

URINARY EXCRETION OF CHROMIUM BY HUMANS FOLLOWING INGESTION OF  
CHROMIUM PICOLINATE

Implications for Biomonitoring

MICHAEL L. GARGAS, ROBIN L. NORTON, DENNIS J. PAUSTENBACH, AND BRENT L. FINLEY

*ChemRisk, a Division of McLaren/Hart*

**ABSTRACT:**

This study investigated the variability in urinary chromium (Cr) excretion following the ingestion of Cr picolinate by human volunteers. A pharmacokinetic model was used to estimate the bioavailability of Cr from ingested Cr picolinate using known distribution patterns and elimination rates of Cr by humans. The possible advantages of using sequential, individual spot, or 24-hr urine sample collection for biomonitoring of Cr exposure were examined. Background concentrations of urinary Cr determined from the spot samples in this study compared well with values reported by others. The variability in urinary excretion of Cr in untreated volunteers indicated that it is virtually impossible to distinguish exposures to most occupational and virtually all environmental exposures to Cr. Sequential urine

sampling was found superior to both 24-hr and spot urine collection for indicating exposure to Cr picolinate. The extent of absorption of Cr from the picolinate matrix in the gastrointestinal tract was  $2.80 \pm 1.14\%$  (SD). It was estimated that 10 mg of soil containing between 7,400 and 52,000 mg Cr(III)/kg would have to be ingested by an adult to result in urinary excretion of Cr clearly above the upper bound of Cr in urine from background populations ( $1.8 \mu\text{g Cr/liter}$ ), depending on certain assumptions regarding bioavailability. This study supports the results of other recent work that demonstrated urinary excretion of Cr resulting from low-level environmental exposure is unlikely to be distinguished from that resulting from dietary uptake.