

## FURTHER STUDIES ON MERCURY TOXICITY

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Discussion after several papers at the 1974 N. C. Nutrition Conference suggested that environmental factors may interact with (weaken) biological membranes and hence precipitate or increase the incidence of oily bird syndrome. Among the environmental factors suggested were aflatoxin and mercury. Both factors interfere with normal fatty acid synthesis in chickens, and fatty acids are an integral part of the structure of all biological membranes. We, therefore, began an investigation of the effects of mercuric chloride ( $\text{HgCl}_2$ ) on the mitochondrial membranes of liver cells in chicks.

Chicks were grown from day-old by feeding a practical broiler starter diet. At one-week of age half the chicks were given  $\text{HgCl}_2$  in the drinking water while the remaining half were given tap water. The chicks were maintained on these regimes for varying time periods, after which they were killed and the livers were removed. The livers were homogenized, and the homogenates were centrifuged to remove nuclei and cellular debris. The resulting liver preparations were assayed for the enzyme, cytochrome c oxidase, which is located inside the mitochondria. The assays were carried out with untreated homogenates and with homogenates treated with 0.02% Triton X-100 (a detergent which effects complete disruption of the mitochondria). Mitochondria were isolated from the homogenates by centrifugation and their susceptibility to rupture by various means was measured also.

The proportion of free cytochrome c oxidase activity (activity measured in untreated homogenates) to total activity (activity measured in Triton X-100-treated homogenates) was not increased by  $\text{HgCl}_2$  treatment (up to 300 p.p.m. Hg in the drinking water) for 4 weeks. This result suggests that Hg did not interfere with the formation of mitochondrial membranes. When Hg-treatment was continued until the birds exhibited tremors (approximately 8 weeks of age) free cytochrome c oxidase activity was markedly higher in Hg-treated birds as compared with untreated birds. Although the data suggest that Hg ingestion can interfere with biological membrane formation in chickens, the levels of Hg and the time required to induce changes indicate that Hg is not involved in the etiology of oily bird syndrome.