

Prospects for the Creation of a Robotic Complex in the Organization of Primary Diagnosis of Risk Factors and Early Forms of Cancer

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ABSTRACT

On the basis of the created robotic complex with a program for the survey with illustrations (by type there are no similar forms of pathology) of major tumors, magnifying, slit lamp, mirror, magnifier on a flexible basis (sleeves) for examination of the oral cavity. The survey was conducted in 38 patients with a certain trajectory for men and women on the touch screen. The use of the robotic complex allowed patients to suspect tumors of the skin, oral cavity, thyroid gland, lymph node enlargement in $39.4\% \pm 1.7\%$, of which $53.4\% \pm 1.9$ with further examination of cancer was confirmed, including 2 patients with melanoma and 4 basal cell carcinomas. In the presence of complaints from the stomach, heartburn or belching with a smell on an empty stomach, 17 patients underwent a "breathing test" (basal and with a load of urea) on the Helik-Scan of AMA LLC, built into the program of the robotic complex. The color change in the "breathing tubes" was scanned with fixation on the touch screen, 7 of them had *Helicobacter pylori* above 10 units with load. In 5 patients with FGS, metaplasia (MP-1 and MP-2) was established, in 2 gastric ulcers and one of them with malignancy. After examination of the patient and processing of the results with a robotic complex, recommendations for further tactics were sent via the confidential Internet to the doctor of the prevention Cabinet.

Keywords: Robotic complex, Survey with illustrations, Breathing test

INTRODUCTION

Although malignant tumors are extremely diverse and difficult to diagnose, a lot is known about the risk factors and mechanisms of cancer development, so that in most cases not only timely diagnosis and treatment, but also taking an active position in assessing the specific risk, successfully conduct prevention. The doctor should conduct a systematic examination of the patient not when something is "sick", but regularly, when nothing hurts, taking into account the risk groups, gender and age when referring to the doctor for any reason. Early forms of cancer are preceded by a long period of carrier of oncogenic viruses, *Helicobacter pylori* and dysplasia, which can be established and cure.

Naturally, asymptomatic pathological processes with this approach against the background of concomitant diseases go by the wayside. And this is the weakest link of the primary diagnosis!

The aim is to find a solution to the class of problems of improving the effectiveness of detection of cancer pathology and risk factors by using a software package of questions on systems, including the fundamental knowledge of specialists in a particular field of medicine, providing advice to less qualified users, That is, the creation of digital systems of

artificial intelligence, which precede the reception of the doctor [1,2].

Robotic intelligence is a technique that allows you to implement algorithms for multi-purpose and system analysis into the expert program. The theoretical basis will be logic, illustrations, digital technologies and expertise with gradual improvement, as was the case with the chess robot.

In our opinion, a large-format digital television screen should be installed in the waiting room of the polyclinic, associated with the prevention program explaining the goals and objectives of the passage of the robotic complex (such

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as a slide show).

To complete the survey, we have created a robotic system (**Figure 1**) with question and illustrations for patients on the touch.



Figure 1. Robotic complex. Screen display, the passport data.

Then follow questions on the main localizations with illustrations (melanoma and non-melanoma) tumors (**Figure**

2b), precancerous skin conditions, risk factors and other conditions, organs, lifestyle and habits.

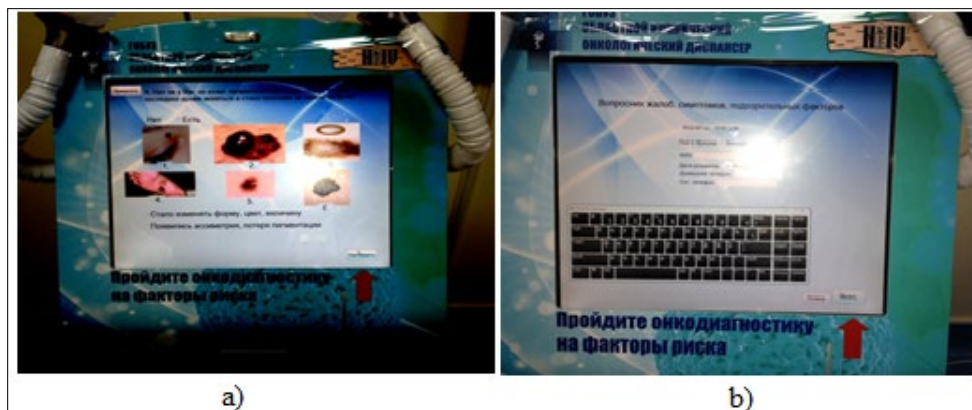


Figure 2. Touch screen: a) keyboard to fill in passport data; b) Questions with illustrations of pigment tumors.

For example (**Figure 3**):

1. Do you have the skin for any sores, cracks or other entities which have recently? 1. Yes, there are began to change the shape, color or size;
2. Yes, there was a tumor spreading to the skin, places with raised edges other changes, sometimes;
3. Itch;
4. Yes, there is an ulcer on the skin that does not heal for more than 3-4 weeks;
5. Yes, there is a formation in the form of plaques skin color with a dent in the center, raised shiny mother-of-pearl edges;
6. Yes, there are, but do not know how to evaluate 1.6 - a few sign 0. Nothing.



Figure 3. Precancerous and basal cell forms of cancer.

Do You have a pigment spot(s) in the face, back, neck, including the nail bed (without injury) or other places, including under magnification? (**Figure 4**).



Figure 4. Pigment tumors (under magnification of the magnifier and without it).

Given the extremely high level of advanced cases of oral cancer, we have mounted movable sleeves with mirrors with an increase (5 times) and without increase. For lighting, a

slit lamp and disposable spatulas are turned on (**Figure 5** - oral examination).



Figure 5. Inspection of the oral cavity (under the tongue).

RESEARCH METHODOLOGY AND DISCUSSION

The organizer of the survey is a specially trained nurse operator, which includes a robotic system and registration code. The nurse operator helps to answer questions, signs or factors that cause difficulties in the patient. The trajectory of the survey depends on gender and clarifying factors. As you

know, stomach cancer takes 2nd place among other malignant tumors.

Given that for the stomach, the proven cause is *Helicobacter pylori*, we in the presence of the slightest complaints from the stomach in the robotic complex provides a sensitive “breathing test”, which manufactures LLC “AMA” in the form of “Helik-Scan” (Figure 6).

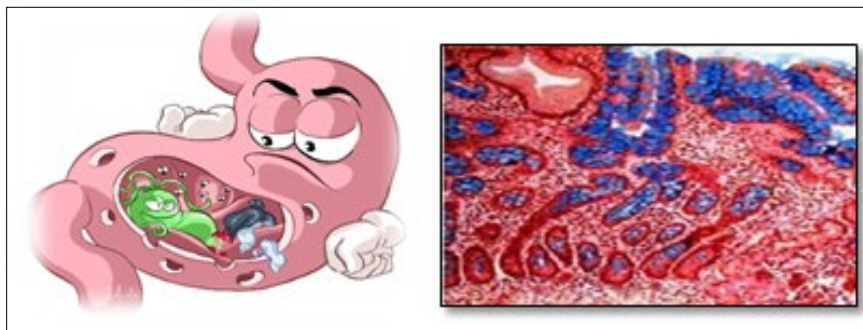


Figure 6. Stomach with *Helicobacter pylori*.

Two “breathing tests” were performed on an empty stomach: before taking urea (basal test) and after (with load). In the case of *Helicobacter pylori* infection, the second sample (with a load of urea or urea) significantly increased its blue

hue due to an increase in the percentage of ammonia in the exhaled air, the system automatically reflected on the screen, compared the change in the length and shade of the second sample and gives the finished result (Figure 7).

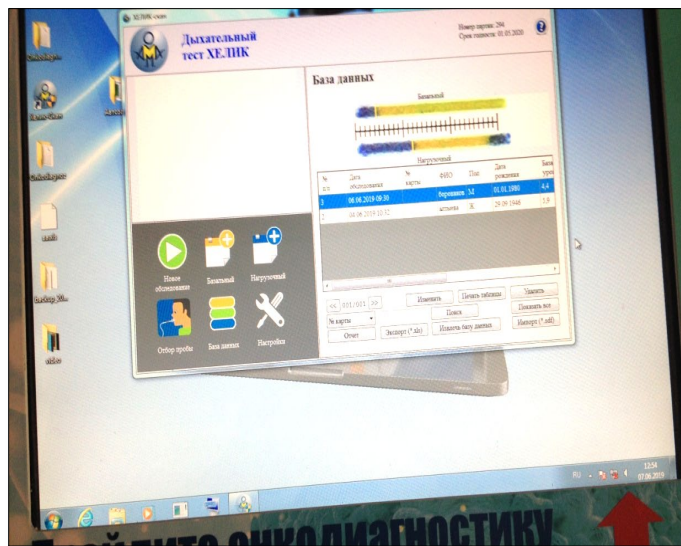


Figure 7. Breathing tests.

In Figure 7 on the Left in the upper rectangle two yellow strips are visible (the upper end after basal respiration became blue - 4, 9 units; the lower - after loading 10, 8 units).

Preliminary tests were conducted in 38 patients, applied to regional clinical Oncology dispensary "open Day" in GOBUZ OKOD. Application of robotic the complex allowed the patients to independently identify, suspect or establish tumors of the skin, oral cavity, thyroid gland, lymph node enlargement in (15 patients) $39.4\% \pm 1.7$, of

which (8 patients) $53.4\% \pm 1.9$ with further examination, cancer was confirmed, including 2 patients with melanoma and 4 basal cell carcinoma.

17 patients presenting certain phenomena of discomfort from the stomach, additionally held a "breath test", 7 of them discovered helicobacters above 10% load. All patients underwent EGD with biopsy for atypical cells and *Helicobacter pylori* for authenticity. 5 patients have metaplasia (MP-1 and MP-2), 2 gastric ulcers and one of them with malignancy.

After processing the results of all the data of the robotic complex through the local Internet system, the results and recommendations were sent to the attending physician, who after further examination of the patient established the final diagnosis.

CONCLUSION

1. The preliminary results of the introduction of the robotic complex indicate the time savings of the “lean” clinic and the active identification of cancer risk factors, dysplastic processes and early forms of malignant tumors, prevention and treatment of which is less costly more effective.
2. Conducting awareness-raising preventive work on digital television screens such as “slide show” in the halls of clinics increases cancer literacy of patients and the focus of their medical examinations and the need for screening.
3. This approach of preliminary complex robotic examination is a real breakthrough in identifying risk factors for cancer and early forms of tumor diseases, which requires further improvement.

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