

## **Part two**

### **Effects of Endocrine Hormone and Immune System after Exposure to Mixed Cypermethrin and Methylparathion**

**Ping LIU, Wei-hua WEN, Wei-hong YUAN, Xiao-xiao SONG, Xinan WU**

Institute of Environmental Medicine, School of Public Health,  
Kunming Medical College, 650031 Kunming, Yunnan, P. R. China

#### **Abstract**

To study effects of two pesticides combination of cypermethrin and methylparathion at low doses on thyroid hormones, reproductive hormones and immune function in rats, 80 Wistar rats (40 male and 40 female) were divided randomly by bodyweight into 4 groups when they were 2-month old. Each group had totally 20 rats (10 male and 10 female). Three doses (1/600 LD<sub>50</sub>, 1/135 LD<sub>50</sub> and 1/30 LD<sub>50</sub>) were chosen as exposure groups, according to oral toxicity in LD<sub>50</sub> for cypermethrin 240 mg/kg and methylparathion 6.9mg/kg. So the doses of cypermethrin were 0.4, 1.8 and 8.0 mg/kg body weight mixed with that of methylparathion 0.0115, 0.0518 and 0.2300 mg/kg body weight, respectively. The control group used vehicle solvent only. All groups were force-fed every two days for 30 days with above doses combination. The body weight gain, organ weights of pituitary gland, thyroid, adrenals, testes, epididymis, prostate, uterus, ovary were determined. The following parameters in the rats' serum were measured using radioimmunoassay(RIA). They were IgG and IgA; reproductive hormones: luteinizing hormone(LH), follicle stimulating hormone (FSH), estradiol(E<sub>2</sub>) and testosterone (T); the thyroid hormones: triiodothyronine (T<sub>3</sub>), tetraiodothyronine (T<sub>4</sub>) and thyroid stimulating hormone (TSH). Two immunological parameters were being measured in blood samples: rate of neutrophils phagocytosis and of transformation in lymphocytes. Our results showed that the mean weights of hypothalamic gland of exposed female rats and of adrenal glands of exposed male rats were heavier than those of respective control animals ( $P<0.05$ ;  $P<0.01$ ). The mean serum levels of FSH and E<sub>2</sub> in exposure female rats were higher than those of the control group ( $P<0.01$ ). The serum TSH levels were increasing along with pesticide dose going up ( $r_s=0.329$ ,  $P<0.01$ );

The rates of lymphocyte transformation in all animals were lower than that of the control group ( $P<0.01$ ). The rates of neutrophils phagocytosis in all exposure groups were higher than th

at of the control group ( $P<0.01$ ). The mean of IgG levels in the serum of all exposed animals were lower than the control group ( $P<0.01$ ). The serum IgA levels in female exposure groups were lower than that of the control group ( $P<0.01$ ). There were dose-effect relationships for all these changes ( $P<0.05$  or  $<0.01$ ). From the study we concluded that exposures to mixture of the two pesticides (cypermethrin and methylparathion) one month even at low doses could have effects on endocrine hormone levels and immune function in rats. As mixed pesticides are widely used for agriculture and forestry, we should pay more attention for their health effects on human beings.

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