

The impact of the "polar map" computation method on the heart disease evaluation in emission tomography

KOLINKO INNA PAVLOVNA

Институт математики им. С.Л. Соболева СО РАН (Новосибирск), Россия
e-mail: kiina131313@gmail.com

This research presents a method for the quality evaluation of solving the inverse problem of the human's torso mathematical model reconstructing with Poisson data. The single-photon emission tomography (**SPECT**) method is used as a clinical examination standard for the patients with cardiovascular diseases. Clinical trials of the SPECT method are limited due to radiation exposure, therefore, *computer simulation method* is developing actively all over the world. Mathematical modeling of the SPECT procedure solves the inverse incorrect problem of the chest organs' (including *heart*) model *reconstruction*. An important part of the research is the evaluation of the reconstruction quality and the obtained mathematical model of the patient interpretation. In nuclear cardiology, the "polar map" is the standard for heart disease evaluation [1]. In the laboratory of "Modeling in Nuclear Medicine" (NSU), a software package "Virtual SPECT" was developed, which includes the following blocks:

1. Virtual patient model
2. Model of a virtual tomograph
3. Image reconstruction program
4. Software "Polar map"(diagnosis of the patient's heart condition).

As part of the research, a proprietary software "Polar Map" was developed to evaluate the results of reconstruction. The program allows to create a template with which quantitatively and semi-quantitatively compare different modes and methods for solving the inverse reconstruction problem can be used. The program was tested by comparison with real clinical data.

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References:

[1] *Cerqueira et al.* Standardized myocardial segmentation and nomenclature for tomographic imaging of the heart: a statement for healthcare professionals from the cardiac imaging committee of the council on clinical cardiology of the american heart association. *Circulation* 105, 39–542.