EPIDEMIOLOGY OF TICK-BORNE ENCEPHALITIS AND LYME DISEASES IN ESTONIA

Natalia Kerbo¹, Jevgenia Epstein¹, Irina Dontšenko¹ and Irina Golovljova²
¹Department of Communicable Diseases Surveillance and Control, Health Board, Estonia
²Institute for Health Development, Estonia

Background
Tick-borne encephalitis (TBE) and Lyme disease are notifiable diseases in Estonia since 1949 and 1992 respectively. The national mandatory, passive surveillance system (clinical and laboratory) is using ICD 10 code.
In Estonia the unique situation is conditioned on the simultaneous of the two species of ticks I. ricinus and I. persulcatus, which are reservoirs and vectors of different TBE virus subtypes. I. ricinus is spread over the whole territory of Estonia. The area of I. persulcatus overlaps the area of I. ricinus in 8 of 15 counties, located in the southern and south-eastern parts of the country.
In recent years, the TBE virus was found in 3.8% of I. persulcatus; in 0.6-0.8% of I. ricinus on mainland and in 3% of I. ricinus on Saaremaa Island.

Aims
To determine the incidence and trends of TBE and Lyme disease in Estonia.

Materials and Methods
The analysis was performed on data from Estonian Communicable Disease Registry for 2002-2011 (TBE – 1,704 cases and Lyme disease 10,079 cases), Annual Immunization Reports and the 7th frame of EU project EDEN.

Results
During the 10-years period, the incidence rate of TBE and Lyme disease had a steady upward trend. During the observation period in 2002-2011 the peak incidence was noted in 2011 both for TBE (18.7/100,000) and for Lyme disease (171.8/100,000).
The incidence rates of TBE and Lyme disease varied by counties. The highest incidence rate was in the Western Estonia (Saaremaa, Pärnumaa and Hiiumaa counties). The lowest incidence rate was in the Central Estonia (Järvamaa and Raplamaa counties). For TBE, in 77.6% of cases, the infection was indigenous, in 0.6% of cases – imported and in 21.8% of cases the place of infection was unknown. Lyme disease was indigenous for 72.8% of cases, 0.7% of cases it was imported and in 26.5% the place of infection was unknown. Lethal outcomes have not been reported.
TBE and Lyme disease cases were notified in all age groups. For TBE the highest morbidity was among people over 40 years old. The proportion of children aged 0 -14 years was 13.1 %. The majority of cases (51.4%) with Lyme disease were registered among those over 50 years.
The season of TBE coincides with the time of biological activity of the two species of ticks *I. ricinus* and *I. persulcatus*. Majority of cases occurred from May to September. Due to the climate change there was a trend towards a longer TBE season. During 2002-2011 three cases were notified with date of onset in March and 1 case with date of onset in December. The proportion of patients with date of onset in November-December was 0.5-1.2% in 2002-2005 and 1.4-3.3% in 2006-2011.

Lyme disease cases were registered all over the year with the maximum in July - September. Cases notified during winter months are usually chronic, untreated or with complications, these are often diagnosed late by physicians.

Part of the TBE cases was infected via the alimentary route (raw goat or caw milk consumption). The highest number of such cases was in 2005: 48 cases (29.3% of annual cases), of these 37 were related to the outbreak in the big supermarket.

99.4% of TBE cases and 80.8% of Lyme disease cases (2002-2011) were laboratory confirmed by serological tests.

The immunization against TBE is not included in the National Immunization Schedule in Estonia. Vaccination is provided for a fee, but it is free for persons whose job is associated with a high risk of TBE infection. Vaccination of these individuals is covered by the employer. Immunization coverage of population is about 10-14%.

**Conclusions**

TBE and Lyme disease remain an important epidemiological problem in Estonia. Vaccination against TBE and education of the population in prevention of these diseases is important. TBE vaccination is recommended to tourists visiting Estonia during the summer and staying in non-urban areas. For the local population the vaccination coverage is low and does not have a significant effect on the epidemiological situation in Estonia.

**Tick Pathogens Isolated in the Territory of Belarus**

A. Krasko, E. Scheslenok, N. Vinokurova, O. Kniazeva, V. Stehniy

The Republican Research and Practical Center for Epidemiology and Microbiology, 220114 Filimonova str. 23, Minsk, Belarus.

We investigated the contamination of ticks by the agents of bacterial and viral tick-borne infections in 4 regions of Belarus. In total 597 ticks of *Ixodes ricinus* were investigated. For 66 samples investigated in the pools (pool with 5-15 ticks) we used RT-PCR method for revealing presence of RNA of TBE virus and PCR method for identification of bacterial tick-borne infections - *B. burgdorferi sensu lato, Anaplasma/ Ehrlichia*.

Most of the cases (80%) of the tick-borne encephalitis (TBE) were reported in Brest and Grodno oblasts. TBE virus was detected in all regions of Brest and in 5 out of 8 regions in Grodno oblast.

Lyme disease is the most commonly reported in territory of Brest and the central regions of Minsk areas. The presence of *Anaplasma/ Ehrlichia* was revealed on the borders of Brest and Vitebsk regions.
TICK-BORNE ENCEPHALITIS AND LYME DISEASE IN LATVIA:
EPIDEMIOLOGICAL SITUATION IN 2007-2011

Irina Lucenko, Antra Bormane, Juris Perevoščikovs
Centre for Disease Prevention and Control, Latvia

Tick-borne encephalitis (TBE) is notifiable disease in Latvia since 1955, and Lyme disease (LD) since 1986. The number of TBE cases varied during all registration period, with highest upsurge in 1986-1996 (5,515 cases). The numbers of LD rose gradually.

Two tick species transmit TBE and LD in Latvia: *Ixodes ricinus* which is present in all territory of Latvia and less in its eastern part; and *Ixodes persulcatus*, dominating in country’s eastern part. Average seasonal activity of ticks during almost 40 years of observation had sharp variations, however overall trend points on gradual increase.

The territorial distribution of the morbidity is not even. During the last five years the highest incidence for TBE has been registered in the western part of the country, however for LD the central and some eastern regions also prevailing.

Regarding morbidity trends by age and gender the mean age of patients is almost the same for TBE and LD (46.2 and 47.5, accordingly), however majority of TBE patients were men while LD patients were women. 37% of TBE patients were unemployed and 28% retired; 43% of LD patients were employed and 26% retired.

The main body sites for tick attachment, pointed in anamnesis of adult patients, were waist (for TBE) and legs (for LD), head and neck (for both diseases) in children. Four cases of alimentary infection were registered in 2011, as well in 2009.

The highest vaccination rates against TBE were documented in 2008 and 2009, with the subsequent decline of vaccination during the last three years. It could be regarded as one of the factors rising adult morbidity with TBE, as percentage of children among TBE patients decreased from 12% in 2001 to 4% in 2011 due to state funded children vaccination in highly endemic regions of Latvia.

TICK BORNE DISEASES IN LITHUANIA

Milda Žygutienė1, Saulius Ėaplinskas1,2
1Centre for Communicable Diseases and AIDS, Lithuania
2M.Romeris University

Background

Lyme disease (LD) and tick-borne encephalitis (TBE) occurs across Lithuania, with a distribution closely matching that of the vector *I. ricinus*. Central part of Lithuania is considered as endemic with highest TBE incidence. Reporting of TBE and LD is obligatory since 1969 and 1991, respectively. Lithuania does not have an official case definition for tick-borne diseases. Only CNS forms of TBE are registered, serological confirmation is obligatory. The TBE virus and *Borrelia burgdorferi* s.l. in *I. ricinus* was present in all administrative territories. Average prevalence of TBE virus in field ticks was 1.3%. The mean *B. burgdorferi sensu lato* infection prevalence of *I. ricinus* ticks in Lithuania was 13.4%, ranging from 1% to 35% in different locations. Besides TBE virus and *B. burgdorferi* s.l., bacteria *Anaplasma*, two species of protozoa (*Babesia, Trypanosoma*) and relapsing fever group spirochete *B. miyamotoi* were detected in *I. ricinus* ticks.
Materials and Methods
The analysis was performed on data (2000-2011) from Communicable disease surveillance system (Centre for Communicable Diseases and AIDS), Annual Reports on Epidemiology of communicable diseases and published data.

Results
In the period of 2000-2011 a total of 4,814 cases of TBE and 23,513 cases of LD were reported in Lithuania. A significant rise of morbidity has been reported since 1997. The highest annual morbidity of tick-borne diseases was registered in 2003: 763 cases (22/10,000) of TBE and 3,688 cases (106/10,000) of LD; and in 2009: 605 cases (17.9/10,000) and 3,600 cases (106.6/10,000), respectively.
During the past decade the changes in tick abundance and timing in tick activity were observed. Tick activity is observed since middle of March to middle of December. Ticks *Ixodes ricinus* are the main vector of TBE, but some TBE cases, registered every year, were infected through consumption of raw milk. Four clusters in 2003 with a total of 22 cases of TBE were linked to the consumption of unpasteurised milk. Four cases of alimentary route also were registered in 2009 and 13 cases in 2011.

The TBE incidence rate among adults is a few times higher than among children. In 2011 the highest incidence rate was observed in the age group from 55 to 64 years. About 30% of all cases of TBE were retired people and unemployed persons. The disease incidence shows a seasonal pattern. The highest incidences rate for TBE is registered in June-October. In 2011 the highest LD incidence rate was registered in the age group from 45 to 74 years; over 30% of all registered cases were retired people and unemployed persons. Morbidity among urban population was 3 times higher than rural population. Lyme disease cases were registered all over the year with the maximum in July - September. 100% of TBE cases and 29.4% of Lyme disease cases in 2011 were laboratory confirmed by serological tests.

TBE virus was detected in *I. ricinus* ticks pools using RT-PCR methods. Average prevalence of TBE virus in field ticks was 1.3% and with isolated European subtype.

Conclusions
Lithuania is endemic country for TBE and LD. The trend of TBE and LD incidence has been increasing since 1990s.

TICK-BORNE ENCEPHALITIS IMMUNISATION IN LITHUANIA
Daiva Razmuvienë, Eglė Savickienë
Centre for Communicable Diseases and AIDS, Lithuania

Introduction
Tick-borne encephalitis (TBE) and Lyme disease have been a mandatory notifiable disease in Lithuania since 1969 and 1991. There is a high risk of contracting tick-borne encephalitis in Lithuania compared to other endemic countries in the European Union. Despite the fact that Lithuania is an endemic area of TBE and has a relatively high morbidity, the incidence rate is the lowest among the Baltic States.
The immunization against TBE is not included in the National Immunization Schedule in Lithuania. Vaccination coverage remains one of the lowest compared with EU countries.

**Aim**
To overview current epidemiological and immunization situation and trends for TBE in Lithuania.

**Methods**
Data were obtained from the Centre for Communicable Diseases and AIDS (CCDA) Register and Annual Prophylactic Immunization Reports from 2008 to 2011.

**Results**
From 2008 to 2011, 1,802 cases of TBE and 9,740 cases of Lyme disease were registered in Lithuania. This corresponds to a mean annual TBE incidence of 1.4 cases per 10,000 inhabitants and a mean annual Lyme disease incidence of 7.3 cases per 10,000. The highest incidence of TBE and Lyme disease were observed in 2010 and consisted of 1.84 and 10.7 cases per 10,000, accordingly. The lowest incidence of TBE and Lyme disease were reported in 2008 and consisted of 0.7 and 3.4 cases per 10,000, accordingly. Lethal outcomes of TBE were reported in 2009 (1 case) and 2010 (3 cases). Lethal outcomes of Lyme disease have not been reported. An analysis of data showed that in the period from 2008 to 2011 the morbidity of TBE and Lyme disease had a tendency to increase.

The highest average incidence rate of TBE was in the districts of Alytus and Utena (2.2 cases per 10,000 inhabitants). The lowest average incidence rate of TBE was in the Marijampole district (0.3 cases per 10,000). The highest average incidence rate of Lyme disease was in the Panevezio district (11.6 cases per 10,000). The lowest average incidence rate of Lyme disease was in the Alytus district (2.3 cases per 10,000).

The vaccine is provided for a fee for the general population. Full vaccine and administration cost is paid by recipients. Vaccination is provided for free only for persons whose job is associated with a high risk of TBE infection. Vaccination of these individuals is covered by employer. Vaccination coverage of the total population of Lithuania is about 9%. The largest number of people vaccinated against TBE was in 2008 and this accounted for 1.6% of the total population. The lowest number of people vaccinated against TBE was in 2010 and this accounted for 1.2% of the total population. An analysis of data showed, that in the period from 2008 to 2011 the vaccination against TBE had a tendency to decrease.

**Conclusions**
A high incidence of TBE and Lyme disease remains a public health problem in Lithuania. The presence of fatal TBE cases in recent years confirms the necessity to intensify and maintain all preventive measures, especially vaccination. The most effective TBE preventive measure is vaccination, but it proceeds slowly and does not influence the reduction of morbidity in Lithuania.
EPIDEMIOLOGICAL SITUATION OF TICK-BORNE DISEASES IN KAUNAS DISTRICT, LITHUANIA, 2001-2011

I.Bulsiene
Kaunas Public Health Centre, Department of Communicable Diseases Control and Prevention

Kaunas district is located in the centre of Lithuania and shares boundaries with Vilnius, Alytus, Marijampole, Taurage, Siauliai and Panevezys districts. The district has 8 municipalities, and population is 647,609 (19.3 % of total population), area is 8,089 km² (12.4 % of Lithuania). Twenty eight percent of Kaunas district area is covered with forests, where leafy trees are dominating, and the number of wild animals is great.

We analysed TBE and Lyme disease incidence data during the period from 2001 to 2011. The data were based on entomological research of ixodid ticks and confirmed cases of TBE and Lyme diseases registered in Kaunas Public Health Centre, Department of Communicable Diseases Control and Prevention.

An analysis of data showed that in the period from 2001 to 2011 the incidence rates of TBE and Lyme disease had a tendency to increase. The highest incidence of tick-borne diseases was registered in 2003 with 242 cases of TBE (3.5 per 10,000 population) and 1,246 Lyme disease cases (17.7 per 10,000). The TBE incidence rates in Kaunas district ranged from 0.8 in 2002 to 3.5 in 2003. The lowest average rate was in Prienai municipality (1.1 per 10,000 population), the highest in Jonava municipality (3.2 per 10,000 population). The Lyme disease incidence rates ranged from 3.4 in 2008 to 17.7 in 2003. The lowest average rate (3.2 per 10,000) was in Kedainiai municipality, the highest in Kaunas city municipality (9.7 per 10,000).

People over 40 years old still remain the most commonly affected population (about 60% of all detected cases). Children under 15 years accounted for 6% of the total number of TBE cases and 5% of the total number of Lyme disease cases. Most cases of TBE (about 24%) were detected in the age group of 45-54 years; the cases of Lyme disease were mostly detected in the age group of 55-64 (21%). Tick-borne encephalitis was dominant among men (54% of all cases), and Lyme disease was dominant among women (67%).

In the period from 2001 to 2011 there were reported 16 cases of TBE transmitted via alimentary route (through raw milk): 6 outbreaks were reported in 2001, 2003, 2006, 2009, 2010 and 2011. In most of the cases the TBE virus was transmitted through raw goat milk.

A summer-autumn seasonality of the tick-borne diseases is evident. Most cases of TBE were registered in September and November (51% of all cases). Lyme disease was mostly detected in August and September (38% of all cases).

There are 3 functioning observation points for tick counting in Kaunas district. Seasonal changes in tick abundance are observed there for many years. In the period from 2001 to 2011 the tick density in Kaunas observation points had a tendency to increase. The largest tick density (27.1 ticks per km of road) was observed in 2010. The largest abundance of ticks was detected in spring with peak of activity in May. A smaller peak was detected in September.

The primary objectives of tick-borne diseases prevention include preventive immunisation against TBE, teaching of population concerning protection against blood-sucking arthropods and prophylaxis of TBE outbreaks caused by diary consumption, entomological and microbiological monitoring and control of ixodid ticks.

Vaccination is one of the most effective measures of TBE prevention. Unfortunately, the vaccination coverage among citizens of Kaunas district is very low and does not have a significant effect on the epidemiological situation in Kaunas district. During the period from 2005 to 2011 the tendency of vaccination was decreasing.
In general, the current epidemiological situation of TBE and Lyme disease in Kaunas district is considered to be unstable. The situation is affected by climate and ecological conditions, maintenance of the vectors population, bacterial and viral infectivity, and how often the population visit natural tick habitats. It is predicted that the situation will remain unstable in the near future.