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Cadmium is heavy metals that cause vascular lesions such as artherocslerosis and hypertension. However, less information is available concerning for its toxicity. The results from previous in vitro and in vivo studies demonstrate that cadmium cation can induce an oxidative stress in various tissues. Oxidative stress has been shown to be involved in the mutagenicity and apoptosis of mammalian cells treated with cadmium.
In this study, we investigated whether cadmium cause cell death in vascular endothelial cells. We also examined the effect of cadmium on mitochondrial function by MTT assay. Cell death was quntitatively determined by measuring lactate dehydrogenase (LDH) activity, propidium iodide(PI)-uptake and by observing morphology in CPAE cells.
In CPAE, a significant decrease was observed in mitochondrial function 24, 36 hours after the treatment with 10-100μM CdCl2. Cadmium-induced cell injury was also observed morphologically by microscope. We also observed cadmium induced increase in PI-uptake.
In conclusion, our results suggest that cadmium can cause mitochondrial dysfunction and subsequent cell death in vascular endothelial cells.

[PA3-3] [10/18/2001 (Thr) 14:00 - 17:00 / Hall D]

Cardiotoxic effect of carbofuran in rat.

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Of all pesticides, carbamates are known to be most common, since alternatives such as organophosphates have long lifetime and are extremely toxic to produce a delayed neurotoxic effect. Among the available carbamates, carbofuran is the most widely used one in agriculture and forestry as a broad-spectrum systemic insecticide. Although a number of studies about toxicity of carbofuran have been reported, its cardiovascular toxicity has not yet been studied.
In the present study, we investigated its cardiovascular toxic effect in isolated Langendorff rat heart and in anesthetized rat in vivo. Isolated rat heart, carbofuran (10μM) caused a significant depression in the left ventricular developed pressure (LVDP), indicating contractile dysfunction by carbofuran. Carbofuran (10μM) also decreased coronary flow rate (CFR) in isolated heart, indicating carbofuran-induced coronary dysfunction. In anesthetized rat model, carbofuran (10 mg/kg) significantly reduced blood pressure and heart rate, and altered ventricular component of electrocardiogram. These results suggest that carbofuran can cause cardiac dysfunction in rat in vivo and vitro.

[PA3-4] [10/18/2001 (Thr) 14:00 - 17:00 / Hall D]

A Cancer Risk Assessment of Di(2-ethylhexyl)phthalate in Powdered Milk for Infant Exposure

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The United States Environmental Protection Agency(EPA) characterized the cancer hazard of di(2-ethylhexyl)phthalate(DEHP) as a B2 group(probable human carcinogen) and proposed "Guidelines for Carcinogen Risk Assessment". This guidelines proposed alternative methods for analyzing carcinogen

dose-response data and for extrapolating the effects of observed at high dose to predict that might occur at lower doses relevant to human exposure. This proposed guidelines state that "If in a particular case, the evidence indicated a threshold, as in the case of carcinogenicity being secondary to another toxicity that has a threshold, the margin of exposure analysis for toxicity is the same as is done for a non-cancer endpoint". DEHP is excellent candidate for reconsideration under the new guidelines for carcinogen risk assessment(John Doull et al., 1998).
This study is conducted about risk asssessment for infant exposure on DEHP in powdered milk using methodology in EPA's new guideline on carcinogenic risk assessment. Estimated cancer risk of DEHP in powdered milk is 1.2E-5(using cancer potency : 1.4E-2 /(mg/kg/day)) and MOE is 0.04(using selected NOEL 20mg/kg/day, uncertainty factor 1000).

[PA3-5] [10/18/2001 (Thr) 14:00 - 17:00 / Hall D]

Suggestion of Policy Option for Management of Cadmium in Food using Reference Dose and Human Exposure Pattern

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Cadmium can be exposed in human via multimedia such as ambient air, water, soil and food. It was reported that food was the main exposure source of cadmium by several studies. This study was conducted to quantify dietary intake level of cadmium and to suggest managing option for management of cadmium using reference dose and human exposure pattern. In order to quantify the dietary intake level of cadmium, data were obtained from both the cadmium levels in foods and consumption data for 53 foods, which were selected as foods must commonly consumed by the general Korean. The residue data in food for the last 5 years, from the Korea Food and Drug Administration and related agencies were collected. For the suggestion of policy option, the maximum residue value of food groups were induced having theory that daily dietary intake level of cadmium must not exceed reference dose as 0.001mg/kg/day based on kidney dysfunction of cadmium and exposure contribution by food group to total dietary intake level. The daily dietary intake level of cadmium, which the general Korean adult group with 60kg was regarded as the target population and the Report on National Health and Nutrition Survey (2000) was used as consumption data, was estimated to be 3.3410-4mg/kg/day. The order of exposure contribution to total dietary intake level was grain (34.02%), vegetables (28.26%), fishes (10.90%), meats (10.38%), fruits (8.08%), legumes (5.0%), potatoes (3.17%), and nuts (0.19%). The maximum residue levels of food group to control below reference dose exposure of cadmium were suggested using equation , maximum residue level(mg/kg) = [Reference dose(mg/kg/day) Body weight (kg)] / [Intake level(g/day) 0.001(kg/g)] and suggested managing options by food group were 0.057ppm in grain, 0.051ppm in vegetables, 0.086ppm in fishes, 0.085ppm in meats, 0.023ppm in fruits, 0.088ppm in legumes, 0.05ppm in potatoes, and 0.051ppm in nuts.

[PA3-6] [10/18/2001 (Thr) 14:00 - 17:00 / Hall D]

Apoptosis induced by tetrandrine in HepG2 cells proceeds via cytochrome c independent and caspase-8 dependent.

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Tetrandrine is a bis-benzyl isoquinoline alkaloid derived from the root of Stephania tetrandra S. Moore, which was reported to elicit in vitro cytotoxic effect on Hela cells and in vivo suppressive effects on mouse ascite tumor. Tetrandrine also induced apoptosis in a various cell lines. Recent studies have revealed that mitochondria has been shown to play an important role in the regulation of several