



GROUPING OF NM EXAMINATIONS AND DESIGN OF A SURVEY OF FREQUENCY OF NM EXAMINATIONS + CONVERSION TO EFFECTIVE DOSE

Contract ENER/2010/NUCL/SI2.581237

**Study on European Population Doses
from Medical Exposure (Dose Datamed 2)**

Training course, Sofia
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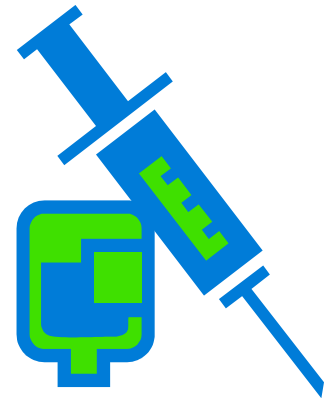
RP 154

**ANNEX 2 – Dose Dated
Report 1a
REVIEW OF NATIONAL
SURVEYS OF POPULATION
EXPOSURE FROM **NUCLEAR
MEDICINE** EXAMINATIONS
IN EIGHT EUROPEAN
COUNTRIES**



EFFECTIVE DOSES FROM NM EXAMINATIONS

- Data to be collected:
 - Procedure
 - Radionuclide
 - Chemical form
 - Mean activity
 - Number of procedures
- Conversion factors (mSv/MBq) from ICRP Reports



$E = \text{average activity} \times \text{conversion factor}$



EXAMPLE OF A DOSE COLLECTION

1. Diagnostic nuclear medicine procedures, adults 2006

Procedure	Radio-nuclide	Chemical form	Mean activity (MBq)	Number of procedures 2006
Gamma- and SPECT				
Brain imaging	Tc-99m	Phosphates or phosphonates		
Cerebral blood flow	Tc-99m	HMPAO		
Cerebral blood flow	Tc-99m	ECD		
Brain receptor imaging	I-123	beta-CIT (karbometoxy-		
Brain receptor imaging	I-123	DaTSCAN (FP-CIT)		
Brain receptor imaging	I-123	Nor-b-CIT		
Brain receptor imaging	I-123	Epideprid		
Brain receptor imaging	I-123	NNC		
Brain receptor imaging	I-123	IBZM (iodidebenzamidi)		
Brain SPECT	Tc-99m			
Lymphoscintigraphy				
Thyroid imaging	Tc-99m	pertechnetate		
Thyroid imaging	I-123	iodide		
Thyroid imaging	I-131	iodide		
Parathyroid imaging, using 1 radionuclide	Tc-99m	MIBI		
Parathyroid imaging, using 2 radionuclides	Tc-99m, I-123	MIBI, iodide		



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Radiation Dose to Patients from Radiopharmaceuticals



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Radiation Dose to Patients from Radiopharmaceuticals

Addendum 2 to ICRP Publication 53

Also includes Addendum 1 to
ICRP Publication 72



Pergamon



ICRP Publication 106: Radiation Dose to Patients from Radiopharmaceuticals A Third Adendum to ICRP Publication 53

- Published February 2009
 - Effective doses for radiopharmaceuticals (mSv/MBq): ¹¹C-acetate, ¹¹C-amino acids, ¹¹C-brain receptor substances, ¹¹C-methionine, ¹⁸F-amino acids, ¹⁸F-FET, ¹⁸F-FDG, ¹¹¹In-monoclonal antibodies/fragments, ¹²³I-fatty acid (BMIPP, IPPA), ¹²³I-monoclonal antibodies/fragments, ¹³¹I-monoclonal antibodies/fragments, and ²⁰¹Tl-ion
- ICRP 80, from 1998



EXAMPLE OF A CONVERSION FROM ACTIVITY TO DOSE

BRAIN PERFUSION GAMMA IMAGING/ Tc-99m-HMPAO 2009

Hospital/ laboratory	Radionuclide/ chemical form	Average activity (MBq)	Number of procedures	Used activity (MBq)
Hospital 1	Tc-99m/HMPAO		22	0
Hospital 2	Tc-99m/HMPAO	900	58	52200
Hospital 3	Tc-99m/HMPAO	370	3	1110
Hospital 4	Tc-99m/HMPAO	740	19	14060
Hospital 5	Tc-99m/HMPAO	700	25	17500
Hospital 6	Tc-99m/HMPAO	700	2	1400
Hospital 7	Tc-99m/HMPAO	740	4	2960
Hospital 8	Tc-99m/HMPAO	740	3	2220
Hospital 9	Tc-99m/HMPAO	740	1	740
9		703,75	Total	Total
			137	92190

	smallest activity	370
	biggest activity	900
	activity/procedure	673
Tc-99m-HMPAO	dose mSv/MBq	9,3E-03
	dose/procedure. (mSv)	6,26
	total dose (mSv)	857

←

$$\frac{\text{Total used activity}}{\text{Number of procedures}}$$



NM TOP 5 in Finland in 2006

Examination/ nuclide and chemical form	Number of examinations	Average effective dose per examination (mSv)	Collective effective dose (mSv)	Proportion of collective effective dose (%)
Bone imaging Tc-99m phosphate and phosphonate	12688	3,7	46637	29,2
Myocardial perfusion Tl-201 chloride	1 017	24,2	24561	15,4
Myocardial perfusion Tc-99m tetrofosmin	2 820	7,6	20898	13,1
Whole body PET/18F-FDG	761	7,0	5350	3,3
Brain dopamine transmitters 123I-β-CIT	580	8,8	5102	3,2



Thank you!