บทคัดย่อ

การกำหนดระดับสูงสุดของวัตถุเจือปนอาหารต้องผ่านการประเมินความเสี่ยงก่อน เพื่อป้องกันการนำไปใช้ในระดับที่ก่ออันตรายต่อสุขภาพ โดยเฉพาะผู้มีอายุน้อยซึ่งกระบวนการด้านทานและกำจัดพิษจากพิษพื้นเมืองไม่เต็มที่ แต่อาหารที่เด็กนิยมบริโภคเป็นอาหารผสมสีซึ่งต้องมีการระวังไม่ให้การได้รับสีสังเคราะห์อยู่ในระดับที่ก่อผลเสียต่อสุขภาพ การศึกษาที่นี้มีวัตถุประสงค์เพื่อประเมินความเสี่ยงของการได้รับสีสังเคราะห์จากบริโภคอาหารของเด็ก โดยประเมินจากค่ามาตรฐานและสถานการณ์จริงในภาคกลาง (กรุงเทพฯและนครปฐม) และภาคใต้ (สุราษฎร์ธานี) ของประเทศ การประเมินจากค่ามาตรฐานของCodexพบว่าสี7ชนิดได้แก่คาร์โมอีซีน,เออริโธรซิน,ปองโซ4อาร์,ไรโบฟลาวิน,คาร์ตาซีน,ซันเซ็ตเย็ลโลว์และอินดิโคตินมีปริมาณการได้รับสัมผัสในกลุ่มเสี่ยงคือเด็กอายุ3-5.9ปีสูงกว่าค่าAcceptable Daily Intake (ADI)จึงต้องปรับลดค่ามาตรฐานของสีเหล่านี้ลงผลการเก็บตัวอย่างอาหารที่เด็กนักเรียนนิยมบริโภคพบการเจือปนสีสังเคราะห์7ชนิดได้แก่คาร์ตาซีน,ซันเซ็ตเย็ลโลว์,คาร์ตินซีน,ปองโซ4อาร์,เออริโธรซิน,สารสีชมพูและบริโภคเนื้อสัตว์ที่ให้สีมีสีที่อนุญาตให้มีการใช้ในอาหารตามประกาศสุขภาพโดยสีกลุ่มสีแดงคือคาร์ตาซีนและซันเซ็ตเย็ลโลว์สีแดงใช้เป็นสีที่มีค่าADIต่ำทำให้มีโอกาสก่อให้เกิดความเสี่ยงจากการได้รับสีสังเคราะห์สูงกว่าสีอื่นในระดับที่ใกล้เคียงกันอย่างไรก็ตามการได้รับสีสีสังเคราะห์ระดับเฉลี่ยของเด็กนักเรียนมีปริมาณต่ำกว่าค่าADIของสีแต่ละชนิดมากแสดงว่าปริมาณสีสังเคราะห์รวดอาหารที่เด็กได้รับไม่ต่ำกว่าร้อยละในระดับที่มีโอกาสส่งผลเสียต่อสุขภาพอย่างไรก็ตามการปรับลดค่าADIจะทำให้ปริมาณสีสังเคราะห์ลดลงแต่จะมีผลต่อการบริโภคอาหารที่มีการเจือปนสีสังเคราะห์สูงสุดซึ่งอาจก่อให้เกิดความเสี่ยงต่อสุขภาพได้หน่วยงานที่เกี่ยวข้องควรให้ความรู้แก่ผู้ผลิตและผู้บริโภคในการเลือกเลือกอาหารข้อได้เปรียบในปริมาณสีสังเคราะห์ข้อเสียในการปรับลดค่าADIของปริมาณสีสังเคราะห์รวมถึงปริมาณสีสารสีที่มีการเจือปนในอาหารที่เด็กนักเรียนได้รับ

ค่าสำคัญ การประเมินความเสี่ยงสีสังเคราะห์อาหารผสมสี

* Corresponding author:

ณัฐพร บุญชู	วิชยา การพานิช	และ ปิยโชติ วิเศษชาติ
สถาบันโภชนาการ มหาวิทยาลัยมหิดล ศาลายา นครปฐม 73170
Email: nuwbe@mahidol.ac.th
Health Risk Assessment of Methomyl Exposure among Farmers in Jasmine’s Agriculture

Chaiklieng S¹, Suggaravetsiri P², and Charerntanyarak L²

¹ Department of Environmental Health Science, Faculty of Public Health, Khon Kaen University
² Department of Epidemiology, Faculty of Public Health, Khon Kaen University

ABSTRACT

Methomyl, a cholinesterase-inhibiting insecticide, is commonly used in a jasmine’s agricultural area, Sila Sub-district, Khon Kaen Province, northeast of Thailand. This cross sectional study aimed to determine the potential health risk to methomyl exposure among farmers working in a jasmine’s agriculture. Personal air samplings were conducted by using Universal Pump Model 224-PCXR8, SKC with filter/solid sorbent tube (OVS-2 tube: 13-mm quartz fiber filter, XAD-2, 270 mg/140 mg). All samples were analyzed by using HPLC with UV detector. Exposure concentrations and hazard quotients (HQ) were estimated for inhalation exposure risk.

This study found that the maximum concentration of methomyl in the breathing zone of workers (N=24) was 1.119 mg/m³ (range 0-1.119 mg/m³). Comparison to the standard regulatory on the ambient concentration of methomyl, i.e. TLV-TWA of 2.5 mg/m³ (ACGIH) or PEL-TWA of 2.5 mg/m³ (NIOSH), the results of this study did not exceed the regulation. The average inhalation exposure to methomyl was 0.018±0.037 mg/kg-d. The result of average HQ indicated no health risk (HQ=0.723±1.461). When each farmer was considered, there were 6 farmers (25%) with high risk (HQ >1). Therefore, there should be health surveillance program and occupational health services for jasmine’s agriculture farmers to work and live safely.

Keywords: Methomyl, health risk assessment, jasmine’s agriculture

* Corresponding author:
Dr. Sunisa Chaiklieng
Department of Environmental Health Science,
Faculty of Public Health, Khon Kaen University
Email: csunis@kku.ac.th
Antimutagenic Activity of *Curcuma elata* Extract against 4-Nitroquinoline 1-oxide and 2-Aminoanthracene Toxicity Observed by *Salmonella* Mutation Assay

Puchadapirom P and Himakoun L*

Department of Pathobiology, Faculty of Science, Mahidol University, Bangkok.

**ABSTRACT**

The use of natural chemicals to suppress or reverse the carcinogenic processes is a promising approach for the prevention of cancers. Most of the chemopreventive agents are derived from various kinds of plant extracts. Both 4-Nitroquinoline 1-oxide (4-NQO) and 2-Aminoanthracene (2-AA) are mutagenic agents and have been implicated in the etiology of human cancers and other diseases. In this study, the hexane extract of *Curcuma elata* Roxb., a Thai medicinal plant known as Wan-chak-mot-luk, was investigated for its antimutagenic activities against the direct acting mutagen, 4-NQO as well as the indirect acting mutagen, 2-AA, by using the *Salmonella* mutation assay (Ames test). The results indicated that the extract from *C. elata* itself does not display a mutagenic activity at the concentration of 5-500µg/plate. The inhibitory effect of *C. elata* against 4-NQO mutagenic activity was shown in a dose dependent manner with the concentration of 25-75 µg/plate. The highest inhibitory effects were 66.2% and 73.9% observed in TA98 and TA 100, respectively. In addition, *C. elata* extract at the concentration of 1,000 µg/plate exhibited the highest inhibitory effect against 2-AA mutagenic activity with 40.9% and 49.9% inhibitions in TA98 and TA 100, respectively. In conclusion, the hexane extract of *C. elata* did not display mutagenic activity in the Ames test but had antimutagenic activity against the carcinogenic compounds 4-NQO and 2-AA. Our results demonstrated that *C. elata* Roxb. could potentially be used as a novel cancer chemopreventive agent.

**Keywords:** *Curcuma elata* Roxb., Ames test, antimutagenicity

* Corresponding author:
  Assoc. Prof. Lakana Himakoun
  Department of Pathobiology, Faculty of Science, Mahidol University, Bangkok, Thailand
  E-mail: sclhk@mahidol.ac.th
Phyllanthus emblica (Ma-Kham-Pom) Increased the Proliferation of Mouse Splenocytes While Suppressing Mouse Lymphoma Cell Growth

Huabprasert S1*, Wongkajornsilp A1, Akarasereenont P1,2, Panich U1, Laohapand T2, Kasetsinsombat K1 and Kangsadalampai K1

1 Department of Pharmacology, Faculty of Medicine Siriraj Hospital, Mahidol University, Bangkok, Thailand
2 Center of Applied Thai Traditional Medicine, Faculty of Medicine Siriraj Hospital, Mahidol University, Bangkok.

ABSTRACT

Phyllanthus emblica Linn. (Ma-Kham-Pom) has been constituted as an herbal component of Thai traditional recipes proposed to slow down the aging process. A number of methodologies were employed to investigate the anti-aging effects of P. emblica in a mice model. The infusion of P. emblica could directly drive the proliferation of mice splenocytes in a dose-dependent manner. The P. emblica infusion was cytotoxic to the YAC-1 (mouse lymphoma) cells in the studied dose, while sparing the human umbilical endothelial cells. Mice ingesting P. emblica infusion for 14 days carried healthy splenocytes with higher proliferative potential in a dose-dependent relationship. However, the isolated splenocytes from the ingesting group did not exhibit higher NK cell activity. We concluded that P. emblica infusion was relatively safe and contained growth enhancing activity toward mice splenocytes

Keywords: Phyllanthus emblica, mouse splenocyte, lymphoma cell
Association between P53 Codon 72 Gene Polymorphism and Risk of Lung Cancer in Thailand

Danai Tiwawech¹, Adisak Sornprom ², Anant Karalak³ and Takafulmi Ishida⁴

¹ Research, ²Surgery and ³Pathology Divisions, National Cancer Institute, Bangkok 10400, Thailand, ⁴ Unit of Human Biology and Genetics, Department of Biological Sciences, School of Science, University of Tokyo, Tokyo, Japan

ABSTRACT

Lung cancer (LUC) is a malignancy killer causing uncountable losses worldwide annually including Thailand. Clinically, the early stage of LUC has no specific warning signs, resulting in late diagnosis when cancer is incurable. Screening for early stage of patients with LUC in high-risk population for intensive counseling and immediately efficient treatment has been suggested to be the best way to prevent this undesirable cancer. Therefore, a mass screening for early stages of LUC patients without cancer-related symptoms is urgent. P53 codon 72 gene (P53cd72), producing P53 protein for inducing cancer cell arrest and apoptosis, has been reported to be polymorphic and associated with increased risk of several cancers. This study aimed to investigate the association between P53cd72 polymorphism and the risk of LUC in Thai population. The frequency of P53cd72 genotypes [Arginine/Arginine (Arg/Arg), Arginine/Proline (Arg/Pro) and Proline/Proline (Pro/Pro)] was detected in DNA extracted from white blood cells of 60 patients with LUC and 148 healthy controls using the real time-polymerase chain reaction (R-PCR) assay.

The results of P53cd72 genotypes detection in the LUC group showed that 4 (6.67%), 40 (66.67%), and 16 (26.67%) of the patients had Arg/Arg, Arg/Pro and Pro/Pro, respectively whereas in the healthy control group, 50 (33.78%), 28 (18.92%), and 70 (47.30%) of subjects had Arg/Arg, Arg/Pro and Pro/Pro, respectively. Overall, the frequency of P53cd72 genotypes between LUC and healthy control groups was significantly different (p<0.001). Individuals with Pro/Pro had an increased risk at 7.14-fold for LUC development as compared with those with Arg/Arg (Odds ratio = 7.14, 95% confidence interval = 2.17-23.46). In addition, the associations between Pro/Pro genotype and the increased risk of LUC in cigarette smokers and alcohol drinkers were observed. The findings of this study showed that P53cd72 polymorphism was associated with LUC and the Pro/Pro genotype was an important factor that could increase the risk for LUC development. Therefore, we suggested that the P53cd72 polymorphism detection could be very useful in screening for high-risk group that may lead to identification of early stages of LUC in Thai population.

Keywords: Lung cancer, risk factor, P53 codon 72 gene, polymorphism, Thailand.

* Corresponding author:
Dr. Danai Tiwawech,
National Cancer Institute, Bangkok 10400, Thailand,
E-mail: tdnai@hotmail.com
Cadmium Levels in Blood and Tissues and the Correlation between Blood Cadmium and Plasma Testosterone in Beef Cattle from a Polluted Area in Thailand

Trakranrungsie N*, Yatmark P and Nakthong C.
Faculty of Veterinary Science, Mahidol University-Salaya, Nakhon Pathom 73170, Thailand

ABSTRACT

Since the incidence of cadmium- (Cd) polluted environment has been declared in the area of Mae Sot district, Tak province, Thailand, investigation on Cd-contaminated agricultural products and human health has been conducted. This study aimed to investigate the levels of Cd in blood, liver and kidney of beef cattle at different age and the possible adverse health impact on the animals. The results revealed that beef cattle reared in this polluted area accumulated high Cd levels in kidney and liver, in which the significant positive correlations between tissue Cd levels and age were detected. With regard to food safety standard, 62% of the 99 studied cattle had renal Cd at levels exceeding the safety limit (1 mg/kg) and 43% concomitantly had hepatic Cd higher than the permitted level (0.5 mg/kg). It was also suggested that environmental Cd exposure could disrupt testosterone homeostasis as demonstrated by the correlation analysis between blood Cd levels and testosterone levels in each age group. These findings indicated that Cd levels in food-producing grazing animals would help reflect the levels of environmental contamination and be valuable in risk estimation of Cd carry-over on human via food chain. The results implied that testicular function was sensitive to Cd and data obtained from the animals could be regarded as a bio-indicator for risk of reproductive dysfunction in humans.

Keywords: Cadmium, testosterone, beef cattle, Thailand

* Corresponding author:
Asst. Prof. Nopamas Trakranrungsie
Faculty of Veterinary Science, Mahidol University
Salaya, Nakhon Pathom 73170, Thailand.
E-mail: vsntk@mahidol.ac.th
Detection of Urinary Kidney Injury Molecule-1 in a Chronic Cadmium Exposed Population, Mae Sot District, Tak Province

Amnart Panyamoon¹, Kowit Nambunmee², Muneko Nishijo³, Witaya Swaddiwudhipong⁴ and Werawan Runyutthikarn⁵*  
¹ Division of Toxicology, Department of Forensic Medicine, Faculty of Medicine, Chiang Mai University, Thailand.  
² Doctor of Philosophy Program in Biomedical Sciences, Faculty of Associated Medical Sciences, Chiang Mai University  
³ Department of Public Health, Faculty of Medicine, Kanazawa Medical University, Ishikawa, Japan.  
⁴ Department of Social Medicine, Mae Sot General Hospital, Tak Province, Thailand.

ABSTRACT

Cadmium (Cd) has been found as an environmental pollutant in Mae Sot district, Tak province. Contaminated Cd in water and rice causes high risk of renal dysfunction among the inhabitants. In order to investigate the effect of Cd induced renal dysfunction, a kidney injury molecule-1 (KIM-1), a recently discovered biomarker for an early detection of renal tubular dysfunction, was measured using an enzyme linked immunosorbent assay (ELISA). Polyclonal goat anti-KIM-1, horseradish peroxidase labeled streptavidin and its specific substrate were used in the in-house ELISA technique. The method was validated and used to quantitate KIM-1 in the urine of 700 Mae Sot inhabitants in comparison to two conventional renal biomarkers; N-acetyl-β-D-glucosaminidase (NAG) and β₂-microglobulin (β₂-MG). The results showed that KIM-1 standard concentrations provided good linearity (r=0.998) with limit of detection and quantitation at the concentrations of 33.20 pg/ml and 110.68 pg/ml, respectively. The coefficient variation (CV) for inter-day and intra-day precisions for 3 levels of KIM-1 (200, 800 and 3,000 pg/ml) were at 0.8, 1.2, and 2.1% CV and 0.7, 2.4, and 6.7% CV, respectively. The accuracy of the assay was found with 89-101% recovery. The average ± SD of the KIM-1 concentrations in urine samples of 700 Mae Sot inhabitants were at 1,347±1,290 pg/gCr, ranged between 61-15,330 pg/gCr. Using Spearman’s rho analysis, a strong positive correlation between KIM-1 and Cd concentrations (r=0.234, P<0.001) was found. The Cd was also correlated well with the NAG (r=0.263, P<0.001) and β₂-MG (r=0.179, P<0.001). Prevalence of high excretion of renal biomarkers was shown in dose response relationship to Cd concentrations. This finding demonstrated that KIM-1 was a sensitive biomarker for detection of renal dysfunction in population with high Cd exposure.

Keywords: Kidney Injury Molecule-1, ELISA, cadmium, Mae sot, Thailand

Full paper on page 72

* Corresponding author:  
Assoc. Prof. Dr. Werawan Ruangyutthikarn,  
Department of Forensic Medicine, Faculty of Medicine, Chiang Mai University, Chiang Mai 50200, Thailand,  
E-mail: wruangyu@med.cmu.ac.th