

## **HOW DOES CHROMIUM(III) BIND DNA?**

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**Abstract:** Chromium(VI) complexes are potent mutagens and carcinogens when inhaled, while the potential of these complexes to generate similar effects when taken orally is an area of active debate. The exact mechanism(s) of action of this activity is unknown, but potential mechanisms can be grouped into two categories. The first is mechanisms associated with the redox chemistry during reduction of Cr(VI) ultimately to Cr(III). In recent years, numerous studies have been focused on studying this potential mechanism. The second mechanism is based on the generated Cr(III) binding to DNA to binary and ternary complexes, which might give rise to the mutagenic and carcinogenic effects. Unfortunately, virtually no data on the molecular level structure of these Cr(III)-DNA complexes exists. Such studies are complicated first by spectroscopic and magnetic properties of Cr(III), which make the studies far from trivial. Second, previous studies have used plasmid DNA, DNA polymers, calf thymus DNA, or DNA isolated from cultured cells, which because of their size and complexity, present numerous potential Cr-binding sites with a range of binding constants. What is required to determine the preferential sites for Cr-binding and to characterize the structure of these sites is the use of DNA oligomers significantly smaller in size whose base sequences can be carefully designed and which can be synthesized in appreciable quantities. Preliminary results of spectroscopic and magnetic studies to characterize the binding of Cr(III) to such DNA oligomers will be presented that indicate that Cr(III) can bind specifically to certain DNA sequences.

**Keywords:** Chromium(III), DNA, Chromium(VI), carcinogen