

## **SYSTEMIC UPTAKE OF CHROMIUM IN HUMAN VOLUNTEERS FOLLOWING DERMAL CONTACT WITH HEXAVALENT CHROMIUM (22 MG/L)**

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*This study examined the systemic uptake of chromium in four human volunteers following three hours of contact with water containing hexavalent chromium [Cr(VI)] at a concentration of 22 mg/L. Volunteers were immersed below the shoulders in water at  $91 \pm 2.5^\circ\text{F}$ . On the day prior to the experiment and for five days afterwards, samples of urine, plasma, and red blood cells (RBCs) were collected and analyzed for total chromium. Red blood cell chromium concentrations were used as a specific biomarker for systemic uptake of Cr(VI). Although total chromium concentrations in RBCs and plasma increased relative to historical background concentrations on the day of exposure, no sustained elevation of chromium concentrations was observed in RBCs or plasma of the volunteers tested. Since absorption of chromium in the hexavalent state would result in the irreversible binding of Cr(VI) to hemoglobin within the RBC (manifested as a sustained elevation of total chromium concentrations in the RBC), the pattern of blood uptake and urinary excretion observed was consistent with uptake and distribution of chromium in the trivalent state. Small increases were observed in the concentration of total chromium in urine within 48 h of exposure, indicating that some trivalent chromium [Cr(III)] may have penetrated the skin at a rate of about  $3.3 \times 10^{-5}$  to  $4.1 \times 10^{-4}$   $\mu\text{g}/\text{cm}^2\text{-h}$ . In short, the data indicated that a 3-h contact with Cr(VI) at concentrations in water plausible for environmental exposure (e.g., swimming) was not expected to result in systemic uptake of measurable amounts of Cr(VI), although a small quantity of Cr(VI) may have penetrated the skin where it was subsequently reduced to Cr(III) prior to systemic uptake.*