

Teleradiology for Remote Quantitative Analysis of PET

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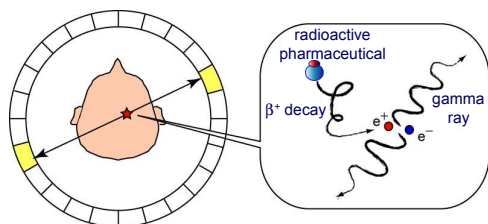
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Principle of PET Measurement

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- Tomographic image of a distribution of radioactive pharmaceutical.



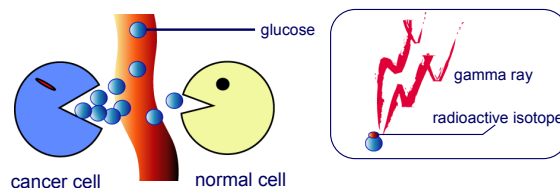
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Principle of PET Measurement

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- Example of pharmaceutical.

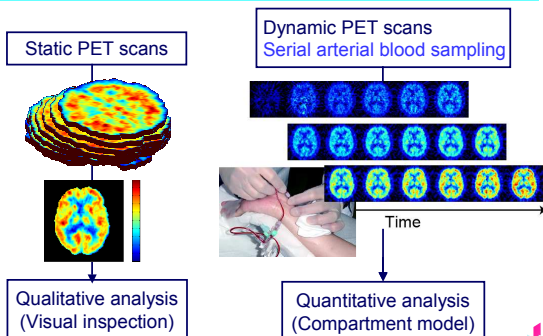


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Static and Dynamic PET Scans

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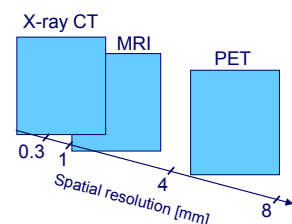
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Qualitative Analysis

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- PET images are VISUALLY analyzed by looking for local differences in uptake in the regions imaged.
 - Non-productive and subjective evaluation.



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Quantitative Analysis 7/15

- Physiological parameters are calculated based on mathematical model.

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Quantitative Analysis 8/15

- Mathematical Model
 - Physiological parameters are estimated voxel-by-voxel or ROI-by-ROI.

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Quantitative Analysis 9/15

- Mathematical Model

Parameter	Estimate
K_1	0.1
k_2	0.1
k_3	0.03

250,000 voxels
20sec/voxel

Calculation time: 5-6 days

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Qualitative and Quantitative analysis 10/15

- Qualitative analysis.
 - Take less time.
 - Subjective and non-reproducible evaluation.
 - Skillful doctors.
- Quantitative analysis.
 - Much computation time.
 - More objective.
 - Relies less on doctor's judgments.
 - Serial arterial blood sampling.
 - Skillful doctors and modelers.

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Number of PET and Experts 11/15

- 72 Institutions (at Oct. 8, 2004).
- Approximately 100 imaging systems of PET

Profession	Number of medical specialists (approx.)
Physician	38000
Surgeon	35000
Orthopedist	25000
Pediatrician	18000
Obstetrician and gynecologist	15000
Ophthalmologist	12000
Otolaryngologist	10000
Urologist	8000
Neurosurgeon	7000
Anesthesiologist	6000
Dermatologist	5000
Radiologist	4000
Pathologist	3000
Clinical laboratory physician	2000

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Teleradiology System 12/15

- Doctor-net, Hospi-net.

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Practical issues

- Omission of arterial blood sampling using statistical separation.
- Reduction of computation time using clustering analysis.

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Proposed System (Proposal)

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Summary

- Quantitative analysis will provide more objective interpretation of PET images, however it requires much computation time and serial arterial blood sampling.
- Radiologists and modelers are very small in number.
- Teleradiography system for quantitative analysis of PET images is proposed.

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