TUESDAY, MAR. 6, 2001
RM 113 MacNAUGHTON BLDG.
UNIVERSITY OF GUELPH
4:00 p.m.

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In vivo x-ray fluorescence measurements of heavy metals

Small quantities of heavy metals, such as mercury, lead, and uranium, can have severe health effects if absorbed by the human body. It is therefore essential to be able to measure trace amounts of these toxic elements in a number of tissues and organs within the body, in order to monitor individuals exposed occupationally, or otherwise, to heavy metals. *In vivo* x-ray fluorescence (XRF) is a powerful and convenient method for performing such measurements. Following irradiation with γ- or x-rays, characteristic x-rays from the element of interest are emitted and detected. With specially designed calibration standards, the intensity of characteristic x-rays can then be related to the concentration of the element present in the target organ or tissue. *In vivo* XRF has been successfully applied to the measurement of lead in bone, as well as cadmium, gold, and platinum in the kidneys.

This presentation will begin with an overview of the XRF elemental analysis technique, with emphasis on the challenges associated with *in vivo* applications. System design considerations will be highlighted with respect to these inherent difficulties. The development and performance of techniques for measuring mercury in the kidneys, as well as uranium in bone mineral, will be presented as examples of current research directions in the field. In light of recent reports in the media, application of *in vivo* XRF to assessing depleted uranium exposure among military personnel will be discussed. In particular, data will be presented from the measurement of a survivor of "Friendly Fire" during Operation Desert Storm (Persian Gulf, 1991), a major with the United States Marine Corps who was inside an Abrams tank when it was fired upon with depleted uranium-cased ammunition.

COFFEE WILL BE AVAILABLE PRIOR TO THE COLLOQUIUM