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Toxic Effects of Particular Concern

Alterations in the structure/function of organs/systems that, if occurring during development, tend to be more severe and/or permanent

- Central nervous system
- Immune system
- Thyroid gland



OEHHA's Mandate under the Children's Environmental Health Act

Under SB-25, OEHHA is directed to assess:

- Exposure patterns among infants and children that are likely to result in disproportionately high exposure to ambient air pollutants in comparison to the general population.
- Special susceptibility of infants and children to ambient air pollutants in comparison to the general population.
- The effects on infants and children of exposure to toxic air contaminants and other substances that have a common mechanism of action.
- The interaction of multiple air pollutants on infants and children, including the interaction between criteria air pollutants and toxic air contaminants.

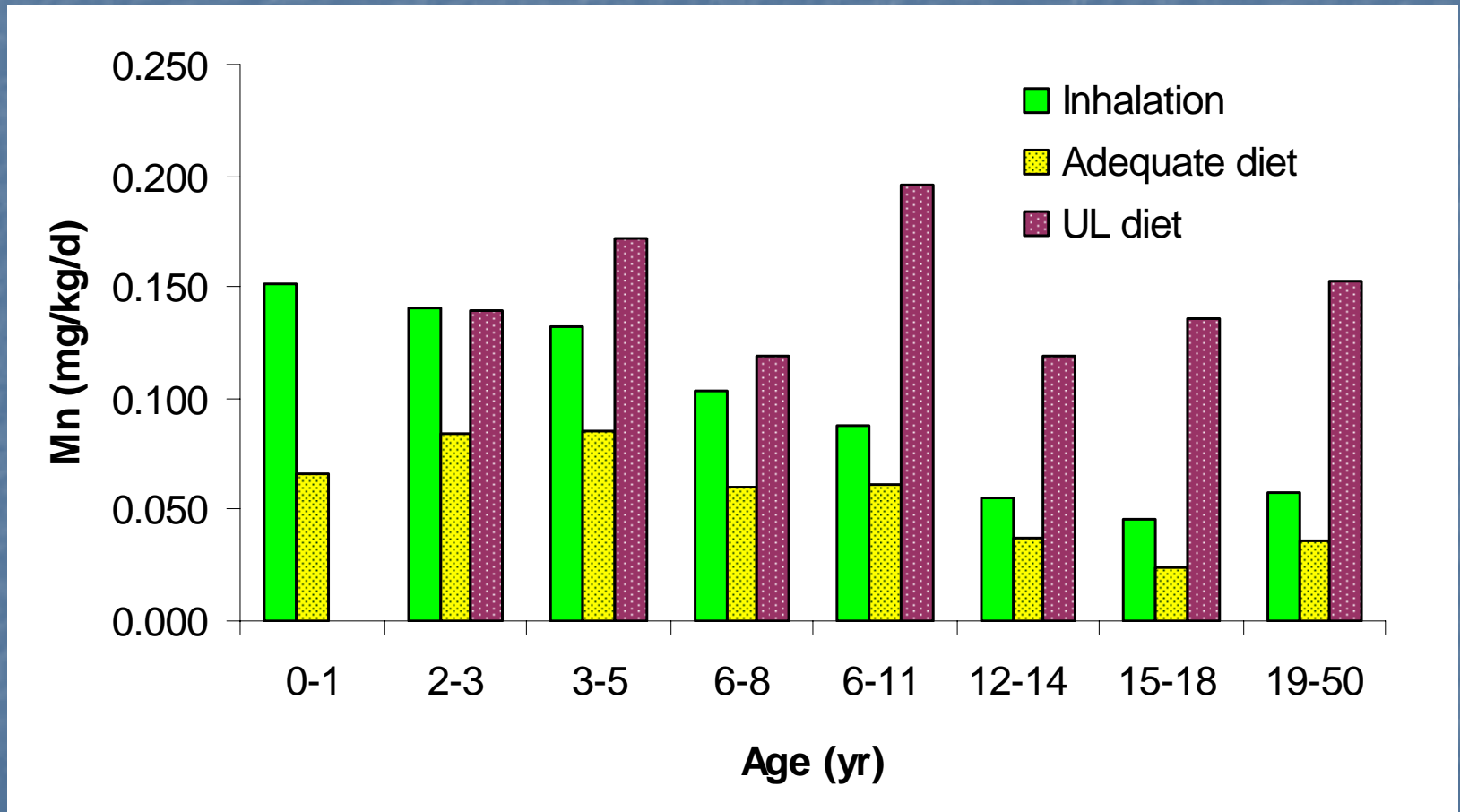


Exposure to Essential Metals

- Route of exposure – Inhalation vs ingestion
- Inhalation provides more rapid uptake of manganese into the blood from lungs, avoids first pass metabolism in liver, allows direct access to brain via olfactory nerves.
- Children absorb and retain more manganese from the diet (20-40% vs 5%).
- A number of chemicals that are toxic by inhalation are relatively innocuous by the oral route, including respirable crystalline silica, beryllium, hexavalent chromium, and nickel.



Manganese Exposure Inhalation vs Diet by Age



Manganese Toxicokinetics vis-à-vis other Metals, e.g. Iron

- Manganese uptake from the intestinal tract (Mena, 1974; Erikson et al., 2002), lungs (Brain et al., 2006), and nose (Thompson et al., 2007), is enhanced by iron deficiency.
- Rats rendered anemic by periodic bleeding absorbed significantly higher amounts of manganese (Brain et al., 2006).
- In each of these studies, brain levels of manganese were increased by iron deficiency.
- Iron deficiency is widespread and disproportionately affects the young (Beard et al., 2001), thus children represent a more susceptible population.

