Pelvic inflammatory disease (PID), a widespread gynecologic pathology, occurs in 60–65 % of gynecologic patients [1, 2, 3], and is the most frequent cause of poor reproductive health in women, with a high medical, social and economic burden [4, 5, 6]. According to the National Center of Control, the case rate of PID in the US is about 1 million cases annually, that is 1 in 10 women of reproductive age has chronic inflammation of organs in the small pelvis, and 1 in 4 of these women have complications [7, 8, 9, 10].

Immunodeficiency (ID) has an important role in the pathogenesis of PID [11, 12], and a weakened immune system leads to chronic disease and recurrence.
involving various organs and systems [13, 14]. Furthermore, immunodepression leads to disturbances of microbiocenosis in the urogenital tract [15, 16]. The aim of this study was to evaluate the immune status of out-patient women of reproductive age with PID and to assess their pathogenic microorganisms.

**Material and Methods.** Overall, 123 patients of reproductive age with pathological changes in the microbiota of the urogenital pathway were examined. Diagnoses were established on the basis of complaints, anamnesis, a clinical picture of disease, results of clinical laboratory inspection including dabs of vaginal and cervical flora, diagnosis of "latent" infections (Chlamydia trachomatis, Mycoplasma genitalium and hominis, Ureaplasma spp., Trichomonas vaginalis) by polymerase chain reaction, bacterial crops of microflora from the cervical channel (with determination of sensitivity of the allocated microorganisms to antibacterial and antifungal medicines), and dabs of atypical cells or Pap smears. Blood and serum were used to assess the antifungal medicines), and dabs of atypical cells or Pap smears. Blood and serum were used to assess the

Statistical significance was assumed when p<0.05.

**Results and Discussion.** The immune response in patients with PID is formed under the influence of many different factors. In this regard, the anamnesis of patients was studied in detail. The patients had frequent respiratory viral diseases in 50 (41 %), recurring associated somatic pathology. In the gynecologic anamnesis the following nosological forms were noted: a small myoma in the uterus in 15 (12 %), premenstrual syndrome – 12 (10 %), infections. In the gynecologic anamnesis the following

**Table 1**

| Indicators                  | Rate       | Patients with an ID on B-type (n=56, 46 %) | Patients with an ID on T-type (n=34, 27 %) | Patients with an ID on the admixed type (n=10, 8 %) |
|-----------------------------|------------|------------------------------------------|------------------------------------------|--------------------------------------------------|
| Leucocytes, x10⁹/l          | 4.3–7.5    | 5.1±0.18                                 | 5.14±0.18                               | 3.8±0.17                                         |
| Lymphocytes, %              | 23–45      | 204±2.01                                 | 302±1.3                                 | 25.1±2.15                                        |
| L-T-lymphocytes (CD3), %    | 41–70      | 55.1±8.24                                | 395±12                                  | 43.1±6.18                                        |
| T-suppressors (CD8), %      | 17–25      | 19.3±2.11                                | 16.1±2.11                               | 19.1±3.18                                        |
| T-helpers (CD4), %          | 23–48      | 26.4±2.23                                | 28.1±2.17                               | 30.2±4.13                                        |
| CD4/CD8                    | 1.1–2.2    | 3.1±0.3                                  | 1.8±0.18                                | 1.5±0.18                                         |
| B-Lymphocytes (CD22), %     | 22.0±3.5   | 18.1±2.12                                | 19.1±2.11                               | 25.2±0.1                                         |
| Ig A, g/ml                  | 0.8–2.8    | 0.3±0.12                                  | 2.8±2.13                                | 4.9±0.11                                         |
| Ig M, g/ml                  | 0.5–1.9    | 0.7±0.17                                  | 1.4±0.14                                | 4.9±1.16                                         |
| Ig G, g/ml                  | 5.4–16.1   | 9.1±2.21                                 | 19.4±2.31                               | 15.7±3.11                                        |
| CICs (conventional units)   | 10.0–54.0  | 66.4±10.24                               | 143.1±15.13                             | 82.2±10.18                                       |

The main changes in indicators of deficient cellular immunity were reduced numbers of T-type of lymphocytes (39.0±5.12) and the CD3/CD22 (2.1±0.11) index. Patients with ID had reduced numbers of B lymphocytes (18.1±2.12). This indicated the reduced production of antibodies in ID patients compared with normal subjects.

A deficiency of immunity with the admixed type was noted in patients with leukopenia and lymphopenia and characterized by a shift in CD3/CD22 towards activation of humoral immunity and high levels of IgA (4.9±0.11), IgM (4.9±1.16), and IgG (82.2±10.18).

Normal immune system conditions were noted in 19 patients (83 %), of which 4 (17 %) had moderately increased levels of IgA, IgM, IgG and circulating immune complexes (CICs).

We found that aerobic vaginitis was present in women with T-type in 13 (38 %), B-type – 20 (36 %), or admixed type – 2 (20 %) ID, and in 17 (74 %) women with standard immunity. The existence of chronic cervicitis was observed in 12 patients with T cell deficiency (35 %), 15 with B cell deficiency (27 %), 5 with admixed deficiency (50 %), and 7 with normal immunity (30 %).

Patients with a deficiency in cellular immunity were positive for microflora in the vagina and the cervical channel (Table 2): *Candida* spp. in 6 (18 %), *E. faecalis* – 5 (15 %), *Gardnerella vaginalis* – 3 (9 %), *U. ssp.* – 2 (6 %), *St. agalactiae* – 1 (3 %), and *E. aerogenes* – 1 (3 %).
The following microorganisms were present: *Candida* spp., *S. aureus*, *E. coli*, *G. vaginallis*, *E. aerogenes*, *Enterococcus faecalis*, *Enterobacter cloacae*, *Gardnerella vaginalis*, *Entero- bacter aerogenes*, *M. genitalis*, *M. hominis*, *C. trachomatis*.

In 23 patients (19%) with normal levels of immunity with microflora in the urogenital tract developed aerobic vaginitis – 17 (74%), chronic cervicitis – 7 (30%), or candidiasis vulvovaginitis – 4 (17%).

*Ureaplasma* spp. was found in all ID groups and its quantitative assessment was not higher than 10^6, and indicated moderate signs of PID. Patients with humoral ID did not have *E. faecalis*, but it was found in those with cellular ID in 6 (18%) or admixed type – 5 (15%), and was found in all cases of PID. Patients with B-type ID had *C. trachomatis* in 13 (23%), *E. coli* – 5 (9%), *M. genitalis* – 1 (2%), *M. hominis* – 1 (2%), and *S. aureus* – 1 (2%). *C. trachomatis* was not noted in patients cellular or admixed type ID.

**Conclusions.** Of 100 (81%) of patient women with PID 46% had B-type, 27% had T-type, and 8% had admixed type. Patients with T-type ID had moderate clinical symptoms, whereas patients with humoral or admixed type ID developed PID symptoms. Depending on the ID type, the type of microorganisms in the microbiota of the urogenital tract differed significantly, especially in those with B-type or admixed type. Patients with humoral ID did not have *E. faecalis*. Patients with B-type ID commonly had *C. trachomatis* and *E. coli*.

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The authors declare no conflict of interest.

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The paper identifies major epidemiological threats associated with holding the XXI World Cup in 11 cities of the Russian Federation. Epidemiological conjuncture of enzootic natural focal infectious diseases of bacterial and viral etiology registered in FWC-2018 host-entities was analyzed from the standpoint of epidemiological risk. It is shown that hemorrhagic fever with renal syndrome was the most significant internal threat for the Republic of Tatarstan and Mordovia, Samara and Nizhny Novgorod Regions; Ixodidae tick-borne borreliosis – for Moscow, Saint Petersburg, and Sverdlovsk Region. The average risk of tick-borne viral encephalitis was determined for the Sverdlovsk Region. During the World Cup-2018, the probability of Crimean hemorrhagic fever occurrence existed in the Rostov Region (medium risk), West Nile fever – in Volgograd Region (medium risk). A clearer understanding of the epidemiological threats picture enabled us to formulate better strategies and possible to scientifically substantiate a set of preventive measures in areas of epidemiological risk.

Keywords: natural-focal infectious diseases, epidemiological risk, comprehensive risk assessment, FIFA World Cup-2018

Определены эпидемиологические угрозы, сопряженные с проведением в 11 городах Российской Федерации XXI Чемпионата мира по футболу (ЧМ-2018). Проведен анализ эпидемиологической конъюнктуры по эндемичным (энзоотичным) природно-очаговым инфекционным болезням бактериальной и вирусной этиологии в принимающих ЧМ-2018 субъектах. Показано, что геморрагическая лихорадка с почечным синдромом была наиболее значимой внутренней угрозой для Республики Татарстан и Мордовии, Самары и Нижегородской областей; иксодовый клещевой боррелиоз – для Москвы, Санкт-Петербурга и Свердловской области. Для клещевого вирусного энцефалита определен средний риск для Свердловской области. В период проведения ЧМ-2018 вероятность возникновения случаев заболевания крымской геморрагической лихорадкой существовала в Ростовской области (средний риск), лихорадкой Западного Нила – в Волгоградской области (средний риск). Таким образом, дифференцирование и ранжирование внутренних эпидемиологических угроз по степени опасности позволило обосновать комплекс профилактических мероприятий в зонах эпидемиологического риска.

Ключевые слова: природно-очаговые инфекционные болезни, эпидемиологический риск, комплексная оценка риска, ЧМ-2018