



Report of the Third Meeting of the Middle East and Eastern Europe Rabies Expert Bureau (MEEREB)

Mérieux University
Lyon, France

7-8 April 2015

Includes Annex 1 – Meeting Participants List

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Middle East and Eastern Europe Rabies Expert Bureau
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1. Introduction - Presentation of the Third MEEREB meeting

The Third meeting of the Middle East and Eastern Europe Rabies Expert Bureau took place in Lyon (France), at the 'Merieux University', on April 8-9, 2015.

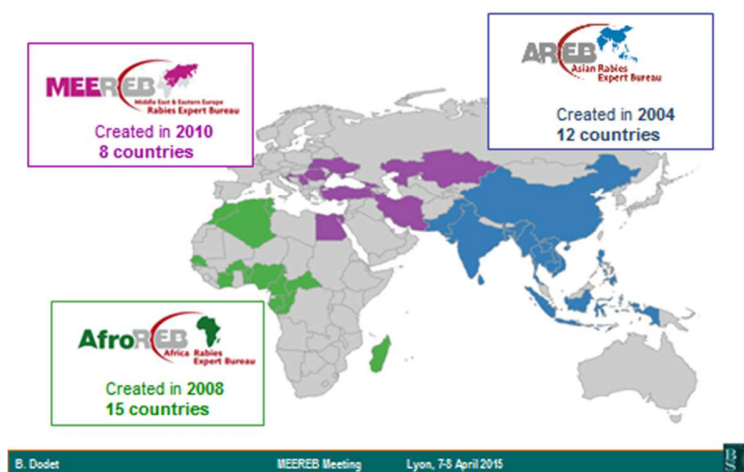
Representatives from 12 countries participated in the meeting, together with representatives of the Pasteur Institute and international organizations: the World Health Organization (WHO), the World Organisation for Animal Health (OIE, for *Office international des Epizooties*), and the Food and Agriculture Organization (FAO).

The meeting, organized by the Fondation Merieux, included formal presentations, discussions, workshops (on rabies pre-exposure prophylaxis, on World Rabies Day and on policy goals) and poster sessions (data on the rabies situation in MEEREB countries).

2. MEEREB: Origin and achievements (Betty Dodet)

The meeting opened with a presentation on the origins and achievements of MEEREB.

After discontinuation of the series of Rabies in Asia meetings organized by the Fondation Merieux with WHO¹, regional networks of rabies experts and champions were established with the support of Sanofi Pasteur. The first one, the Asian Rabies Expert Bureau (AREB), was established in 2004, the African Rabies Expert Bureau (AfroREB) in 2008, and MEEREB in 2010.



The objective of these networks was to improve rabies control and prevention in related countries through shared experiences, advocacy and implementation of state-of-the-art knowledge in practice. These networks met regularly to review the situation in their own countries, discuss practical issues,

¹ The last meeting of this series was in 2001

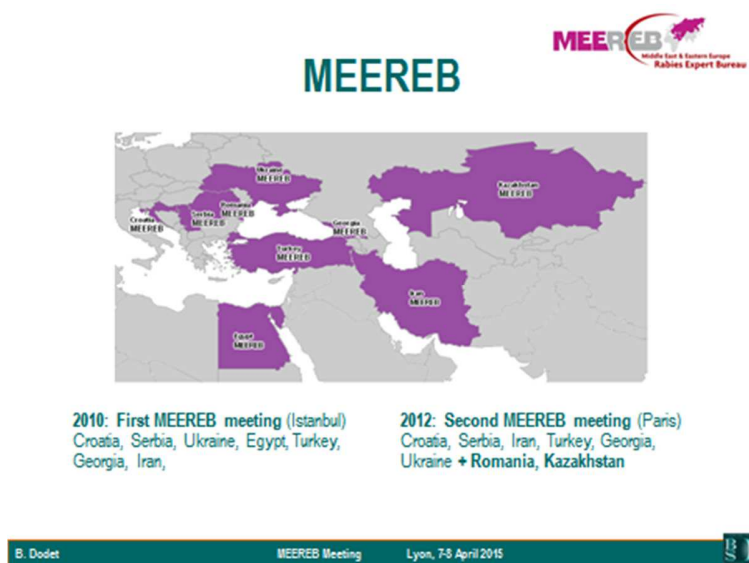
including implementation of the WHO recommendations to the specific regional situation and defining the best practices in regional and local situations. The role of these regional groups in rabies prevention and control has been recognized by WHO [Technical Report, 2013].

The three networks have played an important role in defining the best practices at regional and local levels, in rabies advocacy and awareness and are actively involved in World Rabies Day.

These regional networks of rabies “champions” have developed links at regional level, but also with the global rabies community through the Global Alliance for Rabies Control [GARC, 2010], and through participation of representatives of these networks in international conferences: Rabies in the Americas (RITA), and in WHO Consultations and Technical Meetings on Rabies.

They have participated in the GARC Survey on rabies notifiability [Taylor et al, 2015] and in the recent reevaluation of the global burden of endemic canine rabies [Hampson et al, 2015]. MEEREB, and the other –REB networks also participated in the mapping of the animal bite treatment centers/rabies prevention centers with the International Society of travel Medicine.

The MEEREB group met for the first time in Istanbul (Turkey) in June 2010, with representatives from Croatia, Egypt, Georgia, Iran, Serbia, Turkey, and Ukraine. Its establishment and objectives were announced at a press conference (that also aimed to raise rabies awareness in the host country), and in an international publication [Aylan et al, 2011]. For the second MEEREB meeting, in Paris (France), representatives from Romania and Kazakhstan joined the network. In conclusion of the meeting, they agreed that elimination of human rabies could be achieved in the entire region, requiring political willingness and cooperation of all stakeholders, including the Ministries of Health and of Agriculture, adequate management of animal bites through PEP using appropriate rabies immunobiologicals, pre-exposure prophylaxis for those at high risk of exposure, animal vaccination and control of free roaming dog populations. Dog and wild animal vaccination through well planned campaigns would have a significant benefit for public health, and for strengthening the structure needed for control of other zoonoses [Aikimbayev et al, 2014].



3. A new input for an inter-regional network

Further to the recommendation by WHO that these groups, because of their increasing role in rabies control, could no longer be sponsored by one company, it was decided that AREB and AfroREB would merge with GARC, while MEEREB would include North African countries and be coordinated by Fondation Mérieux. Additional countries were invited to join MEEREB: Libya, Iraq, Tajikistan and Uzbekistan.

MEEREB can now be considered as an 'inter-regional' network, as it links participants from North Africa (Morocco, Algeria, Tunisia, Lybia), Europe (Serbia, Croatia, Bulgaria), Eastern Europe (Ukraine, Georgia), the Middle East (Iran, Iraq), and Central Asia (Kazakhstan, Uzbekistan, Tajikistan).

4. Update on research: Perspectives on rabies therapies (Noel Tordo)

There is currently no specific treatment for rabies infection. Though a small number of people have survived rabies, the disease is usually fatal.

Great hope was placed in the Milwaukee protocol, an experimental course of treatment that was applied to Jeanna Giese, a young girl who survived and recovered from rabies. The treatment involved putting the patient into a chemically-induced coma and administering antiviral drugs. This protocol was based on the fact that rabies virus induces neural dysfunction, presumably in synaptic transmission, but no brain cell destruction. Ketamine was used, as it is an antagonist of NDMA receptors with antiviral activity. Antivirals that had proven effective in other viral diseases were also administered.

However, the role of the treatment is still under discussion, as several attempts to reproduce these results have not been successful [Hemachudha et al, 2006; 2015], and the reasons for Giese's survival under the Milwaukee protocol remain controversial. The patient might have been infected with a particularly weak form of the virus, or being bitten in a site far from the brain provided her immune system sufficient time to fight the virus. When admitted to the hospital, no live virus, only antibodies, could be isolated from her body.

More experimental work is needed in order to identify specific anti-rabies molecules that inhibit virus entry or replication. Two main strategies are used: a combinatory approach, using high throughput screening assays on libraries of molecules, and the design of molecules based on known functional interactions.

Among the candidate molecules, Dermaseptins (antimicrobial peptides derived from frog skin) have been identified as potential candidate molecules preventing virus entry.

5. Rabies situation in MEEREB countries (Posters + oral presentations)

Detailed information on the rabies situation is available in posters and presentations provided by the country representatives. This section aims to give a broad overview of the situation, and highlight the similarities and differences between the countries.

Rabies is a notifiable disease in all MEEREB countries present at the meeting. However, the quality of reporting may vary according to countries.

The rabies situation varies between countries. According to the data presented by MEEREB participants, rabies incidence varies from 0 to 0.8 case per million population (Table 1). A few countries with good surveillance systems have reported no human cases, and are conducting oral vaccination campaigns to eliminate rabies in wild animals (red foxes).

Post-exposure prophylaxis (PEP) is provided free of charge in all but one MEEREB countries. However, in many countries where rabies awareness is low, many bite victims receive incomplete schedule.

Pre-exposure prophylaxis (PrEP) is administered to at risk professionals and travellers. Only cell culture vaccines are used and administered IM, according to the Zagreb or Essen protocol, except in Algeria where vaccines prepared on nerve tissue are still produced and used.

RIG are administered according to WHO guidelines, according to the severity of exposure. Locally produced HRIG are used in Serbia.

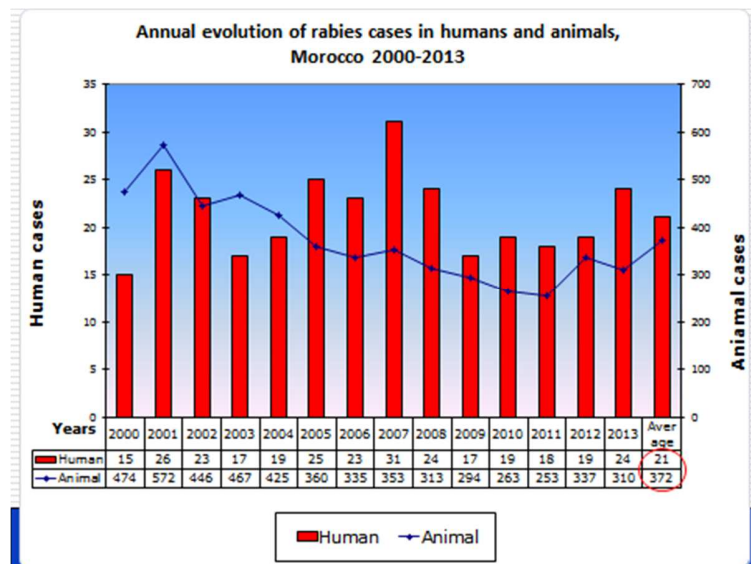
MEEREB countries have established or are currently establishing One Health programs for rabies control and elimination; however implementation of these programs is an issue in many countries.

East European countries (Croatia: Radovan Vodopija; Serbia: Nenad Vranješ; Romania: Alexandru Rafila): No human rabies cases have occurred in the three *European countries* represented at the Lyon meeting (Table 1 & Table 2) during 2013-2015. Indeed, *Croatia and Serbia* have recorded no human deaths from rabies for more than 30 years. Rabies is still present in wildlife (red fox). Campaigns of oral rabies vaccination (ORV) are carried out with the support of the European Union (EU)² to eliminate rabies in foxes. In *Croatia*, only one fox out of 4,488 examined animals was proven to be rabid. In *Serbia* and Montenegro, the number of notified animal rabies cases has been decreasing sharply (245 in 2001 down to 3 in 2014) since the introduction of oral vaccination of foxes. The situation in *Romania* much improved during the last decade, with no human rabies cases since 2011, although rabies is still present in both the dog and wildlife. The rabies control program includes compulsory vaccination of dogs and oral vaccination campaigns supported by the EU to eliminate rabies in wildlife (Table 2).

North Africa (Algeria: Abderazak Soufi; Morocco: Abdelaziz Barkia; Tunisia: Ichraf Zaouia, Samy Khoufi, Habib Kharmachi) (Table 3): The main rabies vector and transmitter is the dog, with spillover to cattle, which has economical consequences. Human cases still occur, with the incidence varying from 0.2 (Algeria and Tunisia) to 0.6 per million (Morocco), while PEP is administered to 150 (Morocco)-400 (Tunisia) /100 000 population, free of charge (Table 2). However, a large percentage of patients do not complete the vaccination schedule. While Tunisia and Morocco only use cell culture vaccines, Algeria still produces NTV that is used in 1/3 PEP. Dog vaccination campaigns are organized, but reach from 25% to 60% of the dog population, which is insufficient to break the transmission chain in dogs [WHO, Fact Sheet N°99, Updated September 2014]. Rabies awareness in the population is low.

² The European Union has also been supporting ORV in Turkey, with limited success

Morocco has a long history of rabies and fight against rabies. A national program was established in 1986, and revised in 2003. Vaccine is available at no cost for patients in 263 rabies prevention centres. However, rabies is a persistent public health problem as it still kills around 20 people every year, in spite of the existence of a multi-sectoral system with availability of resources and working documents. This situation could be explained by a low awareness, incomplete PEP and low vaccination coverage in dogs.



Eastern Europe (Ukraine: Vitalii Nedosekov; Georgia: Paata Imnadze), the Middle East (Iran, Iraq), and Central Asia (Kazakhstan: Alim Aikimbayev; Tajikistan: Firuz Davlyatov): Rabies is endemic in both wild and domestic animals, with an incidence in humans from 0.05 per million (Iran) to 0.17/million (Kazakhstan) to 0.9/million (Georgia) inhabitants (Table 3).

The rabies situation is relatively controlled in Iran thanks to efficient PEP treatments, while it is endemic in dogs as well as wild animals. Georgia and Tajikistan (with 3-4 and 7 annual cases, respectively) have the highest incidence of human rabies deaths (0.8 per million). The same reasons as in North Africa explain the rabies epidemiology: low vaccination coverage in dogs, low rabies awareness, incomplete PEP.

Georgia has the highest incidence of human rabies and of rabies post-exposure prophylaxis, with 1 000 PEP/100,000 population. Almost half (29) of the rabies cases in humans (60) in 2001-2011 were related with the pets (41 dogs, 3 cats); and approximately 80 % of admitted patients were exposed by pets and $\frac{3}{4}$ of other exposures are related with stray dogs. The number of reported admissions for treatment following exposure or suspected exposure to potentially rabid animals has increased each year since 2000, along with an increase of discontinued PEP. The possible reasons of this might be related with increasing of awareness by communication campaigns: In 2014 that Ministry of Agriculture and the Ministry of Labor, Health and Social affairs elaborated joint

approach in fighting against Rabies and prepared the “Decree of the Government of Georgia on measurements to be implemented for prevention of Rabies in 2014-2018”.

6. International organizations for a One Health approach against rabies (Bernadette Abela-Ridder, Gyanendra Gongal, Alain Dehove)

WHO, OIE and FAO unite to call for rabies elimination through a One Health approach. They promote human rabies prevention through the elimination of rabies in dogs as well as a wider access to and use of post-exposure (PEP). Rabies control requires collaborative, cross-sectoral efforts of human and animal health systems and a multidisciplinary approach that considers the complexities of the ecosystems where humans and animals coexist. Preventing and mitigating their occurrence in humans requires control and, where feasible, elimination of the diseases in their animal reservoirs.

For at least three decades, *WHO* has fought to break the "cycle of neglect" affecting rabies prevention and control, particularly in low- and middle-income countries through advocacy, surveys and studies and research on the use of new tools. *WHO* provides international guidelines and standards, recommendations and policies on rabies prophylaxis and for rabies control and elimination (see Box) (a list of recent relevant publications is given – Table 6). It is collecting, processing and mapping rabies data globally, advocating for rabies prevention and control, and supporting the development of regional strategies and initiatives. It also coordinates a network of *WHO* Collaborating Centres for Reference and Research on rabies.

OIE defines the intergovernmental standards. The *OIE Terrestrial Animal Health Code* (the *Terrestrial Code*) sets out standards for the improvement of animal health and welfare and veterinary public health worldwide. The health measures in the *Terrestrial Code* should be used by the Veterinary Authorities of importing and exporting countries to provide for early detection, reporting and control agents that are pathogenic to animals or humans, and to prevent their transfer via international trade in animals and animal products, while avoiding unjustified sanitary barriers to trade (Table 7).

The *Manual of Diagnostic Tests and Vaccines for Terrestrial Animals* (*Terrestrial Manual*) provides internationally agreed diagnostic laboratory methods and requirements for the production and control of vaccines and other biological products, including for rabies.

The principal target readership is laboratories carrying out veterinary diagnostic tests and surveillance, plus vaccine manufacturers and regulatory authorities in Member Countries (Table 7).

Considering that rabies elimination is an achievable target, *WHO* established a roadmap with targets for 2020 for Latin America, South-East Asia and the Western Pacific Region [WHO, 2012].

Prevention: WHO Roadmap for rabies

Elimination as a public health problem

Elimination	Targets and milestones by 2015	Targets and milestone by 2020
Rabies	Established regional elimination in Latin America	Human and dog rabies free status maintained and the incidence of human bat-mediated rabies reduced in Latin America
	Coordinated regional programmes in South-East Asia and Western Pacific regions	Regional elimination in South-East Asia and Western Pacific regions, with sustainability ensured



Slide presented by B. Abela-Ridder

Vision of the world of rabies by 2020

Objective	2015	2020
Reduce the burden of human dog mediated rabies	In western Europe: Freedom from carnivore rabies maintained	Western Europe remains free of terrestrial rabies
	In Latin America: Human and dog rabies eliminated	Human and dog rabies free status maintained and incidence of human bat-mediated rabies reduced in Latin America
	In WHO South-East Asia and Western Pacific regions: Coordinated regional programmes established	Human rabies eliminated in the SEA Region and endemic countries of WP Region and sustainability ensured

Slide presented by G. Gongal

7. Post-exposure prophylaxis (WHO guidelines – B. Abela-Ridder)

Post-exposure prophylaxis (PEP) is possible because the exposure event, usually a dog bite, is easily identifiable, and the incubation period is usually long enough for vaccination to induce a protective immune response before the rabies virus reaches the central nervous system.

PEP should be initiated as soon as possible after exposure; it consists of local treatment of the wound to remove the rabies virus at the site of the infection; a course of potent and effective rabies vaccine; and the administration of rabies immunoglobulin in case of category III exposure.


Category of exposure	Description	Post-exposure prophylaxis
Category I	Touching or feeding animals, licks on intact skin, contact of intact skin with secretions or excretions of rabid animal or person	Not regarded as exposures, therefore no PEP required
Category II	Nibbling of uncovered skin, minor scratches or abrasions without bleeding	Vaccine should be injected as soon as possible
Category III	Single or multiple transdermal bites or scratches, licks on broken skin, contamination of mucous membrane with saliva from licks and exposure to bats.	Vaccine and rabies immunoglobulin should be administered at distant sites as soon as possible. Immunoglobulin can be administered up to 7 days after injection of the first dose of vaccine

Slide B. Abela-Ridder

Vaccines: Since their development more than 4 decades ago, concentrated and purified cell-culture and embryonated egg-based rabies vaccines (here jointly referred to as CCVs) have proven to be safe and effective in preventing rabies. Nerve tissue vaccines (NTVs) induce more severe adverse reactions and are less immunogenic than CCVs a rabies vaccines and are NOT recommended. It is therefore imperative that production and use of nerve-tissue vaccines be discontinued as soon as possible and replaced with CCEEVs. [WHO position paper 2010].

Post-exposure prophylaxis (PEP)

- Prophylaxis should be instituted immediately.
 - If possible, the suspect animal should be identified, quarantined for observation (for 10-14 days) or euthanized for laboratory examination.

Post-exposure vaccination (no previous vaccination)	
Intramuscular	Intradermal
1. A five-dose schedule: one dose on days 0, 3, 7, 14 and 28 1-1-1-1-1	Thai Red Cross regimen injections of 0.1 ml of vaccine at two different intradermal sites on each of days 0, 3, 7 and 28 2-2-2-0-2 
2. A four-dose schedule: two doses on day 0 followed by one dose on days 7 and 21. 2-0-1-0-1 or 2-0-1-1-0	

Slide presented by B. Abela-Ridder

All MEEREB countries use CCVs, except Algeria that still produces and uses NTVs. According to the Algeria representative, 30,540 patients received NTV in 2014.

MEEREB countries use mostly WHO prequalified vaccine ^{3,4};

³ WHO prequalified vaccines: Chiron-Behring, GSK (previously Novartis), Sanofi Pasteur, Serum Institute of India, Zydus Cadila

Several PEP vaccination schedules exist. WHO promotes a wider use of the intradermal route for PEP which reduces volume and thereby the cost of cell-cultured vaccines. This schedule has been successfully implemented in Asia, where animal bite treatment centres receive daily a large number of patients. Practical considerations for introduction of ID vaccination have been published by AREB [AREB, 2006].

All MEEREB countries use the IM route for rabies vaccine administration, either the 4-dose Zagreb regimen, or the 5-dose Essen regimen. A 5-dose regimen is used in Iraq, with a sixth dose optional. Ukraine and Tajikistan use a 6-dose Essen regimen.

PEP is free of charge for bite victims in all MEEREB countries represented at the meeting, except Tajikistan, where patients have to pay for PEP; it is free of charge only for 3% of children under 14 who reside in Dushanbe City.

Rabies immunoglobulin (RIG): Rabies immunoglobulin should be administered in all bite victims with category III exposure and to those with category II exposure who are immunodeficient, in order to provide immediate antibodies at the rabies inoculation site until the patient's immune response is fully protective. Three classes of biological product are available for passive immunization: human rabies immunoglobulin (HRIG), equine rabies immunoglobulin and highly purified F(ab')₂ fragments produced from equine immunoglobulin (ERIG).

Rabies immunoglobulins are in short supply throughout the world. New technology may lead to use of monoclonal antibodies in post-exposure prophylaxis. Rabies monoclonal antibodies, a possible alternative to HRIG and ERIG are in human clinical trials (Slide 12 from B. Abela-Ridder's slide set).

MEEREB participants did not report shortages in RIG as an issue in their countries. Serbia produces and uses HRIG.

8. Pre-exposure prophylaxis (B.Abela-Ridder, Anvar Rassouli, Alexia Kieffer)

Pre-exposure prophylaxis (PrEP) for people who are at risk of exposure to lyssaviruses because of their job, residence or travel is strongly recommended by WHO [WHO, 2013]: "PrEP is recommended for anyone who will be at continual, frequent or increased risk of exposure to the rabies virus, either as a result of their residence or occupation, such as laboratory workers dealing with rabies virus and other lyssaviruses, veterinarians and animal handlers. Travellers in high-risk areas should be vaccinated after a risk assessment. Children living in or visiting rabies-affected areas are at particular risk and should be given pre-exposure prophylaxis on an individual basis or in mass campaigns when there are no economic, programmatic or logistical obstacles" [WHO, 2013].

⁴ Ukraine uses both prequalified rabies vaccines, Kovak vaccine (Mikrogen) and Indirab (Bharat Biotech); Kazakhstan uses Indirab.

Indeed, bites to travellers by potentially rabid animals are relatively frequent: the estimated incidence is 0.4% per month of stay, according to a meta-analysis of $\approx 1,270,000$ travellers [Gautret et al, 2015].

PrEP can be a viable strategy in diminishing the number of rabies deaths, especially those resulting from unapparent or unreported exposures (which is often the case for children), and delayed or incomplete post-exposure prophylaxis. It does not obviate the need for PEP after an exposure to rabies, but it reduces the number of required vaccine doses and clinic visits: two booster doses provide a rapid and appropriate immune response, thus eliminating the need for RIG.

The Philippines have introduced pre-exposure vaccination of school-children in highly endemic areas where rabies incidence exceeds 2.5 human rabies cases per million population, as part of a comprehensive program for rabies elimination. Vaccinating schoolchildren has the advantage of being adapted to ID vaccination, as it can be programmed, and therefore vaccine wastage can be avoided.

In MEEREB countries, PrEP is administered by the IM route and provided of charge to professionally exposed individuals (paid by the government or the institution).

Although the rabies incidence in MEEREB countries does not justify implementation of PrEP in children, consideration should be given to this approach from an economical point of view in countries where the number of PEP is extremely high.

9. Eliminating rabies in dogs

The most cost-effective strategy for preventing rabies in people is by eliminating rabies in dogs through vaccination. Vaccination of dogs has reduced the number of human (and animal) rabies cases in several countries, particularly in Latin America and some areas in Asia (Bohol, Bali, Sri Lanka) and in KwaZulu Natal (South Africa).

Considerable progress has been made in the production of rabies vaccines whether live or inactivated for animal use during the past two decades with the increasing use of continuous cell lines as a substrate and adoption of the fermentor technology for antigen production. These vaccines are produced for administration to domestic animals or wild species by parenteral or oral routes according to vaccine characteristics [WHO, 2013].

9.1 Dog vaccination campaigns (Florence Cliquet)

Mass parenteral vaccination of dogs is the most successful method for control and possibly elimination of dog-mediated rabies [WHO, 2013]. Vaccinating at least 70% of dogs in endemic areas breaks the cycle of transmission in dogs and to humans, thereby preventing rabies in humans most efficiently.

To be successful, dog vaccination campaigns have to be carefully prepared and organized. Prerequisite for defining the strategy of vaccination programs and requirements for their implementation have been listed (Cliquet's slides 8-12).

Campaigns use parenteral vaccination at central points, where owned dogs are brought by their owners. It requires the involvement of local authorities, as well as participation of the population.

House to house (door-to-door) parenteral vaccination is intended for owned dogs that are less accessible (aggressive dogs and dispersed community dogs).

These strategies allow for combining rabies vaccination with vaccination against other diseases and for identification of vaccinated dogs (plastic collars or colored tags; dog vaccination card/certificate)

To obtain the 70% dog vaccination coverage, it is necessary to vaccinate puppies and newborns; to conduct two vaccination campaigns annually, during appropriate periods. Performing mass vaccination during weekends or school holidays can improve the turnout as children often bring their dog.

Oral vaccination can be considered for dogs that cannot be restrained or caught.

To be sustainable, rabies control programs based on mass vaccination of dogs should be integrated in a multiannual project of rabies elimination according to the One Health concept.

The importance of GARC, PRP, and Rabies Elimination Demonstration Projects was highlighted: *The Blueprint* (that was presented as a preview during the first MEEREB meeting) includes all practical advice and resources necessary for rabies control workers to implement effective control strategies in their areas. It has been translated into several languages and can be downloaded from the Internet (<http://www.rabiesblueprint.com>).

9.2 The OIE Vaccine Bank (A. Dehove)

Countries embarking on eliminating rabies in dogs require easy access to quality-assured dog vaccines for planned campaigns and outbreak management.

The World Organisation for Animal Health (OIE) has established Regional Vaccine Banks for Rabies in Asia (2011) and in Africa (2014) in cooperation with WHO and FAO, with funding from the European Union, Australia, France, Singapore, and the Swiss Tropical and Public Health Institute.

The vaccine bank is a rolling stock of injectable rabies vaccines produced when needed and delivered by the vaccine supplier (selected through an international call for tender) to beneficiary countries upon official request from their veterinary services. Priority is given to providing emergency vaccines to developing countries with the lowest GDP within the region that have no immediate access to high quality vaccines.

Countries have to provide justification on the need for rabies vaccines, as well as information on the logistics, financial and administrative framework of the vaccination campaign. They also have to provide updates and progress reports.

10. Tools for rabies control

10.1 The stepwise approach towards rabies elimination (Katinka De Balogh)

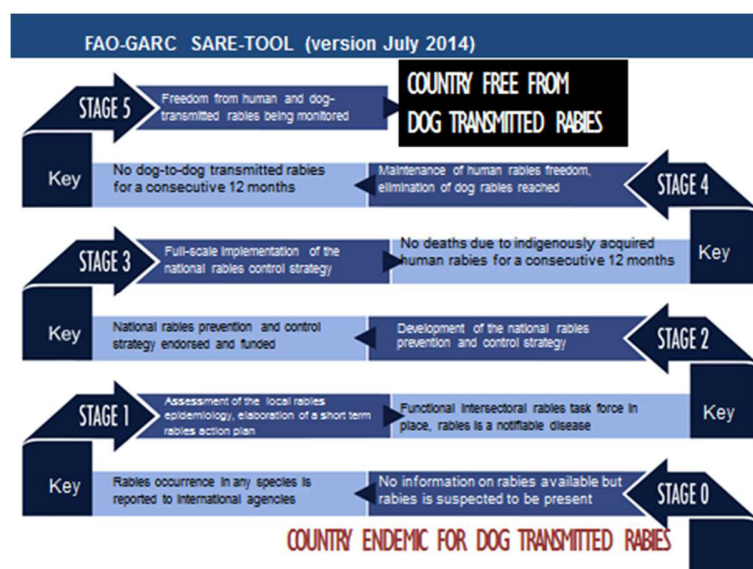
In response to the identified need to assist member countries in developing their action plans and identifying milestones in the prevention of rabies, FAO developed a stepwise approach to rabies elimination that is linked to the rabies Blueprint, and provides a practical tool for all countries.

This approach includes 6 stages to move from endemic to free from human rabies transmitted by dogs, and a list of achievements (keys) and a checklist of activities and achievements to determine where main efforts are needed.

I
Checklist on activities and achievements to determine where main efforts are needed:

Topic	Activities & achievements	NO	YES, available	YES, functional	Blueprint or other links
LEG	Is there a legal framework for rabies available at national level?				3.2. Legislation
LEG	Has a work plan for updating the legal framework on rabies been proposed?				3.2. Legislation
LEG	Is rabies a notifiable disease in humans?				3.2.3-Why-does-rabies-need-to-be-notifiable , 2, 5
LEG	Is rabies a notifiable disease in animals (at least in dogs)?				3.2.3-Why-does-rabies-need-to-be-notifiable , 2, 5
LEG	Is there a case definition on human rabies?				2, 5
LEG	Is there a case definition for rabies in dogs?				2, 5
LEG, IEC	Has this case definition been disseminated to relevant professionals?				2. Roles-and-Responsibilities
LAB	Has laboratory capacity for rabies diagnosis been established?				3.1.8 Minimum laboratory requirements , 6,
LAB	Is rabies diagnostic capacity available in at least one national laboratory?				3.1.8 Minimum laboratory requirements , 6, Laboratory biorisk management /
LAB	Has there been any capacity building for laboratory personnel in approved rabies laboratory methods?				3.1.3 Personnel-surveillance
DCA	Are animal bite events recorded and documented?				5.3.1-Rabies-surveillance
DCA	Are dog bite events recorded and documented separately?				5.3.1-Rabies-surveillance
DCA	Are there mechanisms for reporting of suspect rabies cases?				5.3.1-Rabies-surveillance , e

Slide 9 presented by K. de Balogh



Slide 10 presented by K. de Balogh

10.2 The GARC education program (Louis Nel)

The GARC Education Program is a web domain where various online courses will be hosted. Some courses will be open to all participants, while others will be for specific professions. To date, one course (the Rabies Educator Certificate) has been developed and is available on the website: <http://education.rabiesalliance.org>

GARC developed the Rabies Educator Certificate (REC) program in response to the need for a widespread mechanism to raise public knowledge regarding rabies and rabies prevention. It is a free online course for community educators, public health workers and anyone interested in learning how to prevent rabies in their communities. Its aim is to teach participants about rabies, how it is caused, how it can be prevented, and how to communicate this life-saving information to people in their community.

This online course has five modules. Each module contains specific and clear information that should be applicable to all situations, regardless of geographical location and circumstances. Participants are taught how to prevent rabies once a bite case has occurred; how to prevent bite cases (preventing additional cost expenditure); about responsible pet ownership, and about vaccination.

On passing a final online assessment, participants receive a certificate of achievement and should be ready to provide life-saving information to their target communities.

The course is currently in English, but will be translated into other languages, including French and Spanish. Other courses are planned that will cover specific rabies-related information and the One Health approach targeted to animal handlers (under development), veterinarians and physicians.

11. Next steps

11.1 Preparation of World Rabies Day

The World Rabies Day (WRD) which takes place annually on September 28th – in memory of Louis Pasteur's death - , was launched in 2007 and was the first global initiative to increase rabies awareness. It began as a single day of action and has evolved into a year-round initiative to mobilize governments to support rabies prevention programs. It is now included on the United Nations website of annual health days, and is supported by international health agencies, rabies experts, NGOs, private and public organizations, and local champions working to improve rabies prevention in their own communities. The global participation continues to grow each year.

MEEREB countries have organized special events for World Rabies Day. A workshop was organized during the meeting to exchange experience and make suggestions for events to be conducted for the next World Rabies Day.

11.2 Policy goals: Development and implementation of comprehensive multisectoral programs

One of the main challenges for MEEREB countries is to develop / improve and effectively **implement** integrated, multisectoral strategies for prevention and control of rabies, according to the One Health approach.

For *Croatia, Serbia and Romania*, main efforts aim to control rabies in foxes through oral vaccination campaigns, with the objective to be free of terrestrial rabies.

Countries where dog rabies is still present have to focus on increase dog vaccination coverage and dog population control.

In addition several countries (Algeria, Iran, Serbia, Kazakhstan) have listed updating the national recommendations on PEP in accordance with international standards as one of their priorities. Algeria aims at eliminating urban animal rabies as a first step. No commitment was taken to phase out nerve tissue vaccines.

MEEREB will continue to support countries in their fight against rabies, and act as a think tank, where country can share data, , information, experience and best practices to jointly address challenges in rabies control and prevention, through:

- Fostering networking amongst local actors, member countries and international organizations;
- Promoting one health inter-sectoral collaboration;
- Increasing awareness and commitment through knowledge sharing and exchange of experiences of decision-makers, the communities and other related local actors.

Activities punctually supported by MEEREB and participating countries between meetings are as following:

1. Establishing a baseline assessment of country situations (through questionnaires, data country reports etc.);
2. Mapping interventions
3. Identifying gaps & priorities;
4. Revising established action plans and supporting capacity building for their implementation;
5. Promoting dissemination of knowledge and rabies resources (Ex: stepwise approach, rabies certificate, WRD.....)

References

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Table 1.- Classification of participating MEEREB countries according to rabies incidence in humans

Source: data presented at the 3rd MEEREB meeting in Lyon, France (data for 2014)

0 human rabies death	<0.1 rabies death per million	0.1-0.5 rabies death per million	0.5 – 0.9 rabies death per million
Croatia			
Serbia			
Romania			
	Iran: 0.05		
	Ukraine: 0.09		
		Kazakhstan: 0.17	
		Algeria: 0.20	
		Tunisia: 0.27	
		Iraq: 0.30	
			Morocco:: 0.63
			Georgia: 0.8
			Tajikistan: 0.8

Table 2.- Rabies epidemiology and management in Eastern Europe as presented at MEEREB 2015

	Year	Croatia	Serbia	Romania
Main vector		Red fox	Red fox	Dog, fox
Human population ⁵ (2013)	2013	4.25 million	7.16 million	19.98 million
N° human rabies deaths (incidence per million)	2014	0	0	0
N° patients who received PEP	2014	1 414 (33.2/100,000) IM – 4-dose Zagreb & 5-dose Essen schedule	833 (11.6/100,000) IM – 4-dose Essen schedule	6 213 (31.1/100,000) IM – 4-dose Zagreb schedule
N° patients who received RIG	2014	77	489 (HRIG) Free of charge	544
N° PrEP	2014	185	60 People at risk, free of charge	
	2013			
N° rabies prevention centers		21	27	41
N° notified animal cases	2014	confirmed case in dog	3 foxes in 2014	142 (wild + domestic) 41 (domestic animals)
	2013	confirmed case in horse		628 (wild + domestic) 128 (domestic animals)
N° dogs vaccinated		349 622 ompulsory vaccination of owned dogs	86 149 Compulsory vaccination of owned dogs	Compulsory vaccination of owned dogs
		ral vaccination of foxes	Oral vaccination of foxes	Oral vaccination of foxes

⁵ World Bank data

Table 3.- Rabies epidemiology and management in North Africa - MEEREB 2015

		Algeria	Morocco	Tunisia
Reservoir and vector		Dog	Dog	Dog
Human population ⁶	2013	39.21 million	33.01 million (33.85 in 2014)	10.98 million
Number of human rabies cases/deaths (Calculated incidence per million)	2014	8 (0.20) 1/8 laboratory confirmed	21 (0.63)	3 (0.27) all laboratory confirmed
	2013	22 (0.56)	24 (0.72)	6 (0.55) 7
Number of patients who received PEP	2014	86 191 (CCV) - 30 540 (NTC) IM, Zagreb & Essen - (298/100,000)	51 892 CCV – IM (153/100,000)	~ 41 000 CCV - IM, Zagreb & Essen (482/100,000)
	2013	20% of exposed people		ERIG~ 20 000 vials/year = 30% of PEP (free of charge)
N° patients who received RIG	2014			ERIG~ 20 000 vials/year = 30% of PEP (free of charge)
N° rabies prevention centers		1258	263	360
N° PrEP	2014			Laboratory staff- Staff of dog vaccination
N° reported animal rabies cases	2014	Not available	325/year	476
N° dogs vaccinated	2014	22 158 (dogs and cats)	169970 /year (25%)	426 000
	201			419 546 (50%-60% of dog population)

⁶ World Bank data

Table 4.- Rabies epidemiology and management in the Middle East/Eurasia as presented at MEEREB 2015

	Year	Ukraine	Georgia	Kazakhstan	Tajikistan	Iran	Iraq
		Dog and wild animals	Dog, cat, (jackal, wolf) cattle	Wild & domestic animals	Dog, wolf, jakal	Dog, wild animals	
Human population ⁷	2014	44 million	4.9 million	17.2 million	8.5	79	35
N° human rabies deaths (incidence per million)	2014	4 (0.09) All lab. confirmed	4 (0.8) All lab. confirmed	3 (0.17)	7 (0.8) Clinically diagnosed	4 (0.05)	10 ² (0.3) No lab. confirmation
N° patients who received PEP	2014	24,000 (54.5/100,000) IM 6-dose Essen	47,267 (965/100,000) IM 5-dose Essen	299,436 (1,741/100,000)	8,880 ⁸ (105/100,000) 6-dose IM	153,297 (195/100,000)	15,455 (45/100,000)
N° patients who received RIG	2014	3 000	10 063 (2 241.7)	240,129 (1396/100,000)	-	31 000 (400.25/million)	N/A (No RIG?)
N° PrEP	2014	50		61 464	0		
	2013					2 674	
Rabies prevention centers		976	90	-	74		18
N° cases in animals /dogs	2014	1,072 /299	119 /62	163 /140	100 (domestic animals)	286 (out of 446 tested)	
Dogs vaccinated	2014	3.9 million	236 901	-	110 170 (92%) ⁹	450,000 (30%)	
	2013			-	103 615 (100%) ⁴		

⁷ World Bank data

⁸ 66% of bitten patients

⁹ "92% of planned domestic animals to be vaccinated"

Table 5.- Classification of participating MEEREB countries according to the number of PEP reported to the country population

Source: data presented at the 3rd MEEREB meeting in Lyon, France (data for 2014)

Croatia (32)	Tajikistan (105)	Georgia (965)
Serbia (12)	Morocco (153)	Kazakhstan (1700)
Romania (31)	Iran (195)	
Ukraine (55)	Algeria (298)	
	Tunisia (482)	

Table 6.- WHO publications related to rabies

Second WHO report on NTDs 2014 http://www.who.int/neglected_diseases/en	<ul style="list-style-type: none"> – Defines concept of control, elimination and eradication – Analyzes challenges at country level – Emphasizes improvement of coordination and integration at country level – Highlights strengthening of country level capacity – Focuses on working with other sectors such as education, agriculture and veterinary public health
Third NTD report http://www.who.int/neglected_diseases/en/	Analyses of the investments needed to achieve scale up of implementation required to achieve the targets of the WHO Roadmap on NTDs and universal cove
Rabies facts in short Fact Sheet N°99 – Updated September 2014	http://www.who.int/mediacentre/factsheets/fs099/en/
WHO. Rabies vaccine: WHO position paper WER, 2010, 85, pp 309-320	http://www.who.int/wer/2010/wer8532/en/
Accelerating work to overcome the global impact of neglected tropical diseases. A roadmap for implementation. WHO Geneva, 2012	– http://www.who.int/neglected_diseases/NTD_RoadMap_2012_Fullversion.pdf?ua=1
WHO Expert Consultation on Rabies. Second Report. WHO Technical Report Series 982, 2013	http://apps.who.int/iris/bitstream/10665/85346/1/9789240690943_eng.pdf
Guide for post-exposure prophylaxis	http://www.who.int/rabies/human/postexp/en/
WHO guide for rabies pre- and post-exposure prophylaxis in humans (revised 15 June 2010)	http://www.who.int/rabies/PEP_prophylaxis_guidelines_June10.pdf?ua=1
Oral vaccination of dogs against rabies	
WHO guidelines for oral vaccination of dogs	http://www.who.int/rabies/resources/guidelines%20for%20oral%20vaccination%20of%20dogs%20against%20rabies_with%20cover.pdf

Table 7.- OIE international standards (rabies)

OIE Terrestrial Animal Health Code http://www.oie.int/en/international-standard-setting/terrestrial-code/access-online/ (English) http://www.oie.int/fr/normes-internationales/code-terrestre/acces-en-ligne/ (French)	
Chapter 8.12.	<ul style="list-style-type: none"> • Case definition: <u>Any</u> animal infected with the Rabies virus (<i>Lyssavirus genus</i>) • Aim: mitigate the risk of rabies to human and animal health • Rabies free country: notification, surveillance, prevention, no rabies cases
Chapter 7.7. Stray dog population	Scope: Control & welfare <ul style="list-style-type: none"> • Responsibilities: public and private • Regulatory framework: vaccination, identification, dog movement, welfare, ownership, etc. • Resources: human, financial, technical, etc. • Control measures: education, reproductive control, capture, environmental, euthanasia, etc. • Monitoring and evaluation dog population
The Manual of Diagnostic Tests and Vaccines for Terrestrial Animals http://www.oie.int/en/manual-of-diagnostic-tests-and-vaccines-for-terrestrial-animals/ (English) http://www.oie.int/fr/manuel-des-tests-de-diagnostic-et-des-vaccins-pour-les-animaux-terrestres/ (French)	
Chapter 2.1.13. Rabies	<i>Quality standards:</i> <ul style="list-style-type: none"> • Diagnostic techniques • Sampling and shipment • Test for the identification of the agent • Serological test • Requirements for vaccines • Minimum standard scientific-based requirements • Supplemented by national and regional requirements • Parenteral vaccination (domestic) • Oral vaccines (wildlife)