

## HUMAN DIROFILARIOSIS IN THE SLOVAK REPUBLIC – A CASE REPORT

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**Abstract:** The spread of dirofilariosis, as a newly emerging zoonosis, due to global changes has been documented in several Central European countries. In Slovakia, the first autochthonous case of dirofilariosis was recorded in dogs in 2005. The first case of human subcutaneous dirofilariosis caused by *Dirofilaria repens* was diagnosed in a 60-year-old patient from an area of western Slovakia. We report another case of dirofilariosis in a 37-year-old woman living in the same area of south-western Slovakia. The infection manifested as a painful, inflamed nodule on the back of the left hand, containing an adult parasite. Morphological analysis aroused suspicion of the presence of a filarial worm belonging to the genus *Dirofilaria*. Subsequent PCR analysis of the DNA identified the parasite as *Dirofilaria repens*. After removal of the parasite, the subcutaneous nodule completely resolved and the patient was successfully cured.

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## INTRODUCTION

Climate change is an important catalyst for the spread of parasitic infections, transmitted by the vectors from endemic to previously infection-free areas, thus creating new epizootological and epidemiological situations. Haematophagous arthropods act as the vectors of pathogenic agents with a potentially serious impact on human health. Among helminthoses, emerging in the last decades, mosquito-borne dirofilariosis has been recorded in Slovakia. It is transmitted by more than 60 mosquito species, including those living within the territory of Slovakia. Dirofilariosis is a common infection in canids and other carnivores, and occasionally humans. Several *Dirofilaria* species can cause infection in humans, though only two species, *Dirofilaria immitis* and *Dirofilaria repens* occur in Europe [16]. Less common *D. immitis* invades pulmonary arteries and the right heart ventricle and atrium, causing serious cardiovascular disease in dogs. Less pathogenic

*Dirofilaria (Nochtiella) repens* parasitizes the cutaneous and subcutaneous tissues. In humans, filarial nematodes can invade the subcutaneous tissues, the eyes and lungs, causing serious health problems. Only rarely have such infections been diagnosed in the past in our latitudes, and always with regard to travel or import from subtropical or tropical regions. Nevertheless, the state of affairs has been changing significantly in the last decade. Autochthonous occurrence of human dirofilariosis has been confirmed in several European countries, e.g. Hungary and Switzerland [7, 17], new cases of dirofilariosis have been reported from Russia (Rostov region) [11], and the number of confirmed cases is still increasing. In Slovakia, autochthonous canine dirofilariosis was confirmed for the first time in 2005 [19], and the number of confirmed cases continues to increase [14]. In humans, the first isolation of *Dirofilaria repens* from the subcutaneous nodule was reported in 2007 [2]. The presented study reports the second case of human subcutaneous dirofilariosis in Slovakia.

## CASE DESCRIPTION

A patient, 37-year-old woman, who was referred to an orthopaedic outpatient clinic, presented with an inflamed nodule on the left hand, which had appeared about two weeks prior to her clinic visit. A second nodule was localized at the right costal arch. The body temperature of the patient was within normal range. Clinical examination showed a palpable pea-sized nodule located in the centre on the back of the left hand, above the third finger extensor, reddish and palpable sensitive, with no fluctuation. The US scan showed the presence of a hypoechogenic structure, measuring 1 cm in diameter, well-defined, with no fluid collection. Despite the nodule being punctured, no content was aspirated. While extracting the needle from the nodule, a structure, resembling sewing thread, was found and easily extirpated. Based on the morphological examination in the parasitological laboratory, the parasite was identified as *Dirofilaria* spp. The fragment length was only 5 cm. The PCR assay confirmed the species as *Dirofilaria repens*. The DNA of the isolated parasite was extracted using DNeasy Blood and Tissue Kit (Qiagen, Hilden Germany). PCR reaction for the amplification of the cytochrome c oxidase subunit 1 (CO1) was performed using specific *Dirofilaria immitis* and *Dirofilaria repens* pairs of primers. Amplification consisted of 35 cycles at the temperatures of 94°C/30 s, 57°C/30s, 72°C/30s. The PCR products were visualised on a 1.5% agarose gel [18].

After removal of the parasite, the symptoms on the left hand ceased completely within three weeks. No worm was detected from the nodule in the area of costal arch.

## DISCUSSION

Though dirofilarirosis in humans occurs rather rarely, the number of documented cases of subcutaneous dirofilarirosis due to *Dirofilaria repens* has been increasing worldwide over the last decade. Among other parasitic infections of animals, it is even considered as the arthropod-borne infection with the fastest spread rate [14]. Owing to climatic changes, human and animal migration, increase in vector abundance due to frequent flooding, the range margins of its endemic areas in southern and eastern Europe [8, 16] are now expanding northwards, to include Slovakia [9]. Prevalence of human dirofilarirosis in Slovakia is coincident with its prevalence in dogs. The first epidemiological survey identified endemic areas for *Dirofilaria* spp. in dogs: the Poddunajská Lowland and Borská Lowland (Záhorie) in the southwest and Eastern Slovak Lowland. In several districts within these areas, more than 30.0% of the examined dogs were infected [14]. The first two cases of autochthonous human dirofilarirosis were also reported from these districts – a male patient living near the town of Malacky, and our female patient, living in southwestern Slovakia near Bratislava. A high abundance of mosquitoes is typical for both localities. As our patient stated no

travel abroad into endemic areas of dirofilarirosis, an epidemiological link with the acquisition of infection in this environment is highly probable. Both cases presented with subcutaneous nodules on forearms or back of the hand, containing an adult worm. It is very well known that man is a dead-end host for dirofilarial worms, and pre-adult or adult worms are detained in the subcutaneous nodules in various parts of the body. They are often localized on face, neck, hands, chest, the eye, or even on the scrotum, and have also been found in the lungs [1, 6, 10, 12, 13, 17]. The subcutaneous presence of the parasite does not cause serious problems, although the symptoms include swelling, inflammation and itching. Tumour-like cutaneous lesions are often reported [4], and they should be examined for dirofilarial infection with differential diagnostics. An inflamed and painful nodule in our female patient correlates with the aforementioned symptoms. The most reliable diagnostic methods of human subcutaneous dirofilarirosis are direct identification of the parasite extirpated from the lesion, or by histological examination. Although the presence of microfilaria in such lesions is less probable, it is not impossible, as reported by Negahban *et al.* [15], who found adult microfilaria worm in a subcutaneous nodule. Morphological analysis of the parasite aroused the suspicion of dirofilaria, and subsequent PCR analysis of the DNA [3, 5] identified the species of the parasite. PCR assay has proved to be a highly sensitive and specific method [3, 5].

## CONCLUSION

The impact of global changes on the spread of infections into new, in particular, northern areas is undeniable. This has also been proved by the description of the presented case of human autochthonous dirofilarirosis, the second in Slovakia within a short period of time. Besides alveococcosis, this is an example of another parasitic zoonosis, spreading into previously infection-free areas. The high prevalence of *Dirofilaria* infections in its reservoir hosts – dogs, and presence of the vectors, contribute to the spread of the parasite in the human population in Slovakia.

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