



## Holter monitoring in the assessment of physiological systems in patients with cervical cancer

V. G. Nesterov <sup>1\*</sup>, V. N. Dmitriev <sup>1</sup>, S. V. Igrunova <sup>1</sup>, E. V. Nesterova <sup>1</sup>, M. A. Surushkin <sup>1</sup>, G. V. Emelianova <sup>1</sup>

<sup>1</sup> Belgorod State National Research University, Belgorod, RUSSIA

\*Corresponding author: [valnest@inbox.ru](mailto:valnest@inbox.ru)

### Abstract

The article sets the task to consider the effectiveness of Holter monitoring during electrocardiographic monitoring of the state of the heart as a pivot factor in the functional state of the body during specific treatment of patients with cervical cancer. As a result, the authors prove that Holter monitoring of myocardial bioelectrical activity in the treatment of cervical cancer can detect heart rhythm disturbance both in individuals being examined according to indications, and in patients who had no indications for electrocardiographic monitoring at more early stages of the examination. Based on this, using Holter electrocardiographic monitoring as a mandatory test is advisable to ensure proper monitoring of the myocardium in patients with cervical cancer.

**Keywords:** physiological systems, electrocardiography, Holter monitoring, cervical cancer

Nesterov VG, Dmitriev VN, Igrunova SV, Nesterova EV, Surushkin MA, Emelianova GV (2020) Holter monitoring in the assessment of physiological systems in patients with cervical cancer. Eurasia J Biosci 14: 239-241.

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### INTRODUCTION

It is noted that most cancer patients have a serious comorbid background, and the most common pathology is the cardiovascular conditions (Efremova et al. 2017, Kovynev et al. 2006, Polonikov et al. 2015, 2017). Timely correction of the state of physiological systems increases the likelihood of effective treatment of the underlying cancer (Bushmina et al. 2018).

Holter monitoring during ECG is a modern method of functional diagnostics, which allows detecting cardiac arrhythmias, clarifying their genesis and electrophysiological development mechanisms (Medvedev 2000). However, at present, the introduction of Holter monitoring into the set of examination of cancer patients is difficult due to both technical and economic reasons. During dispensary observation of cancer patients, routine electrocardiography (ECG) is more often used. ECG is used as a test identifier for the first stage of the examination, and Holter monitoring serves as a test discriminator of the subsequent stage of the examination according to indications determined by the results of the ECG. However, the literature provides no assessment of the effectiveness of such use of Holter monitoring in cancer patients (Sirotnina et al. 2018).

In connection with the foregoing, the objective of our study was to determine the value and role of Holter monitoring in the evaluation of the electrical stability of myocardium in patients with cervical cancer (Yarosh et al. 2015).

### MATERIAL AND METHODS

To determine the indications for Holter monitoring, a standard ECG was first performed. Studies were performed in 102 patients with verified locally advanced cervical cancer (T<sub>2b</sub>N<sub>x</sub>M<sub>0</sub>, T<sub>3b</sub>N<sub>x</sub>M<sub>0</sub>). All women underwent combined radiation therapy according to traditional methods excluding polychemotherapy in the treatment regimen. Remote irradiation was carried on ROKUS-M (<sup>60</sup>Co), and Agat B (<sup>60</sup>Co) was used for intracavitary irradiation. The average age of patients was (53.9 ± 1.7) years. There were no clinical signs of cardiac and other therapeutic abnormalities in all examined patients.

ECG was performed on the Poli-Spektr-EFSR hardware and software complex (NeuroSoft, Ivanovo). The present article deals with the analysis of part of a combination polycardiographic study performed on a 12-channel electrocardiographic device.

Holter monitoring was performed on a Cardiotekhnika 4000AD monitor (Inkart, St. Petersburg) in leads CS1, CS2, CS3, CS5, for 24 hours (to determine the circadian rhythm). All patients kept their diary, recording changes in their well-being.

Statistical data processing was performed using *STATISTICA for Windows 8.0 (StatSoft, Inc.)*.

Received: August 2019

Accepted: January 2020

Printed: March 2020

## RESULTS AND DISCUSSION

Standard electrocardiography detected heart rhythm disturbances in 55 examined ( $53.9 \pm 5.0\%$ ). According to the results of Holter monitoring, 33 patients made up ( $32.4 \pm 4.6\%$ ) of the examined. Differences in the mean values of ages and periods after the end of specific treatment in this group of patients and the general group were statistically insignificant. The indication for conducting Holter monitoring in 3 patients ( $9.1 \pm 2.8\%$ ) was a suspicion of a sinoauricular block (CA block), degree II, type I, in 6 patients - an atrioventricular block (AV block), degree I; in 18 patients ( $54.5 \pm 4.9\%$ ) - extrasystole, in 4 patients ( $12.1 \pm 4.2\%$ ) - severe sinus bradycardia (with heart rate of less than  $45 \text{ min}^{-1}$ ), in 2 patients ( $6.1 \pm 2.4\%$ ) - Wolf-Parkinson-White phenomenon (WPW).

In addition, Holter monitoring was performed in 14 patients who did not have indications for this study. The sample was random for a group of people who, according to ECG, had no pathological changes in the myocardium, and amounted to ( $29.2 \pm 6.6\%$ ). Differences in the mean values of ages, gender and periods after the end of treatment in this group of patients and the general group were statistically insignificant.

Multichannel ECG in ( $45.5 \pm 6.7\%$ ) of patients revealed changes in the automatism of the sinus-atrial node - moderate sinus bradycardia and arrhythmia, pacemaker migration, escaping complexes and rhythms. Severe sinus bradycardia, sinoauricular block, degree II, type I, atrioventricular block, degree I, supraventricular and ventricular extrasystoles, WPW phenomenon amounted to ( $7.3 \pm 3.5\%$ ). 13 patients ( $12.7 \pm 3.3\%$ ) had pauses due to sinus arrhythmia within the age limits. In 3 cases out of 6 with AV block of degree I registered on a standard ECG at night, Wenckebach episodes of AV block of degree II were noted at night.

ECG in all patients examined in connection with the presence of extrasystoles (mainly ventricular) revealed their pathological amount from 600 to 6100 per day. This put us on the alert, since ventricular extrasystole plays a large role in the development of sudden death in young people.

One of the 4 patients with severe bradycardia had prolonged episodes of blocked atrial extrasystole, which

caused bradycardia. In those examined for the WPW phenomenon (2 people), paroxysms of supraventricular tachyarrhythmia were not detected. The results of Holter monitoring made it possible to evaluate the revealed violations of the function of the sinus node as vagotonic dysfunction.

Holter monitoring allowed us to rehabilitate 12 patients ( $36.4 \pm 4.8\%$ ), rejecting the assumption of pathological changes in the bioelectric activity of the heart muscle.

In 6 patients ( $42.9 \pm 4.9\%$ ) who underwent Holter monitoring without preliminary indications, cardiac arrhythmias were also detected. Of these, 3 patients had changes in the automatism of the sinus-atrial node - moderate sinus bradycardia and arrhythmia, migration of the pacemaker, escaping complexes and rhythms, two had severe sinus bradycardia, type II sinoauricular blockade, type I atrioventricular blockade, and extraventricular and ventricular extrasystoles. One of 23 patients had pauses due to sinus arrhythmia, not exceeding normal limits.

Additionally, we compared the results of standard ECG and Holter monitoring in 47 patients by chi-squared test. When taking the results of daily monitoring as a reference test, when deciding on the "pathological" state of electrophysiological processes in the myocardium, ECG sensitivity was ( $77.3 \pm 4.1\%$ ), and specificity was ( $47.3 \pm 4.9\%$ ).

The obtained operational characteristics preclude from recommending ECG as an identifier for the first stage of the examination; therefore, Holter monitoring should be used regardless of the ECG results.

## SUMMARY

During the study of myocardial bioelectrical activity as part of monitoring cancer patients, Holter monitoring helps identify heart rhythm disturbances both in individuals being examined according to indications and in patients who had no indications for Holter monitoring at earlier stages of the examination.

To ensure proper monitoring of the state of the myocardium in cancer patients, it is advisable to use Holter monitoring as a mandatory test.

## REFERENCES

- Bushmina ON, Loktionov AL, Dolgareva SA, et al. (2018) Pharmacological correction of metabolic disturbances in experimental acute pancreatitis on the background of chronic alcohol intoxication. *Research Results in Biomedicine* 4(4): 35-51 (In Russian). <https://doi.org/10.18413/2313-8955-2018-4-4-0-5>
- Efremova OA, Bolkhovitina OA, Vorobyeva A.S, et al. (2017) Interest of doctors and patients with chronic heart failure in active out-patient observation and training. *Research Result. Medicine and Pharmacy* 3(2):15-19 (In Russian). <https://doi.org/10.18413/2313-8955-2017-3-2-15-19>
- Kovynev IB, Pospelova TI, Loseva MI, et al. (2006) Independent prognostic effect of comorbid cardiological and other therapeutic pathology on the effectiveness of antitumor therapy and survival of older patients with non-Hodgkin malignant lymphoma. *Materials of the 1st National Congress of Therapists M.* - P.99.

- Medvedev MM (2000) Holter monitoring in determining treatment tactics for a heart rhythm disturbance M.M. Medvedev, St.P.: In-kart, - 48 p.
- Polonikov A, Bykanova M, Ponomarenko I, Shvetsov Y, Ivanov V (2017) The contribution of CYP2C gene subfamily involved in epoxygenase pathway of arachidonic acids metabolism to hypertension susceptibility in Russian population. *Clinical and Experimental Hypertension* 39(4): 306-311. <https://doi.org/10.1080/10641963.2016.1246562>
- Polonikov A, Kharchenko A, Bykanova M, Churnosov M, Solodilova M, Polonikov A, Kharchenko A, Bykanova M, Churnosov M, Solodilova M (2017) Polymorphisms of CYP2C8, CYP2C9 and CYP2C19 and risk of coronary heart disease in Russian population *Gene* 627: 451-459. <https://doi.org/10.1016/j.gene.2017.07.004>
- Polonikov AV, Ushachev DV, Ivanov VP, Bushueva OY, Solodilova MA (2015) Altered erythrocytemembrane protein composition mirrors pleiotropic effects of hypertension susceptibility genes and disease pathogenesis. *Journal of Hypertension* 33(11): 2265-2277. <https://doi.org/10.1097/HJH.0000000000000699>
- Sirotnina S, Ponomarenko I, Kharchenko A, Solodilova M, Polonikov A (2018) A Novel Polymorphism in the Promoter of the CYP4A11 Gene Is Associated with Susceptibility to Coronary Artery Disease. *Disease Markers*: 5812802. <https://doi.org/10.1155/2018/5812802>
- Yarosh SL, Kokhtenko EV, Churnosov MI, Solodilova MA, Polonikov AV (2015) Joint effect of glutathione S-transferase genotypes and cigarette smoking on idiopathic male infertility. *Andrologia* 47(9): 980-986. <https://doi.org/10.1111/and.12367.2>