BIOLOGICAL EFFECTS OF POLYCHLORINATED BIPHENYLS IN RATS AND QUAIL

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Polychlorinated biphenyls (PCB's) have been administered to rats and to quail to discover the nature of the biological effects which these environmental pollutants produce in mammals and birds. Biological effects evaluated were (1) estrogenic activity of the PCB's in rats, (2) alterations of pentobarbital metabolism induced by the PCB's as judged by sleeping time of Japanese quail, (3) alterations of liver vitamin A, liver lipids and liver weight induced by Aroclor 1242 in rats and quail, and (4) egg production of Japanese quail on a diet containing Aroclor 1242.

Estrogenic activity was assessed by determining the stimulation of the uterine glycogen response of the immature rat uterus. In a series of 11 polychlorinated biphenyls and terphenyls, the compounds containing up to 48% chlorine were estrogenically active.

A sleeping time test with pentobarbital was utilized as a means of determining liver microsomal enzyme activity since the liver is the major site for the metabolism of barbiturates. The PCB's were tested for their acute or short term effects (48 hours) and for longer term effects at 3 and 7 days. A single dose of Aroclor 1268 or Aroclor 5460 initially increased sleeping times in Japanese quail but by 18 hours sleeping times were less than untreated control values. By 48 hours the PCB's had stimulated the liver enzymes which metabolize pentobarbital and sleeping times were only 50% of control sedation times. Continuous feeding for 3 and 7 days confirmed this, sleeping times being about 50-70% of control levels, thus indicating greater metabolism of the barbiturate.

Aroclor 1242 at a dietary level of 100 µg/g feed was fed to male and female rats and quail for two months. In both rats and quail, liver vitamin A was depressed about 50% but liver weight and liver lipid increased significantly. Average egg production in the Aroclor 1242-fed quail declined to about 71% as compared to 85% in the controls. The number of membranous and broken eggs in the PCB group was over 2X that of the control quail.

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