IRPA9
1996 International Congress on Radiation Protection
April 14-19,1996
Vienna, Austria

FORM FOR SUBMISSION OF ABSTRACTS
(Instructions for preparation on reverse)

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PAPER TITLE "WINDOWS" CODE FOR THE INTERPRETATION OF THE RADIOACTIVE BIOASSAY MEASUREMENTS BASED ON U.S. NUCLEAR REGULATORY COMISSION DATA AND THE INITIAL INTAKE/DOSE ASSESSMENTS USING U.S. INTERNAL DOSIMETRY CODES ON EUROPEAN INTERCOMPARISON DATA #

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MAJOR SCIENTIFIC TOPIC NUMBER 3.1 ..... (see page 7)

ABSTRACT (See instructions overleaf)
An European intercomparison study (Gibson,1992) uses the bioassay data for 5 cases of contaminations by inhalation, wound or injection with 7 radionuclides to estimate the initial intakes and doses in 9 laboratories (U.K., Germany, France, Spain and Switzerland).

To extend the area of this intercomparison we made a study to establish the degree of fitness for several computer codes currently used for estimation of initial intakes and doses at Lawrence Livermore National Laboratory (LLNL), USA. This study provided equivalent results within the inherent errors of the data and the method of dose estimation. In our initial intake assessments, the results are more constrained, showing that the model parameters were the roughly the same, while in the European study model parameters were independently chosen by the dosimetrist. The range of the coefficients of variation for the dose estimates show that the choice of the dose conversion factors was fairly consistent among the European laboratories and U.S. dosimetry codes.

To show that it is possible to fulfill a gap in the interpretation of the bioassay measurements, we made at the LLNL a short "demo computing program" to use the US Nuclear Regulatory Commission data and recommendations (CR4884 and DG8009). We present the algorithms, inputs and outputs for our new "Windows" program for the interpretation of radioactive bioassay measurements.

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PAPER TITLE CPHR-Whole Body Counter Unit. Calibration results.

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MAJOR SCIENTIFIC TOPIC NUMBER ...3. (see page 7)

ABSTRACT (See instructions overleaf)

A high sensitivity whole body counter has been installed at the Centre for Radiation Protection and Hygiene (CPHR-Cuba).The detectors system consists of a 8"x4" NaI(Tl) and a 3"x3" NaI(Tl) scintillation detectors located in a low background room. The room is made of low intrinsic radioactivity steel plates (less than 1 Bq of ^{60}Co per kg of steel), with internal dimensions 2500 mm w by 2500 mm l by 2600 mm h and plate thickness of 162 mm. Internal walls are lined with 3 mm of Pb, 1.8 mm of Sn and 1.5 mm of Cu for background reduction between 10 keV and 3 MeV. The gamma ray spectra are analyzed automatically using a special purpose software package and a personal computer. In order to calibrate the detection system for high energy photon emitters a structure based on the BOMAB phantom which comprise ten elliptical containers was assembled. This structure approximate the physical shape of a human body for 5, 10, 15 years old and an adult person. Phantoms are filled with plastic bags containing radioactive solution of ^{57}Co, ^{22}Na, ^{137}Cs, ^{226}Ra, ^{134}Cs, ^{54}Mn, ^{133}Ba, ^{60}Co, ^{40}K, simulating an uniform distribution. Each photon was measured with NaI(Tl) 8"x4" detector using a tilted chair geometry. Detection efficiency, FWHH and minimum detectable activity as function of energy, for counting time of 30 minutes was calculate for each radionuclide. The calibration factors as a function of weight of the phantoms were calculated too.

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PAPER TITLE

A PBPK Model for Carbon; for describing metabolism in humans for use in internal dosimetry.

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MAJOR SCIENTIFIC TOPIC NUMBER ..... (see page 7)

3.1 Internal Dosimetry

ABSTRACT (See instructions overleaf)

The metabolism of carbon has been extensively studied and is well known. Despite this, models currently being used to describe intake, distribution, and retention following a pulsed intake are not adequate for internal dosimetry. Carbon-14 is encountered in the nuclear industry primarily as CO_2, and in nuclear medicine and biomedical research as organic carbon compounds. Environmental ^{14}C will become bound in a variety of hydrocarbons. On occasion, ^{14}C will exist as an insoluble aerosol (inhalation Type S). The dose per unit intake from these different compounds will have a large range, as will the relationship between intake and excretion. This paper describes a physiologically based pharmacokinetic (PBPK) model that has been developed for use with bioassay to evaluate the dose from an intake of ^{14}C. The model has been used to calculate committed effective and equivalent dose following inhalation intakes of compounds containing ^{14}C as gases and vapors, and as Type F, M, and S compounds, as well as from ingestion intakes. Data useful in relating measurable quantities (chest contents, and urine and fecal excretion) to organ contents are given.

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