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Non-essential Heavy Metals and Their Influence on Cardiovascular Disease and Therapeutic Efficacy

Non-essential heavy metals such as arsenic (As), cadmium (Cd), lead (Pb), mercury (Hg), and chromium (Cr) have no biological role and are toxic even at low levels. In developing countries like India, environmental concentrations of these metals in industrial waste disposal, fertilizers, pesticides, polluted air and water, etc, are steadily increasing. Exposure to non-essential heavy metals raises cardiovascular disease (CVD) risk mainly through oxidative stress, inflammation, and disruption of mineral balance. However, critical gaps remain in understanding their effects on cellular, tissue, and organ-level disease progression, their effect on drug absorption, distribution, metabolism, and excretion (ADME), and how they influence CVD drug efficacy and targets. Additionally, limitations in existing survey data hinder effective assessment of heavy metal impact on CVD. Addressing these research gaps through improved data collection, longitudinal studies, and advanced analytical tools is essential to advance CVD treatment in exposed populations.

Keywords: Non-essential heavy metals, environmental pollution, cardiovascular disease progression, heavy metal-drug interaction.

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