

Among the most dangerous parasites of humans are those transmitted by vectors- mosquitoes, fleas or ticks. Millions of people in tropical and subtropical countries suffer from vector-borne diseases, e.g. Malaria or African sleeping sickness. However, there is no need to travel to tropical regions to contract a vector-borne disease. Due to global warming and increased travel, diseases and vectors may spread to other parts of the world, creating new public health dangers in milder climatic zones. Among some of the most fast spreading diseases is dirofilariosis – a disease transmitted by mosquitoes, caused by nematodes- filariae, occurring in blood and many tissues of humans and animals. Two of the most important species of genus *Dirofilaria* are: *Dirofilaria immitis*, heartworm of dogs, widely distributed in the southern states of the USA and also found in Southern Europe, and *Dirofilaria repens* – a parasite of subcutaneous tissue of dogs, which has been reported in Southern Europe for many years.

Both species are pathogenic for dogs and cats. People become infected following the bite of an infected mosquito. Nematode larvae spread with the blood circulation, settle in various organs and form fast-growing nodules. *D. repens* larvae frequently settle in the eye, at which point surgery is needed to remove the worms from the eye.

The discovery, that high rates of dogs in Central Europe, including Poland, are infected with *D. repens* was very surprising.

The main aim of the project is to determine the reasons and consequences of dirofilariosis expansion in Central Europe through:

- (1) Determination of the geographical range and zoonotic reservoir in Poland and in other Baltic countries; (2) determination of the genetic variation among *Dirofilaria* spp. in the area of Europe; (3) determination of the effect of co-invasion of *Dirofilaria repens* and *Babesia canis* on canine health.

To control the risk of dirofilariosis, there is a need to determine where infected dogs are located, as they constitute the main source of infection for mosquitoes. The higher the rate of infected dogs, the higher the risk of infection for humans. There is also a need to identify any infected species of free-living animals, constituting a reservoir of filariae and complicating the control of the disease. Can we monitor the spread of *D. repens*? – To answer this, we plan to study infection in dogs along the South-North axis in Baltic countries, from Lithuania, through Latvia, to Estonia. To determine the influence of microfilariae- larvae produced by adult nematodes, present in blood- we plan to employ molecular techniques (quantitative PCR) to determine the number of parasite DNA copies in infected dogs and to correlate this number with blood parameters (cell counts, biochemistry). We also plan to study the impact of multiple infections with more than one parasite species. Piroplasm *Babesia canis* is another dangerous parasite, transmitted by ticks, the cause of life-threatening babesiosis in dogs. In our pilot study, we have discovered that dogs infected with filariae developed babesiosis more often, but the disease was less severe. This interesting discovery needs further study. And the last question we may answer by genotyping *Dirofilaria* isolates from different European countries, from dogs, humans and foxes, is - where did the filariae currently present in Poland originate from?