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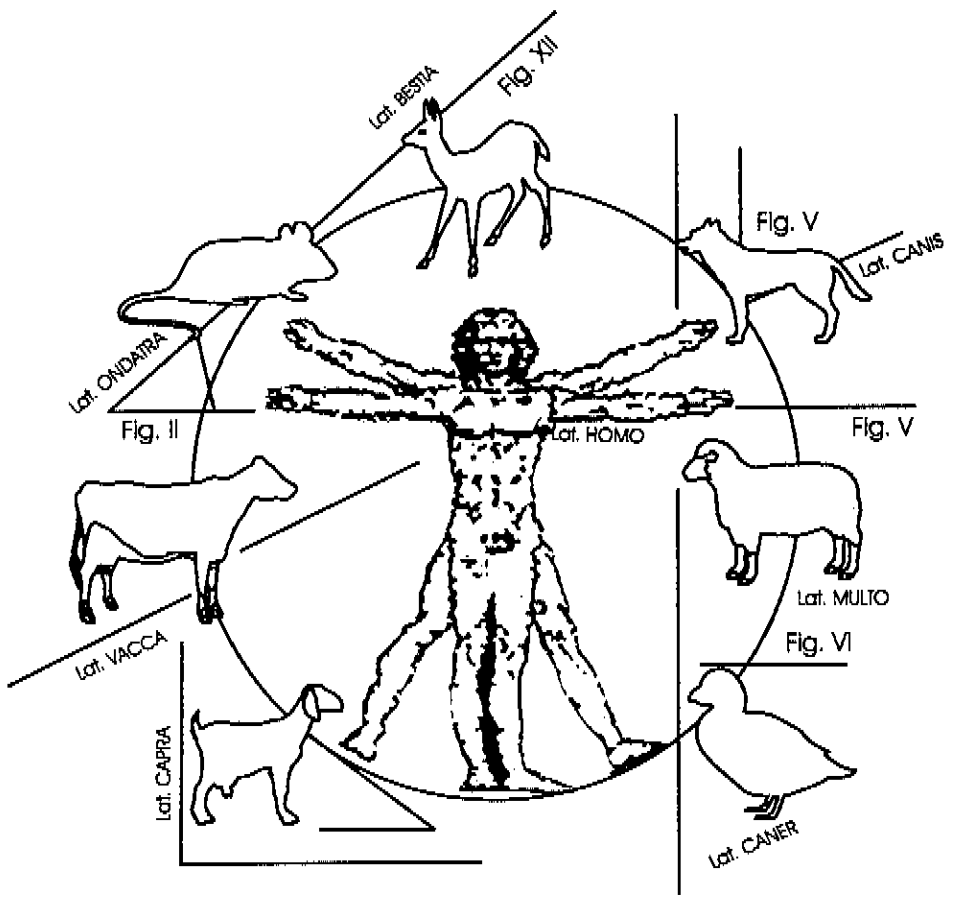
WHO/MZCP/NCIPD CONSULTATION ON RABIES CONTROL IN HUMANS AND ANIMALS

SOFIA, BULGARIA
22-24 MAY 1995



WORLD HEALTH ORGANIZATION
VETERINARY PUBLIC HEALTH UNIT

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LIST OF ABBREVIATIONS

BHK	-	Baby Hamster Kidney
ERIG	-	Equine Rabies Immunoglobulins
FAT	-	Fluorescence Antibody Test
HDC	-	Human Diploid Cell
HRIG	-	Human Rabies Immunoglobulins
MIT	-	Mouse Inoculation Test
MNT	-	Mouse Neutralization Test
PET	-	Post-exposure Treatment
RIG	-	Rabies Immunoglobulins
UV	-	Ultraviolet

1. INTRODUCTION

The meeting was opened by Dr Radka Agirova, Deputy Minister and Chief State Sanitary Inspector, Ministry of Health, Bulgaria, who conveyed the greetings of the Minister of Health, Bulgaria. Rabies in wildlife and management of stray dog populations in urban areas currently have a high priority in public health in Bulgaria. Practical steps are urgently needed to reduce the number of post-exposure treatments in humans after contact with rabies-suspected carnivores. The Ministries of Health and Agriculture, Bulgaria, are about to introduce a new law on the control of rabies and other zoonotic diseases and the meeting should provide additional momentum for its refinement and implementation. Dr Agirova stressed that international cooperation and interinstitutional teamwork between public health and veterinary public health sectors gained more and more importance considering the various partners involved in the control of a disease which can be transmitted from animals to humans.

Dr K. Stöhr opened the meeting on behalf of the Director-General of WHO, Dr Hiroshi Nakajima, and conveyed the greetings of Dr F.-X. Meslin, Chief, Veterinary Public Health unit, to the participants for a successful meeting. He expressed his thanks and gratitude to Dr A. Seimenis, Director of the Mediterranean Zoonoses Control Centre, Athens, and to Professor B. Petrunov, Director of the National Institute for Parasitic and Infectious Diseases, and their staff for their support during the preparation and implementation of the meeting.

The primary objectives of the workshop were:

- to review in the participating countries (Albania, Bulgaria, Greece, The former Yugoslav Republic of Macedonia, Republic of Moldova, Romania, and Turkey):
  - the current rabies situation in humans and animals;
  - the operating surveillance system on rabies and on post-exposure treatment in humans;
  - the current schemes and available vaccines for post-exposure treatment in humans.
- to present and discuss current WHO recommended schemes for pre- and post-exposure treatment of rabies in humans;
- to present approaches for dog population management;
- to discuss the feasibility and prerequisites for oral immunization of foxes against rabies;
- to make conclusions and recommendations on:
  - future regional and national strategies for the reduction of rabies in humans and in animal reservoirs;
  - national and international cooperation for rabies control;
  - feasibility of oral immunization of wildlife against rabies.

Specialists from each country (Annex 1: list of participants) presented reports on the national rabies situation and invited speakers discussed various subjects of rabies control in humans and animals (Annex 2).

Country reports were discussed extensively and three working groups were formed to review issues on:

- rabies diagnosis, surveillance, and epidemiological analysis;
- currently used vaccines and schemes for pre- and post-exposure treatment of rabies, future propositions;
- national and regional programmes for rabies control, including possibilities for applying oral immunization to wildlife and/or dogs.

The conclusions and recommendations made by the working groups, discussed and approved in the plenary session, are given in the following two sections.

2. CONCLUSIONS[1)]

2.1 Rabies situation

The level of rabies surveillance intensity and regional coverage varies in the participating countries. Knowledge on the prevalence of the disease is deficient in some of the countries and active surveillance systems are scarce.

2.1.1 Rabies in animals

Rabies has been enzootic for many years in several, although not all, participating countries from the Balkan subregion, such as in **Bulgaria** (252 cases from 1985 to 1994, 13 in 1994), **Moldova** (no details available), **Romania** (1985-94: 593 cases from 1985 to 1994, 33 in 1994) and in **Turkey** (Fig. 1, Fig. 2), where rabies has

Figure 1

Number of reported animal rabies cases

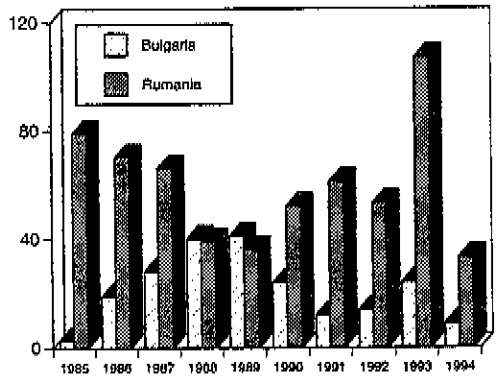
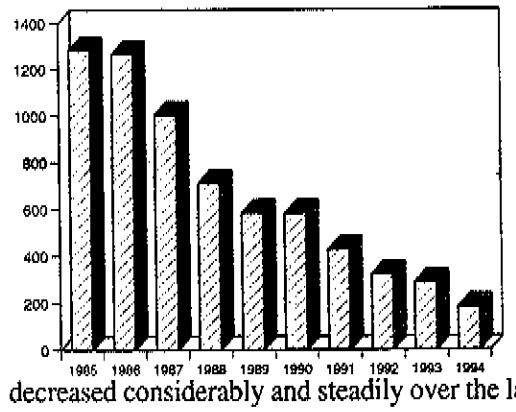


Figure 2

Number of reported animal rabies cases in Turkey



decreased considerably and steadily over the last 10 years from 1 284 cases in 1985 to 182 in 1994. The red fox is the main vector in **Bulgaria** and **Romania**, while in **Turkey** dog rabies is prevalent. Both **Albania** and **the former Yugoslav Republic of Macedonia** reported the last cases of rabies in 1976, when the disease was diagnosed in 10 and 2 humans, respectively. Surveillance data and the diagnostic capabilities, however, are very limited in **Albania** with only 2 animals tested in the last 10 years. **Greece** reported the last case in wildlife in 1974, and one case in a dog in 1985 and one in 1987. The diagnosis of rabies in a fox in southern **Bulgaria** (up to now free of rabies) in April 1995, only 10 km from the Greek border, is of major concern to **Greece.**

All countries reported problems with increasing stray dog populations in urban areas. In **Turkey**, rabies cases in dogs accounted for 71% of all cases over the last 10 years, while in **Bulgaria** and **Romania** they accounted for 12% and 11%, respectively. In 1994 rabies cases in dogs (mainly stray dogs) in **Bulgaria** made up for about 40 % of the reported animal rabies cases.

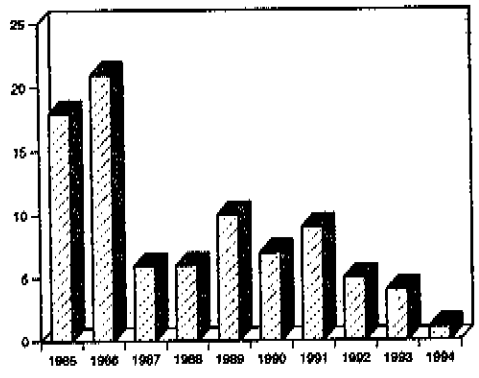
The fact that the Balkan subregion has dog rabies in the south and fox rabies in the north complicates risk assessment and prevention and could have consequences for the future spread of the disease in this subregion.

2.1.2 Rabies in humans

Rabies cases in humans have only rarely been reported in the participating countries within the last decade. In 1994 **Bulgaria** reported its first rabies case in humans after more than 20 years. In **Turkey**, human rabies cases have steadily decreased over the last decade with only one case in 1994 (Fig. 3) whilst the number of post-exposure treatments steadily increased.

Figure 3

Number of human rabies cases in Turkey



2.1.3 Costs associated with rabies

Estimates on the cost of rabies to the public health and agricultural sectors do not exist.

[1)] Summary table in Annex 5

WHO Workshop on European Cooperation on Oral Vaccination of Foxes against Rabies, Budapest, Hungary, 31 March to 1 April 1995). **Romania** is considering developing an oral vaccination project and may start to vaccinate the border area towards Ukraine in Autumn 1995, using imported baits.

Greece might consider oral vaccination of foxes in case the disease would spread into the country from **Bulgaria.** Both **Albania** and **the former Yugoslav Republic of Macedonia** are rabies-free, and taking into account the budgetary constraints, oral vaccination campaigns are not planned for the near future in these countries.

3. RECOMMENDATIONS

3.1 General recommendations

3.1.1 Strengthening the intersectoral and interinstitutional cooperation between the different sectors involved in rabies control, especially among public health, veterinary, wildlife and stray control specialists, should be considered a priority. Zoonoses control / veterinary public health units should be established at both the Ministry of Health and the Ministry of Agriculture to coordinate national zoonoses control committees on a permanent basis.

3.1.2 Research projects should be fostered to assess the impact of rabies on public health and economics including cost-benefit analyses of current control and prevention activities and alternative strategies.

3.1.3 In all countries a national programme for the control of human and animal rabies should be prepared by the members of a national zoonoses (rabies) control committee. This committee should be established in all countries. The rabies control programme should be endorsed by both the Ministry of Health and Ministry of Agriculture and be legally enacted for the control of the disease in humans and animals.

National authorities are encouraged to seek expertise in rabies control gained in other European countries when preparing national control programmes upon a request from its member countries. WHO will mediate appropriate contacts with experts according to the needs of specific national programmes.

3.1.4 Based on the goals set in the national rabies control programmes, appropriate funding institutions and organizations should be approached by WHO in order to help those countries with the most urgent need to establish basic diagnostic facilities, train personnel in standard diagnostic techniques and, if necessary, to provide vaccine for post-exposure treatment.

3.1.5 Rabies-infected countries are encouraged to establish national rabies expert groups composed of specialists in disease control, rabies diagnosis, post-exposure treatment, veterinary public health and epidemiology. Regular meetings organized on a revolving basis by different institutions should evaluate the epizootiological and epidemiological situation, laboratory and surveillance techniques, the progress of the national rabies control strategy, etc.

3.1.6 National authorities are encouraged to review and update their rabies control orders and related regulations. These analyses should be complemented with expertise from WHO rabies specialists.

3.1.7 It is suggested that, under the auspices of WHO and MZCC, an international working group of rabies experts be established in order to implement cross-border cooperation. This group should seek the collaboration of WHO experts to prepare guidelines for the implementation of a common international project on rabies control in the Balkan countries, including oral vaccination of reservoir species.

3.1.8 It is recommended that annual informal meetings of representatives of the competent agencies of all participating countries be held to exchange information and experiences on ongoing and planned activities related to all fields of rabies surveillance, control and diagnosis.

However, costs associated with the procurement (purchase or production) and application of rabies vaccine and RIG (where applied) may account for the largest share in the rabies control and prevention budgets.

In most countries costs incurred in rabies control and prevention in humans and animals are being borne by the government, and a specific budget, albeit sometimes small, is allocated to rabies control and prevention. Usually, post-exposure treatment of humans, mass vaccination campaigns of dogs, sample procurement and shipment and laboratory diagnosis are paid for by the national government, and in some cases (dog vaccination) by local authorities. While inactivated vaccines for animal use are often produced locally (**Bulgaria, Romania**), vaccine and RIG - where applied - for human post-exposure treatment have often to be imported, which draws additionally on already shrinking resources.

2.2 Rabies prevention in humans

2.2.1 Rabies vaccines and immunoglobulins

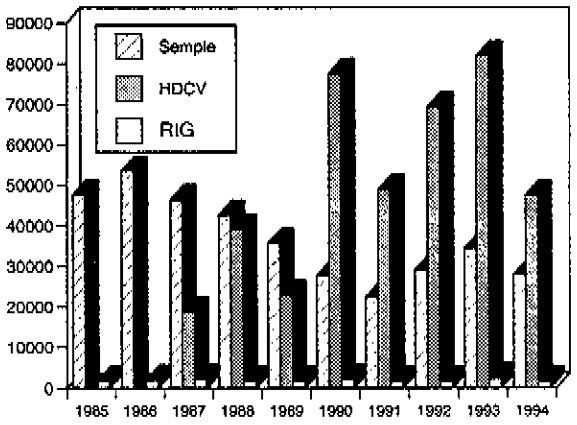
Nervous tissue culture vaccines are produced and applied in **Albania** (virus strain: PV11, produced on lamb brain), **Romania** (Romanian strain: Babes, suckling mouse brain vaccine) and **Turkey** (lamb brain vaccine). Cell culture vaccines of low potency are imported by **Moldova** (from Russia). Production of a low titer cell culture vaccine was suspended in **Bulgaria** in 1994, where efforts are currently being made to establish the production of a highly potent (> 3 IU/ml) concentrated and purified cell culture vaccine (Vnukovo-32, produced on BHK, UV- and formalin-inactivated purified) in collaboration with the Institute for Poliomyelitis and Encephalitis, Moscow.

All participants expressed their concern about the continuation of the use of nervous tissue vaccines in humans. However, this is the only vaccine available for **Albania** and **Romania** for the moment and current financial constraints do not allow the purchase of sufficient quantities of modern cell culture vaccines in these countries.

Bulgaria, Croatia, Greece, the former Yugoslav Republic of Macedonia, and Turkey are already purchasing modern cell culture vaccines for pre- and post-exposure treatment to meet either entirely (**Bulgaria, Greece, Macedonia**) or partially (**Turkey**) (Fig. 4) the local vaccine demand.

Figure 4

Postexposure treatment in Turkey: vaccines used



Rabies immunoglobulins are not generally available. **Albania** stopped production of ERIG in 1993 due to high production costs. Since then vaccine is used alone. HRIG is currently produced in **Bulgaria** (3000 ml per year, 60 IU/ml). **Romania** produces ERIG in a quantity meeting local demand. RIG is imported by **Greece, the former Yugoslav Republic of Macedonia, Turkey, and Moldova** (ERIG from Russia).

2.2.2 Pre-exposure treatment

In countries where nervous tissue vaccines are used exclusively (**Albania and Romania**) pre-exposure treatment is not performed and even personnel producing rabies vaccines or working in rabies diagnositic laboratories are not vaccinated. A list of high risk groups to receive pre-exposure treatment is established in the other countries based on the occupational risk (laboratory workers, pathologists, veterinarians, hunters, etc.) but not all of them are vaccinated regularly.

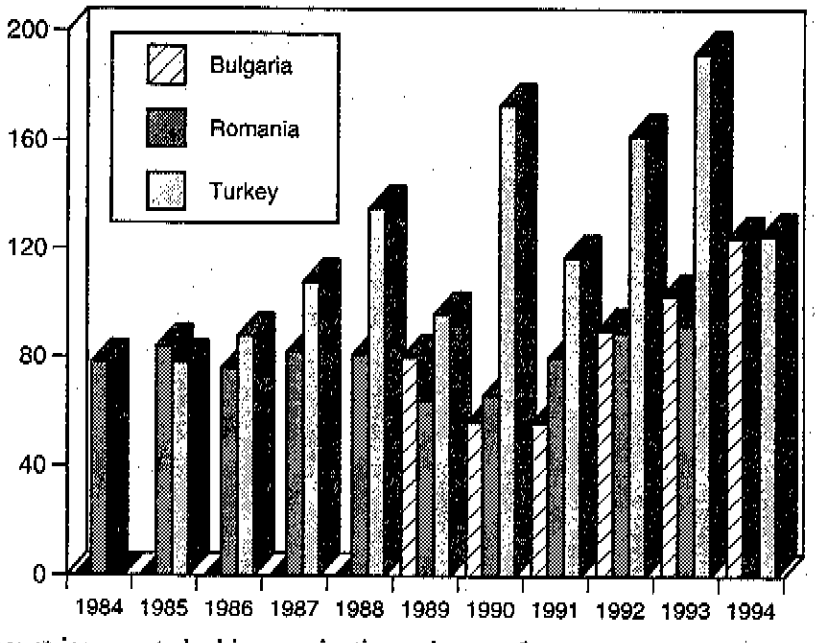
Serological verification of vaccination success is done in **Bulgaria** and **Greece** for the rabies laboratory staff only (50 samples per year in **Bulgaria**, MNT and RFFIT; 30 samples per year in **Greece**, ELISA) and for likely immunosuppressed / immunocompromised individuals. The RFFIT technique has also been established in **Turkey**.

2.2.3 Post-exposure treatment schemes and criteria for their application

The number of post-exposure treatments has increased significantly in all participating rabies-infected countries over the last 4-7 years up to 124 per 100 000 inhabitants in 1994, e.g. in Sofia (Fig. 5).

Figure 5

Postexposure Treatments per 100 000 inhabitants



All countries reported rabies vaccination to be conducted by specialized centres. WHO-recommended schemes are known. For nervous tissue rabies vaccines different sets of post-exposure treatment schemes and application criteria are utilized (generally 7-25 applications of 3 ml vaccines around the umbilical region). RIG alone is still part of treatment procedures in some countries (**Greece, the former Yugoslav Republic of Macedonia**).

Modern tissue culture vaccines are applied according to the producers description. In **Croatia** HDC has been used with success since 1984 in the abbreviated schedule (2-1-1) as recommended by WHO (see page 25 of the Eighth Report of the WHO Expert Committee on Rabies, WHO Technical Report Series, No. 824).

In some countries almost all individuals consulting a treatment centre after contact with rabies-suspected animals receive post-exposure treatment (**Bulgaria** [particularly Sofia], **Albania**) (Fig. 6, next page). In **Albania** this is mainly due to the lack of laboratory and epidemiological data and the low dog vaccination coverage and in **Bulgaria** mainly to the large stray dog population and the difficulty and low public acceptance in following up stray animals.

2.2.4 Information exchange between parties involved in human rabies prevention

Close contact between the local veterinary, public health and other services is indispensable for the proper selection of the appropriate post-exposure treatment in each individual case. This helps to avoid any unnecessary treatment and allows for its immediate suspension if the offending animal is found to be rabies negative by proper laboratory tests.

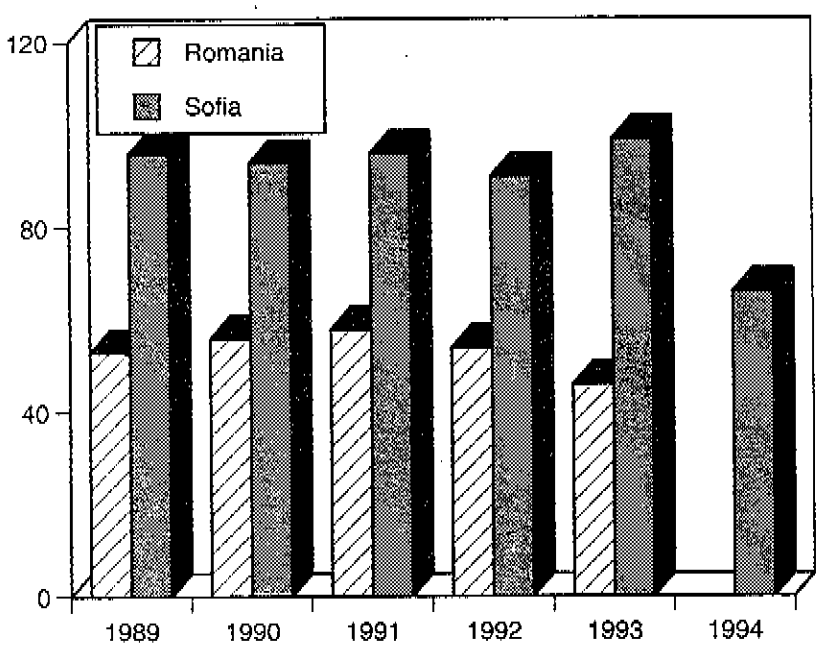
The quality of cooperation and reporting between all parties involved in human rabies prevention appears to differ substantially in the participating countries.

2.2.5 Complications of anti-rabies treatment

Epidemiological data on vaccine complications are available from **Albania** (1 in 3 500), **Bulgaria** (zero) and **Romania** (1-2 per 20 000

Figure 6

% of treated persons after contact to rabies suspected animals



cases). Approximately 100 cases of serum sickness after application of ERIG are reported from **Romania** (no data on number of patients receiving ERIG).

2.3 Rabies control in animals

2.3.1 Laboratory testing and reporting

With the exception of **Albania** the fluorescent antibody test (FAT) is the diagnostic standard test in all countries. In general, results of the FAT are checked with the mouse inoculation test (MIT) at least for human exposure cases. **Bulgaria and Greece** are also evaluating other approaches of rabies diagnosis (ELISA). In most countries, the conjugates used in the FAT are imported, although some also produce their own reagents.

Reporting of diagnostic results is considered satisfactory in the animal sector within the individual countries, as channels for notification exist. In some of the countries deficiences in the information flow from the animal rabies laboratory to post-exposure treatment centres occur, which often results in unnecessary continuation of treatment of individuals who have had contact with animals later found to be rabies negative. Most countries contribute the positive laboratory findings only (number and species) to national monthly or quarterly veterinary public health circulars and regularly communicate their data in the Rabies Bulletin Europe and other international bodies.

2.3.2 Control programmes in dogs

All countries reported a significant increase in the number of stray dogs in urban areas. The real number and proportion of owned to unowned dogs in rural and urban areas is not known though in any of the countries. Few, if any, data are available on other population parameters such as reproduction, turnover, etc.

Albania is faced with an increasing number of stray dogs, especially in large cities. Also, the number of pet dogs and cats is steadily increasing. No vaccination programmes for any of these species are in place and a locally produced vaccine for use in animals is no longer available. Mass vaccination would be highly desirable, especially as the rabies status of the country is not known due to a lack of diagnostic facilities and surveillance.

The **Bulgarian** control programme to prevent rabies in dogs includes mass vaccination of owned dogs (300 000 per year). It is estimated that about 90% of owned dogs are vaccinated within towns, but probably a lower percentage in villages. Dogs are registered and owners pay a dog tax (US$5 to $10). Catching of the increasing number of stray dogs has been discontinued. Stray dog population management or vaccination campaigns are not conducted.

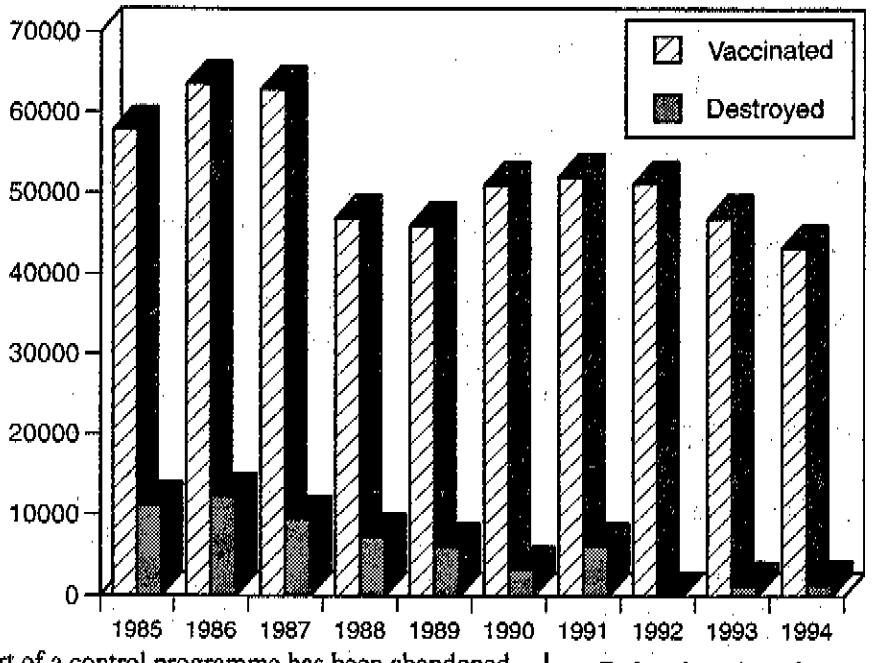
In **Greece**, it is estimated that approximately 90% of the owned dogs are vaccinated. The

elimination of stray dogs is the task of the municipalities, but their removal meets increasing opposition from the public due to better animal welfare awareness.

In **the former Yugoslav Republic of Macedonia** annual vaccination of dogs is compulsory. It is estimated that the programmes of the State Veterinary Service reach 60 to 80% of the registered dog population, with an average of 55000 animals vaccinated annually over the last 10 years (Fig. 7). The killing of stray dogs as part of a control programme has been abandoned, although dogs without owners can still be euthanised. A programme is currently underway to create shelters to facilitate re-homing of dogs.

Figure 7

Dog vaccination and destruction in the F.Y.R.M.



The population of owned dogs in **Romania** is estimated at approximately 2 million. Vaccination of dogs is mandatory and campaigns are carried out yearly in autumn. A programme to neuter dogs was started recently. Some data about dog population biology are available from small-scale studies.

The rabies control programme in **Turkey** includes culling of stray animals, mass vaccination campaigns, quarantine measures and public awareness programmes. Since 1992 **Turkey** has embarked on a project aimed at orally immunizing dogs, in a joint technical cooperation project with the WHO Collaborating Centre for Rabies Surveillance and Research in Tübingen, Germany. Laboratory trials and field studies with the SAD B19 vaccine incorporated in a locally produced bait (so-called 'Köfte' bait) have been carried out. If the programme should prove to be successful an extension will be considered.

2.3.3 Control programmes in foxes

Currently, fox reduction programmes of varying scales are the only control measures taken in any of the participating countries. Hunting figures appear to be available in most countries and may serve as a source to get rough population estimates for the red fox. A more detailed estimate from hunters' associations is available for **Bulgaria**, where fox densities are estimated to be between 0.91 and 1.13 per km^2, and **the former Yugoslav Republic of Macedonia**, where the density is estimated to be between 0.4 and 0.5 per km^2. A fox population reduction program where bounties are paid is in place in **Bulgaria** and **Greece**. .

Bulgaria carried out limited laboratory trials to immunize foxes orally in 1991 (6 animals), using a SAD-derived vaccine strain of Russian origin. There is a marked interest to start a field trial in the near future in the border area towards Romania where most of the wildlife rabies cases are reported to occur. In **Moldova** a field trial on oral immunization of foxes might start as early as this year, most likely with imported baits (see

3.1.9 The countries participating in the current meeting in Sofia will identify a place and date for further meetings of experts in rabies control and provide WHO and the MZCC with suggestions by September 1995.

3.2 Specific recommendations

3.2.1 Rabies prevention in humans

- The number of post-exposure treatments could be adjusted if due consideration is paid to the health status of the biting animal. National rabies control strategies should include regulations enforcing the immediate and firm follow-up of any exposure of humans to rabies suspected animals. Local veterinary and other services such as municipalities, police, etc. are to be involved in identification and retrieval of animals at source of exposure. Proper animal retrieval will result in a consequent reduction of any possible overtreatment. Previous recommendations given by WHO (Technical Report Series, No. 824) and experiences of other countries should be considered.

- Data on post-exposure treatments should be included in the national rabies surveillance systems according to WHO recommendations. Epidemiological analyses of regionally or centrally collected data on post-exposure treatment are encouraged. This should help:
  - ascertain the impact of the disease on public health and economics;
  - detect unusual reactions or complications of vaccine and RIG application;
  - identify high risk groups accessible for pre-exposure treatment;
  - evaluate trends and assess vaccine and RIG demands.

- Post-exposure treatment schemes should strictly adhere to WHO recommendations. RIG application alone should be abandoned.

- Local authorities are encouraged to completely abandon the production and application of nervous tissue rabies vaccines. In future, all post-exposure treatments should be conducted with modern cell culture vaccines.

- Given the difficulties in biologicals procurement in sufficient quantities (vaccine and RIG), abbreviated multi-site schedules, such as the 2-1-1 scheme, should be considered.

- Subregional and other international support is required particularly for Albania, the former Yugoslav Republic of Macedonia, and Romania to reach self-reliance as regards biologicals necessary for rabies control. WHO is requested to support tenders for the purchase of modern tissue culture vaccines for these and possibly other participating countries.

- Available facilities for periodical serological verification of vaccination success should be used for all high risk groups receiving pre-exposure treatment (e.g. staff of rabies vaccine production or diagnostic laboratories, staff of pathological, health or veterinary institutions) to assess the need for booster injections.

3.2.2 Rabies control in animals

Laboratory diagnosis

- Laboratory diagnosis procedures, including sample procurement and shipment, laboratory facilities and training of scientific and technical staff should be further developed in countries with weak infrastructure and limited financial possibilities. This refers especially to Albania, which needs particular financial and technical assistance to set up adequate diagnostic facilities and to implement an efficient surveillance system.

- Updating training workshops for laboratory staff should be held for more efficient and standardized diagnosis procedures. National rabies experts should be trained in WHO collaborating centres in rabies diagnostic techniques, surveillance methods, reporting and data analysis techniques, and modern methods of rabies control.

- Rabies virus isolates from both dogs and foxes should be sent to WHO reference laboratories on

a regular basis to type and assess the origin of the virus strain and in order to quickly identify any spillover from one vector species to another (dog, fox).

- Rabies laboratories should seek to obtain information on the availability, sensitivity and specificity of commercially or otherwise available FAT conjugates and establish permanent quality assurance systems including diagnosis verification through MIT.

Pet vaccination and dog licensing

- Dog vaccination should be mandatory and attempts made to reach the highest vaccinate coverage possible.
- All dogs should be registered

Control of stray dog populations

Based on the statements of the WHO Expert Committee on Rabies (TRS 824, p. 31) that "there is no evidence that removal of dogs has ever had a significant impact on dog population densities or the spread of rabies" and "Therefore, this approach should not be used on large scale control programmes unless ecological and sociocultural studies show it to be feasible", it is suggested that the:

- Balkan countries should prepare a proactive programme for the control of stray dogs. Such a programme should be implemented with the support of all parties and groups involved, including national and/or international animal welfare associations. Animal welfare associations should support national authorities of countries ready to apply alternatives to stray dog culling, for example in providing marking equipment or other material support, or practical assistance where possible.
- Scientific research projects and field studies should be implemented or improved, and generalized to better understand the relationship between dog ecology and behaviour, and rabies epidemiology.
- Educational programmes should cover the responsibilities of dog ownership, to prevent impulse and ill-informed purchase of pet dogs, and to ensure proper care and control of owned animals.
- Stray dog control should follow the principles set out in the WSPA/WHO Guidelines on Dog Population Management (WHO/ZOON/90.166), and be designed to stem the problems at source (e.g. control of owned dogs, education, legislation and enforcement, promoting neutering, control of breeders and sales outlets). Additional programmes to solve existing stray problems should include:
  - capture and restriction (for at least 10 days) to find original owner and re-homing;
  - neuter, vaccinate, identify/mark, and release, where feasible, of dogs not homed;
  - euthanasia by humane methods, where unavoidable, for elderly, diseased, or aggressive stray dogs;
  - control of environment of stray dogs, i.e. in the area from where dogs are removed, efforts should be made to reduce food sources (e.g. regulate and eliminate disposal of edible waste, in particular near hotels, restaurants, slaughterhouses, etc.) and shelter, to avoid repopulation.

3.2.3 Surveillance

- A need for improved surveillance has been identified in all countries with priority to be given to vector species. Rabies control regulations in each country should contain surveillance as an indispensable part .
- More information on the prevalence of the disease in wild and domestic carnivores, spatial and temporal distribution and tendencies of spreading is desirable for countries where rabies is currently enzootic. Countries free of rabies should identify those border areas that are at risk of becoming infected across national borders and implement appropriate surveillance programmes.
- Both for infected areas and areas at risk minimum surveillance requirements (minimum

number of animals from the vector species to be tested per year and by region) should be defined. The need to procure these specimens should create additional awareness in the agencies involved, thus increasing the likelihood that any animal suspected of having rabies will be identified and submitted for testing.

- Intersectoral communication and collaboration, especially between public health, veterinary and wildlife specialists, as well as forestry personnel should be strengthened to increase the number of samples available for surveillance purposes.

- Countries free of rabies (e.g. Greece) are encouraged to compile as much information as possible on the distribution and density of vector species (fox, dog) in areas at risk, in order to be able to respond quickly with appropriate measures (mass vaccination of dogs, possibly oral immunization of foxes) in case an outbreak should occur.

3.2.4 Information collection and exchange

- The following data should be collected, epidemiologically analysed and distributed by the national rabies reference centres or other appropriate agencies in the Ministry of Health and/or the Ministry of Agriculture:

  - number, spatial and temporal distribution of:

    rabies cases in humans and animals including type of diagnosis

    samples (by species and reason for submission) submitted for rabies diagnosis including information on exposure to humans

    post-exposure treatment including animal source, treatment scheme

  - data to identify risk groups for later pre-exposure treatments

  - data on fox and stray dog population management activities (hunting bag, neutering, etc.)

- Bilateral and multilateral information exchange between countries should be encouraged and implemented on a regular basis, including the exchange of monthly/quarterly rabies reports.

3.2.5 Health education and public awareness

- Health education by governmental and non-governmental organizations should include information on rabies prevention and control, with the technical support of WHO. Public awareness towards rabies should be strengthened, not only in infected areas, but also in areas at risk in order to ensure that exposed people get adequate treatment and newly infected areas are identified as early as possible.

ANNEX 1: LIST OF PARTICIPANTS

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ANNEX 2: LIST OF COUNTRY REPORTS AND PAPERS PRESENTED

COUNTRY REPORTS

- Report on the Rabies Situation and Control in Albania
  Kushe, G.; Kusi, I.

- Rabies Prevention and Control in Bulgaria from 1984-1994
  Popova, S.; Valtchovski, R.; Lossev, B.; Gacheva, N.

- Rabies Situation in Greece during the Last Ten Years
  Mangana, O.

- Control and Prevention of Rabies in the Former Yugoslav Republic of Macedonia
  Ivanovska, L.; Hristovski, M.

- Report on the Rabies Situation in Romania
  Badescu, F.; Ghita, S.

- Country Report on the Rabies Situation and on Rabies Control in Turkey
  Aydin, M.

PAPERS PRESENTED

- Current schemes of rabies pre- and post-exposure treatment in humans
  Stöhr, K.

- Current rabies vaccines for pre- and post-exposure treatment in humans
  Vodopija, I.

- Activities of the World Society for the Protection of Animals (WSPA) in the field of rabies animal reservoir population management
  Cox, J.

- Achievements and current status of oral immunization of foxes in Europe
  Stöhr, K.

- Oral immunization of wildlife against rabies: prerequisites and limitations
  Kappeler, A.

- Oral vaccination of foxes against rabies in France
  Artois, M.

ANNEX 3: LIST OF WHO PUBLICATIONS ON RABIES

WHO Expert Committee on Rabies
Eighth Report
Technical Report Series, No. 824
1992, vii + 84 pages [E, F, S*]
ISBN 92 4 120824 4
Sw.fr. 12.–/US $10.80
In developing countries: Sw.fr. 8.40
Order no. 1100824

Report of WHO Informal Consultation on Reproductive Control of Carnivores
Geneva, 16 June 1993
World Health Organization 1993
WHO/CDS/VPH/93.124
9 pages

WHO/WSPA Guidelines for Dog Population Management
World Health Organization 1990
WHO/Zoon./90.166 (1990)
116 pages

Consultations on Oral Immunization of Dogs Against Rabies

Report of 5th Consultation on Oral Immunization of Dogs Against Rabies
Geneva, 20-22 June 1994
World Health Organization 1994
WHO/Rab.Res./94.45
23 pages

Report of 4th Consultation on Oral Immunization of Dogs Against Rabies
Geneva, 14-15 June 1993
World Health Organization 1993
WHO/Rab.Res./93.42
17 pages

Report of 3rd Consultation on Oral Immunization of Dogs Against Rabies
Organized by WHO with the Participation of the International Office of Epizootics
Geneva, 21-22 July 1992
World Health Organization 1992
WHO/Rab.Res./92.38
14 pages

Report of 2nd WHO Consultation on Oral Immunization of Dogs Against Rabies
Geneva, 6 July 1990
World Health Organization 1991
WHO/Rab/Res.91.37
21 pages

Report of WHO Consultation on Oral Immunization of Dogs Against Rabies
Geneva, 26-27 February 1988
World Health Organization 1988
WHO/Rab/Res.88.26
11 pages

Suggestions for the Development of a Research Project for the Field Evaluation of Several Vaccine-bait Delivery Techniques to Vaccinate Dogs Orally against Rabies
H. Matter
World Health Organization 1993
WHO/Rab.Res./93.40
11 pages

Report of WHO Workshop on Vaccine Procurement for the Prevention and Control of Rabies in Baltic Countries
Tallinn, Estonia, 14-15 February 1994
World Health Organization 1994
WHO/CDS/VPH/94.133
17 pages

Report of WHO/APHIS Consultation on Baits and Baiting Delivery Systems for Oral Immunization of Wildlife against Rabies
Fort Collins, USA, 10-12 July 1990
World Health Organization 1990
WHO/Rab/Res.90.36
222 pages

WHO Consultations on Monoclonal Antibodies in Rabies Diagnosis and Research

Report of 6th WHO Consultation on Monoclonal Antibodies in Rabies Diagnosis and Research
Philadelphia, USA, 2-3 April 1990
World Health Organization 1990
WHO/Rab.Res./90.34
12 pages

Report of 5th WHO Consultation on Monoclonal Antibodies in Rabies Diagnosis and Research
Geneva, 3 March 1989
World Health Organization 1989
WHO/Rab.Res./89.33
15 pages

Report of 4th Meeting on Monoclonal Antibodies in Rabies Research
Washington, 2 November 1986
(Appears as Annex 3 in the 5th Consultation Report)
World Health Organization 1989
WHO/Rab.Res./89.33
15 pages

Report of German Green Cross/WHO Workshop on Monoclonal Antibody in Rabies Diagnosis and Research
Tonbach, Germany, 27-28 May 1984
World Health Organization 1984
WHO/Rab.Res./84.20
10 pages

Laboratory Techniques in Rabies
Fourth edition
edited by *F.-X. Meslin, M.M. Kaplan,* and *H. Koprowski*
Approximately 400 pages
IN PREPARATION

World Surveys of Rabies

World Survey of Rabies 29 (1993)
World Health Organization 1995
IN PREPARATION

World Survey of Rabies 28 (1992)
World Health Organization 1994
WHO/Rabies/94.210
26 pages

World Survey of Rabies 27 (1991)
World Health Organization 1993
WHO/Rabies/93.209
36 pages

World Survey of Rabies 26 (1990)
World Health Organization 1993
WHO/Rabies/93.208
22 pages

Instructions for the Design, Equipping and Staffing of a Laboratory for the Production of Animal Rabies Vaccine Prepared on Cell Culture
P. Reculard
World Health Organization 1990
WHO/Rabies/90.201
54 pages

ANNEX 4: ADDRESSES OF WHO COLLABORATING CENTRES ON RABIES

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Annex 5 Summary table

	Albania	Bulgaria	Greece	F.Y.R.Macedonia	Moldowa	Romania	Turkey
Surveillance							
Samples investigated annually, 10 yr avg	0,2		243,9	9 c)	125,9		
Rabies positive annually, 10 yr avg	0	39,1	0,2	0	12,3	59,3	664,8
domestic	0	21,4	0,2	0	7,6	37,6	651,2
wildlife	0	18,7	0	0	4,3	21,7	13,6
human	0	0,1	0	0	0,4	0	8.7 x)
Laboratory tests performed	HIST, RIT	FAT, MIT	FAT, MIT	FAT	FAT, MIT	HIST, FAT,	HIST, FAT, MIT
		(RTCIT, ELISA)	(ELISA)			MIT	(RTCIT, ELISA)
Conjugate for FAT		locally prod.				locally prod.	Centocor
Postexposure Treatment (PET), 10 yr avg							
Number of exposures	?	1127 a)		1347	8885		
Number of PET	3000 - 4000	968 b)	1810	89	4013		36787 + 50828 f)
Vaccine used	lamb brain	CC vaccine,	CC vaccine,	CC vaccine,	CC vaccine,	lamb brain	Semple vaccine
		imported	imported	imported	imported	local	some CC vacc.
							imported
Vaccination scheme	16-25 doses		Essen	abbr. Essen d)	9 - 24 doses	11-17 doses	
Neurological complications	1/3500	0			2/ 10000	1-2/20000	
Pre-exposure vaccination	not done				not done	not done ?	
vaccine		CC vaccine		CC vaccine		lamb brain	
scheme				0,7,21-28		3 doses i.d.	
Vaccine production		b)	none	none	none, imported		
Human					from Russia		
virus	PV-11	Vnukovo-32					
inactivation	phenol					beta-propiolactone	
substrate	lamb brain	HK-cells				lamb brain	lamb brain
Serum production			imported	imported	imported		imported
ERIG	ceased in 1993					local prod.	
HRIG		3000 ml/yr					

	Albania	Bulgaria	Greece	F.Y.R.Macedonia	Moldowa	Romania	Turkey
Dog vaccination	currently no vaccine available	mandatory	mandatory in border areas	mandatory	mandatory	mandatory	
Dog population size (estimate)						2000000	
Dogs vaccinated per year		300000		55147	approx. 350 000	annual campaigns	234194 h)
% of dog population vaccinated		up to 90%	approx. 90%	60 - 80% e)	20 - 30%		
vaccine used		local	imported		imported		
Rabies cases 1985 - 1994							
1985	0	4	1	0	20	79	1284
1986	0	26	0	0	8	70	1266
1987	0	66	1	0	27	66	1005
1988	0	78	0	0	5	39	710
1989	0	87	0	0	7	33	584
1990	0	34	0	0	14	52	583
1991	0	19	0	0	21	61	427
1992	0	24	0	0	7	53	320
1993	0	40	0	0	7	107	287
1994	0	13	0	0	7	33	182
Total 1985-1994	0	391	2	0	123	593	6648
Human cases 1985-1995	0	1	0	0	4	0	87 f)
Comments	only 2 samples between 1985 and 1994		last case in wildlife in 1974	last case (human) in 1976			

a) Average for 1989-94 for Sofia City only. Countrywide: 44.4 PET /100000 inhabitants in 1987-93, 97/100000 in 1994.
b) Production discontinued in 1994. Production of a modern type cell culture vaccine under development.
c) Data and average for the years 1990-1994.
d) The abbreviated Essen scheme is considered standard, although other schemes are applied as well.
e) The dog vaccination program covers approx. 70% of registered dogs.
f) Number of rabies cases in general and human cases in particular steadily decreasing with only one human case in 1994.
g) The figures reflect the average number of doses of Semple vaccine (1985-94) and imported cell culture vaccine (1987-94) distributed. NOT the number of patients treated!
h) Average of years 1992-94.

CC	Cellculture
FAT	Fluorescent antibody test
HIST	Histological investigation
MIT	Mouse inoculation test
RIM	Rabbit inoculation test
RTCIT	Rabies tissue culture infection test