

**TABLES OF RADIATION ABSORBED DOSE TO THE EMBRYO/FETUS
FROM RADIOPHARMACEUTICALS**

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The material in this document is taken from the Master's thesis of Ms. Joy Russell (University of Tennessee, Master's Degree conferred August 1995). The data below, and the methods and assumptions used to derive them, are published in two documents in the Health Physics Journal (73(5):747-755, 1997 and 73(5):756-769, 1997) and also in the Proceedings of the Sixth International Radiopharmaceutical Dosimetry Symposium. Please contact the center with any questions or comments about the data.

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Please note our area code changes from 423 to 865 effective October 1, 1999.

Dose estimates in mGy/MBq may be converted to rem/mCi by multiplying by a factor of 3.7.

Table 1. Residence times used to produce the dose estimates in this study

Co-57 Vitamin B-12, Normal-Flushing

LLI	7.17E+00 hr
Small Intestine	1.20E+00 hr
Stomach	1.00E+00 hr
ULI	3.89E+00 hr
Kidneys	3.90E+00 hr
Liver	1.71E+03 hr
Urinary BI Contents	1.21E+00 hr
Remainder	8.56E+02 hr

Co-57 Vitamin B-12, Normal-No Flushing

LLI	7.17E+00 hr
Small Intestine	1.20E+00 hr
Stomach	1.00E+00 hr
ULI	3.89E+00 hr
Liver	2.56E+03 hr
Remainder	1.29E+03 hr

Co-57 Vitamin B-12, Pernicious Anemia-Flushing

LLI	2.18E+01 hr
Small Intestine	3.64E+00 hr
Stomach	1.00E+00 hr
ULI	1.18E+01 hr
Kidneys	4.90E-01 hr
Liver	2.20E+02 hr
Urinary BI Contents	1.52E-01 hr
Remainder	1.06E+02 hr

Co-57 Vitamin B-12, Pernicious Anemia-No Flushing

LLI	2.18E+01 hr
Small Intestine	3.64E+00 hr
Stomach	1.00E+00 hr
ULI	1.18E+01 hr
Liver	3.23E+02 hr
Remainder	1.66E+02 hr

Co-58 Vitamin B-12, Normal-Flushing

LLI	7.09E+00 hr
Small Intestine	1.20E+00 hr
Stomach	1.00E+00 hr
ULI	3.88E+00 hr
Kidneys	1.40E+00 hr
Liver	6.03E+02 hr
Urinary Bl Contents	9.79E-01 hr
Remainder	3.03E+02 hr

Co-58 Vitamin B-12, Normal-No Flushing

LLI	7.09E+00 hr
Small Intestine	1.20E+00 hr
Stomach	1.00E+00 hr
ULI	3.88E+00 hr
Liver	9.04E+02 hr
Remainder	4.55E+02 hr

Co-58 Vitamin B-12, Pernicious Anemia-Flushing

LLI	2.15E+01 hr
Small Intestine	3.64E+00 hr
Stomach	1.00E+00 hr
ULI	1.18E+01 hr
Kidneys	1.70E-01 hr
Liver	7.80E+01 hr
Urinary Bl Contents	1.23E+01 hr
Remainder	3.70E+01 hr

Co-58 Vitamin B-12, Pernicious Anemia-No Flushing

LLI	2.15E+01 hr
Small Intestine	3.64E+00 hr
Stomach	1.00E+00 hr
ULI	1.18E+01 hr
Liver	1.14E+02 hr
Remainder	5.86E+01 hr

Co-60 Vitamin B-12, Normal-Flushing

LLI	7.20E+00 hr
Small Intestine	1.20E+00 hr
Stomach	1.00E+00 hr
ULI	3.90E+00 hr
Kidneys	8.80E+00 hr
Liver	3.85E+03 hr
Urinary Bl Contents	1.66E+00 hr
Remainder	1.93E+03 hr

Co-60 Vitamin B-12, Normal-No Flushing

LLI	7.20E+00 hr
Small Intestine	1.20E+00 hr
Stomach	1.00E+00 hr
ULI	3.90E+00 hr
Liver	5.77E+03 hr
Remainder	2.89E+03 hr

Co-60 Vitamin B-12, Pernicious Anemia-Flushing

LLI	2.19E+01 hr
Small Intestine	3.64E+00 hr
Stomach	1.00E+00 hr
ULI	1.18E+01 hr
Kidneys	1.10E+00 hr
Liver	4.95E+02 hr
Urinary Bl Contents	2.09E-01 hr
Remainder	2.39E+02 hr

Co-60 Vitamin B-12, Pernicious Anemia-No Flushing

LLI	2.19E+01 hr
Small Intestine	3.64E+00 hr
Stomach	1.00E+00 hr
ULI	1.18E+01 hr
Liver	7.28E+02 hr
Remainder	3.72E+02 hr

F-18 FDG

Brain	9.80E-02 hr
Heart Wall	9.24E-02 hr
Kidneys	2.11E-02 hr
Liver	8.45E-02 hr
Lungs	6.34E-02 hr
Ovaries	2.60E-04 hr
Pancreas	9.00E-03 hr
Spleen	2.90E-02 hr
Urinary Bl Contents	3.67E-01 hr
Remainder	1.85E+00 hr

F-18 Sodium Fluoride

Kidneys	2.50E-02 hr
Cortical Bone	5.60E-01 hr
Trabecular Bone	5.60E-01 hr
Urinary Bl Contents	4.99E-01 hr
Remainder	3.36E-01 hr

Ga-67 Citrate (nonpregnant)

Adrenals	5.00E-02 hr
LLI	1.54E+00 hr
Small Intestine	3.48E-01 hr
ULI	1.01E+00 hr
Kidneys	7.40E-01 hr
Liver	4.45E+00 hr
Red Marrow	3.66E+00 hr
Cortical Bone	5.75E+00 hr
Trabecular Bone	5.75E+00 hr
Urinary Bl Contents	4.01E-01 hr
Remainder	6.33E+01 hr

Ga-67 Citrate (3 months)

Adrenals	5.00E-02 hr
LLI	1.54E+00 hr
Small Intestine	3.48E-01 hr
ULI	1.01E+00 hr
Kidneys	7.40E-01 hr
Liver	3.58E+00 hr
Red Marrow	3.66E+00 hr
Cortical Bone	4.78E+00 hr
Trabecular Bone	4.78E+00 hr
Urinary Bl Contents	4.01E-01 hr
Fetus	2.27E+00 hr
Remainder	5.32E+01 hr

Ga-67 Citrate (6 and 9 months)

Adrenals	5.00E-02 hr
LLI	1.54E+00 hr
Small Intestine	3.48E-01 hr
ULI	1.01E+00 hr
Kidneys	7.40E-01 hr
Liver	3.58E+00 hr
Red Marrow	3.66E+00 hr
Cortical Bone	4.78E+00 hr
Trabecular Bone	4.78E+00 hr
Urinary Bl Contents	4.01E-01 hr
Fetus	2.27E+00 hr
Placenta	2.28E+01 hr
Remainder	5.32E+01 hr

I-123 Hippuran

Kidneys	1.04E-01 hr
Urinary Bl Contents	4.02E+00 hr
Remainder	2.23E-01 hr

I-123 IMP

Brain	6.00E-01 hr
Liver	1.65E-01 hr
Lungs	1.46E+00 hr
Urinary Bl Contents	6.51E-01 hr
Remainder	1.15E+01 hr

I-123 mIBG

Adrenals	3.40E-03 hr
Heart Wall	1.36E-01 hr
Liver	3.45E+00 hr
Spleen	1.06E-01 hr
Thyroid	9.40E-04 hr
Urinary Bl Contents	1.20E+00 hr
Remainder	6.30E+00 hr

I-123 Sodium Iodide

Small Intestine	1.03E+00 hr
Stomach	9.07E-01 hr
Liver	1.13E-01 hr
Thyroid	3.28E+00 hr
Urinary Bl Contents	1.25E+00 hr
Remainder	3.65E+00 hr
Fetus (3 month)	4.00E-03 hr
Fetus (6 month)	1.37E-01 hr
Fetus (9 month)	2.71E-01 hr

I-124 Sodium Iodide

Small Intestine	1.44E+00 hr
Stomach	1.27E+00 hr
Liver	5.75E-01 hr
Thyroid	3.26E+01 hr
Urinary Bl Contents	1.83E+00 hr
Remainder	5.20E+00 hr

I-125 HSA

Brain	1.03E+01 hr
Heart Wall	1.98E+01 hr
Kidneys	2.68E+00 hr
Liver	1.11E+01 hr
Lungs	2.07E+01 hr
Spleen	3.50E+00 hr
Urinary Bl Contents	1.85E+00 hr
Remainder	4.16E+02 hr

I-125 IMP

Brain	1.34E+00 hr
Liver	3.49E-01 hr
Lungs	3.45E+00 hr
Urinary Bl Contents	2.38E+00 hr
Remainder	4.29E+01 hr

I-125 mIBG

Adrenals	2.60E-02 hr
Heart Wall	1.28E+00 hr
Liver	1.66E+01 hr
Spleen	1.37E+00 hr
Thyroid	5.00E-02 hr
Urinary Bl Contents	2.52E+00 hr
Remainder	3.23E+01 hr

I-125 Sodium Iodide

Small Intestine	1.72E+00 hr
Stomach	1.53E+00 hr
Liver	6.39E+00 hr
Thyroid	2.74E+02 hr
Urinary Bl Contents	2.21E+00 hr
Remainder	1.54E+01 hr

I-126 Sodium Iodide

Small Intestine	1.55E+00 hr
Stomach	1.37E+00 hr
Liver	1.90E+00 hr
Thyroid	9.39E+01 hr
Urinary Bl Contents	1.98E+00 hr
Remainder	7.70E+00 hr

I-130 Sodium Iodide

Small Intestine	1.01E+00 hr
Stomach	8.88E-01 hr
Liver	1.09E-01 hr
Thyroid	3.01E+00 hr
Urinary Bl Contents	1.22E+00 hr
Remainder	2.85E+00 hr

I-131 Hippuran

Kidneys	1.04E-01 hr
Urinary Bl Contents	4.53E+00 hr
Remainder	2.30E-01 hr

I-131 HSA

Brain	9.45E+00 hr
Heart Contents	1.81E+01 hr
Kidneys	2.46E+00 hr
Liver	1.02E+01 hr
Lungs	1.89E+01 hr
Spleen	3.22E+00 hr
Urinary Bl Contents	7.77E-01 hr
Remainder	1.27E+02 hr

I-131 MAA

Kidneys	1.08E-01 hr
Liver	2.60E+01 hr
Lungs	1.85E+01 hr
Urinary Bl Contents	1.48E+00 hr
Remainder	7.78E+00 hr

I-131 mIBG

Adrenals	1.90E-02 hr
Liver	9.98E+00 hr
Spleen	8.00E-01 hr
Thyroid	1.20E-02 hr
Urinary Bl Contents	2.31E+00 hr
Remainder	1.90E+01 hr

I-131 Sodium Iodide

Small Intestine	1.50E+00 hr
Stomach	1.33E+00 hr
Liver	1.16E+00 hr
Thyroid	6.10E+01 hr
Urinary Bl Contents	1.92E+00 hr
Remainder	6.40E+00 hr
Fetus (3 month)	8.20E-02 hr
Fetus (6 month)	2.21E+00 hr
Fetus (9 month)	4.71E+00 hr

I-131 Rose Bengal		
Gall Bl Contents	4.83E-01 hr	
LLI	1.98E+01 hr	
Small Intestine	3.75E+00 hr	
ULI	1.16E+01 hr	
Kidneys	4.20E-03 hr	
Liver	2.04E+00 hr	
Urinary Bl Contents	1.65E-01 hr	
Remainder	1.80E-01 hr	

In-111 DTPA		
Small Intestine	2.88E-02 hr	
Stomach	2.25E-02 hr	
Kidneys	7.48E-02 hr	
Liver	6.22E-02 hr	
Muscle	2.23E-01 hr	
Spleen	4.50E-03 hr	
Urinary Bl Contents	3.60E+00 hr	
Remainder	2.23E+00 hr	

In-111 Pentetreotide		
Gall Bl Contents	1.95E-02 hr	
LLI	3.91E-01 hr	
Small Intestine	9.20E-02 hr	
ULI	2.64E-01 hr	
Kidneys	4.66E+00 hr	
Liver	1.21E+00 hr	
Spleen	1.42E+00 hr	
Thyroid	2.94E-02 hr	
Urinary Bl Contents	3.26E+00 hr	
Remainder	8.13E+00 hr	

In-111 Platelets		
Liver	1.43E+01 hr	
Red Marrow	3.94E+00 hr	
Spleen	2.18E+01 hr	
Urinary Bl Contents	7.06E-01 hr	
Remainder	5.70E+01 hr	

In-111 Red Blood Cells		
Liver	2.78E+00 hr	
Red Marrow	1.39E+00 hr	
Spleen	2.78E+00 hr	
Remainder	9.07E+01 hr	

In-111 White Blood Cells	
Liver	2.45E+01 hr
Red Marrow	3.92E+01 hr
Spleen	2.45E+01 hr
Remainder	9.80E+00 hr
Kr-81m Gas	
Lungs	5.20E-03 hr
Kr-81m Injection	
Heart Contents	4.00E-03 hr
Lungs	1.16E-03 hr
Remainder	7.90E-07 hr
Kr-81m Oral	
Stomach	5.20E-03 hr
N-13 Ammonia	
Brain	1.65E-02 hr
Liver	1.70E-02 hr
Urinary Bl Contents	7.17E-03 hr
Remainder	1.99E-01 hr
P-32 Phosphate	
Cortical Bone	7.42E+01 hr
Trabecular Bone	7.42E+01 hr
Remainder	1.30E+02 hr
Tc-99m Albumin Microspheres	
LLI	1.22E-01 hr
Stomach	4.29E-01 hr
ULI	2.00E-01 hr
Kidneys	6.72E-01 hr
Lungs	4.28E+00 hr
Thyroid	2.00E-02 hr
Urinary Bl Contents	2.09E-01 hr
Remainder	2.40E+00 hr

Tc-99m Disofenin	
Gall Bl Contents	7.70E-01 hr
LLI	1.14E+00 hr
Small Intestine	1.79E+00 hr
ULI	2.34E+00 hr
Kidneys	1.20E-02 hr
Liver	8.00E-01 hr
Urinary Bl Contents	5.30E-01 hr
Remainder	1.40E-01 hr
Tc-99m DMSA	
Kidneys	3.81E+00 hr
Urinary Bl Contents	3.16E-01 hr
Fetus	2.61E-02 hr
Placenta	1.82E-01 hr
Remainder	2.94E+00 hr
Tc-99m DTPA (nonpregnant)	
Kidneys	9.20E-02 hr
Urinary Bl Contents	1.84E+00 hr
Remainder	2.84E+00 hr
Tc-99m DTPA (3 month)	
Kidneys	9.20E-02 hr
Urinary Bl Contents	1.84E+00 hr
Fetus	6.05E-04 hr
Remainder	2.84E+00 hr
Tc-99m DTPA (6 month)	
Kidneys	9.20E-02 hr
Urinary Bl Contents	1.84E+00 hr
Fetus	2.00E-03 hr
Placenta	8.77E-04 hr
Remainder	2.84E+00 hr
Tc-99m DTPA (9 month)	
Kidneys	9.20E-02 hr
Urinary Bl Contents	1.84E+00 hr
Fetus	1.20E-01 hr
Placenta	5.50E-03 hr
Remainder	2.84E+00 hr

Tc-99m DTPA Aerosol (nonpregnant)

LLI	5.60E-02 hr
Small Intestine	8.79E-02 hr
Stomach	3.21E-02 hr
ULI	1.14E-01 hr
Kidneys	4.00E-02 hr
Lungs	1.03E+00 hr
Urinary Bl Contents	7.48E-01 hr
Remainder	1.41E+00 hr

Tc-99m DTPA Aerosol (3 month)

LLI	5.60E-02 hr
Small Intestine	8.79E-02 hr
Stomach	3.21E-02 hr
ULI	1.14E-01 hr
Kidneys	4.00E-02 hr
Lungs	1.03E+00 hr
Urinary Bl Contents	7.48E-01 hr
Fetus	6.05E-04 hr
Remainder	1.41E+00 hr

Tc-99m DTPA Aerosol (6 month)

LLI	5.60E-02 hr
Small Intestine	8.79E-02 hr
Stomach	3.21E-02 hr
ULI	1.14E-01 hr
Kidneys	4.00E-02 hr
Lungs	1.03E+00 hr
Urinary Bl Contents	7.48E-01 hr
Fetus	2.00E-03 hr
Placenta	8.77E-04 hr
Remainder	1.41E+00 hr

Tc-99m DTPA Aerosol (9 month)

LLI	5.60E-02 hr
Small Intestine	8.79E-02 hr
Stomach	3.21E-02 hr
ULI	1.14E-01 hr
Kidneys	4.00E-02 hr
Lungs	1.03E+00 hr
Urinary Bl Contents	7.48E-01 hr
Fetus	1.20E-01 hr
Placenta	5.50E-03 hr
Remainder	1.41E+00 hr

Tc-99m Glucoheptonate	
Kidneys	8.64E-01 hr
Liver	1.30E-01 hr
Urinary Bl Contents	1.77E+00 hr
Fetus	1.65E-02 hr
Placenta	2.00E-02 hr
Remainder	2.68E+00 hr
Tc-99m HDP	
Kidneys	8.61E-02 hr
Cort Bone	2.02E+00 hr
Trab Bone	2.02E+00 hr
Urinary Bl Contents	4.83E-01 hr
Fetus	4.34E-02 hr
Placenta	4.34E-02 hr
Remainder	2.14E+00 hr
Tc-99m HEDP	
Kidneys	1.64E-01 hr
Cort Bone	7.30E-01 hr
Trab Bone	7.30E-01 hr
Urinary Bl Contents	9.54E-01 hr
Remainder	2.22E+00 hr
Tc-99m HMPAO	
Brain	4.16E-01 hr
Gall Bl Contents	3.48E-01 hr
LLI	2.44E-01 hr
Small Intestine	3.83E-01 hr
ULI	4.98E-01 hr
Kidneys	6.42E-01 hr
Liver	9.38E-01 hr
Lungs	7.13E-01 hr
Thyroid	4.60E-02 hr
Urinary Bl Contents	6.17E-01 hr
Remainder	2.44E+00 hr

Tc-99m Human Serum Albumin	
Brain	4.24E-01 hr
Heart Contents	8.13E-01 hr
Kidneys	1.10E-01 hr
Liver	4.57E-01 hr
Lungs	8.47E-01 hr
Spleen	1.44E-01 hr
Urinary Bl Contents	5.53E-02 hr
Remainder	5.67E+00 hr
Tc-99m MAA	
Kidneys	1.78E-02 hr
Liver	1.04E+00 hr
Lungs	4.89E+00 hr
Urinary Bl Contents	2.17E-01 hr
Fetus	5.20E-02 hr
Placenta	7.89E-01 hr
Remainder	1.68E+00 hr
Tc-99m MAG3	
Kidneys	7.57E-02 hr
Urinary Bl Contents	3.33E+00 hr
Remainder	2.30E-01 hr
Tc-99m MDP	
Kidneys	1.48E-01 hr
Cort Bone	1.36E+00 hr
Trab Bone	1.36E+00 hr
Urinary Bl Contents	7.82E-01 hr
Fetus	2.34E-02 hr
Placenta	2.08E-02 hr
Remainder	1.64E+00 hr

Tc-99m MIBI-Rest	
Gall Bl Contents	7.35E-02 hr
LLI	6.44E-01 hr
Small Intestine	1.01E+00 hr
ULI	1.31E+00 hr
Heart Wall	5.30E-02 hr
Kidneys	2.90E-01 hr
Liver	1.86E-01 hr
Lungs	4.90E-02 hr
Spleen	2.40E-02 hr
Urinary Bl Contents	7.80E-01 hr
Remainder	3.86E+00 hr

Tc-99m MIBI-Stress	
Gall Bl Contents	1.48E-01 hr
LLI	5.08E-01 hr
Small Intestine	7.97E-01 hr
ULI	1.04E+00 hr
Heart Wall	6.60E-02 hr
Kidneys	2.35E-01 hr
Liver	7.20E-02 hr
Lungs	4.50E-02 hr
Spleen	1.40E-02 hr
Urinary Bl Contents	5.50E-01 hr
Remainder	3.89E+00 hr

Tc-99m Pertechnetate	
LLI	4.90E-01 hr
Stomach	3.03E-01 hr
ULI	7.90E-01 hr
Thyroid	3.80E-02 hr
Urinary Bl Contents	7.95E-01 hr
Fetus	3.34E-01 hr
Placenta	9.54E-01 hr
Remainder	5.02E+00 hr

Tc-99m PYP	
Kidneys	9.23E-02 hr
Cort Bone	1.50E+00 hr
Trab Bone	1.50E+00 hr
Urinary Bl Contents	5.45E-01 hr
Fetus	6.08E-02 hr
Placenta	6.95E-02 hr
Remainder	3.00E+00 hr

Tc-99m RBC - Heat Treated	
Spleen	7.78E+00 hr
Remainder	8.64E-01 hr

Tc-99m RBC - <i>in vitro</i> Labeling	
Heart Contents	5.70E-01 hr
Kidneys	7.80E-02 hr
Liver	3.22E-01 hr
Lungs	5.97E-01 hr
Spleen	1.01E-01 hr
Urinary Bl Contents	4.50E-01 hr
Fetus	8.67E-03 hr
Placenta	9.70E-02 hr
Remainder	5.38E+00 hr

Tc-99m RBC - <i>in vivo</i> Labeling	
Heart Contents	8.64E-01 hr
Kidneys	8.00E-02 hr
Liver	3.34E-01 hr
Lungs	6.19E-01 hr
Spleen	1.05E-01 hr
Urinary Bl Contents	2.80E-01 hr
Fetus	8.67E-03 hr
Placenta	9.70E-02 hr
Remainder	5.96E+00 hr

Tc-99m Sulfur Colloid - Normal (nonpregnant)	
Liver	7.37E+00 hr
Red Marrow	4.33E-01 hr
Spleen	6.07E-01 hr
Remainder	2.60E-01 hr

Tc-99m Sulfur Colloid - Normal (3 month)	
Liver	7.37E+00 hr
Red Marrow	4.33E-01 hr
Spleen	6.07E-01 hr
Fetus	7.70E-03 hr
Remainder	2.52E-01 hr

Tc-99m Sulfur Colloid - Normal (6 months)

Liver	7.37E+00 hr
Red Marrow	4.33E-01 hr
Spleen	6.07E-01 hr
Fetus	2.50E-02 hr
Placenta	6.90E-02 hr
Remainder	1.66E-01 hr

Tc-99m Sulfur Colloid - Normal (9 months)

Liver	7.37E+00 hr
Red Marrow	4.33E-01 hr
Spleen	6.07E-01 hr
Fetus	4.40E-02 hr
Placenta	1.01E-01 hr
Remainder	1.15E-01 hr

Tc-99m Sulfur Colloid - Liver Disease

Liver	2.78E+00 hr
Red Marrow	2.17E+00 hr
Spleen	2.60E+00 hr
Urinary Bl Contents	1.76E-01 hr
Remainder	1.13E+00 hr

Tc-99m Teboroxime

Brain	1.70E-01 hr
Gall Bl Contents	2.00E-01 hr
LLI	4.55E-01 hr
Small Intestine	7.14E-01 hr
ULI	9.28E-01 hr
Heart Wall	4.20E-01 hr
Liver	1.20E+00 hr
Lungs	3.70E-01 hr
Urinary Bl Contents	1.76E-01 hr
Remainder	2.65E+00 hr

Tc-99m White Blood Cells

Liver	2.17E+00 hr
Red Marrow	3.47E+00 hr
Spleen	2.17E+00 hr
Remainder	8.67E-01 hr

Tl-201 Chloride

Brain	1.86E+00 hr
LLI	2.70E+00 hr
Small Intestine	1.10E+01 hr
Stomach	2.19E+00 hr
ULI	3.60E+00 hr
Heart Wall	2.53E+00 hr
Kidneys	4.02E+00 hr
Liver	3.61E+00 hr
Lungs	8.00E-01 hr
Testes	1.05E+00 hr
Thyroid	4.30E-01 hr
Urinary Bl Contents	9.13E-02 hr
Remainder	5.15E+01 hr

Xe-127, 5 Minute Rebreathing, 5 Liter Spirometer Volume

Lungs	2.20E-02 hr
Remainder	2.44E-01 hr

Xe-127, 5 Minute Rebreathing, 7.5 Liter Spirometer Volume

Lungs	1.70E-02 hr
Remainder	1.34E-01 hr

Xe-127, 5 Minute Rebreathing, 10 Liter Spirometer Volume

Lungs	1.30E-02 hr
Remainder	1.47E-01 hr

Xe-133, 5 Minute Rebreathing, 5 Liter Spirometer Volume

Lungs	2.20E-02 hr
Remainder	2.44E-01 hr

Xe-133, 5 Minute Rebreathing, 7.5 Liter Spirometer Volume

Lungs	1.70E-02 hr
Remainder	1.34E-01 hr

Xe-133, 5 Minute Rebreathing, 10 Liter Spirometer Volume

Lungs	1.30E-02 hr
Remainder	1.47E-01 hr

Xe-133, Injection

Heart Contents	1.84E-02 hr
Lungs	8.76E-02 hr
Remainder	2.60E-03 hr

Table 2. Absorbed Dose Estimates to the Embryo/Fetus Per Unit Activity of Radiopharmaceutical Administered to the Mother (shading indicates maternal and fetal self dose contributions).

Radiopharmaceutical	Early mGy/MBq	3 Month mGy/MBq	6 Month mGy/MBq	9 Month mGy/MBq
Co-57 Vitamin B-12, Normal-Flushing	1.0E+00	6.8E-01	8.4E-01	8.8E-01
Co-57 Vitamin B-12, Normal-No Flushing	1.5E+00	1.0E+00	1.2E+00	1.3E+00
Co-57 Vitamin B-12, PA-Flushing	2.1E-01	1.7E-01	1.7E-01	1.5E-01
Co-57 Vitamin B-12, PA-No Flushing	2.8E-01	2.1E-01	2.2E-01	2.0E-01
Co-58 Vitamin B-12, Normal-Flushing	2.5E+00	1.9E+00	2.1E+00	2.1E+00
Co-58 Vitamin B-12, Normal- No Flushing	3.7E+00	2.8E+00	3.1E+00	3.1E+00
Co-58 Vitamin B-12, PA-Flushing	8.3E-01	7.4E-01	6.4E-01	4.8E-01
Co-58 Vitamin B-12,PA-No Flushing	9.8E-01	8.5E-01	7.6E-01	6.0E-01
Co-60 Vitamin B-12, Normal-Flushing	3.7E+01	2.8E+01	3.1E+01	3.2E+01
Co-60 Vitamin B-12, Normal - No Flushing	5.5E+01	4.2E+01	4.7E+01	4.7E+01

Co-60 Vitamin B-12, PA-Flushing	5.9E+00	4.7E+00	4.8E+00	4.5E+00
Radiopharmaceutical	Early mGy/MBq	3 Month mGy/MBq	6 Month mGy/MBq	9 Month mGy/MBq
Co-60 Vitamin B-12,PA-No Flushing	8.3E+00	6.5E+00	6.8E+00	6.5E+00
F-18 FDG	2.7E-02	1.7E-02	9.4E-03	8.1E-03
F-18 Sodium Fluoride	2.2E-02	1.7E-02	7.5E-03	6.8E-03
Ga-67 Citrate	9.3E-02	2.0E-01	1.8E-01	1.3E-01
I-123 Hippuran	3.1E-02	2.4E-02	8.4E-03	7.9E-03
I-123 IMP	1.9E-02	1.1E-02	7.1E-03	5.9E-03
I-123 MIBG	1.8E-02	1.2E-02	6.8E-03	6.2E-03
I-123 Sodium Iodide	2.0E-02	1.4E-02	1.1E-02	9.8E-03
I-124 Sodium Iodide	1.4E-01	1.0E-01	5.9E-02	4.6E-02
I-125 HAS	2.5E-01	7.8E-02	3.8E-02	2.6E-02
I-125 IMP	3.2E-02	1.3E-02	4.8E-03	3.6E-03
I-125 MIBG	2.6E-02	1.1E-02	4.1E-03	3.4E-03
I-125 Sodium Iodide	1.8E-02	9.5E-03	3.5E-03	2.3E-03

Radiopharmaceutical	Early mGy/MBq	3 Month mGy/MBq	6 Month mGy/MBq	9 Month mGy/MBq
I-130 Sodium Iodide	1.8E-01	1.3E-01	7.6E-02	5.7E-02
I-131 Hippuran	6.4E-02	5.0E-02	1.9E-02	1.8E-02
I-131 HAS	5.2E-01	1.8E-01	1.6E-01	1.3E-01
I-131 MAA	6.7E-02	4.2E-02	4.0E-02	4.2E-02
I-131 MIBG	1.1E-01	5.4E-02	3.8E-02	3.5E-02
I-131 Sodium Iodide	7.2E-02	6.8E-02	2.3E-01	2.7E-01
I-131 Rose Bengal	2.2E-01	2.2E-01	1.6E-01	9.0E-02
In-111 DTPA	6.5E-02	4.8E-02	2.0E-02	1.8E-02
In-111 Pentetretotide	8.2E-02	6.0E-02	3.5E-02	3.1E-02
In-111 Platelets	1.7E-01	1.1E-01	9.9E-02	8.9E-02
In-111 Red Blood Cells	2.2E-01	1.3E-01	1.1E-01	8.6E-02
In-111 White Blood Cells	1.3E-01	9.6E-02	9.6E-02	9.4E-02

Radiopharmaceutical	Early mGy/MBq	3 Month mGy/MBq	6 Month mGy/MBq	9 Month mGy/MBq
Tc-99m Albumin Microspheres	4.1E-03	3.0E-03	2.5E-03	2.1E-03
Tc-99m Disofenin	1.7E-02	1.5E-02	1.2E-02	6.7E-03
Tc-99m DMSA	5.1E-03	4.7E-03	4.0E-03	3.4E-03
Tc-99m DTPA	1.2E-02	8.7E-03	4.1E-03	4.7E-03
Tc-99m DTPA Aerosol	5.8E-03	4.3E-03	2.3E-03	3.0E-03
Tc-99m Glucoheptonate	1.2E-02	1.1E-02	5.3E-03	4.6E-03
Tc-99m HDP	5.2E-03	5.4E-03	3.0E-03	2.5E-03
Tc-99m HEDP	7.2E-03	5.2E-03	2.7E-03	2.4E-03
Tc-99m HMPAO	8.7E-03	6.7E-03	4.8E-03	3.6E-03
Tc-99m Human Serum Albumin	5.1E-03	3.0E-03	2.6E-03	2.0E-03
Tc-99m MAA	2.8E-03	4.0E-03	5.0E-03	4.0E-03
Tc-99m MAG3	1.8E-02	1.4E-02	5.5E-03	5.2E-03
Tc-99m MDP	6.1E-03	5.4E-03	2.7E-03	2.4E-03

Tc-99m MIBI-rest	1.5E-02	1.2E-02	8.4E-03	5.4E-03
Radiopharmaceutical	Early mGy/MBq	3 Month mGy/MBq	6 Month mGy/MBq	9 Month mGy/MBq
Tc-99m MIBI-stress	1.2E-02	9.5E-03	6.9E-03	4.4E-03
Tc-99m Pertechnetate	1.1E-02	2.2E-02	1.4E-02	9.3E-03
Tc-99m PYP	6.0E-03	6.6E-03	3.6E-03	2.9E-03
Tc-99m RBC-Heat Treated	1.7E-03	1.6E-03	2.1E-03	2.2E-03
Tc-99m RBC- in vitro	6.8E-03	4.7E-03	3.4E-03	2.8E-03
Tc-99m RBC- in vivo	6.4E-03	4.3E-03	3.3E-03	2.7E-03
Tc-99m Sulfur Colloid - normal	1.8E-03	2.1E-03	3.2E-03	3.7E-03
Tc-99m Sulfur Colloid-Liver Disease	3.2E-03	2.5E-03	2.8E-03	2.8E-03
Tc-99m Teboroxime	8.9E-03	7.1E-03	5.8E-03	3.7E-03
Tc-99m White Blood Cells	3.8E-03	2.8E-03	2.9E-03	2.8E-03
Tl-201 Chloride	9.7E-02	5.8E-02	4.7E-02	2.7E-02
Xe-127, 5 minute rebreathing, 5 liter spirometer volume	4.3E-04	2.4E-04	1.9E-04	1.5E-04
Xe-127, 5 minute rebreathing, 7.5 liter spirometer volume	2.3E-04	1.3E-04	1.0E-04	8.4E-05

Radiopharmaceutical	Early mGy/MBq	3 Month mGy/MBq	6 Month mGy/MBq	9 Month mGy/MBq
Xe-127, 5 minute rebreathing, 10 liter spirometer volume	2.3E-04	1.4E-04	1.1E-04	9.2E-05
Xe-133, 5 minute rebreathing, 5 liter spirometer volume	4.1E-04	4.8E-05	3.5E-05	2.6E-05
Xe-133, 5 minute rebreathing, 7.5 liter spirometer volume	2.2E-04	2.6E-05	1.9E-05	1.5E-05
Xe-133, 5 minute rebreathing, 10 liter spirometer volume	2.5E-04	2.9E-05	2.1E-05	1.6E-05
Xe-133, injection	4.9E-06	1.0E-06	1.4E-06	1.6E-06

Table 3. Fetal Dose Estimates from Various Nuclear Medicine Procedures (shading indicates maternal and fetal self dose contributions)

Procedure	Activity MBq (mCi)	Early mGy (rad)	3 Month mGy (rad)	6 Month mGy (rad)	9 Month mGy (rad)
Co-57 Vitamin B-12 Normal- Flushing	0.04 (0.001)	4.0E-02 (4.0E-03)	2.7E-02 (2.7E-03)	3.4E-02 (3.4E-03)	3.5E-02 (3.5E-03)
Co-57 Vitamin B-12 Normal- No Flushing	0.04 (0.001)	6.0E-02 (6.0E-03)	4.0E-02 (4.0E-03)	4.8E-02 (4.8E-03)	5.2E-02 (5.2E-03)
Co-57 Vitamin B-12 Pernicious Anemia-Flushing	0.04 (0.001)	8.4E-03 (8.4E-04)	6.8E-03 (6.8E-04)	6.8E-03 (6.8E-04)	6.0E-03 (6.0E-04)
Co-57 Vitamin B-12 Pernicious Anemia-No Flushing	0.04 (0.001)	1.1E-02 (1.1E-03)	8.4E-03 (8.4E-04)	8.8E-03 (8.4E-04)	8.0E-03 (8.0E-04)
Co-58 Vitamin B-12 Normal-Flushing	0.03 (0.0008)	7.5E-02 (7.5E-03)	5.7E-02 (5.7E-03)	6.3E-02 (6.3E-03)	6.3E-02 (6.3E-03)
Co-58 Vitamin B-12 Normal-No Flushing	0.03 (0.0008)	1.1E-01 (1.1E-02)	8.4E-02 (8.4E-03)	9.3E-02 (9.3E-03)	9.3E-02 (9.3E-03)
Co-58 Vitamin B-12 Pernicious Anemia- No Flushing	0.03 (0.0008)	2.9E-02 (2.9E-03)	2.6E-02 (2.6E-03)	2.3E-02 (2.3E-03)	1.8E-02 (1.8E-03)
F-18 FDG	370 (10)	1.0E+01 (1.0E+00)	6.3E+00 (6.3E-01)	3.5E+00 (3.5E-01)	3.0E+00 (3.0E-01)
Ga-67 Citrate	190 (5)	1.8E+01 (1.8E+00)	3.8E+01 (3.8E+00)	3.4E+01 (3.4E+00)	2.5E+01 (2.5E+00)

Procedure	Activity MBq (mCi)	Early mGy (rad)	3 Month mGy (rad)	6 Month mGy (rad)	9 Month mGy (rad)
Hg-197 Chlormerodrin	4 (0.1)	4.4E-02 (4.4E-03)	3.0E-02 (3.0E-03)	2.7E-02 (2.7E-03)	2.8E-02 (2.8E-03)
I-123 Hippuran	75 (2)	2.3+00 (2.3E-01)	1.8E+00 (1.8E-01)	6.3E-01 (6.3E-02)	539E-01 (5.9E-02)
I-123 IMP	200 (5.5)	3.8E+00 (3.8E-01)	2.2E+00 (2.2E-01)	1.4E+00 (1.4E-01)	1.2E+00 (1.2E-01)
I-123 mIBG					
phaeochromocytoma	350 (9.5)	6.3E+00 (6.3E-01)	4.2E+00 (4.2E-01)	2.4E+00 (2.4E-01)	2.2E+00 (2.2E-01)
cecholamine tumor	80 (2)	1.4E+00 (1.4E-010)	9.6E-01 (9.6E-02)	5.4E-01 (5.4E-02)	5.0E-01 (5.0E-02)
I-123 Sodium Iodide					
thyroid uptake study	30 (0.8)	6.0E-01 (6.0E-02)	4.2E-01 (4.2E-02)	3.3E-01 (3.3E-02)	2.9E-01 (2.9E-02)
thyroid imaging	15 (0.4)	3.0E-01 (3.0E-02)	2.1E-01 (2.1E-02)	1.7E-01 (1.7E-02)	1.4E-02 (1.4E-03)
I-125 HAS	2 (0.05)	5.0E-01 (5.0E-02)	1.6E-01 (1.6E-02)	7.6E-02 (7.6E-03)	5.2E-02 (5.2E-03)
I-125 NaI	1 (0.03)	1.8E-02 (1.8E-03)	9.5E-03 (9.5E-04)	3.5E-03 (3.5E-04)	2.3E-03 (2.3E-04)
I-131 Hippuran					
renal function	1.3 (0.035)	8.3E-02 (8.3E-03)	6.5E-02 (6.5E-03)	2.5E-02 (2.5E-03)	2.3E-02 (2.3E-03)

Procedure	Activity MBq (mCi)	Early mGy (rad)	3 Month mGy (rad)	6 Month mGy (rad)	9 Month mGy (rad)
I-131 Hippuran renal imaging	1.3 (0.035)	8.3E-02 (8.3E-03)	6.5E-02 (6.5E-03)	2.5E-02 (2.5E-03)	2.3E-02 (2.3E-03)
I-131 HSA	0.5 (0.013)	2.6E-01 (2.6E-02)	9.0E-02 (9.0E-03)	8.0E-02 (8.0E-03)	6.5E-02 (6.5E-03)
I-131 MAA	55 (1.5)	3.7E+00 (3.7E-01)	2.3E+00 (2.3E-01)	2.2E+00 (2.3E-01)	2.3E+00 (2.3E-01)
I-131 MIBG	20 (0.5)	2.2E+00 (2.2E-01)	1.1E+00 (1.1E-01)	7.6E-01 (7.6E-02)	7.0E-01 (7.0E-02)
I-131 NaI (Diagnostic)					
thyroid uptake	0.55 (0.015)	4.0E-02 (4.0E-03)	3.7E-02 (3.7E-03)	1.3E-01 (1.3E-02)	1.5E-01 (1.5E-02)
scintiscanning	4 (0.11)	2.9E-01 (2.9E-02)	2.7E-01 (2.7E-02)	9.2E-01 (9.2E-02)	1.1E+00 (1.1E-01)
localization of extra- thyroid metastases	40 (1.1)	2.9E+00 (2.9E-01)	2.7E+00 (2.7E-01)	9.2E+00 (9.2E-01)	1.1E+01 (1.1E+00)
I-131 NaI (Therapeutic)					
hyperthyroidism	350 (9.5)	2.5E+01 (2.5E+00)	2.3E+01 (2.3E+00)	8.1E+01 (8.1E+00)	9.5E+01 (9.5E+00)
ablation of normal thyroid tissue	1900 (50)	1.4E+02 (1.4E+01)	1.3E+02 (1.3E+01)	4.4E+02 (4.4E+01)	5.1E+02 (5.1E+01)

Procedure	Activity MBq (mCi)	Early mGy (rad)	3 Month mGy (rad)	6 Month mGy (rad)	9 Month mGy (rad)
I-131 Rose Bengal	0.04 (0.001)	8.8E-03 (8.8E-04)	8.8E-03 (8.8E-04)	6.4E-03 (6.4E-04)	3.6E-03 (3.6E-04)
In-111 DTPA	20 (0.5)	1.3E+00 (1.3E-01)	9.6E-014 (9.6E-02)	4.0E-01 (4.0E-02)	3.6E-01 (3.6E-02)
In-111 Pentetreotide					
planar imaging	110 (3)	9.0E+00 (9.0E-01)	6.6E+00 (6.6E-01)	3.8E+00 (3.8E-01)	3.4E+00 (3.4E-01)
SPECT imaging	230 (6)	1.9E+01 (1.9E+00)	1.4E+01 (1.4E+00)	8.0E+00 (8.0E-01)	7.0E+00 (7.0E-01)
In- 111 Platelets	10 (0.25)	1.7E+00 (1.7E-01)	1.1E+00 (1.1E-01)	9.9E-01 (9.9E-02)	8.9E-01 (8.9E-02)
In-111 White Blood Cell	20 (0.5)	2.6E+00 (2.6E-01)	1.9E+00 (1.9E-01)	1.9E+00 (1.9E-01)	1.9E+00 (1.9E-01)
Kr-81m Gas	600 (15)	1.1E-04 (1.1E-05)	1.0E-04 (1.0E-05)	1.6E-04 (1.6E-05)	2.0E-04 (2.0E-05)
Tc-99m Disofenin	350 (9.5)	6.0E+00 (6.0E-01)	5.2E+00 (5.2E-01)	4.2E+00 (4.2E-01)	2.3E+00 (2.3E-01)
Tc-99m DMSA	220 (6)	1.1E+00 (1.1E-01)	1.0E+00 (1.0E-01)	8.8E-01 (8.8E-02)	7.5E-01 (7.5E-02)
Tc-99m DTPA					
kidney imaging & glomerular filtration	750 (20)	9.0E+00 (9.0E-01)	6.5E+00 (6.5E-01)	3.1E+00 (3.1E-01)	3.5E+00 (3.5E-01)

Procedure	Activity MBq (mCi)	Early mGy (rad)	3 Month mGy (rad)	6 Month mGy (rad)	9 Month mGy (rad)
Tc-99m DTPA					
brain imaging & renal perfusion	750 (20)	9.0E+00 (9.0E-01)	6.5E+00 (6.5E-01)	3.1E+00 (3.1E-01)	3.5E+00 (3.5E-01)
1 st . pass	350 (9.5)	4.2E+00 (4.2E-01)	3.0E+00 (3.0E-01)	1.4E+00 (1.4E-01)	1.6E+00 (1.6E-01)
gastric reflux	10 (0.27)	1.2E-01 (1.2E-02)	8.7E-02 (8.7E-03)	4.1E-02 (4.1E-03)	4.7E-02 (4.7E-03)
hypertension	800 (22)	9.6E+00 (9.6E-01)	7.0E+00 (7.0E-01)	3.3E+00 (3.3E-01)	3.8E+00 (3.8E-01)
residual urine determination	350 (9.5)	4.2E+00 (4.2E-01)	3.0E+00 (3.0E-01)	1.4E+00 (1.4E-01)	1.6E+00 (1.6E-01)
Tc-99m DTPA Aerosol	40 (1.1)	2.3E-01 (2.3E-02)	1.7E-01 (1.7E-02)	9.2E-02 (9.2E-03)	1.2E-01 (1.2E-02)
Tc-99m Glucoheptonate					
renal imaging	750 (20)	9.0E+00 (9.0E-01)	8.2E+00 (8.2E-01)	4.0E+00 (4.0E-01)	3.4E+00 (3.4E-01)
brain imaging	750 (20)	9.0E+00 (9.0E-01)	8.2E+00 (8.2E-01)	4.0E+00 (4.0E-01)	3.4E+00 (3.4E-01)
	750	3.9E+00	4.0E+00	2.3E+00	1.9E+00

Tc-99m HDP	(20)	(3.9E-01)	(4.0E-01)	(2.3E-01)	(1.9E-01)
Procedure	Activity MBq (mCi)	Early mGy (rad)	3 Month mGy (rad)	6 Month mGy (rad)	9 Month mGy (rad)
Tc-99m HMPAO	750 (20)	6.5E+00 (6.5E-01)	5.0E+00 (5.0E-01)	3.6E+00 (3.6E-01)	2.7E+00 (2.7E-01)
Tc-99m Human Serum Albumin	200 (5.5)	1.0E+00 (1.0E-01)	6.0E-01 (6.0E-02)	5.2E-01 (5.2E-02)	4.4E-01 (4.4E-02)
Tc-99m MAA					
hepatic artery perfusion	150 (4)	4.2E-01 (4.2E-02)	6.0E-01 (6.0E-02)	7.5E-01 (7.5E-02)	6.0E-01 (6.0E-02)
lung imaging	200 (5.5)	4.2E-01 (4.2E-02)	6.0E-01 (6.0E-02)	7.5E-01 (7.5E-02)	6.0E-01 (6.0E-02)
isotopic venography	220 (6)	6.2E-01 (6.2E-02)	8.8E-01 (8.8E-02)	1.1E+00 (1.1E-01)	8.0E-01 (8.0E-02)
LeVeen shunt patency	110 (3)	3.1E-01 (3.1E-02)	4.4E-02 (4.4E-02)	5.5E-01 (5.5E-02)	4.4E-01 (4.4E-02)
Tc-99m MAG3	750 (20)	1.4E+00 (1.4E+00)	1.0E+01 (1.0E+00)	4.1E+00 (4.1E-01)	3.9E+00 (3.9E-01)
Tc-99m MDP	750 (20)	4.6E+00 (4.6E-01)	4.0E+00 (4.0E-01)	2.0E+00 (2.0E-01)	1.8E+00 (1.8E-01)
Tc-99m MIBI-rest	1100 (30)	1.7E+01 (1.7E+00)	1.3E+01 (1.3E+00)	9.2E+00 (9.2E-01)	5.9E+00 (5.9E-01)
Tc-99m MIBI-stress	1100 (30)	1.3E+01 (1.3E+00)	1.0E+01 (1.0E+00)	7.6E+00 (7.6E-01)	438E+00 (4.8E-01)

Procedure	Activity MBq (mCi)	Early mGy (rad)	3 Month mGy (rad)	6 Month mGy (rad)	9 Month mGy (rad)
Tc-99m Pertechnetate					
brain imaging	1100 (30)	1.2E+01 (1.2E+00)	2.4E+01 (2.4E+00)	1.5E+01 (1.5E+00)	1.0E+01 (1.0E+00)
thyroid imaging	400 (11)	4.4E+00 (4.4E-01)	8.8E+00 (8.8E-01)	5.6E+00 (5.6E-01)	3.7E+00 (3.7E-01)
salivary gland imaging	200 (5.5)	2.2E+00 (2.2E-01)	4.4E+00 (4.4E-01)	2.8E+00 (2.8E-01)	1.9E+00 (1.9E-01)
placental localization	110 (3)	1.1E+00 (1.1E-01)	2.4E+00 (2.4E-01)	1.5E+00 (1.5E-01)	1.0E+00 (1.0E-01)
blood pool imaging	1100 (30)	1.1E+01 (1.1E+00)	2.4E+01 (2.4E+00)	1.4E+01 (1.4E+00)	1.0E+01 (1.0E+00)
cardiovascular shunt detection	550 (15)	6.0E+00 (6.0E-01)	1.2E+01 (1.2E+00)	7.7E+00 (7.7E-01)	5.1E+00 (5.1E-01)
1 st pass	550 (15)	6.0E+00 (6.0E-01)	1.2E+01 (1.2E+00)	7.7E+00 (7.7E-01)	5.1E+00 (5.1E-01)
Tc-99m PYP					
skeletal imaging	550 (15)	3.3E+00 (3.3E-01)	3.6E+00 (3.6E-01)	2.0E+00 (2.0E-01)	1.6E+00 (1.6E-01)
cardiac imaging	700 (19)	4.2E+00 (4.2E-01)	4.6E+00 (4.6E-01)	2.5E+00 (2.5E-01)	2.0E+00 (2.0E-01)
blood pool imaging	700 (19)	4.2E+00 (4.2E-01)	4.6E+00 (4.6E-01)	2.5E+00 (2.5E-01)	2.0E+00 (2.0E-01)

Procedure	Activity MBq (mCi)	Early mGy (rad)	3 Month mGy (rad)	6 Month mGy (rad)	9 Month mGy (rad)
Tc-99m RBC - in vitro labeling	930 (25)	6.3E+00 (6.3E-01)	4.4E+00 (4.4E-01)	3.2E+00 (3.2E-01)	2.6E+00 (2.6E-01)
Tc-99m RBC - in vivo labeling					
rest	550 (15)	3.5E+00 (3.5E-01)	2.4E+00 (2.4E-01)	1.8E+00 (1.8E-01)	1.5E+00 (1.5E-01)
exercise	930 (25)	6.0E+00 (6.0E-01)	4.0E+00 (4.0E-01)	3.1E+00 (3.1E-01)	2.5E+00 (2.5E-01)
lower GI bleeding	930 (25)	6.0E+00 (6.0E-01)	4.0E+00 (4.0E-01)	3.1E+00 (3.1E-01)	2.5E+00 (2.5E-01)
Tc-99m Sulfur Colloid-normal					
liver -spleen imaging	300 (8)	5.4E-01 (5.4E-02)	6.3E-01 (6.3E-02)	9.6E-01 (9.6E-02)	1.1E+00 (1.1E-01)
bone marrow imaging	450 (12)	8.1E-01 (8.1E-02)	9.5E-01 (9.5E-02)	1.4E+00 (1.4E-01)	1.7E+00 (1.7E-01)
Pulmonary aspiration	20 (0.5)	3.6E-02 (3.6E-03)	4.2E-02 (4.2E-03)	6.4E-02 (6.4E-03)	7.4E-02 (7.4E-03)
LeVeen shunt patency	110 (3)	2.0E-01 (2.0E-02)	2.3E-01 (2.3E-02)	3.5E-01 (3.5E-02)	4.1E-02 (4.1E-02)

Procedure	Activity MBq (mCi)	Early mGy (rad)	3 Month mGy (rad)	6 Month mGy (rad)	9 Month mGy (rad)
Tc-99m White Blood Cells	200 (5.4)	7.6E-01 (7.6E-02)	5.6E-01 (5.6E-02)	5.8E-01 (5.8E-02)	5.6E-01 (5.6E-02)
Tl-201 Chloride					
planar imaging	150 (4)	1.5E+01 (1.5E+00)	8.7E+00 (8.7E-01)	7.0E+00 (7.0E-01)	4.0E+00 (4.0E-01)
SPECT imaging	110 (3)	1.1E+01 (1.1E+00)	6.4E+00 (6.4E-01)	5.2E+00 (5.2E-01)	3.0E+00 (3.0E-01)
Myocardial perfusion	55 (1.5)	5.3E+00 (5.3E-01)	3.2E+00 (3.2E-01)	2.6E+00 (2.6E-01)	1.5E+00 (1.5E-01)
thyroid imaging	80 (2.2)	7.8E+00 (7.8E-01)	4.6E+00 (4.6E-01)	3.8E+00 (3.8E-01)	2.2E+00 (2.2E-01)
Xe-133, injection					
muscle blood flow	20 (0.5)	9.8E-05 (9.8E-06)	2.0E-05 (2.0E-06)	2.8E-05 (2.8E-06)	3.2E-05 (3.2E-06)
Pulmonary function with imaging	1100 (30)	5.4E-03 (5.4E-04)	1.1E-03 (1.1E-04)	1.5E-03 (1.5E-04)	1.8E-03 (1.8E-04)