Assessment, using Monte Carlo and Biokinetic Models, of the Absorbed Dose in the Thyroid, as a Critical Organ, in Scintigraphies with ^{123}I and ^{99m}Tc

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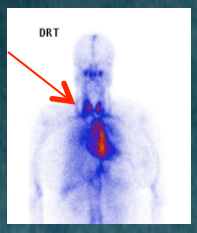
1. Introduction

In scintigraphies with

$Na^{99m}TcO_4$ or I*

Thyroid blocking →



2. Objectives

Optimize, in the patient dosimetry and radiological protection point of view, of the current blocking thyroid protocols

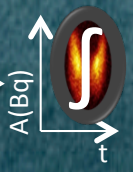
Calculate the absorbed dose in the thyroid resulting of scintigraphic studies with considered isotopes

3. Methods

3.1 **Exam selection** → ^{123}I-DaTscan® | ^{123}I-mIBG | Scintigraphy for Meckel's diverticulum search | MUGA

3.2 **Biokinetic Models aplication**

→ **ICRP + ORNL** →



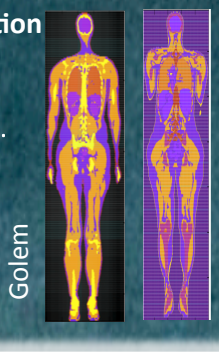
Total number of disintegrations in the thyroid → Ãs

3.3 **Voxel Phantoms implementation**

Monte Carlo methods
(PENELOPE v.2008 + penEasy).

↓

Dose/particle

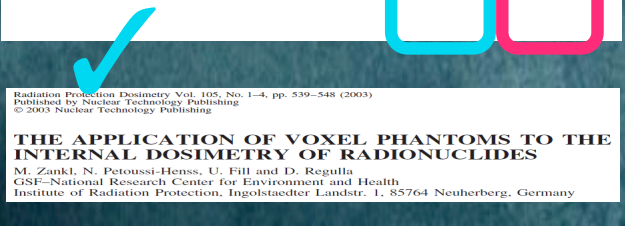


→

To estimate the absorbed dose in the thyroid

4. Results

Procedure	Thyroid Dose (mGy)			Diference Golem/ICRP (B/A)-1	Diference Laura/ICRP (C/A)-1
	Adults ICRP (A)	Golem (B)	Laura (C)		
MUGA	4,22	0,23	0,16	-94,55%	-96,21%
MD	0,48	0,06	0,04	-87,50%	-91,67%
MIBG	0,84	0,12	0,08	-85,71%	-90,48%
DaTScan	9,25	0,08	0,06	-99,14%	-99,35%



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THE APPLICATION OF VOXEL PHANTOMS TO THE INTERNAL DOSIMETRY OF RADIONUCLIDES

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5. Conclusions

- $Na^{99m}TcO_4$ → results about 90% lower than those given by ICRP;

  Calculated doses → more than 50 times below the ARSAC threshold → the "no blocking" protocol is adequate

- ^{123}I →–results much lower than those given by ICRP – 85 - 90% for mIBG and about 100% for DatScan®.

The optimization of thyroid blocking protocols for procedures with ^{123}I is possible!