



## 2022 Annual Report of the Swiss Rabies Centre

In 2022, the Swiss Rabies Centre at the Institute of Virology and Immunology tested a total of 110 samples (= 171 analyses) for rabies:

- 96 samples from animals investigated in connection with rabies surveillance in Switzerland (Table 1)
- 13 samples from four suspected clinical cases in humans
- 1 sample from an immunobiological preparation

Detailed information on animal species and testing methods is compiled in Table 3.

The EBLV-2 rabies virus was detected in a Daubenton's bat (*Myotis daubentonii*) from the canton of Bern (municipality of Büren an der Aare). This is the fifth recorded case of bat rabies in Switzerland (the previous cases were in 1992, 1993, 2002 and 2017). Tests conducted on the other 109 samples were negative. 21 out of 32 samples from dogs and 13 out of 23 samples from cats involved an illegal import from abroad.

Despite the absence of rabies in domestic animals and terrestrial mammals, the recommendation to include rabies in the differential diagnosis in a case of clinical suspicion (rapidly progressing encephalitis) in domestic and wild animals remains unchanged. This applies all the more so if there has been any human exposure. Thanks to the import regulations for dogs and cats (Pet Travel Scheme, EU-PETS) in force in Switzerland since June 2003 and in the EU since October 2004, the risk of pets introducing rabies can be regarded as low, but not negligible (see below).

### *Terrestrial rabies and import of rabies cases in Europe*

No cases of terrestrial rabies were reported from Italy, Austria, Liechtenstein or Germany in the reporting year. In France, a dog died in an animal shelter in Evry-Courcouronnes (south of Paris) in October. Initial investigations indicate that it had been illegally imported into France from Morocco. The animal had bitten several people. These persons and others who had been exposed had to undergo post-exposure prophylaxis (PEP). This case once again emphasises the need for systematic pre-exposure prophylaxis (PrEP) for all persons working in animal shelters and veterinary practices. In eastern Europe, rabies cases were reported principally from Ukraine in domestic and wild animals, from Georgia and Romania mostly in domestic animals and from Poland mainly in wild animals (<https://www.who-rabies-bulletin.org/site-page/queries>; see Table 2).

In view of the high number of animals euthanised after being imported illegally into Switzerland from rabies-risk countries (at least 21 dogs and 13 cats in the reporting year), this risk potential must be taken very seriously. The potential consequences of a single case, such as multiple vaccinations for those persons exposed and extensive quarantine measures for (potential) in-contact animals, justify a strict approach which should normally prioritise euthanasia, partly on animal welfare grounds (as quarantine lasts for several months). Because rabies cannot be diagnosed in the live animal during the potentially long incubation period and given that the veterinary profession bears a great responsibility in terms of public health (One Health), any improvised "home quarantine" solutions should be discouraged.

The entry requirements for dogs and cats accompanying refugees from Ukraine were temporarily eased in view of the humanitarian crisis, but clear instructions were drawn up to guarantee continuing protection against any introduction of rabies (<https://www.blv.admin.ch/blv/en/home/tiere/reisen-mit-heimtieren/hunde-katzen-ukraine.html>).

### *Human rabies cases in Europe*

Travelling or working in areas where rabies is endemic poses a risk to human health. In the case of travel to rabies-risk countries, the need for pre-exposure rabies vaccination is therefore assessed or the persons concerned are made aware of the risk of rabies (“Pre- and post-exposure rabies prophylaxis in humans”, version dated 27 January 2021, Federal Office of Public Health, Rabies Working Group, Federal Commission for Vaccination).

One human case of rabies was reported from Georgia (<https://www.who-rabies-bulletin.org/site-page/queries>; see Table 2). No details of this case are available.

### *Bat rabies*

The sporadic occurrence of European bat rabies was confirmed again in 2022. A case was also detected in Switzerland this year (see above). Given the specific biology and the very low prevalence of this form of rabies, the risk of transmission to other wild or domestic animals (especially cats as successful hunters) is negligible in practice. In this very unlikely case, only a noticeably symptomatic domestic animal would pose a risk of transmission to humans, as indirect transmission can be ruled out in the case of rabies. On the other hand, in the event of physical (bite) contact with a human being, immediate post-exposure prophylaxis is indicated, as the target is an absolute zero risk to public health. It is therefore especially important not to touch any wild animals that appear sick or show abnormal behaviour, and to prevent bite injuries.

### *Rabies serology*

In 2022, a total of 4,170 samples (2,771 in the previous year) were tested by rabies serum neutralisation test for the presence of neutralising antibodies (Table 4.a). This is an increase of 50% from the previous year. The rise is partly due to the resumption of travel after the restrictions imposed during the COVID-19 pandemic. In addition, the discussion about the risk of rabies being introduced by pets of Ukrainian refugees and the detection of rabies virus in a Daubenton's bat have led to increased awareness among the veterinary profession and the general population. However, the number of samples tested also shows a rising trend compared to the pre-pandemic years (see Figure 1).

1,421 sera came from humans (Table 4.a). A check after pre-exposure vaccination (PrEP) was indicated in 834 cases and a check after post-exposure treatment (PEP) was indicated in 532 cases. 6 samples were examined by serology in addition to PCR as part of the investigation of suspected clinical cases (see above). In 49 cases, no reason for the investigation could be established despite further inquiries (Table 4.b). There are no laboratory tests to diagnose rabies during the incubation period (the period between infection and the appearance of the first symptoms). Rabies is a rare exception in that it does not induce any immune response during the potentially long incubation period before symptoms appear. In the event of exposure, PEP must be initiated immediately.

2,143 sera came from dogs and 444 from cats (Table 4.a). Detailed figures on the indications are given in Table 4.b.

162 samples were for production control of human rabies immune globulin (HRIG) preparations for post-exposure prophylaxis from South Africa.

**Table 1**

Swiss Rabies Centre, Institute of Veterinary Virology, Länggassstrasse 122, CH-3012 Bern, Tel. 031 684 23 78. RABIES: ANNUAL REPORT FOR 2022 (1.1.2022 – 31.12.2022). Results of submissions from the Swiss cantons and the Principality of Liechtenstein.

Canton/Fox/Badger/Stone marten/Other carnivore/Deer/Other wild animal/Bat/Cat/Dog/Bovine/Horse/Sheep/Other domestic animal/Other animal

Schweizerische Tollwutzentrale / Centre suisse de la rage - Institut für Virologie und Immunologie/ Institut de virologie et d'immunologie - Länggassstrasse 122, CH-3012 Bern, Tel 031 684 23 78

**TOLLWUT / RAGE: JAHRESBERICHT / RAPPORT ANNUEL 2022 (1.1.2022 - 31.12.2022)**

Resultate der Einsendungen aus den Schweizer Kantonen und dem Fürstentum Liechtenstein / Résultats des envois des cantons suisses et de la Principauté du Liechtenstein

Kant. Cant.	Fuchs Renard		Dachs Blaireau		St'marder Fouine		And.Carn Autr.carn.		Reh Chevreuil		And.Wildt. Autr.a.sauv.		Fledermaus Chau.-sour.		Katze Chat		Hund Chien		Rind Bovin		Pferd Equin		Schaf Ovin		And.Haust. Autr.a.dom.		And.Tiere Autr.anim.		Total Total	
	pos	neg	pos	neg	pos	neg	pos	neg	pos	neg	pos	neg	pos	neg	pos	neg	pos	neg	pos	neg	pos	neg	pos	neg	pos	neg	pos	neg	pos	neg
AG	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	-	1	-	-	-	-	-	-	-	-	-	-	-	-	5
AI	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
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BE	-	2	-	-	-	-	-	-	-	-	-	1	5	-	2	-	1	-	-	-	-	-	-	-	-	-	-	1	10	
BL	-	2	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4
BS	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	2	-	-	-	-	-	-	-	-	-	-	-	-	3
FL	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
FR	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-	2
GE	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-	3
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NE	-	1	-	-	-	-	-	-	-	-	-	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
NW	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
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SG	-	-	-	-	-	-	-	-	-	-	-	1	-	1	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	4
SH	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-	3
SO	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
SZ	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
TG	-	-	-	-	-	-	-	-	-	-	-	1	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4
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VD	-	2	-	-	-	-	-	-	-	-	-	1	-	7	-	6	-	-	-	-	-	-	-	-	-	-	-	-	-	16
VS	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	1
ZG	-	-	-	-	-	-	-	-	-	-	-	5	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	6
ZH	-	1	-	1	-	1	-	-	-	-	-	-	6	-	2	-	10	-	-	-	-	-	-	-	-	-	-	-	-	21
CH	-	10	-	1	-	1	-	-	-	-	-	1	1	27	-	23	-	32	-	-	-	-	-	-	-	-	-	-	1	95

Total Einsendungen / Total des envois: 99 Nicht untersuchbar / Pas analysable: 3  
 Menschen durch tollwütige Tiere gebissen / Personnes mordues par des animaux enragés: -  
 Rauferei tollwütiger Tiere mit Haustieren / Bagarres entre animaux domestiques et animaux enragés: -








Total submissions 99 / non-analysable 3

Persons bitten by animals with rabies: - Fights between domestic animals and animals with rabies: -

**Table 2**

**Reported rabies cases in Europe in 2022**

<https://www.who-rabies-bulletin.org/site-page/queries>

		Country	Domestic animals	Wild life	Bat	Human cases	Total
▶		Ukraine	416	183	0	0	599
▶		Georgia	30	1	0	1	32
▶		Romania	21	7	0	0	28
▶		Spain	9	0	5	0	14
▶		Poland	3	33	3	0	39
▶		France	1	0	12	0	13
▶		Hungary	1	3	0	0	4
▶		Slovak Republic	1	1	0	0	2
▶		Austria	0	0	0	0	0
▶		Belgium	0	0	0	0	0
▶		Bulgaria	0	0	0	0	0
▶		Croatia	0	0	0	0	0
▶		Cyprus	0	0	0	0	0
▶		Czech Republic	0	0	0	0	0
▶		Denmark	0	0	0	0	0
▶		Estonia	0	0	0	0	0
▶		Finland	0	0	0	0	0
▶		Germany	0	0	6	0	6
▶		Greece	0	0	0	0	0
▶		Italy	0	0	0	0	0
▶		Latvia	0	0	0	0	0
▶		Liechtenstein	0	0	0	0	0
▶		Portugal	0	0	0	0	0
▶		Serbia	0	0	0	0	0
▶		Slovenia	0	0	0	0	0
▶		Switzerland	0	0	1	0	1
▶		The Netherlands	0	0	1	0	1
<b>Total</b>			<b>482</b>	<b>228</b>	<b>28</b>	<b>1</b>	<b>739</b>
<b>%</b>			<b>65,2</b>	<b>30,9</b>	<b>3,8</b>	<b>0,1</b>	<b>100</b>

**Table 3: Rabies detection (antigen, virus and virus genome detection)**

Species	IF		CCT		PCR		TOTAL Samples
	N	P	N	P	N	P	
BADGER	1	-	-	-	-	-	1
BAT	27	1	4	-	-	1	28 <sup>1</sup>
FOX	10	-	-	-	-	-	10
DOG	32	-	32	-	-	-	32
CAT	23	-	22	-	-	-	23
HUMAN	-	-	1	-	13	-	13 <sup>2</sup>
BOVINE	-	-	1	-	-	-	1 <sup>3</sup>
STONE MARTEN	1	-	1	-	-	-	1
WOLF	1	-	-	-	-	-	1
<b>TOTAL analyses</b>	<b>95</b>	<b>1</b>	<b>61</b>	<b>0</b>	<b>13</b>	<b>1</b>	<b>110 samples</b> <b>171 analyses</b>

Abbreviations used:

IF Immunofluorescence

CCT Cell culture test for virus detection by isolation on neuroblastoma cells

PCR Polymerase chain reaction

N Negative (no rabies)

P Positive (rabies detected)

<sup>1</sup> 1 Daubenton's bat (*Myotis daubentonii*) positive: IF positive and PCR positive

<sup>2</sup> 4 suspected human cases, 13 samples in total, 13 x PCR negative, 1 x CCT negative

<sup>3</sup> 1 immunobiological preparation

**Table 4.a Rabies serology for detection of neutralising antibodies using RFFIT1<sup>1</sup>**

SPECIES	HUMAN	DOG	CAT	IG PREP <sup>2</sup>	TOTAL
Number of samples	1,421	2,143	444	162	<b>4,170 samples</b>
					<b>4,656 analyses</b>

<sup>1</sup> Rapid Fluorescent Focus Inhibition Test (rabies serum neutralisation test)

<sup>2</sup> Rabies immunoglobulin preparations for post-exposure treatment of humans (National Bioproducts Institute, Pinetown, South Africa); the samples are titrated at least 4 times to determine the mean potency in international units (I.U.)/ml; 2022: 162 samples / 648 analyses

**Table 4.b Reason for rabies serology**

INDICATION	HUMAN	DOG	CAT
Check after pre-exposure vaccination	834		
Check after post-exposure prophylaxis	532		
Clinical suspicion	6		
No information	49		
Export / import (travel)		1,751	302
Airport (missing documents, etc.)		54	9
Ukraine (refugees' pets)		215	112
Ordered by authorities		103	17
Other (titre control, etc.)		20	4
<b>TOTAL</b>	<b>1,421</b>	<b>2,143</b>	<b>444</b>

**Figure 1**

Katzen – Cats / Hunde – Dogs / Mensch – Humans

**Number of samples tested by serology in the years 2006–2022 (excluding rabies immunoglobulin preparations)**

