Regions of interest (ROI) were drawn over brain, lungs, heart, liver, spleen, kidneys, intestine, thyroid (blocked by perchlorate) and bladder. The ROI data were related to whole body counts and transferred to percentages of the injected dose with the excreted radioactivity taken into account. Based on these data the MIRD method was used to calculate the absorbed dose in various organs.

IMT was rapidly eliminated by the kidneys (57±6% at 1,5 h, 70±4% at 3h and 79±4% at 5 h). The effective dose according to ICRP 60 was 7,67 µSv/MBq. The absorbed dose to single organs is given in the table.

Organ	Dose (µGy/MBq)	Organ	Dose (µGy/MBq)
kidney	9,50 ± 2,88	lungs	3,81 ± 0,51
bladder wall	45,88 ± 8,69	liver	3,85 ± 0,71
testes	2,12 ± 0,41	upper large intestine	7,30 ± 2,01
ovaries	4,28 ± 0,82	lower large intestine	9,49 ± 2,71

At a recommended dose of 550 MBq IMT for brain-SPECT the effective dose is 4.2 mSv and thus in the range of routine nuclear medicine investigations.

No. 397

REDUCTION OF RADIATION ABSORBED DOSE IN F-18 FDOPA PET STUDIES BY HYDRATION-INDUCED VOIDING

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The PET tracer F-18 FDOPA is effectively extracted by the kidneys and collected in the bladder. The radiation absorbed dose to the bladder wall, therefore, is the limiting factor in PET studies. We have investigated the effectiveness of hydration as a means of reducing the radiation absorbed dose without decreasing image quality.

Thirteen subjects (6 m, 7 f, mean age 47±27 y) were hydrated by administration of soft drinks prior to the PET study. The radiation absorbed doses to various organs were estimated using the MIRD method together with a three-source approach, the brain, the bladder content and the remainder of the body being the source organs. The brain time activity curve was measured by PET. The bladder content curve was modeled as the complement of the plasma curve and corrected for the activity eliminated at first voiding. It was calibrated from urine samples obtained approximately 2 hr after tracer administration. Dose estimates for non-hydration were obtained from extrapolation of the non void-corrected bladder curve to infinity.

Estimated radiation absorbed doses with hydration and without hydration (values in parentheses) were: bladder wall: 1.21 (1.84) rad/mCi; uterus: 0.11 (0.15) rad/mCi; lower large intestin: 0.07 (0.09) rad/mCi; and the whole body effective dose was: 0.10 (0.14) rem/mCi. Thus, hydration resulted in a reduction of radiation absorbed dose to the above organs of 35, 27, 20, and 29%, respectively.

We conclude that hydration-induced voiding is an efficient means of reducing radiation absorbed doses without impairing image quality for radiopharmaceuticals that are rapidly cleared by the kidneys.

No. 398

DOSIMETRY AND REPRODUCIBILITY OF A CAPSULE-BASED C-14 UREA BREATH TEST.

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The aims of this study were 1) to determine the excretion of the C-14 and associated radiation dose and 2) to examine the reproducibility of a commercial C-14 urea breath test for *H.pylori* diagnosis. Tests were performed on twenty consenting volunteers (13M, 7F, 24-48 yr). Breath samples containing 1 mmol CO_2 were obtained at 0, 5, 10, 15, 20, 25, 30 min and 1,2,3,4,5,6,12, 24 hrs following administration of the 37kBq C-14 urea test capsule. A 24-hr urine collection was performed with each voiding collected separately. A repeat breath test was performed 24 hr after the first. *H. pylori* positive (HP+) was defined as a 15 minute breath sample >=50 dpm. Total urine excretion was obtained directly. Breath excretion was modeled by estimating the area under the excretion curve and using a constant factor of 884 mmol CO_2 /hr. Urine and breath excretion data in HP+ and H. pylori-negative (HP-) volunteers were pooled and fit to a monoexponential function thus estimating the cumulative urinary excretion of unmetabolized urea. Previously reported biokinetic models of C-14 urea and bicarbonate (JNM 1993;34:821-825) were used to estimate radiation doses from each compound. Weighted sums were calculated for each dose estimate using each group's excretion fraction distribution.

	Day 1- 15" dpm	Day 2-15" dpm	% in Urine	% in Breath	Total 24hr Excretion	EDE (mGy)
HP+ (9)	1320 ±830	1190 ±655	34 ±15%	38 ±18%	73 ±8%	0.0024
HP- (11)	7.5 ±6.1	7.0 ±6.0	68 ±7%	5 ±3%	73 ±11%	0.00086

Both HP+ and HP- volunteers excreted an average of 73% of the C-14 over the first 24 hr. HP+ excretion was evenly divided between breath (34%) and urine (38%). HP- excretion is almost solely by the urinary pathway. The maximum dose for HP+ was to the red marrow (0.0033 mGy) and a maximum of 0.0054 mGy to the urinary bladder wall for HP-. There was no difference between 15" breath samples on the two days(t-test,p >0.6). The minimum HP+ result at 15" was 270 dpm and the maximum HP- result at 15" was 18 dpm, indiciating great separation between HP+ and HP- results. This study verifies previous dose estimates using C-14 excretion data. The test is sensitive and reproducible with a low radiation dose.

No. 399

REPRODUCIBILITY OF RADIATION DOSIMETRY ASSESSED IN A PHANTOM AND IN 20 PATIENTS BY PLANAR IMAGING STUDIES.

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Reproducible and accurate radiation dosimetry is important for assessment of the efficacy and toxicity of radionuclide therapy. Planar imaging methods were used and the region of interest for the whole body, organs or tumors was manually defined by the operator based on the visual boundary. The number of counts were converted to activity using a reference standard. MIRD formalism and the standard man assumption were used to derive radiation dose. Intra- and inter-operator (3 operators) reproducibility were evaluated in an abdominal phantom and in 20 patients. Operator's skill was also examined for a trainee and 2 experienced operators. Reproducibility scores were expressed as the intraclass correlation coefficient (ICC) based on one-way analysis of variance. Inter-operator ICC for activities in the phantom were 0.98 for organs and 0.96 for tumors. Radiation doses and biological half-lives were assessed for whole body, liver, spleen, lungs, kidneys, and tumors in patients for Cu-67, I-131 and In-111. Inter-operator ICC for radiation doses were 0.98 for whole body, 0.96 for liver, and 0.94 for spleen, but inter-operator ICC was slightly lower for kidneys (0.91) and lungs (0.86) where an aliquot method was used because of overlapping tissues. For well defined tumors of ≥3 cm in diameter, the inter-operator and intra-operator ICC were 0.90 and 0.96, respectively. In all cases, the intra-operator ICC was higher than inter-operator ICC. Although the differences in inter-operator ICC were not significant for the 3 radionuclides, intra-operator ICC for Cu-67 were better than those for I-131 reflecting better image quality for Cu-67. This study revealed that inter- and intra-operator reproducibility were quite good for all tissues after a training period of 80 hours using this method.

Neuroscience: Movement Disorders

8:00–9:30 **Session 68** **Room: 103D**

Moderator: Peter Herscovitch, MD
Comoderator: Michael A. Meyer, MD

No. 400

PRECLINICAL DIAGNOSIS OF PARKINSON'S DISEASE WITH [C-11]WIN 35248 PET IMAGING OF THE DOPAMINE TRANSPORTER.

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Striatal dopamine uptake sites were quantified in 6 patients (age 55±6 years, mean±s.d.) with L-Dopa responsive Stage 1 Parkinson's disease (PD), and 10 age matched controls (age 55±9). Subjects were scanned with a GE4096 PET camera (FWHM resolution 7mm) after