

## Conference Paper

# Intellectual Interdisciplinary Support System for Making Medical Decisions in the Diagnosis of Inorganic Retroperitoneal Tumors

Nikitaev V.G.<sup>1</sup>, Selchuk V.Y.<sup>1,2</sup>, Pronichev A.N.<sup>1</sup>, Korenevskaja P.Y.<sup>1</sup>, Polyakov E. V.<sup>1</sup>, Roslov N.A.<sup>1</sup>, and Dmitrieva V.V.<sup>1</sup>

<sup>1</sup>National Research Nuclear University MEPhI (Moscow Engineering Physics Institute), Kashirskoe shosse 31, Moscow, 115409, Russia

<sup>2</sup>N.N. Blokhin Russian Cancer Research Center, Ministry of Healthcare of Russian Federation, Kashirskoe shosse 23, Moscow, Russia

## Abstract

The paper considers the creation of the intellectual support system of medical decisions of inorganic retroperitoneal tumors. The system is focused on improvement of diagnostics quality of inorganic retroperitoneal tumors - one of the most difficult at diagnosing at early stages among oncologic patients.

Corresponding Author:

V. Nikitaev

VGNikitayev@mephi.ru

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## 1. Introduction

The oncology is a specialty which demands from the doctor wide cross-disciplinary knowledge to carry out diagnostics and treatment of malignant tumors [1].

The Inorganic Retroperitoneal Tumors (IRT) are considered as the most difficult for diagnostics at early stages. That provokes the high level of mortality among patients with this diagnosis. Therefore, nowadays, providing of highly qualified personnel lack, modern approaches in education acquires extremely high importance [2].

One of the most priority ways of informatization in oncology is the decision-making support systems for doctors performing as the multimedia training complexes with usage of knowledge bases, expert systems and network-based systems. The development of such systems is a complex interdisciplinary task, combining tasks from medicine, education and information technologies (as shown on Figure 1).

The purpose is the development of intellectual support system for medical decisions at IRT.

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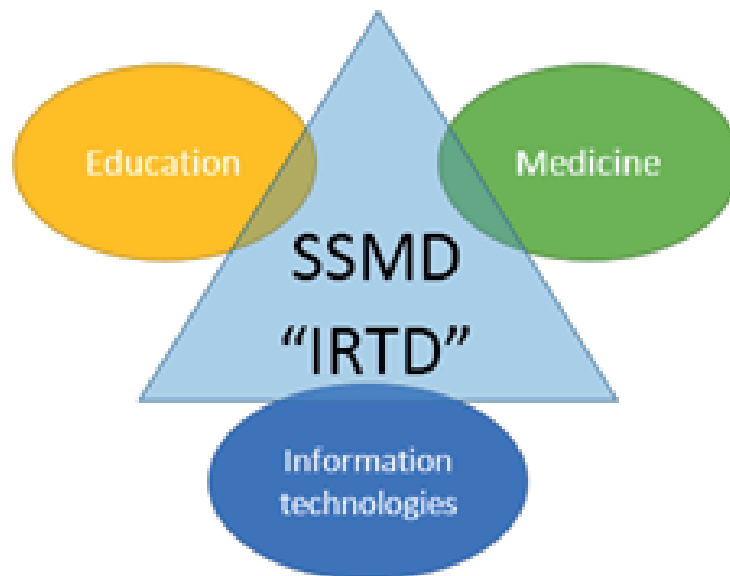


Figure 1: Multidisciplinary essence of work.

## 2. Support systems of decision making at the diagnostics of inorganic retroperitoneal tumors

The intellectual support system of medical decisions (SSMD) at IRT diagnostics performs as the multimedia information training complex to diagnosing of IRT which is based on the training materials provided by N.N. Blokhin Russian Cancer Research Center.

The SSMD at IRT diagnostics accumulates knowledge and experience of medical experts and IT specialists [3]. It was developed for doctors, interns. We have made a predesign research. It includes subject domain analysis, analysis of object medium and possible alternatives, unresolved problems and approaches to their decision. This research allowed to choose development tools and to formulate requirements for this complex and its systems [4]. The main stage of development decision support system was designing the knowledge base which data on patients with the diagnosis "Retroperitoneal cancer" are stored. The structure of this knowledge base is shown in the Figure 2.

Its characteristics and structure of the subsystems it were defined. It consists of website for distance learning, testing system, clinical knowledge base of IRT clinical records and electronic manual.

The interface of the developed knowledge base is shown in the Figure 3 The fields and structure of the interface were developed in cooperation with practicing physicians

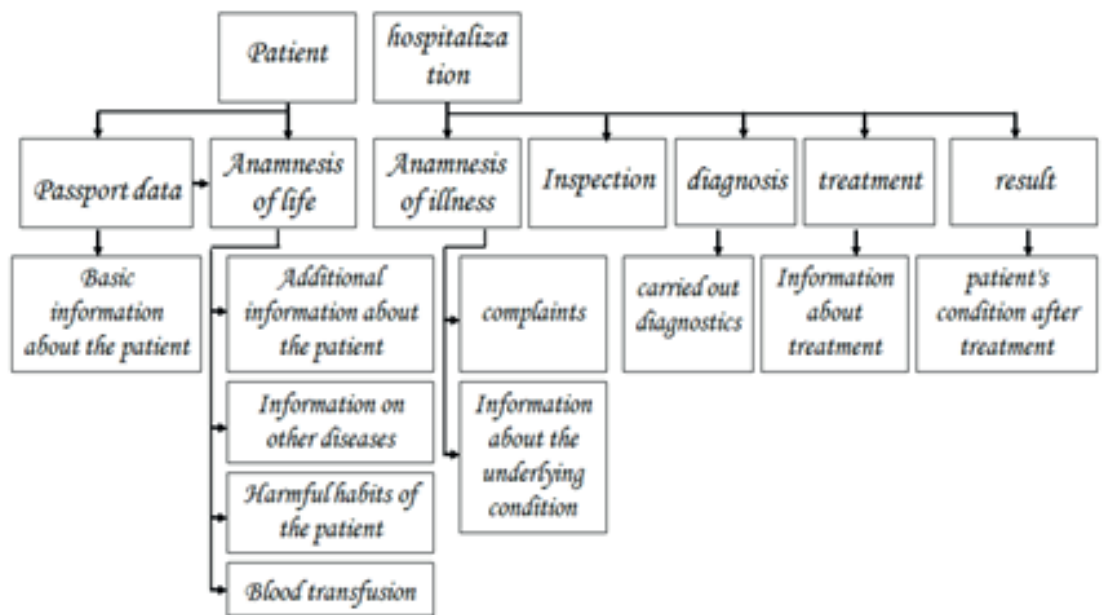


Figure 2: Structure of the knowledge base.

in order to provide maximum clarity and convenience for medical professionals who will use this system in future, filling it with new data.

Figure 3: Knowledge base interface.

The developed system allows us to collect the data of objective research, such as survey, palpation, percussion, listening), additional research methods (clinical laboratory methods, special methods (MRI, CT, ultrasonography, PET, radiological, radioisotope diagnostics), instrumental methods (gastroscopy, laparoscopy), morphological methods and subjective research methods (anamnesis of life, anamnesis of disease, complaints of patients).

The system was implemented with the C++ programming language with using of cross-platform developer tools of the application software "Qt creator"[5]. The relational database under control of MySQL is developed for the storage of researches data.

### 3. Summary

The developed support system of decision making at diagnostics of inorganic retroperitoneal tumors for doctors was experimentally tested. Also the manuals of work with subsystems of SSMD and the electronic glossary were created.

The main advantage of SSMD is the possibility of accumulation and transfer of knowledge to future experts in diagnostics of inorganic retroperitoneal tumors.

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### References

- [1] S.Makarov, T.Zhidkova, E.Kosenko, M.Ziborov, V. Finayev, *Modelirovaniye i informatcionnoye obespecheniye meditsinskikh uchrezhdeniy*, 2005.
- [2] M. Davydov, *Problemy i perspektivy razvitiya onkologii v Rossii*, Federalniy spravochik "Zdravookhraneniye Rossii", vol.10, 2013.
- [3] Y. Li, *Management of primary retroperitoneal tumors*, Cluing Ilua Wai Ko Tsa Chih, vol. 31, pp.242-244, 1993.
- [4] V.Nikitayev, Y.Berdnikovich, A.Pronichev, *Razrabotka multimediynykh kursov distantsyonnogo obucheniya vrachey po gistologicheskoy i citologicheskoy diagnostike s primeneniym ekspertnykh system*, Nauchnaya sessiya MIFI, vol.3, 2008.

[5] J. Thelin, Foundation of QT development, pp. 1-528, 2008.