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POSSIBLE CAUSES OF NEW MYCOSES

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Annotation
Invasive mycoses are significant causes of morbidity and mortality in different immunocompromised patients. Candida spp., Aspergillus spp. and Cryptococcus neoformans are main pathogens in these patients. Several new diagnostic methods and systemic antifungal agents have been approved for clinical use in last ten years. This review focuses on modern recommendation for diagnosis and treatment of invasive mysoses.

Key words: candidiasis, aspergillosis, cryptococcosis, cryptococcosis.

Аннотация
За последние десятилетия значительно увеличилась распространенность инвазивных микозов у различных категорий иммунокомпрометированных больных. Основными возбудителями инвазивных микозов являются Candida spp., Aspergillus spp. и Cryptococcus neoformans. Инвазивный кандидоз, аспергиллез и криптококкоз отличаются тяжестью клинических проявлений и высокой летальностью. В последние годы появились новые методы диагностики и противогрибковые препараты. В статье представлены современные рекомендации по диагностике и лечению инвазивного кандидоза, аспергиллеза и криптококкоза.

Ключевые слова: кандидоз, аспергиллез, криптококкоз, криптококкоза.

Over the past 3–4 decades, fungi that can cause various human diseases have become of great relevance in medicine. Mortality from mycoses in the United States increased by 200% by 2000 compared to 1979 [1]. Among the dangerous mycoses, histoplasmosis, blastomycosis, coccidioidomycosis, paracoccidioidomycosis are well known, the endemic foci of which are located mainly on the American continent. More than 500 thousand of these mycoses are registered annually in the world [2]. In Russia, the number of diseases is also growing, the causes of which are different types of microscopic fungi that were not previously considered pathogenic. The group of imperfect fungi (Fungi imperfecti, Deuteromycetes) includes most of the pathogens of human mycoses. Among them, representatives of the genera Aspergillus, Penicillium, Fusarium, Acremonium, Beauveria, Verticillium, Trichoderma, Paecilomyces are the most widespread [3]. Many of them affect people with weakened immune systems, causing diseases of the skin, eyes, lungs, and joints. Every year the list of potential pathogens of mycoses increases. One of the dangerous mycoses that appeared back in the USSR is zaaminellosis. For the first time, I learned about this mysterious disease personally from Nazima Abdullaevna Dekhkan Khodjaeva, Doctor of Medical Sciences, professor from Uzbekistan, during our meeting in Moscow in 1973. My article on the polymorphism of sporulation of predatory fungi aroused her interest, in which

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she saw formations similar to those she said she found in the lung tissue of children who died in Uzbekistan from an unknown disease. More detailed studies showed that in our case there was not a polymorphism of sporulation, but mixed cultures in which nematophagous fungi contained mycophilic fungi in their mycelium. They often appeared in cultures when nematophagous fungi were isolated from the soil. These were different species, including those from the list of potential pathogens above. Many species of mycophils belonged to entomopathogenic fungi from the genera Cephalosporium, Beauveria, Paecilomyces. In nature, they can exist due to the mycelium and conidia of fungi containing chitin in the cell wall [4]. Later it became known that the identification of cultures of the fungus isolated from the blood of patients - residents of Uzbekistan, using molecular biological studies, made it possible to attribute it to a new variety of the fungus Paecilomyces variotii Bainier (1907), which was designated as Paecilomyces variotii Bainier var. Zaaminella Dechkan (1974), after the name of the city of Zaamin in Uzbekistan, from the blood of the inhabitants of which it was first identified in 1974. Zaaminellosis is a deep mycosis with damage to the blood, hematopoietic organs, respiratory organs, skin, genitourinary system, allergic manifestations of a different nature, etc., which are based on damage to human immunity [5]. The species Paecilomyces variotii, which later turned out to be the cause of the disease, has long been known in the literature as an imperfect fungus that can be found everywhere in the soil, more often on insects in the litter. It belongs to entomophilous, as it is associated with insects as a substrate [6]. An analysis of the literature data indicates the possibility of the emergence of new strains and even species of micromycetes with pathogenic properties under the influence of mutagenic environmental factors. In fungi that do not have sexual reproduction, evolution is based on the appearance of mutations. The discovery of induced mutagenesis in fungi under the action of radiation and chemicals has made fungi, as eukaryotic organisms, an important object of genetic research. In a changing ecological environment, the radiation factor can also enhance microevolutionary processes. Of 440 pesticides tested for mutagenic, carcinogenic, teratogenic and embryotoxic effects, 73.9% had a positive effect in one or more test systems. The facts show that under the influence of not only strong poisons and radiation, strains with increased toxicity to plants, animals and humans can occur. It was established that under the influence of perennial crops of medicinal plants that produce various metabolites (glycosides, phytoestrogens, flavonoids, etc.) into the soil through root secretions, the diversity of the complex of soil fungi decreased. Representatives of toxigenic species from the genera Aspergillus, Fusarium, Cladosporium, Alternaria, which are dangerous for plants, animals, and humans, remained among the dominant ones in the soil. Any change in the population of microorganisms will necessarily affect its ecological strategy, while a person may not assume what consequences this may lead to. For example, with the transition of legionella from nature to new habitats (shower installations), the pathogen entered the human body. The 70s of the 20th century were considered in the agriculture of the USSR the era of complex chemicalization, when the massive use of mineral fertilizers, pesticides, and growth regulators on various crops began. It is known that in the past, in the development of many chemical plant protection products, compounds belonging to the group of chemical warfare agents from the First World War were used. They were toxic not only to harmful organisms, but also to humans, animals, and the environment.

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The pathogenic species that causes zaaminellosis could arise under the influence of the constant action of pesticides used on the cotton crop. It is important to note that Paecilomyces variotii has relatively small unicellular conidia 4–5 × 2–3 μm with one nucleus, which increases the likelihood of chemical compounds affecting the fungal genome. The pathogen could have spread beyond Uzbekistan in aerosols, including dust from cotton fields. Possibly, under the influence of the same mutagenic factors, pathogenic strains of Paecilomyces variotii could also appear in other places on the globe, since this species is known everywhere, and environmental conditions on the planet are only getting worse.

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