P023 A Study of oxidative DNA damage caused by ingested transition metals

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The main causes of oxidative DNA damage are irradiation, chemical reactions, and oxidation by reactive oxygen species (ROS), including hydroxyl radicals. The most widely studied of the DNA oxidation products is the Guanine oxidation product 8-oxoguanine (8-oxoG).

This study has concentrated on the damage caused to DNA by oxidation via the Fenton reaction [6] catalysed by the ingested transition metals: nickel, cadmium, cobalt, manganese and zinc. These transition metals are present as trace elements in food, though in contaminated areas are present in much higher, sometimes toxic amounts. Some transition metals well as H_2O_2 are also available in vivo through various biochemical processes, indicating the importance of this reaction in the body.

Guanine was incubated with the Fenton reagents and the formation of 8-oxoG was monitored over time, with duplicate samples taken at one-minute intervals. The concentration of 8-oxoG was seen to oscillate as the reaction proceeded for each of Nickel, Cadmium, Cobalt, Zinc and Manganese. This erratic formation of 8-oxoG appears to be characteristic of the transition metal interaction with hydrogen peroxide to produce a hydroxyl radical.

Magnesium, a readily available and ingested alkali earth metal was used as a control sample, and did not show any formation of 8-oxoG over the course of the incubation period.