=119) had negative energy balance (-1.8 MJ and -2.2 MJ), the lowest energy intake index (1.58 and 1.46) and the highest energy expenditure index (1.78 and 1.79). Differences were statistically significant. Negative correlation between BMI and EI/BMM ($r = -0.173$ men and $r = -0.185$ women), as well as positive correlation between BMI and EE/BMM ($r = 0.258$ men and 0,226 women) was confirmed.

Results of our study show that even in sample of young people with relatively high level of health consciousness the bias of reporting energy intake and energy expenditure in relation to BMI could be expected.