Serological results of a dog vaccination campaign against rabies in Peru

B. CHOMEL*, G. CHAPPUIS**, F. BULLON***, E. CARDENAS***, T. DAVID DE BEUBLAIN****, M.C. MAUFRAIS**** and E. GIAMBRUNO*****

Summary: Urban rabies is a significant problem in many Latin American countries. The authors describe the rabies situation from 1980 through September 1986 in Peru, especially in Lima and Callao, and present the organisational approach and the results of the mass campaign in which around 270,000 dogs (65% of the estimated dog population) were vaccinated within one month. Reported rabies cases declined sharply. No new human case was observed. A serological survey was conducted to determine the immune response, under field conditions, of a randomly selected sample of Peruvian dogs 2 to 3, 6, 9 and 12 months after immunisation with a cell cultured, inactivated and adjuvanted rabies vaccine. Only 3% of the 198 dogs from the 12-month sample had less than 0.5 IU/ml rabies neutralising antibody (the protective threshold defined by WHO); 87% had 1.0 IU/ml or more. These data demonstrate the excellent results obtained under field conditions with such a vaccine.

KEYWORDS: Disease control - Dogs - Epidemiological survey - Immune response - Man - Peru - Public health - Rabies - Vaccination.

Urban rabies remains a major threat in most Andean countries, and the number of reported cases has greatly increased since the beginning of the 1980’s. Peru, unfortunately, belongs to those countries where rabies is a chronic problem; in 1982, Lima-Callao experienced its largest epidemic to date (1,023 dog cases and 13 human cases).

After providing some general background on the problem of rabies in Peru, and especially in Lima, the massive rabies vaccination campaign conducted in Lima-Callao in March 1985 will be described. To evaluate the efficacy of rabies vaccine under field conditions, a serological survey of a random sample of immunised dogs is then presented. Sera were collected from selected dogs, 2 to 3, 6, 9 and 12 months after vaccination.

The conclusion will emphasise the need for mass vaccination of domestic animals.

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GENERAL BACKGROUND

The rabies situation in Peru

Rabies is mainly a canine and urban disease. Dogs accounted for 90.37% of all animal rabies cases reported during the 1970's and 89.87% of cases during the period from 1980 to 1984 (2). The disease is transmitted to humans largely via dog bites. This was the origin of 96% of 118 human rabies cases studied in Peru (3).

Rabid bats account for the lowest portion (.07%) of all reported animal cases. This problem is confined mainly to the Amazon Forest.

The number of reported rabies cases throughout the country considerably increased in the early 1980's (Table I), especially in large population centres: Lima-Callao, in the centre of the country; Piura and Lambayeque in the north, and Arequipa and Ica in the south. Rabies, throughout Peru, has seasonal trends; increasing regularly during the second quarter, it reaches its peak in September and then decreases during the last quarter. Reported rabies cases also present a three to five-year cycle.

<table>
<thead>
<tr>
<th>Year</th>
<th>Dogs</th>
<th>Other species</th>
<th>Total in animals</th>
<th>Humans</th>
</tr>
</thead>
<tbody>
<tr>
<td>1980</td>
<td>878</td>
<td>98</td>
<td>976</td>
<td>9</td>
</tr>
<tr>
<td>1981</td>
<td>1,406</td>
<td>134</td>
<td>1,540</td>
<td>29</td>
</tr>
<tr>
<td>1982</td>
<td>1,893</td>
<td>183</td>
<td>2,082</td>
<td>39</td>
</tr>
<tr>
<td>1983</td>
<td>1,149</td>
<td>118</td>
<td>1,267</td>
<td>31</td>
</tr>
<tr>
<td>1984</td>
<td>840</td>
<td>156</td>
<td>996</td>
<td>32</td>
</tr>
<tr>
<td>1985</td>
<td>505</td>
<td>N/A*</td>
<td>N/A*</td>
<td>28</td>
</tr>
</tbody>
</table>

* N/A: Not available.
(Source: Ministerio de Salud, Peru).

Rabies in Lima-Callao

The department of Lima, one of Peru's 24 regional departments, is the home of more than 30% of all Peruvians and a zone of influx for the poorest rural citizens.

Urban context

Lima and its harbour, Callao, represent a large urban area spread over a desert landscape and bounded by the Pacific Ocean to the west, and the first of the Andes Mountains to the east. The climate is warm and humid, and the equatorial sun is hidden several months of the year by the thick fog generated by massive evaporation from the Humboldt cold water flow in the Pacific Ocean.

Of the five to six million persons living in Lima, about half have low socio-economic status. Each year, the city's population increases by 3.7%, mostly due to poor rural migration into slum areas around the city. Several infectious diseases are endemic to these districts, including rabies.
The rabies situation

Prior to 1970, urban canine rabies was widespread in Lima. As a result of mass vaccination campaigns conducted in 1971 and 1973 by the Peruvian Ministry of Health and the Pan American Health Organization (PAHO), the disease almost totally disappeared from Lima and Callao. Only eight cases of rabid dogs were reported in 1973 and 1974 compared to 541 cases in 1970. And only one case was reported during the next four years. No human case was reported in 1975-1979 (Table II). Despite warnings from specialists, these reductions encouraged a false feeling of security and led to decreased funding. Surveillance and maintenance activities steadily deteriorated. During the same period, about 50,000 persons and 5,000 dogs arrived annually in Lima; although some came from regions where rabies was endemic, there was little done to monitor their condition. Rabies reappeared in Lima at the end of 1980 and reached a peak in 1982 with the worst epidemic on record (1,023 dog cases, 13 human cases). Control measures were readopted, and mass vaccination campaigns were conducted in 1983-1984. While the number of cases regressed, continued lack of financial support permitted less than 60% of the dog population to be vaccinated, thus not checking the disease in areas where it was endemic. Foci remained active in San Martin de Porres, Comas and the southern suburbs.

Table II

Number of rabies cases reported in Lima-Callao, Peru (1970-1986)

<table>
<thead>
<tr>
<th>Year</th>
<th>Dogs</th>
<th>Cats</th>
<th>Other species</th>
<th>Total in animals</th>
<th>Humans</th>
</tr>
</thead>
<tbody>
<tr>
<td>1970</td>
<td>541</td>
<td></td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>1971</td>
<td>208</td>
<td></td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>1972*</td>
<td>7</td>
<td></td>
<td></td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>1973</td>
<td>8</td>
<td></td>
<td></td>
<td></td>
<td>0</td>
</tr>
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<td>1974</td>
<td>8</td>
<td></td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>1975</td>
<td>4</td>
<td>N.A.**</td>
<td>N.A.**</td>
<td>N.A.**</td>
<td>0</td>
</tr>
<tr>
<td>1976</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>1977</td>
<td>0</td>
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<td>1</td>
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<td>1979</td>
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<td></td>
<td>0</td>
</tr>
<tr>
<td>1980</td>
<td>47</td>
<td>3</td>
<td>1</td>
<td>51</td>
<td>2</td>
</tr>
<tr>
<td>1981</td>
<td>532</td>
<td>36</td>
<td>5</td>
<td>573</td>
<td>8</td>
</tr>
<tr>
<td>1982*</td>
<td>1,023</td>
<td>105</td>
<td>11</td>
<td>1,139</td>
<td>13</td>
</tr>
<tr>
<td>1983</td>
<td>172</td>
<td>30</td>
<td>1</td>
<td>203</td>
<td>8</td>
</tr>
<tr>
<td>1984*</td>
<td>53</td>
<td>6</td>
<td>2</td>
<td>61</td>
<td>5</td>
</tr>
<tr>
<td>1985*</td>
<td>13</td>
<td>3</td>
<td>1</td>
<td>17</td>
<td>3</td>
</tr>
<tr>
<td>1986***</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

* Animal (dogs and cats) vaccination campaign conducted.
** N.A.: Not available.
*** Until 1 October 1986.
(Source: Ministerio de Salud, Peru).
Rabies Vaccination Campaign in Lima-Callao

In order to take advantage of the period of remission and eliminate rabies in Lima, especially in the enzootic foci, a mass vaccination campaign was undertaken by Peruvian authorities with the help of PAHO, the Order of Malta, the Mérieux Foundation and Mission Bioforce (training programme in the "Rhône-Alpes" region of France for technicians for developing countries).

The campaign began in Lima and Callao, on account of their particularly dense concentration of humans (about one-third of the Peruvian population) and dogs. Activities were then extended to adjoining areas in the north, east and south which represent a re-contamination risk for the capital.

Materials and methods

Between December 1984 and March 1985, the technical and financial means which the Minister of Public Health had solicited internationally were put into operation. The city was divided into 11 areas, and a schedule drawn up that would provide vaccination services to the entire city within a month. Vaccination teams were based in very accessible sites (markets, squares, etc.). It was calculated that 110 vaccination teams would be needed to vaccinate the estimated dog population of 400,000 within a month. Campaign Headquarters were established at the Lima Antirabies Centre. Despite our request, it was not possible to link a stray dog elimination programme with the vaccination efforts. This should be implemented at least during the maintenance phase. Through international cooperation, Peru received 500,000 doses of animal vaccine, 600 doses of human vaccine (produced on Vero cells), 50,000 syringes, 75,000 needles, 160 insulated boxes and ice packs, 500,000 vaccination certificates and 500,000 blue collars to be worn by the vaccinated animals.

More than 250 persons were deployed as follows:

- 110 teams of one vaccinator and one registrar.
- 11 supervisors, each in charge of ten teams and of one of the designated areas of Lima.

In spite of considerable (if foreseeable) logistic problems as well as other difficulties, the campaign was ready to be implemented on February 25th. The above materials were chosen in conformity with existing Peruvian vaccination procedures. Immunised dogs, for example, are commonly identified by a plastic collar.

The choice of the vaccine had different objectives. It was necessary to use a highly immunogenic, safe, stable product licensed for dogs and cats which require a low volume injection. The product could not be overly sensitive to heat and had to be usable in multi-dose batches. An inactivated rabies vaccine (Rabisin® = Imrab® in USA) produced in France was utilised. This product provides a three-year immunity against rabies (10).

The vaccination campaign

Every day from 25 February to 27 March, 1985, 110 teams reported to the vaccination sites at 8:00 am. The supervisors, in cars equipped with megaphones, requested people to bring their animals for vaccination. The appeal was furthered by students on summer vacation.
Results

In one month of very intensive work, more than 300,000 carnivores over three months of age were vaccinated. This figure includes 273,000 dogs, 65% of the total estimated dog population in Lima-Callao.

A follow-up survey conducted in April 1985 by the PAHO, the Peruvian Ministry of Health and the Mission Bioforce, indicates a dog to persons ratio of 1:10-11, and that 77.7% of the dogs in Lima were immunised at the time of the survey (the figure includes those dogs vaccinated in March, those which were immunised by private veterinarians, as well as those vaccinated at the Antirabies Centre or during the preparation period (November 1984-February 1985)). The survey also revealed that one month after the campaign, 97.8% of the vaccinated dogs were wearing the blue collar.

This high estimate of immunisation is confirmed by the excellent results obtained during the maintenance and surveillance period (Figure 1).

One year after the massive campaign, the number of rabies cases has dropped dramatically, with only one reported dog case (an animal too young to be vaccinated in March 1985), and no new human cases.

Two cases observed in cats in November and December 1985 prove that the virus has not totally disappeared. According to the survey cited above, the vaccination coverage of cats is much lower than in the dog population. In Lima, the survey showed
that there is one cat for every 17 to 23 inhabitants. An estimated 54,000 (37.4%) cats were vaccinated during the campaign. Only 26% of them were wearing a blue collar one month after vaccination.

SEROLOGICAL SURVEY

Although massive rabies vaccination campaigns have been conducted in many parts of the world, there is very little data available on the serum antibody response in dog populations (1, 4, 5, 11), especially in countries where rabies is enzootic with a canine reservoir.

In order to obtain a better idea about the serological response of a randomly selected and representative sample of dogs, groups of dogs were bled at varying intervals after vaccination.

ANIMALS, MATERIALS AND METHODS

Animals

Animals were randomly selected as follows: within each test period (two to three, six, nine and twelve months after vaccination) 20 districts of the city, and in each selected district, one block, were designated at random. Every tenth household was visited, and the family dog bled, until a total of ten households had been consulted.

Blood samples were obtained from 137 dogs, two to three months after immunisation, 151 dogs after six months, 130 after nine months and 198 after 12 months.

These sample sizes were calculated in conformity with the methods of the Centers for Disease Control, by the use of a standard formula (8)*.

It was estimated that from one to nine months after vaccination, at least 90% of the population would have a protective rabies antibody titre. If \( p = .90 \), the sample size was determined as:

\[
N = 138
\]

For the survey conducted one year after the massive vaccination campaign, a value of \( p = .85 \) was chosen, i.e.:

\[
N = 196
\]

As dogs were randomly selected without any knowledge of prior rabies vaccination history, the injection of vaccine in March 1985 could have been a first dose or a booster dose. Of those that received a booster dose, most had already been vaccinated by a similar brand vaccine.

For the twelve-month survey, 90% of the dogs bled were vaccinated for the first time.

\* N = \( t^2 \times \frac{pq}{d^2} \)

\( N = \) Sample size
\( t = 1.96 \) (95% confidence level)
\( d = .05 \) (5% accuracy)
\( p = \) Proportion of the target population with the characteristic being measured
\( q = 1 - p \)
Vaccine

The vaccine used in the study is produced with the Pasteur PV.11 strain on hamster embryo cell line culture, inactivated by beta-propiolactone and adjuvanted by aluminium hydroxide. A mean titre* higher than 1.5 IU/ml (in NIH tests) was obtained upon examination by the Peruvian National Health Institute. A one ml dose was administered subcutaneously.

Methods

Survey: For each dog which was bled, information regarding its sex, age and vaccination status (first injection or booster) was collected, along with the district in which it lived.

For the twelve-month survey, a more detailed questionnaire was submitted to dog owners.

Antibody titration: Antibody determinations were made using the Rapid Focus Fluorescent Inhibition Test (RFFIT). The WHO control serum was systematically used for titration with results expressed in IU of sero-neutralising antibodies/ml.

The threshold values are as follows:

- < 0.1 IU/ml - no response
- 0.1-0.5 IU/ml - medium response**
- ≥ 0.5 IU/ml - good response

RESULTS

Sample characteristics

Data on sex, age and vaccination status of each group of dogs are summarised in Table III.

Analysis of the twelve-month survey questionnaire

A total of 304 dogs were counted in the 220 households visited, i.e. 1.53 dogs per household. There were 281 dogs (92.4%) present in March 1985, whereas 23 (7.56%) were adopted later. 35 dogs died or disappeared during the twelve months, i.e. 11.2% of the 316 dogs observed in the households in March 1985.

Owners could produce rabies vaccination certificates for 95% (267/281) of the vaccinated dogs, but less than 50% were wearing their blue collars.

200 dogs were bled (two of them providing an insufficient quantity for testing). The dog chosen in each household was, whenever possible, one of those vaccinated for the first time in March 1985. 86.5% (173/200) of the dogs recorded lived in their district of birth, but most (151 dogs = 75.5%) roamed regularly in the streets. All except one dog had been vaccinated in March 1985 during the massive campaign, and 90% of these (178 of 198) were vaccinated for the first time. The mean age of the sample was three years. (By definition, all dogs studied in the sample were more than one year old.)

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* Lowest titre level accepted: 0.3 IU/ml.
** 0.5 IU/ml is the protection threshold accepted by the WHO.
<table>
<thead>
<tr>
<th>No.</th>
<th>Sex</th>
<th>Age</th>
<th>Vaccination status</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Male (%)</td>
<td>Female (%)</td>
<td>&lt; 1 year (%)</td>
</tr>
<tr>
<td>Group tested after 2-3 months</td>
<td>137</td>
<td>*81 (60.4)</td>
<td>** 47 (35.3)</td>
</tr>
<tr>
<td>Group tested after 6 months</td>
<td>151</td>
<td>***88 (58.7)</td>
<td>56 (37.0)</td>
</tr>
<tr>
<td>Group tested after 9 months</td>
<td>130</td>
<td>82 (63.0)</td>
<td>36 (27.7)</td>
</tr>
<tr>
<td>Group tested after 12 months</td>
<td>198</td>
<td>147 (74.2)</td>
<td>0 (0)</td>
</tr>
</tbody>
</table>

* Sex unknown for 3 dogs
** Age unknown for 4 dogs
*** Sex unknown for 1 dog
Serological results

The serological results are summarised in Tables IV and V and Figures 2 and 3.

**TABLE IV**

*Mean rabies antibody titres kinetics in SN log 10 and IU/ml in dogs.
Lima-Callao, Peru, 1985-1986*

<table>
<thead>
<tr>
<th>Months after vaccination</th>
<th>Number of dogs</th>
<th>2-3 months</th>
<th>6 months</th>
<th>9 months</th>
<th>12 months</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>137</td>
<td>151</td>
<td>130</td>
<td>198</td>
</tr>
<tr>
<td>SN log 10</td>
<td>Mean</td>
<td>1.95</td>
<td>1.60</td>
<td>1.52</td>
<td>1.61</td>
</tr>
<tr>
<td></td>
<td>95% C.I.</td>
<td>1.86-2.04</td>
<td>1.53-1.67</td>
<td>1.43-1.6</td>
<td>1.54-1.69</td>
</tr>
<tr>
<td>IU/ml</td>
<td>Mean</td>
<td>11.13</td>
<td>7.96</td>
<td>5.02</td>
<td>4.33</td>
</tr>
<tr>
<td></td>
<td>95% C.I.</td>
<td>8.79-13.47</td>
<td>5.96-9.96</td>
<td>3.38-6.66</td>
<td>2.53-6.13</td>
</tr>
</tbody>
</table>

**TABLE V**

*Rabies antibody titres in dogs, by months after vaccination.
Lima-Callao, Peru, 1985-1986*

<table>
<thead>
<tr>
<th>Months after vaccination</th>
<th>No.</th>
<th>Number of dogs and percentage by IU/ml classes</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>&lt; 5 IU/ml</td>
<td>&lt; 0.5 IU/ml</td>
</tr>
<tr>
<td></td>
<td></td>
<td>No.</td>
<td>%</td>
</tr>
<tr>
<td>2-3</td>
<td>137</td>
<td>2</td>
<td>1.5</td>
</tr>
<tr>
<td>6</td>
<td>151</td>
<td>4</td>
<td>2.6</td>
</tr>
<tr>
<td>9</td>
<td>130</td>
<td>7</td>
<td>5.4</td>
</tr>
<tr>
<td>12</td>
<td>198</td>
<td>6</td>
<td>3</td>
</tr>
</tbody>
</table>

These data show a mean titre of 4.33 IU/ml one year after the campaign, with 97% of the tested dogs having antibody titres higher than the protective threshold.

There is a steady decrease in the level of antibody titre (36% of dogs have less than 5 IU/ml after two to three months versus 70 and 60% after nine and twelve months — Table V). However, all of these dogs remain far above the accepted protective threshold. If the data are arranged according to vaccination status, there is no statistically significant difference (chi-square and Fisher exact test) between the subgroups; titres, of course, are higher in the boosted population.

Mathematical analysis of the results indicates that:

- there is no significant difference in relation to sex, age or size (small, medium, large) of dogs (variance analysis);
- there is a parallel in the percentage of dogs with antibody between the subgroups of dogs vaccinated for the first time and those receiving boosters, with a mean difference of about 3 IU/ml in favour of boosted dogs.
3 months after vaccination

![Graph showing the percentage of dogs with different SN titre levels 3 months after vaccination in Lima, Peru. The mean SN titre is 1.95 IU, with a median of 11.13 IU.]

6 months after vaccination

![Graph showing the percentage of dogs with different SN titre levels 6 months after vaccination in Lima, Peru. The mean SN titre is 1.6 IU, with a median of 7.92 IU.]

**FIG. 2 (a)**
Dog rabies SN antibodies titres in log 10 after vaccination, Lima, Peru
9 months after vaccination

![Graph showing SN titres (log 10) for 130 dogs in Lima, Peru. Mean: 1.52, 5.02 IU.]

12 months after vaccination

![Graph showing SN titres (log 10) for 198 dogs in Lima, Peru. Mean: 1.61, 4.33 IU.]

**FIG. 2 (b)**

Dog rabies SN antibodies titres in log 10 after vaccination, Lima, Peru
3 months after vaccination

137 dogs, Lima, Peru
Mean: 11.13 IU

6 months after vaccination

151 dogs, Lima, Peru
Mean: 7.96 IU

**FIG. 3 (a)**
SN results. Histogram of frequencies, Lima, 1985-1986
(field conditions)
9 months after vaccination

130 dogs, Lima, Peru
Mean: 5.02 IU

12 months after vaccination

198 dogs, Lima, Peru
Mean: 4.33 IU

FIG. 3 (b)
SN results. Histogram of frequencies, Lima, 1985-1986
(field conditions)
DISCUSSION

The age and sex characteristics of our samples, except in the twelve-month survey, are very similar to data collected in 1970 by Malaga (7) and in 1985 by Lopez (6).

According to Malaga (7), 28.26% of the dogs are less than one year old, and 71.31% of the dog population is comprised of males. Lopez (6) found a higher percentage of young dogs (34.31% less than one year old), as well as a majority of males.

The results obtained in the course of our survey underline the excellent level of rabies antibody titres, following vaccination, in a dog population studied under field conditions.

One year after immunisation, 97% of the dogs immunised for the first time had an antibody titre higher than the protective threshold, and 87% of the dogs had 1.0 or more IU/ml. These results are comparable to those obtained in European countries.

In France, a follow-up on 76 dogs immunised with the same vaccine as in our study, and administered by the same route, showed that one year later, 75 had significant antibody titres. The mean rabies antibody titre in these animals was higher than 2 IU/ml (5).

In our booster group (N = 20), 95% of the dogs had 1.0 IU/ml or higher. Although the size of this sample is small, such data are very similar to results obtained in France by Toma et al. (11) who studied 59 dogs one year after a booster injection.

This study does not confirm the low response rate (when expressed in IU, 24.2% of the dogs had 0.5 or greater IU/ml) observed recently in Tunisia (4). When our findings are compared to the Tunisian results, a significant difference exists, in spite of the fact that both studies used the same rabies vaccine.

Even if the methodology of the sampling and the follow-up on the vaccinated dogs was different in the two studies (follow-up on the same 29 dogs in Tunisia versus 178 dogs randomly chosen and varied from a pool of 273,000 dogs vaccinated in March 1985 in Peru), the differences of approach do not explain such divergent results.

According to the Tunisian authors, parasitism and malnutrition could generate immune depression and low antibody responses in dogs. This hypothesis needs more supportive data. The dogs tested in Peru, like dogs in other developing countries, suffered from parasitic infection and malnutrition (Bullon, personal communication) but their immune responses remained acceptable.

Obviously, these dogs have antibody titres lower than those of experimental dogs kept under good conditions. But our results, contrary to those of Haddad et al. (4), indicate that there is less than one \( \log_{10} \) difference between laboratory confined, experimental dogs and Peruvian dogs (9; Chappuis, personal communication). The antibody titres are in all cases highly protective and justify the immunisation schedule proposed for the vaccine.

The dog is the main carrier of rabies in Peru (3). Massive vaccination has broken the chain of transmission of the disease (no human case since April 1985 in Lima);
but it is necessary to be vigilant and to continue with prophylactic measures, since reported cases represent only the tip of the infection’s “iceberg”. Our study reveals the great prevalence (75.5%) of dogs that roam the streets, although many are owned. This is one more reason why in many countries, the need remains for massive vaccination campaigns to prevent the spread of rabies.

**CONCLUSION**

Rabies continues to be a threat to public health in many South and Central American countries.

Massive vaccination campaigns have proven very effective in the control of urban dog rabies. The campaign recently conducted in Lima-Callao, Peru, is a case in point.

This study has shown the efficacy under field conditions of inactivated and adjuvanted rabies vaccines produced on cell culture. The immunity response of a general dog population to the product used is excellent. Even for dogs suffering from malnutrition and parasitic infections, the immunity response was well above the protective threshold.

**ACKNOWLEDGEMENTS**

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**RÉSULTATS SÉROLOGIQUES D’UNE CAMPAGNE DE VACCINATION ANTIRABIQUE DES CHIENS AU PéROU. — B. Chomel, G. Chappuis, F. Bullon, E. Cardenas, T. David de Beublain, M.C. Maufrais et E. Giambruno.**

**Résumé :** La rage urbaine est un problème important dans de nombreux pays latino-américains. Les auteurs décrivent la situation de la rage de 1980 à septembre 1986 au Pérou, plus particulièrement à Lima et Callao. Ils présentent les méthodes d’organisation et les résultats de la campagne d’immunisation de masse au cours de laquelle environ 270 000 chiens, soit 65 % de la population canine estimée, ont été vaccinés en un mois. Le nombre de cas de rage notifiés a décru fortement. Aucun cas n’a été observé chez l’homme. Une enquête sérologique a été réalisée pour évaluer la réponse immunitaire, dans les conditions du terrain, d’un échantillon aléatoire de chiens péruviens, entre 2 et 3 mois, puis à 6, 9 et 12 mois après leur vaccination avec un vaccin antirabique inactivé avec adjuvant préparé en culture cellulaire. Sur les 198 chiens de l’échantillon à 12 mois, 3 % seulement ont présenté un titre d’anticorps neutralisants inférieur à 0,5 UI/ml (seuil de protection défini par l’OMS) ; 87 % ont présenté un titre égal ou supérieur à 1,0 UI/ml. Ces chiffres démontrent les résultats excellents obtenus sur le terrain grâce à l’emploi de ce vaccin.

**MOTS-CLÉS :** Chien - Enquête épidémiologique - Homme - Pérou - Prophylaxie - Rage - Réponse immunitaire - Santé publique - Vaccination.

Resumen: La rabia urbana constituye un problema importante en numerosos países de América Latina. Los autores describen la situación de la rabia en Perú, y particularmente en Lima y en el Callao, de 1980 a septiembre de 1986. Presentan los métodos y los resultados de la campaña de immunización de masa durante la cual cerca de 270.000 perros, ya sea el 65% de población canina estimada, fueron vacunados en un mes. El número de casos de rabia notificados ha disminuido considerablemente. No se observó ningún caso en el hombre. Una encuesta serológica fue realizada bajo condiciones del lugar, para evaluar la respuesta inmunitaria de una muestra aleatoria de perros peruanos a los 2 y 3 meses y a los 6, 9 y 12 meses después de su vacunación con una vacuna antirrábica inactivada con adyuvante, preparada en cultivo celular. Sobre los 198 perros de la muestra a los 12 meses, solamente 3% presentaron un título de anticuerpos neutralizantes inferior a 0,5 UI/ml (umbral definido por la OMS); 87% presentaron un título igual o superior a 1,0 UI/ml. Estas cifras muestran los excelentes resultados obtenidos in situ, gracias a la utilización de esta vacuna.


REFERENCES
