

Bioinorganic Chemistry at the Australian National Beamline Facility, Photon Factory

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During the last fifteen years, we have conducted many bioinorganic chemistry XAS experiments at the ANBF and, occasionally, other PF beamlines that has formed a crucial part of our biomedical research. This research has included:

- The characterization of highly reactive Cr(VI)-esters, Cr(V), and Cr(IV) species that are important intermediates in the mechanism of DNA damage to cells. This can ultimately lead to Cr(VI)-induced cancers and may also be involved in the anti-diabetic effects of Cr(III) nutritional supplements;
- The characterization of the structures of commercial Cr(III) dietary supplements that have previously eluded structural characterization;
- The structural characterization of certain metal complexes with non-steroidal anti-inflammatory drugs and also their structures in commercial formulations.
- Speciation of the biotransformations of anti-diabetic pro-drugs of Cr(III), V(V), V(IV) and Mo(VI) in gastric fluids, blood fractions and bulk cells;
- Speciation of the biotransformations of anti-cancer pro-drugs of Ga(III), Ru(II), Ru(III) and V(IV) in blood fractions and bulk cells, which has been a key to understanding their modes of action and toxicities; and
- Many other studies on biomedical research and the 3D structures of unstable transition metal complexes.

Some of these applications will be discussed in this talk.

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