Effect of Administration Sequence of Mercuric Chloride and Sodium Selenite on Their Toxicities in Mice. III. Changes in Behavior of Mercury and Selenium

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Parizek *et al.*^{1,2)} demonstrated that selenite dramatically decreased the acute nephrotoxicity of mercuric mercury in rats, provided that selenite was given 1 or 4 h after mercuric mercury or simultaneously with mercuric mercury. However, when selenite was given a few hours before mercury an increased mortality was observed.²⁾ These effects of administration sequence on the toxicities of both compounds are important for an understanding of the interaction of mercuric mercury and selenite in animals. This study was undertaken to clarify the relations between administration sequence of these chemicals and their toxicities and behavior in the mouse.

Sodium selenite (25 $\mu\text{mol/kg}$) and mercuric chloride (25 $\mu\text{mol/kg}$) were administered *iv* to male mice (ICR, 20 g) as follows; mercury only (Hg), selenite only (Se), mercury and selenite simultaneously (Hg+Se), selenite given 1 h after mercury (Hg→Se), or selenite given 1 h before mercury (Se→Hg). The body weights of the mice given mercury or selenite alone (Hg, or Se) did not increase, but the mice given both substances simultaneously (Hg+Se) grew as well as control mice. On the other hand, a shift of administration of either compound for 1 h (Hg→Se, or Se→Hg) destroyed the mutual detoxifying effect. The body weights of the mice given Hg→Se did not increase, and 80% of the mice given Se→Hg died within 1 h after the mercury injection.

Upon simultaneous administration of selenite (Hg+Se) mercury levels increased in the blood and liver, and decreased markedly in the kidneys in comparison

with the case of Hg administration. These effects were not significant in the mice of the Hg→Se and Se→Hg groups. Sephadex G-200 gel filtrations of the plasma, stroma-free hemolysate and liver or kidney soluble fraction indicated that the mercury and selenium interaction, as a result of which equimolar amounts of both elements came to be eluted in a high-molecular weight fraction,³⁻⁵⁾ was more clearly observed in the tissues of the mice of the Hg+Se group than those of the Hg→Se and Se→Hg groups. The molar ratios of mercury and selenium accumulated in the plasma, erythrocytes, and the tested organs (except the spleen) of the mice given Hg+Se were close to 1, from 30 min to 24 h after administration. In the case of the mice given Hg→Se, the molar ratios of mercury and selenium in their tissues appeared to approach to 1 within 24 h. However, in the case of Se→Hg, the molar ratios were far from 1 during the period of observation.

These experimental results demonstrated that the interaction of mercuric mercury and selenite in mice was greatest upon administration of Hg+Se. Considering the relatively rapid clearances of both mercury and selenium from the blood observed when these compounds were administered separately, the above result may support the hypothesis that the primary interaction of mercuric mercury and selenite in animals occurs mainly in the blood stream.^{4,6)}

References

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