



“Qualitative assessment of bacteriuria on the basis of activation of monocytes by the biofilm of isolated bacteria”

Product description

Urinary tract infections (UTI) are one of the most frequently occurring infections among children as well as adults. They often take the form of an ascending infection during which the bacteria colonize urethra, urinary bladder, ureters and subsequently kidneys. Some patients may, as a result of UTI, experience development of a dangerous systemic infection. Patients with chronic kidney disease, a condition which often accompanies such civilization diseases as diabetes, hypertension and atherosclerosis, constitute a group particularly exposed to urinary tract infections. Complications of UTI have also become a substantial cause of failures in transplantation and deaths of the recipients.

The proposed solution constitutes an innovative method of differentiating bacteriuria into one which demonstrates colonization of urinary track and thus burdened with significant risk of UTI occurrence and one which indicates the presence of bacteria in urine, stemming from contamination of the lower section of urethra which ought to be considered as physiological. This method enables identification of uropathogenic strains of Enterococcus type and invasive strains on the basis of the change in morphology of monocytes under the action of contact with biofilm of bacteria isolated from urine.

Key words

Urinary tract infection, immunosuppression, infectious potential, monocytes

Legal status of product

Patent Office of the Republic of Poland:

– P.415250, „ Diagnostic test for identification of pathogenic potential of Enterococcus type of strains”- submitted to PO RP on 11.12.2015, decision on patent granting from 11.12.2017

Subject of the offer

The subject of the offer is an innovative method of assessment of infectious potential of bacteria in diagnostics of urinary tract infections. This method is characterized by an increased diagnostics potential, based on the assessment of internal reactions of cells of patient's immune system to bacteria occurring in their urinary track.

Previous funding of research on the product

– NCN N N401 597540 „Biofilm *Enterococcus faecalis*, as a virulence marker of strain in urinary tract infections”.

- Santander Universidades 2014–2015 “Impact of immunosuppression on anti-phagocytic properties of bacteria isolated from patients in the course of kidney transplantation”.

– Innovation Incubator + “Support for scientific research management and commercialization of R&D work results in scientific units and enterprises” in the framework of the Operational Programme Intelligent Development 2014-2020.



Analysis of market competition

At present, the basic criterion in UTI diagnostics is a relatively simple quantitative assessment of presence of bacteria in urine collected while maintaining applicable standards. The use of quantitative criterion is necessary due to the ingress of bacteria present in physiological conditions in the urethra to urine during urination. It is assumed that bacteriuria in the range of 10^4 – 10^5 of bacteria in ml of urine indicates the possible infection. However, in order to fully assess the test results it is necessary to consider an entire series of clinical data, such as age, gender of a patient, leucocyturia, presence of factors predisposing it to infections (kidney stone, diabetes etc.). Despite its simplicity, this method is very much exposed to errors stemming from incorrect collection, transport or storage of material. Diagnostics among patients in immunosuppression in case of whom clinical symptoms are barely expressed as well as in cases of the so called asymptomatic bacteriuria is a substantial issue.

Due to the fact that in the present medical standard, the diagnostics of UTI tends to be a difficult and inconclusive process, GUMed scientists elaborated an innovative, qualitative method of assessing bacteriuria which consists of the assessment of morphology of patient's immune cells in response to the contact with bacteria biofilm isolated from their urine sample.

Advantages of the proposed product

It is estimated that UTI constitute one of the most frequent causes of antibiotic prescription by doctors. Even though in case of fully symptomatic UTI the procedure is rather simple, the issue of treating asymptomatic bacteriuria remains the subject of controversy, especially in certain populations of patients such as diabetics or persons after kidney transplantation. One must remember that antibiotic therapy, especially among patients with decreased immunity, involves the risk of occurrence of side effects of antibiotics, such as allergic reactions, risk of consequential fungal infections or *Clostridium difficile*, and from the systemic perspective, generation of unnecessary costs or growth of multidrug-resistant bacterial strains.

The proposed solution will enable identification of uropathogenic strains of *Enterococcus* type and invasive strains. Thus, it will be possible to exclude the infection by enterococci, which constitute an accidental contamination of material, without the necessity to repeat tests. Since urinary track is the most common source of microbes appearing into bloodstream, an additional advantage of the proposed method is the possibility of assessing the risk of systemic development of infection.

The use of proposed method will allow for an easy and fast diagnosis of UTI, which in turn will cause limiting of antibiotic therapy use among patients in case of whom it is not necessary, contributing to a decrease in costs related to UTI treatment and its complications.