

Full Length Research Paper

Survey of the feline AIDS prevalence in the Slovak Republic

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The authors have carried out an epizootiological and serological survey in the Slovak Republic aimed to the determination of the prevalence of Feline Immunodeficiency Virus (FIV) in autochthon domestic and stray cat populations. At the same time the prevalence of feline leukaemia and toxoplasmosis was also researched in the cat populations. One hundred and ninety eight cats of younger and older age categories were examined in 9 districts of the Slovak Republic during the years 2007 and 2009. The antibodies against FIV and the Feline Leukaemia Virus (FeLV) antigen were determined by commercial rapid diagnostic tests; the antibodies against *Toxoplasma gondii* were determined by ELISA method using a commercial kit. From the total One hundred and ninety eight cats, nine were FIV-positive (4.5%) and 4 of them were also FeLV positive (2%). Fifty two cats (26.3%) were toxoplasmosis-positive; the 9 FIV-positive cats were also positive for toxoplasmosis.

Key words: Domestic and stray cats, feline AIDS, feline leukaemia, toxoplasmosis.

INTRODUCTION

Feline Immunodeficiency Virus is a RNA-virus classified into the *Retroviridae* family, *Lentivirus* genus. It causes an acquired immunodeficiency syndrom (FeAIDS) in cats which is characterised with a long latency (Pedersen et al., 1987, 1989). FIV is relative to human immunodeficiency virus (HIV) by its structure, replication, life cycle and pathogenesis, but humans are not sensitive to FIV infection (Miller et al., 2000). The clinical symptoms of the FIV infections are dependent on the damage rate of the immune system and on the presence of secondary infections. The disease occurs mostly in non-castrated tomcats older than 6 years of age. Typical for FIV is a wound infection, it is transmitted mainly by bite, mostly at the territory fights or in spring in the mating period (Švrček, 2006). The infected cats can live several years without symptoms, but the disease is not curable. The seriousness of the secondary bacterial infections can be muffle by antibiotics (Anonymous 1, 2007). Although a vaccine against feline AIDS has been developed (Syufy, 2009), in the Slovak Republic it is still not accessible and

the cats are not vaccinated against this serious disease. The laboratory diagnostics is significant in the prevention and control of the disease. The best period for antibodies detection is cca 6 weeks after exposition, i.e. after the suspected infection (Knotek et al., 1997).

FeLV is spread in cca 3 - 26% of european cat population, however this value is dependent on the population density of cats, but also on the accessibility of the examined material.

As the FIV-infected cats have weakened immune system, the disease is often accompanied by other infections; mostly by feline leukaemia or toxoplasmosis. The feline leukaemia is unfortunately a wide-spread disease. It occurs rarely in countryside, but in towns its prevalence is 25 - 60%. Especially the breedings and shelters of cats are contaminated. In some states like Belgium, Netherland or Switzerland the seroprevalence of the FeLV is more than 10%. The majority of cases was reported in Japan and Australia (Anonymous 2, 2009).

The toxoplasmosis is a well-known parasitic disease. Even though this parasite is able to live in guest cells of various warm-blooded organisms (including human), reservoir species are the cats, because the parasite can produce oocysts only in the cat intestinal cells; (Beers, caused by the all over present parasite *Toxoplasma*

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gondii, 2009).

Statistical data about the prevalence of feline AIDS in the Slovak Republic are not available. Epizootiological and serological survey in year 2006 showed 0,61% occurrence of FIV, also FeLV and 18.9% occurrence of toxoplasmosis antibodies in stray cats and in cats from shelters (Ondrejka et al., 2007).

MATERIAL AND METHODS

Epizootiological and serological survey was performed in 198 domestic and stray cats from 9 districts in the Slovak Republic: Košice, Prešov, Žilina, Bratislava, Trenčín, Nitra, Revúca, Rožňava, Kysucké Nové Mesto (Figure 1). Research was conducted according to the principles presented in the „Guide for Care and Use of Laboratory Animals“ (2003).

Blood sampling

In order to acquire blood sera the blood samples from cats were obtained from *vena cephalica antebrachii* by aseptic method without anticoagulants.

Serological examination of FIV antibodies and FeLV antigen

The specific antibodies against FIV and the FeLV antigen were determined by commercial rapid diagnostic test *SNAP COMBO TEST FeLV Ag / FIV Ab* (IDEXX, Canada) (Figure 3). The operating procedure is schematically imaged in Figure 4; the assessment of the test in Figures 5 and 6.

Serological examination of toxoplasmosis

Toxoplasma-specific IgG antibodies were measured by a commercial kit (ELISA *T. gondii* serum screening, INSTITUT POURQUIER, Montpellier, France). The serum was positive if more than 50% S/P was found.

RESULTS

One hundred and ninety eight cats from 9 districts of the Slovak Republic during the years 2007 - 2009 were examined. The cats came from younger and older age categories of both sex (Table 1), but 60.1% of examined cats were 6 or more years old.

From the total number of 198 cats were 9 ones FIV-positive (4.5%), 4 cats (2%) were also FeLV-positive. The FIV-negative cats were also FeLV-negative. 52 cats (26.3%) were toxoplasmosis-positive, among them were all the FIV-positive cats. The locality (Figure 2), the age and the sex of the FIV-positive cats are presented in the Table 2.

DISCUSSION

Laboratory, especially serological diagnostics has the

definitive importance in prevention and control of the FIV infection. In present a highly reliable commercial ELISA kit is used for the serological diagnostics of feline AIDS and feline leukaemia (Barr et al., 1991). The commercial rapid diagnostic test used by us is suitable for qualitative determination of FIV and FeLV seropositivity, but it is not appropriate for quantitative determination of antibodies titres.

The antibodies detection is necessary in case when some diseases return and the cats are resistant to the therapy (Jiran, 1996). The antibodies detection is best to perform after suspected infection (after bite); usually several weeks (the best 6 weeks) after exposition. The result of serological investigation may be later negative, because at the immunodeficient disease the antibody production may be insufficient.

Since 1992, it is known that an infected cat can transfer FIV on her youngs. Some kittens of an infected mother may be seropositive at the birth already before suckling. Kittens are often still born or very weak with below-standard weight. This way of transfer arises after the infection of mother in the first third of the pregnancy. Other kittens may be seronegative at the birth and the antibodies production starts after two weeks or a few months; these individuals remain persistently seropositive. These facts suggest the peri- or postnatal contamination of the youngs (Horzinek et al., 2003).

In our survey we found that from the total number of 198 examined cats 9 sera were FIV-positive (4.5%). Many results of the clinical and serological examinations of cats are not summarised, so it is rather difficult to define the percentual occurrence of the FIV in the Slovak Republic. The situation is similar in the surrounding states. No statistical data are known, probably because the cats usually are not examined on FIV.

Sex, eventually the sterilisation of the animal can also play an important role in the rise of the disease and also in its diagnostics. The sexually matured animals, especially the tomcats, have a greater risk of insufficient protection, because the free-held cats acquire innumerable wounds in the fights connected with mating and so they may be easier infected. The fact that testosterone can suppress the immune system and support to infection is also important (Rife et al., 1990).

Seven of the examined positive sera in our experiment were from tomcats and 2 sera from she-cats. All of the animals were older than 6 year.

The feline leukaemia is also a frequent infectious disease of cats. The morbidity is raised by the increasing number of animals and by a multiple virus infection. The occurrence of the disease is most frequent in places where higher number of cats is live (breedings, shelters). The most sensitive to the infection are the cubs younger than 6 months. Even though vaccines against feline AIDS and also leukaemia already exists (Syufy, 2009), the most of cats especially in the risk group are not vaccinated.



Figure 1. Districts of the epizootiological-serological survey on FIV, FeLV and toxoplasmosis prevalence in cats in the Slovak Republic.



Figure 2. The localities of feline AIDS occurrence in the Slovak Republic.



Figure 3. SNAP COMBO TEST FeLV Ag / FIV Ab for detection of FeLV antigen and FIV antibodies (Drugs.com, 2009).

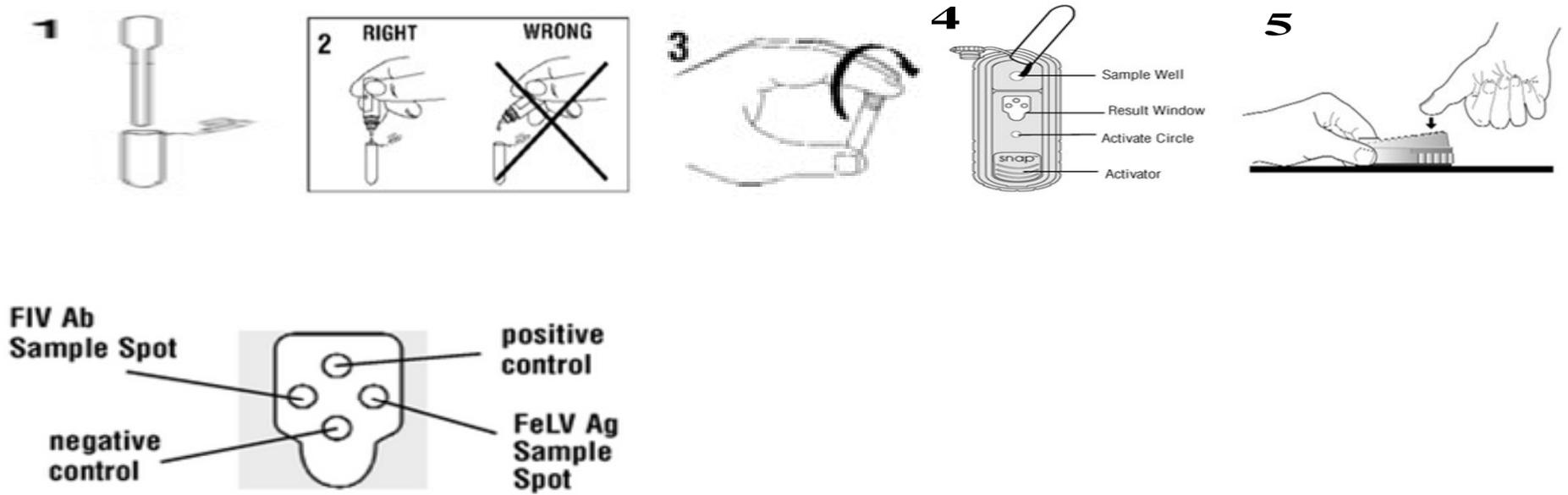


Figure 4. Examination process of FIV antibodies and FeLV antigen (Drugs.com, 2009).

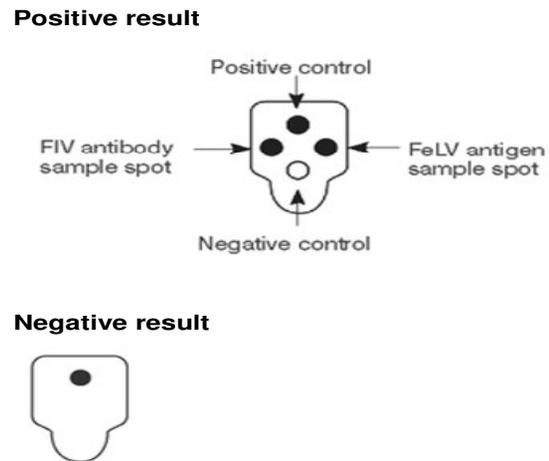


Figure 5. Assessment of FIV antibodies and FeLV antigen (Drugs.com., 2009) Positive result: any color development in the sample spots indicates the presence of FIV antibody or FeLV antigen in the sample. Negative result: only the positive control spot develops color.



Figure 6. Positive test of the FIV antibodies (on the left) and of the FeLV antigen (on the right).

Table 1. The age range of 198 cats examined for feline AIDS, feline leukaemia and toxoplasmosis in 9 districts of the Slovak Republic during years 2007 - 2009.

Age range of cats	Number of examined cats	% from 198 examined cats
1 - 3 years	30	15.15
4 - 5 years	49	24.75
6 or more years	119	60.10

Table 2. Origin, age and sex of the FIV-positive cats and comparison with other examined infections (feline leukaemia, toxoplasmosis).

Locality	Total number*	Age (cca)	Sex	FIV	FeLV	Toxoplasmosis
Košice – city	12	8 years	♂	+	+	+
Košice – surroundings	16	10 years	♂	+	+	+
Žilina	11	6 years	♂	+	–	+
Kysucké Nové Mesto	7	7 years	♂	+	+	+
Trenčín	10	6 years	♀	+	–	+
Bratislava	16	6 years	♂	+	–	+
Rožňava	10	10 years	♂	+	+	+
Prešov	20	6 years	♀	+	–	+
Prešov		8 years	♂	+	–	+

* – total number of examined cats in the district

The infection between the animals is transmitted mostly by saliva, eventually by urine or dropping. The cubs of FeLV infected mothers can be infected intrauterinly or by maternal milk. Not every FeLV-infected cat becomes definitively infected. The reason is an infection by a low-infectious virus strain or the status of the immune system of individual animal (first 4 - 12 weeks). According to the

literature sources in Great Britain 1 - 2% of cats are infected by FeLV (Anonymous 3, 2009). We detected 2% of infected cats in the Slovak Republic. However, this fact may be influenced by not very high number of examined individuals. Unfortunately the capture of stray cats is rather difficult - even for financial reward it is problematic to obtain high number of animals for examination.

From the total number of cats examined on presence of specific antibodies against toxoplasmosis they were detected in more than 26%. Although the toxoplasmosis is not fatal for cats, it is necessary to pay an increased attention to the prevention and control mainly because of the risk for human infection. We performed the toxoplasmosis examination aimed to the determination of other possible infections occurred parallelly with FIV-infection, as e.g. feline leukaemia, toxoplasmosis, *Herpesvirus* infection, *Calicivirus* infection, feline infectious peritonitis, *Cryptococcus*, *Cryptosporidium*, or *Mykoplasma* infection.

The presence of the FIV-positive patients in examined populations is influenced to certain level by the geographic conditions, but especially by the way of breeding of cats in individual countries. When the cats are free-held and generally not castrated, there is higher frequency of the FIV-positive animals in comparison with the countries with tradition of close-breeding of castrated cats (USA) (Knotek et al., 1997).

Conclusions

It is necessary to think about a possible FIV-infection always after a solid epizootiological anamnesis. Extremely important is the differential diagnostics by using of screening tests - searching of the asymptomatic infection carriers. It is important to take into account suspected prevalence, age, race, breeding way; e.g. FeLV occurs mostly in cats in closed breeding groups, FIV is expected in older stray tomcats.

Specific antibodies against FIV should be detected in cats with chronic disease of unknown ethiology, in cats with bite or scratching, in stray cats, in cats after contact with cats of unknown origin or with FIV-positive ones and in cats before vaccination.

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REFERENCES

- Anonymous 1 (2007). Allatbetegseg.hu: Macska oltásai és fertőző betegségei (in Hungarian). <http://www.allatbetegseg.hu/index.php?go=show&id=46&subcat=0&cat=1>
- Anonymous 2 (2009). <http://www.famkat.hu/orvos/virus.htm>.
- Anonymous 3 (2009). <http://www.famkat.hu/orvos/test.htm>.
- Barr M, Zou L, Long F, Hoose W, Avery R (1991). Proviral organization and sequence analysis of feline immunodeficiency virus isolated from a pallas cat. *Virology* 228: 84-91.
- Beers MH (2009). MSD Medical Handbook in family. Chapter 196. Infections caused by Parasits. Toxoplasmosis (in Hungarian). http://www.dr.info.hu/drinfo/pid/0/betegsegKonyvProperties/oid/0/KonyvReszegyseg.4_5013;jsessionid=98A8F929F61AE3AB73851A8F78EFAF59.
- Drugs.com Veterinary Edition, 2009. <http://www.drugs.com/vet/snap-combo-felv-ag-fiv-antibody-test-kit-can.html>.
- Guide for Care and Use of Laboratory Animals. Statute No. 289/2003. Government of the Slovak Republic, 9.7.2003.
- Horzinek M, Schmidt V, Lutz H (2003). Diseases of cats (in Slovak). Pro-trade Ltd., Bratislava (Slovak Republic), 814 pp.
- Jiran E (1996). To the immunodeficiency syndrom in cats (in Czech). *Veterinářství*, 11: 480.
- Knotek Z, Gojda M, Svoboda M (1997). Dignostics of the retrovirus infections of cats in clinical practice (in Czech). *Veterinářství* 1: 20-22.
- Miller RJ, Cairns S, Bridges S, Sarver N (2000). Human immunodeficiency virus and AIDS: insights from animal lentiviruses. *J. Virology* 74: 7187-7195.
- Ondrejka R, Ondrejková A, Süli J, Beníšek Z, Pošiváková S, Švrček Š (2007). Epizootiological and serological survey of feline AIDS, leukaemia and toxoplasmosis in domestic cat populations in the Slovak Republic (in Hungarian). *Magyar Állatorv. Lapja*, 129: 628-631.
- Pedersen N, Brown ML, Yamamoto J (1987). Isolation of T-lymphotropic virus from domestic cats with an immunodeficiency-like syndrome. *Science* 235: 790-793.
- Pedersen N, Yamamoto J, Ishida T, Hansen H (1989). Feline immunodeficiency virus infection. *Vet. Immunol. Immunopathol.*, 21: 111-129.
- Rife SU, Marquez MG, Escalante A, Velich T (1990). The effect of testosterone on the immune response 1. Mechanism of action on antibody-forming cells. *Immunol. Invest.* 19: 259-270.
- Syufy F (2009): The new FIV vaccine. Friend or foe: About.com: Cats. http://cats.about.com/cs/vaccination/a/fiv_vaccine.htm.
- Švrček Š (2006). Viral and prion diseases: Viral immunodeficiency of cats (in Slovak). *Vírusová imunodeficiencia mačiek. Felínny AIDS*. University of Veterinary Medicine, Košice, pp. 238-243.