FAST DIAGNOSIS OF BACTERIAL AND VIRAL INFECTIONS IN CANCER DISEASES

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Abstract
There is a number of viral and bacterial infections that can cause serious or even life-threatening diseases whose treatment necessarily require chemotherapy. Experience has shown that the active antiviral chemotherapy should be started at the very beginning of the disease, and it is therefore crucial to recognize early symptoms of various diseases and know the methods leading to rapid diagnosis of these diseases.

Introduction
Infections in neoplastic diseases may be of bacterial, viral or eventually parasitical origin. Bacterial infections are one of the most serious complications in the treatment of cancer diseases [1]. Infection affects 1-10% of patients (depending on the operated parts, age, mode of operations, resistance to infections, post-operative care) [2-6]. Because of these complications are consequently weakened immune system, the need for reoperation in the most serious cases, amputation of the lower extremity, septic shock or death of the patient [7-9]. Among the most common infectious pathogen states the Staphylococcus aureus [10, 11]. Moreover, this microorganisms are a threat due to their resistance [12, 13]. There is a number of very sensitive immunoassays for the detection of virus in secretions from the respiratory and digestive tract. The most serious viral diseases include chicken pox and measles, influenza and human papillomaviruses that cause common warts on both hands and feet, but it is transmitted to the surface of the cervix may result in the formation of cancer. Rapid diagnosis of viral diseases is important especially in immunodeficient patients.
Aims
The aim is to prevent infection by various technical and technological measures. For this purpose we used substances with antibacterial effects, which are also not harmful to the human body (silver ions, silver nanoparticles, hyaluronic acid and chitosan).

Material and Methods
The most common methods for fast diagnosis of bacterial and viral infections in cancer include:

- fast immunochromatographic tests - fast tests for the presence of antigens [14]
- PCR methods - fast and easy multiplication of the DNA based on the nucleic acids replication principle [15-17]
- latex agglutination - direct detection of rotavirus in stool [18]
- serology - deals with the serum and in particular with regard to the presence of specific antibodies against the antigens [19, 20]
- Western blot - an analytical technique used to detect a specific protein in a mixture with other proteins [21, 22]
- cultivation - targeted maintenance or multiplication of microorganisms in vitro etc.

For our purposes to assess the antimicrobial effects of individual substances we used the methods of cultivation of these substances on Petri dishes with culture of Staphylococcus aureus and measuring zones of inhibition. For comparison with this method we used the method of growth curves.

Results and Discussion
By measuring the zones of inhibition after 24 hours of cultivation greatest inhibitory effect in combination of 9.7 mM chitosan and 300 μM silver (AgNO₃) and 250 μM nanosilver (nano Ag₃PO₄) was observed, where values reached inhibition zones 2 mm for silver and 2.5 mm for nanosilver (Fig.1.). At 8.3 mM of hyaluronic acid inhibition zone 1.3 mm for silver and 1.5 mm for nanosilver were determined.
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Fig. 1. Zones of inhibition of bacterial cultures of *Staphylococcus aureus* with hyaluronic acid (8.3 mM) and chitosan (9.7 mM) with 300 μM AgNO₃ (A, B) and 250 μM nano Ag₃PO₄ (C, D).

Fig. 2. Spectrophotometric analysis of the growth of bacterial cultures of *Staphylococcus aureus* with hyaluronic acid (8.3 mM) and chitosan (9.7 mM) containing various concentrations of 300 μM of AgNO₃ (A, B) and 250 μM nano Ag₃PO₄ (C, D).

References


