Fox rabies was first recorded in France in March 1968, and remained a problem until 1998. In the course of the first two decades and despite the control measures applied, rabies expanded both in terms of the enzootic surface area and number of cases. The measures applied consisted of actions aimed at reducing fox population density, the mandatory vaccination of domestic carnivores in the officially infected areas, and use of human prophylaxis. Following the large scale implementation of oral vaccination of foxes, starting 1989-1990, the rabies front was pushed back and yearly incidence decreased until rabies was eliminated at the end of 1998. The comparison of results obtained during both periods of enzootics progressed (1968-1990) is shown in figure 2 [3]. The evolution of the yearly incidence of fox rabies in France is shown in figure 1.

**Figure 1**


The period between March 1968 and December 1998 represented three decades of fox rabies in France. Looking back over several years, it is possible to evoke the characteristics of the descriptive epidemiology (evolution in time and space) of this fox rabies ‘invasion’, and the measures applied to control it. After two decades of semi-failures, those measures eventually were successful thanks to the prophylactic ‘revolution’ represented by oral vaccination of foxes against rabies [1].

**Key Words:** fox, France, rabies, vaccination


From 1968 to 1975, the progression of the fox rabies front was uninterrupted and the increase of incidence was exponential. From 1975, the progression of the front slowed down. Epidemic waves were observed every 3-6 years in the infected area.

Until 1990, the control efforts, which were mainly based on limiting fox populations and vaccination of domestic animals, were unable to control the disease. A retrospective study on 10 years [4] of the efficacy of sanitary control measures on rabies incidence did not show any constant efficacy.

From 1990, the yearly incidence decreased until the complete disappearance of rabies in 1999. The enzootic area progressively shrank northwards until it disappeared.

The success of the eradication programme was due to the change in policy against rabies implemented in 1989.

**The fight against fox rabies in France**

For two decades, rabies prophylactic measures applied to foxes were mainly based on attempts to reduce fox populations using various available means, strongly opposed by ecologists, such as poisoning, rifle shooting, gassing fox dens with chloropicrine, etc.

In France, the first actions 'on-site' oral vaccination of foxes were carried out in 1986 along the borders with Belgium and Luxembourg. The results were disappointing, unlike the more satisfying results obtained in Switzerland [5].

In December 1998, the Scientific Commission of the National Federation of Cattle Sanitary groups dedicated its annual meeting to rabies, gathering together specialists from the National Rabies Laboratory (Nancy) and Pasteur Institute (Paris). Vaccination of foxes against rabies was clearly a topic of interest, and proposals were made to implement it on a large scale in France. In 1989, the decision was made at the highest level (by the prime minister) to adopt a strategy to surround the enzootic area by a vaccination belt, followed by an action of forcing back infection towards the north east.

The strategy was defined by the National Rabies Laboratory and the "Entente Interdépartementale de la rage" (ERZ), which also organised and implemented all the campaigns.

The immunity barrier to block the advance of the rabies front was set up in 1989 and 1990, and ran from the Swiss border to the North Sea, covering 54 792 km2, nearly 41% of the enzootic area [6].

Vaccination areas were then progressively extended, moving up to the northeastern borders [FIGURE 3]. The whole enzootic area was covered by the autumn 1992 (192 418 km2 treated in the year).

This systematic vaccination policy over the whole enzootic area achieved the elimination of fox rabies within a few years, with the last case being recorded at the end of December 1998.

The rules set up were:

- **Vaccination in spring and in autumn in enzootic areas;**
- **Implementation of three successive vaccination campaigns in free areas after the last recorded case;**
- **Application on extended areas all in one block with a sanitary cordon representing a rabies-free territory of at least 30 km wide;**
- **Maintenance of increased alertness (continuous surveillance of rabies by sampling, then analysing suspect animals) in areas considered rabies-free in order to quickly react in case a cluster appears.**

The efficacy of oral fox vaccination campaigns was increased thanks to various procedures such as [7]:

- **Extra vaccination by distributing baits in front of dens;**
- **Increase of bait density distributed (number by surface).**

The intensive efforts carried out between 1989 and 1998 by the National Rabies Laboratory and the ERZ yielded dramatic results. Every year that followed 1998, safety measures were implemented along the German border. From 1999 to 2003, nine oral vaccination campaigns (with only one campaign in autumn 2003) were performed along the German border in order to avoid recontamination of France.

France, along with other western European countries (such as Belgium, Switzerland and Luxembourg), succeeded in eliminating fox rabies from its territory, thanks to the methodical use of anti-rabies vaccination of foxes [8]. Since 2000, France has been listed as rabies-free according to the OIE criteria. France is faced with two potential rabies risks: on one hand, the risk from bats, although the yearly incidence in recent years (since 1989, year of the first bat rabies diagnosis, 20 bat rabies cases all due to EBLV-1 virus on *Eptesicus serotinus* have been recorded in France [9]) suggests that the situation has stabilised; and on the other hand, the risk from imported dog rabies, as recently experienced in Southern of France [10]. With the recent tightening of European regulations [11] that now require anti-rabies vaccination for any transport of pets between rabies-free countries, the fear is that illegal importation of young cats and dogs acquired by travellers to rabies enzootic countries (mainly in North Africa) will continue.
In August 2004, a case of rabies was diagnosed in a puppy that had been illegally imported from Morocco to Bordeaux (France). Because a great number of people and animals were thought to have come into contact with the puppy, extensive tracing measures were implemented, and an international alert was launched to trace and treat the contacts at risk. One hundred and eighty seven people have come into contact with the puppy, extensive tracing measures had been illegally imported from Morocco to Bordeaux (France). In August 2004, the CNNR (National Reference Centre for Rabies - Pasteur Institute) reported a case of rabies in a 4-month old puppy illegally imported from Morocco to Bordeaux in France to the French public health institute, the Institut de Veille Sanitaire (InVS). The animal, which was neither officially registered nor vaccinated, was acquired in the Moroccan region of Agadir and brought to France by car, via Spain, on 11 July 2004. After becoming aggressive on 21 August, the dog’s condition rapidly deteriorated and it died on 17 August , the dog's condition rapidly deteriorated and it died on 17 August.

Rabies is a zoonosis caused by a rhabdovirus of the genus Lyssavirus. The disease can be transmitted to humans via biting, scratching, or licking of excoriated skin or mucosa; the incubation period typically ranges from 1 to 3 months. If untreated during this phase, rabies infection leads to fatal encephalomyelitis. France has been free of rabies in terrestrial mammals since 2001. Fox rabies, which was first recorded in France in 1968, was eliminated following a national vaccination programme for foxes combined with increased control of stray animals [1].

An investigation was initiated by the DDASS (Departmental Health and Social Services Division) and the DDSV (Departmental Veterinary Services Division) of the relevant French districts and the CIRE (Inter-Regional Epidemiology Centre-) of the Aquitaine region, in conjunction with the health and food industry authorities, the CNNR and the InVS. The purpose of the investigation was to ensure that all necessary information must be made available to EU residents travelling to rabies enzootic areas.

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Key Words: dog, rabies, investigation, control, treatment

Introduction
On 26 August 2004, the CNNR (National Reference Centre for Rabies - Pasteur Institute) reported a case of rabies in a 4-month old puppy illegally imported from Morocco to Bordeaux in France to the French public health institute, the Institut de Veille Sanitaire (InVS). The animal, which was neither officially registered nor vaccinated, was acquired in the Moroccan region of Agadir and brought to France by car, via Spain, on 11 July 2004. After becoming aggressive on 17 August , the dog’s condition rapidly deteriorated and it died on 21 August.

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