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Research Article

**DATA OF MAMMOGRAPHIC SCREENING AS A BASIS FOR  
EFFECTIVE USE OF PHARMACEUTICAL PREPARATIONS**E.I.Rybnikova<sup>1</sup>, S.V.Popov<sup>1</sup>, L.A.Titova<sup>1</sup>, I.V.Popov<sup>2</sup><sup>1</sup> Voronezh State Medical University n.a. N.N. Burdenko<sup>2</sup> Voronezh State Agrarian University n.a. Peter the Great

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**Abstract:**

*The study analyzed the experience of using ultrasound and X-ray methods of research to identify the pathology of the mammary glands in women of different age groups. A comparative analysis of the diagnostic significance of the two radiological methods of research was carried out, which made it possible to propose a new algorithm of screening the pathology of the mammary glands in the course of additional clinical examination taking into account age-specific features. It is noted that the X-ray method of research in some cases is not sufficiently informative, which is associated with individual characteristics of the ratio of tissues constituting the mammary glands, and the potential risk of non-recognition of malignant tumors against the background of X-ray dense glandular tissue. Ultrasound examination method has several advantages that can compensate for the disadvantages of the X-ray method. However, the use of ultrasound in the clinical examination is not fixed by law. We strongly believe that the inclusion of an ultrasound method of examination in the algorithm of screening breast pathology with additional clinical examination will optimize the diagnostic process and ensure the timely start of treatment with appropriate pharmaceutical preparations.*

**Key Words:** breast cancer, screening**Corresponding author:****Dr. I.V.Popov,**

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**INTRODUCTION:**

Currently, pharmaceutical manufacturers are actively developing, producing and introducing into clinical practice more and more new medicines to treat various diseases of mammary glands, including such formidable ones as breast cancer (BC). However, only early and accurate detection of pathological changes ensures high efficiency of medication intake. In this regard, the development of informative diagnostic algorithms that allow the appliance of drugs in a targeted and optimal way is of particular importance. The increase in the incidence and high mortality rate of women, especially of young reproductive age, from breast cancer (BC) is a pressing medical and social problem. Moreover, breast cancer among young women has a more adverse prognosis and a lower 5-year survival rate [1, 2]. Detection of the disease in the later stages leads to women's disability, five-year survival rate decreases. Secondary prevention (screening) is a priority in the fight against breast cancer [3, 4]. The state program "Health" and additional clinical examination (ACE) of working citizens were directed to solve this problem. However, the currently available algorithm for screening mammary glands (MG) pathology among working women cannot fully solve this problem. In the course of ACE, which has been carried out in our country for the working population since 2006, the instrumental examination of breast cancer - x-ray mammography (XRM) - is established for women over 40 years once in 2 years [5, 6]. For women under the age of 40, only a physical examination of the breast is performed, which significantly affects the quality of screening, since only palpable formations are detected this way. The use of XRM for women older than 40 years is often limited with a dense background of the MG, because the sensitivity of the cancer to early diagnosis of breast pathology depends on the severity and ratio of glandular, adipose and fibrous tissue [7, 8]. In young women with a predominance of glandular (radiologically dense) tissue in the breast, as well as with various forms of diffuse fibrocystic mastopathy (DFCM), the information obtained using XRM is unsatisfactory [7]. In addition, glandular tissue is presented in the structure of the breast not only in young women, but also in women in the period of pre- and post-menopause [8, 9].

A number of authors lay stress on a decrease in the informational value of XRM for women aged 40–49 years, which is associated not only with the peculiarities of the breast structure and the prevalence of radiographically dense glandular tissue at this age, but also with the fact that women at this age have a

high proportion of rapidly growing aggressive tumors [3, 10, 11].

The supersonic method has a number of advantages that can compensate for the shortcomings of XRM [7, 9, 12]. Currently, supersonic examination (ultrasound) of the breast in the context of clinical examination is not legally recommended as a screening method. However, in recent years, the diagnostic capabilities of ultrasound have increased significantly in response to the emergence of high-resolution devices, the improvement of options and the introduction of modern research techniques.

The inclusion of ultrasound in the screening the pathology of breast cancer algorithm in the course of ACE, taking into account the age-specific features of a woman, will minimize the deficiencies of XRM for women over 40 years of age, as well as conduct a more complete examination of breast cancer in women under 40 years of age. An important aspect of the use of ultrasound, in addition to the well-known advantages and advantages of this method, is the ability to maximally "bring" this type of examination to the female population, thanks to the presence of portable devices.

The aim of the study was to analyze the results of clinical examinations for a five-year period on the basis of the current legislative framework, and also to propose a new algorithm for screening mammary glands pathology, taking into account women's age-specific characteristics.

**MATERIAL AND METHODS:**

The results of the clinical examination of 14190 women for the period from 2008 to 2012 were analyzed on the basis of the City Clinical Polyclinic of the city of Voronezh. According to the orders of the Ministry of Healthcare and Social Development of the Russian Federation, all employed women underwent a physical examination, women over 40 years old were provided with a XRM (1 time in 2 years). In a number of cases, both during the physical examination and after the XRM, an additional examination was shown - an ultrasound of the MG, which was not included in the list of additional medical examinations, but was carried out on the basis of City Clinical Polyclinic as part of this study. During the period from 2008 to 2012, 14,190 women were examined. The age of the examined women varied from 18 to 81 years. The ultrasound method usage made it possible to examine mammary glands for pregnant and lactating women. The physical examination of mammary glands was conducted by a gynecologist, complaints and results of

the examination were recorded in a dispensary card with subsequent recommendations for additional examination (ultrasound of mammary glands) and consultation with the mammologist.

Ultrasound of the MG was performed in B-mode, using linear sensors with a frequency of 5-7 MHz using the Aloka-1500, Aquila, Aloka-500, SA-6000 SMT and Vivid-3 devices. During the study, the structure of mammary glands, the ratio of glandular, fatty and fibrous tissue, the condition of the milky ducts, and the presence of focal lesions were assessed. This examination took into account the age and functional status of the female body. It was mandatory to examine the axillary, supra- and subclavian regions in order to analyze the state of the regional lymph nodes.

The XRM was performed using the Mammo-4T mammograph in an oblique projection, with the obligatory observance of the symmetry of the image of both breast cells. After laying, the gland was compressed. The radiation dose in this case was 0.11-0.13 mSv.

The survey revealed the following types of changes:

1. Diffuse fibrocystic mastopathy:
  - a) Diffuse fibrocystic mastopathy with a predominance of the glandular component (adenosis)
  - b) Diffuse fibrocystic mastopathy with a predominance of the cystic component (DFCM)
  - c) Diffuse fibrocystic mastopathy with a predominance of the fibrous component (DFM)
  - d) Mixed form of diffuse fibrocystic mastopathy (MDFM)
2. Nodular form of fibrocystic mastopathy (nodular FCM)
3. Local fibrosis
4. Benign entities:
  - a) cysts
  - b) fibroadenomas
  - c) lipomas
5. microcalcines
6. Breast cancer
7. Other focal changes (not excluding the probability of a malignant process, requiring morphological verification).

Taking into account certain difficulties in diagnosing various forms of FCM associated with the resolution of XRM, especially with the dense background of the mammary glands, and taking into account the increased interest of domestic and foreign experts to use the X-ray method as a screening for women aged 40-49 years, age groups of women: from 40 to 49 years old and over 50 years old.

### RESULTS:

During the study, it was found that more than every fourth (27.6%) women older than 40 years old had a pronounced glandular component that did not match their age. The glandular component was  $\frac{1}{2}$  or dominated in the structure of the MG when assessing the ratio of glandular and adipose tissue, that is, there was a background of a dense glandular parenchyma. It should be noted that out of 27.6% of women over 40 years old who have a predominance of glandular tissue, 21.0% are women in the age group from 40 to 49 years old, and 6.6% are women in the age group 50 years and older.

With a dense glandular parenchyma, the diagnostic capabilities of XRM are markedly reduced. This leads to the need to use other methods in the diagnostic process, primarily ultrasound. In the course of analyzing the results of additional medical examinations, ultrasound was prescribed to almost half of the women examined - 42.9%.

The analysis of the results of medical examinations of the age group up to 40 years showed that 43.2% of women according to the physical examination recommended ultrasound, while for 5 years the number of these women increased from 35.7% in 2008 to 47.8% in 2012 ( $t > 4.6$ ,  $p < 0.05$ ).

The main purpose of the ultrasound examination was to identify focal pathology with characteristic ultrasound signs of mammary glands cancer. The diagnosis of breast cancer according to the results of a comprehensive survey was established with a frequency of 0.6 per 100 women examined. The highest frequency of mammary glands cancer occurrence was determined in the age group of 40-49 years old (0.9 per 100 women examined) and in the age group of 50 years and older (0.6 per 100 women examined), the lowest in the age group 30-39 years old (0.3 per 100 examined women), in the age group of 20-29 years such patients were not identified (Table 1). In all cases, the regional lymph nodes were examined. Other focal changes in mammary glands, which did not allow excluding the probability of a malignant process and requiring morphological verification,

were detected with a frequency of 0.3 per 100 women examined.

A comparative analysis of ultrasound and XRM usage in the detection of pathology of mammary glands was conducted and differences in the frequency of mammary glands pathology detection with these methods were determined. Comparative

characteristics of the frequency of mammary glands cancer pathology detection by ultrasound and XRM among women older than 40 years (Table 1) were obtained by examining one group of women who underwent both methods of the study - ultrasound and XRM.

**Table 1: The frequency of mammary glands pathology detection by ultrasound and XRM among women over 40, per 100 women surveyed**

Type of pathologies	Research method / Age					
	Ultrasound			XRM		
	40-49 years	50 years and older	Total	40-49 years	50 years and older	Total
DFCM	26,5	23,8	25,4	8,8	15,5	11,4
DFM	16,2	33,3	22,7	6,6	21,4	12,3
MDFM	5,9	7,4	6,3	31,2	35,6	33,2
Adenosis	1,5	0,6	1,1	0,9	0,4	0,7
Nodular FCM	0,4	0,7	0,5	0,9	1,2	1,1
Local fibrosis	0,6	0,4	0,5	3,2	2,8	3,1
Cysts	11,0	14,3	12,3	4,8	5,6	6,3
Lipomas	13,2	16,7	14,5	9,5	10,7	10,0
Fibroadenomas	6,1	5,7	5,9	4,4	4,7	4,5
Other focal changes	0,7	0,9	0,8	0,7	1,2	0,9
Breast cancer	0,8	1,1	0,9	0,8	1,1	0,9
Microcalcifies	-	-	-	0,7	0,5	0,6
Total	82,9	104,9	90,9	72,5	100,7	85,0

A comparative analysis of the diagnostic capabilities of radiological research methods showed that diffusion FCM, fibroadenomas, lipomas were detected more often with the ultrasound method. On the contrary, certain types of MG pathology were detected mainly by the X-ray method. These included local fibrosis, which was diagnosed 6.2 times more often by the XRM method than by the ultrasound method. X-ray signs of "malignancy" (non-invasive mammary glands cancer "in situ") - grouped microcalcifications - were determined using the XRM method with a frequency of 0.6 per 100 examined women over 40 years of age. Ultrasound, unlike XRM, does not allow to detect microcalcifies due to the technical features of the method. Focal changes in the MG, which do not allow to exclude the probability of a malignant process, were detected by ultrasound and X-ray methods with almost the same frequency (0.8 and 0.9 per 100 examined women, respectively,  $t = 1.9$ ,  $p > 0.05$ ). During the study, ultrasound signs that mammary glands cancer were detected in all women who were referred for follow-up examination after XRM with this diagnosis. In the course of ACE, there were cases (2.6%) where women refused to conduct an X-ray examination due to radiation exposure, as well as discomfort and pain during compression of the gland during the study.

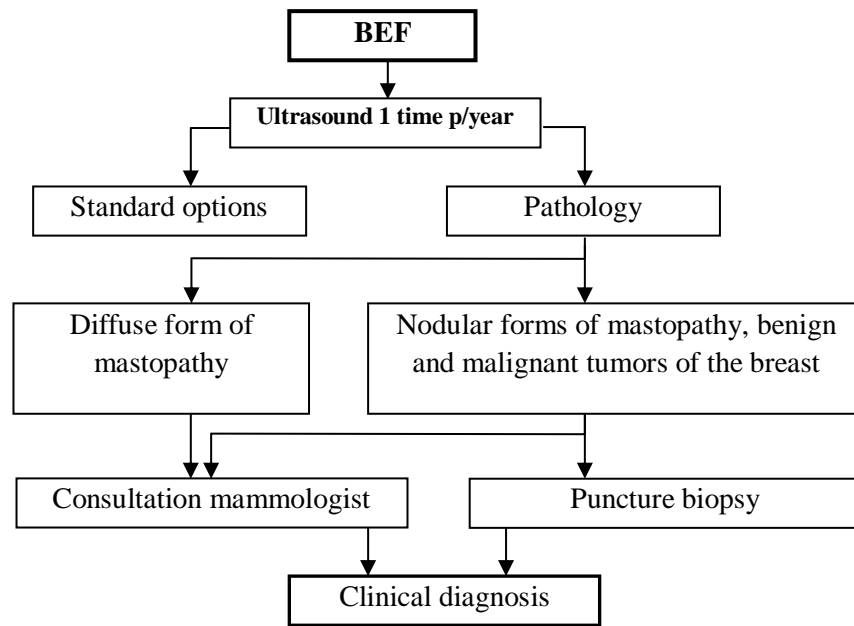


Figure 1. Examination algorithm for women from 20 to 39 years old when screening for mammary glands pathology (BEF = breast examination form).

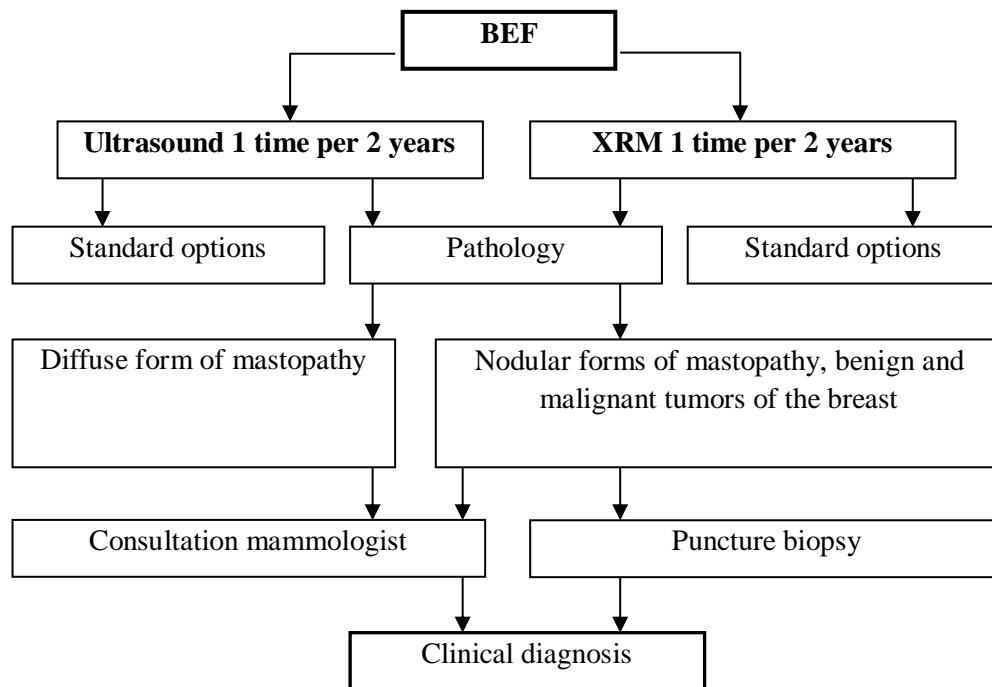


Figure 2. Examination algorithm for women from 40 to 49 years old when screening for mammary glands pathology.

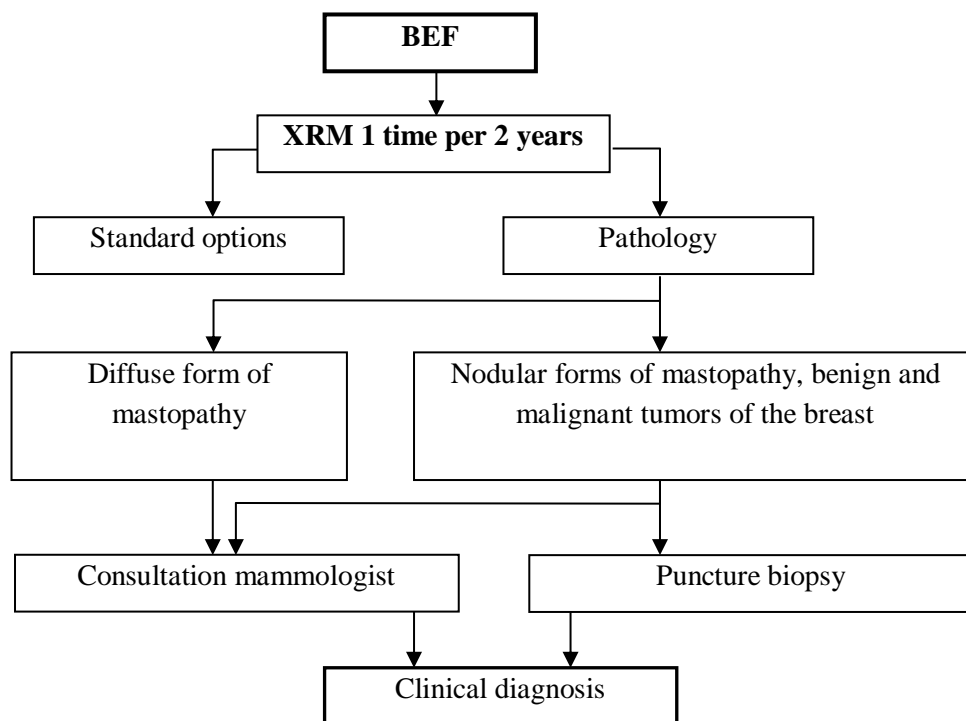


Figure 3. Examination algorithm for women over 50 years old when screening for mammary glands pathology.

### DISCUSSION:

Thus, the diagnostic capabilities of ultrasound and XRM are determined by women's age-specific features, which dictates the demand for the integrated use of these methods in screening for MG pathology. Given the data obtained, the following is proposed:

1. In order to timely detect the pathology of mammary glands to use ultrasound as an additional method for examining women in the age group up to 49 years.

2. When conducting clinical examination and other forms of preventive examinations in order to timely diagnose the pathology of mammary glands in women, in addition to physical examination:

- at the age of 20 to 39 years old, conduct an ultrasound of the MG annually (Fig. 1);

- at the age of 40 to 49 years old, conduct XRM 1 time in 2 years, in the intervals between the XRM, conduct ultrasound of the breast fluid (Fig. 2)

- at the age of 50 years and older, conduct XRM 1 time in 2 years (Fig. 3).

The inclusion of ultrasound in the algorithm for screening the pathology of mammary glands during ACE, taking into account women's age-specific features proposed by the authors, will minimize the number of disadvantages of the X-ray method for women over 40 years old, as well as conduct more complete examination of mammary glands for women under 40. It seems that the practical use of the presented diagnostic algorithms will improve the quality of the examination and the effectiveness of the drug intake in the treatment of identified diseases of mammary glands.

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