DESCRIPTION OF THE CASE CONFIRMING THE CONCEPT THAT A HUMAN IS THE FACULTATIVE HOST *DIROFILARIA REPENS.* CASE PRESENTATION

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Summary

According to the scientific data, recently were described cases of dirofilariasis affecting people living in different regions of the planet, which is considered that can be linked with global warming. In Republic of Moldova were detected more cases of dirofilariasis at people without any history of travelling abroad the country. In all previous cases the resected specimens were infertile. Now there are more and more publications confirming that the human can be facultative host for *Dirofilaria spp*. In this publication we present a human case of dirofilaria in which the resected specimen was fertilized.

Key words: *Dirofilaria repens*, human organism, facultative host, Republic of Moldova

Rezumat

Descrierea cazului care confirmă conceptul că omul poate fi gazdă facultativă pentru *Dirofilaria repens*

Tot mai multe publicaţii ştiinţifice recente descriu cazuri de dirofilarioză umană la persoanele care trăiesc în diferite regiuni ale planetei, anterior libere de această invazie parazitară. Fenomenul poate fi legat de încălzirea globală a climei. În Republica Moldova au fost depistate mai multe cazuri de dirofilarioză la persoane fără istoric de călătorii peste hotarul ţării. În toate cazurile anterioare au fost extirpate exemplare nefertile. Actualmente apar tot mai multe publicaţii care confirmă faptul că omul poate fi gazdă facultativă pentru *Dirofilaria spp*. În acest articol este prezentat un caz de dirofilarioză umană, în care a fost extirpat un exemplar matur fecundat.

Cuvinte-cheie: *Dirofilaria repens*, organism uman, gazdă facultativă, Republica Moldova

Резюме

Описание случая, подтверждающего концепцию, что человек может быть факультативным хозяином для *Dirofilaria repens*

В последнее время все больше научных публикаций описывают случаи дирофиляриоза у людей, живущих в разных регионах планеты, прежде свободных от этой паразитарной инвазии. Это может быть связано с глобальным потеплением. В Республике Молдова также выявлены случаи заболевания у людей, которые никогда не выезжали за пределы республики. Во всех предыдущих случаях удаленные у людей экземпляры паразита были незрелыми. К настоящему времени существуют публикации, подтверждающие, что человек может быть факультативным хозяином для *Dirofilaria spp.* В данной публикации представлен случай, когда у человека был удален зрелый, оплодотворенный экземпляр.

Ключевые слова: *Dirofilaria repens*, человек, факультативный хозяин, Республика Молдова

Introduction. In last year's many countries in Europe noticed an obvious increase of dirofilariosis human cases [1-5]. Authors attribute this to global warming and related to this, the increasing number of infected mosquitoes and dogs.

Dirofilariasis is a zoonotic parasite that affects dogs, cats and wild carnivores, which are the definitive host for the parasite. Adult worms, *Dirofilaria (D) repens* and *D. immitis* are relatively large, with a length of up to 120-180 mm and affect the heart and the lungs of animals. At the infected animals, adult worms release microfilariae into the host's blood. It is transmitted by the mosquito bite of the Anopheles, Culex and Aedes – intermediate hosts and vectors for these filariae. Humans may become infected as aberrant hosts. The worms fail to reach adulthood while infecting a human body. *D. repens* is located in the subcutaneous tissue, while *D. immitis* commonly affects the lungs and other human viscera.

The larva can form a subcutaneous nodule. Subcutaneous migration of the worm may result in local swellings with changing localization (creeping eruption). Because typically only a single worm is present, removal of the parasite from the skin is usually sufficient to treat human infections. However, the invasion can cause a variety of symptoms, depending on the location of the parasite. Final

diagnosis is established by microscopic examination of excised worm.

In addition, rare cases of organ manifestation have been reported, affecting the lung, male genitals, female breast, or the eye. The latter is found in particular during the migratory phase of the parasite. Invasions with *D. immitis* are often initially detected only accidentally and are often confused with malignant tumors [6-8].

Although man is considered a biological impasse for *D. repens* still in 1930 K. I. Skreabin discovered at a person, a male of *D. repens*, which in comparison with a sample taken from the dog, has been identified as mature [9].

Results. The case was a 20-years-old patient, resident of Chisinau municipality living on the outskirts of town. The patient with swelling, accompanied by itching, in the abdominal region required medical assistance at the municipal hospital. During the medical examination, the surgeon palpates a harsh, mobile mass in the form of cordon in the subcutaneous tissue. An unknown origin of live nematode was extracted. The formation was sent for identification to the parasitological laboratory of National Center of Public Health. On macroscopic examination it was noticed that the nematode was a fertilized female measuring about 110 mm, with specific morphological features of *Dirofilaria* genus. Moreover, uterus contained a large amount of microfilariae, the majority being in the uterine sac (figure 1).

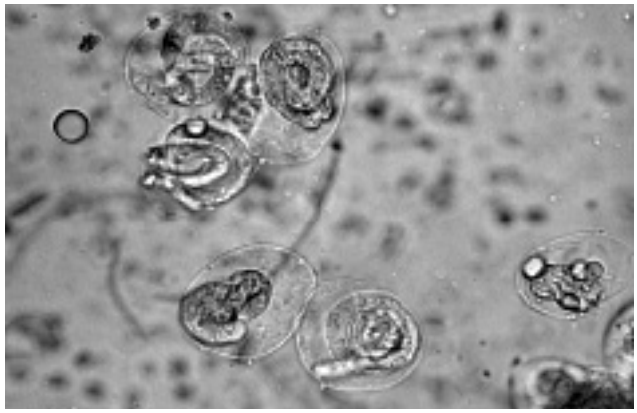

Figure 1. **Microfilariae of Dirofilaria repens extracted from the nematode uterus (10x40)**

This confirms that:

1) it is a mature female;

2) the patient had at least two types of *Dirofilaria* (female and male), given that the female was fertilized.

Peripheral blood examination results (smear and thick drop on the presence of microfilariae) were negative.

The patient is living on the outskirts of town in a neighborhood with houses and courtyards where dogs are present. There are reservoirs around living patient area, were mosquito populations are very intense. The case worked as a butcher and outside of the country never traveled.

Discussions. Cases of human dirofilariasis have been reported from different parts of the world including North America, Australia, Asia, Africa, Middle East and Eastern Europe. Dirofilariasis are considered as emerging pathogens, currently increasing their geographical range. It is well known that *D. repens* is found in temperate climate zones in Europe [3]. In the last years, a growing number of human dirofilariasis cases were reported in Russia, Ukraine, Israel, Greece, Italy, Spain, France, Czech Republic, Hungary and Romania. Single cases have been reported in northern European countries: Germany, Austria, Switzerland [10-14].

The growing number of reported confirmed cases of human dirofilariasis, can be explained by a greater interest and awareness among specialists, along with climate change and lack of prevention the spread of etiologic agent among zoonotic reservoirs. In last decades invasion by non-native nematodes are more common in European countries because of international tourism development. This suggests that dirofilariasis is a disease which spreads under the influence of global warming [11].

In Republic of Moldova were registered solitary cases of Dirofilariasis. In 2017, the first case was described in an ophthalmological center from Chisinau (Vera Lungu, 2008). Later were related and other cases, all specimens were identified as infertile *D. repens*. In Moldova, dirofilariasis disease is probably more common than it is known and the number of cases may be increasing. In all cases, the patients did not travelled outside the country, which proves that the infection has been occurred in the country. In this case, it can be concluded that the invasion persists in dogs too, although the veterinary-sanitary service did not reported any case of disease in animals. Moreover, such studies in the country have not yet been conducted.

According to a study conducted in Rostov-on-Don (Russia) in the period of 2000-2011, extensivity invasion in dogs was 2.1-19.4%, this number is increasing with the age of animals. In different years, mosquitoes were infected with *D. repens* with a frequency of 1.0-13.6% [15]. Another study was conducted in North-West of Russia (Rostov regions, Astrakhan, Krasnodar, Novgorod and the Republic of Adygeya), during the period of 2009-2013 on

a sample of 6070 different species of mosquitoes. Invasion extensivity with larvae of Dirofilaria spp. was 2.3±0.3% at Aedes mosquitoes (Meigen, 1818); 1.9±0.4% for Culex mosquitoes (Linnaeus, 1758); 0.6±0.1% in Anopheles mosquitoes (Meigen, 1818) [16]. A study conducted in Hungary by Fok Eva (2009) has shown that the highest extensivity invasion in dogs (18.2%) and cats (4.5%) was found to be in the water basins surrounding regions.

In last year's there are more and more facts that man can be optional host of the parasite. In the literature there are described cases where in the subcutaneous nodules or in the peripheral blood in some of those patients that the worm has been removed, were found microfilariae [5, 9, 17-19].

The recent case shows further proof of the concept that the man can be facultative host for *Dirofilariae.*

Conclusions:

1. As in other countries in the European region, now in Republic of Moldova human dirofilariasis is recorded more frequently. Human, rarely can be the obligatory host for *Dirofilaria repens*. The facts indicate that the medical doctors should be more cautious in the detection and reporting of registered cases.

2. There is a need to perform an epizootic study on the spread of the invasion at animals.

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