



**Global Alliance  
for Rabies  
Control**

The newsletter of The Global Alliance for Rabies Control

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# RABID BYTES

SARE Workshop in Cameroon .....	2
Agnes Korir .....	3
Want A Friend Campaign .....	4
Documenting Rabies Control .....	4
ABTC Records in the Philippines .....	5
A Better Way Forward .....	6
Bat Rabies in Peru .....	7
World Spay Day .....	8
Recent Research .....	8
Upcoming Conferences .....	9

## EDITORIAL

GARC has always sought to fill the gaps that prevent rabies control activities from achieving their best outcomes and to take advantage of partnerships that allow us to do that. In this issue of the newsletter, we see a number of different initiatives that demonstrate how GARC and our partners—from individuals to national governments—are helping to protect communities at risk from the burden of rabies.

[A Stepwise Approach to Rabies Control workshop](#) was recently completed by the Cameroon government with support from GARC as well as the US CDC and Metabiota. Rabies experts from all around Cameroon gathered together to identify areas of rabies prevention that need attention and resources and to prioritise activities will speed up progress towards rabies elimination.

In a similar collaboration, the GARC South African team recently joined a large number of partners in East Africa, using a regional meeting to build capacity in rabies control activities across a number of different countries. In addition, leaders of the rabies control network across Latin America joined the meeting, lending their own experiences from successful rabies control initiatives to support and encourage new programs in Africa. Learning from the successes of others can make the best use of scant resources and to avoid mistakes than can delay future successes.

A series of [documentary videos](#) developed by journalism students from the University of Los Baños in the Philippines spreading awareness about the risk of rabies and ways to control it, but also educated the students themselves. Some of the next generation of journalists now has personal insight into the teamwork between communities and the authorities that is necessary to overcome the challenges of controlling diseases such as rabies in vulnerable communities.

The theme of partnership is also echoed by the article profiling [Dr. Agnes Korir](#), one of this year's winners of the MSD Animal Health World Rabies Day awards. Fulfilling the award's remit to recognise those advocating for change in their communities, this winner is a truly inspirational lady who has turned personal tragedy into hope for so many others through her vaccine donation programs and her unceasing commitment to raising awareness of rabies in Kenya.

We were delighted with the success of our year-end fundraising effort, which, thanks to your support, will allow our partners at Onderstepoort Veterinary Institute to distribute [3,000 copies of our bite prevention booklet](#) to children in rural South Africa.

Lastly, I recently had the privilege of experiencing how [our team in the Philippines works](#) with its many partners firsthand. As we went into meetings, communities and clinics, I met a whole range of people from village leaders to provincial veterinarians to record keepers at the bite treatment clinics to the manager of the national rabies programme and academics. Each has an important role in working towards the Philippines goal of rabies freedom by 2020. Through collaboration, we can problem solve together and come up with better solutions to the challenges we face.

We are all in the fight against rabies together and we all have a role in leading, joining or supporting initiatives wherever we see opportunities to advance our mission to **End Rabies Now**.

*Contributed by Louise Taylor, GARC*

## NEWS FROM GARC AND WRD

### Workshop Evaluates Rabies Control Activities in Cameroon Using the “SARE” Tool

With the global drive towards canine-mediated human rabies elimination by 2030, many countries are planning, developing or refining national control strategies with renewed vigour in an effort to reach freedom from dog-mediated human rabies within the globally agreed timeframe.

Cameroon, a Global Health Security Agenda (GHS) member country, is leading the fight within the central African region and has taken the first critical step towards controlling and eliminating rabies by developing an up-to-date and comprehensive national control strategy. The development of the national strategy for rabies started in September 2016 when all of the governmental stakeholders came together to assess the country's specific needs and requirements. The conclusions of the initial stakeholder meeting in 2016 were built upon during a focused in-country workshop entitled:



Participants at the Workshop held in January 2017

“Workshop focused on evaluating the rabies control activities in Cameroon using the “SARE” tool” (*Atelier d'évaluation de activités de lutte contre la rage au Cameroun à l'aide de l'outil “SARE”*), held on 10 and 11 January 2017.

The in-country workshop, supported by GARC and the US Centers for Disease Control and Prevention (CDC) collaboratively, focused on bringing the national champions from across the country together to complete the “Stepwise Approach towards Rabies Elimination” (SARE) assessment scoresheet for Cameroon. The 23 meeting attendees originated from the Ministry of Public Health, Ministry of Livestock Farming and Animal Industries, the Centre Pasteur du Cameroun and Cameroon-based staff of Metabiota (the in-country partner responsible for managing GHS) encompassing a comprehensive panel of experts.

Over the course of the two-day workshop, the national stakeholders used the SARE assessment scoresheet to evaluate the strongpoints and existing shortcomings of the current rabies situation within the country, while also identifying core activities that will need to be addressed in the national control strategy that is under development. The SARE assessment scoresheet is not intended to replace any existing or developing control strategies, but should be routinely implemented as a monitoring and evaluation tool that 1) assists in self-assessments, 2) the planning of the logical progressive steps and 3) provides a mechanism for the measurement of progress within project sites. The SARE assessment scoresheet is firmly embedded under the Organization section within the Global Framework “STOP-R”.

Additionally, the meeting participants prioritized short-term objectives for the 2017 – 2018 period to ensure continued progress towards controlling and eliminating rabies.

These 7 short-term activities included the following:

1. Reviewing the country's legal framework in order to determine its appropriateness
2. Submitting animal or human samples biannually to an international laboratory for diagnostic confirmation
3. Designing and implementing a comprehensive Information, Education and Communication (IEC) plan for a selected pilot area within the country
4. Undertaking consultations with stakeholders in order to develop humane canine population management strategies
5. Ensuring that the existing intersectoral working groups and committees on rabies meet at least twice a year
6. Establishing mechanisms whereby emergency funds can be mobilized in the event of identified rabies outbreaks
7. Establishing a coordinated surveillance system for human and animal rabies within the country

At the end of the workshop, the current SARE score was identified for Cameroon. The SARE assessment scoresheet indicates that Cameroon is officially on Stage 1,5, which is in line with a country that is developing a national control strategy (a Stage 2 milestone). With the strong linkage between the SARE assessment scoresheet and the rabies blueprint (BP) the prioritized activities in Cameroon can be addressed in a concise and efficient manner, thereby ensuring the rapid progression of the control and elimination of rabies in Cameroon.

Contributed by Andre Coetzer of GARC who coordinated the SARE assessment during in the workshop.



To share what inspires those involved in the effort to eradicate rabies, we are taking a closer look at the work and the lives of some of the winners of the World Rabies Day MSD Animal Health Award from 2016.

## Rabies Victim Lives on through Her Mother's Dedication

While harvesting guavas with her cousins during the Christmas holidays, Sharon Korir, an 8-year old Kenyan girl, was bitten by a stray dog, which first chased her and then attacked her, leaving a small scratch on her back. Her parents took Sharon immediately to the hospital, but the child was released after just a topical cleansing of the wound. No one thought the bite was too serious because the injury was so small. Three weeks later, after Sharon had returned to school, she became severely ill and her condition continued to deteriorate; she was restless, weak, vomiting and in and out of consciousness. No one suspected rabies until Sharon tried to bite her mother. But by then it was too late to provide any life-saving treatment, and Sharon died from her rabies infection by the next day.

It was this tragedy that inspired Sharon's mother, Dr. Agnes Korir, a lecturer at Daystar University in Nairobi, to open a foundation in Sharon's name—the Sharon Live On Foundation. Wanting to find a way to keep her daughter's death from being in vain, Agnes decided to create a health advocacy organization with the help of her husband and close family friends, drawing on her background in community development to find a way to address the shortages of rabies vaccine in Kenya and to ensure more Kenyans know about the dangers of rabies. So far the foundation has received, vaccinated and distributed close to 300,000 vaccines. 270,000 of those vaccines were distributed primarily to the Kenyan county of Nandi where Sharon was bitten, but other areas of Kenya have also received assistance.

Agnes and her husband, Barnaba Korir, together with some close friends in the United States, launched the foundation after learning about a vaccine donation program through Merck Animal Health, which provides a free dose of rabies vaccine to Africa for every dose of Merck rabies vaccines that is purchased (by other veterinarians or governments). After establishing a connection with Merck Animal Health, the Sharon Live On Foundation began to sponsor campaigns for the mass vaccination of dogs in Kenya, partnering with the Kenya Veterinary Association so that vaccine delivery to animals and localities with a high burden of rabies was more affordable and effective. Agnes often funds the foundation's work using her own salary and relies on donations from family and friends abroad to sustain operations.

In addition, Dr. Korir has also been engaged in Kenya's rabies elimination campaign, which was launched two years ago (see [October 2016 story](#)) as part of Kenya's strategy for reaching the 2030 goal of rabies elimination. During the launch of the elimination campaign in 2014, Dr. Korir spoke at the ceremonies, where her personal story of how she lost her daughter helped motivate and secure the commitment of resources for rabies elimination. Her commitment to rabies elimination also led to an invitation to serve on the national Rabies Elimination Coordination Committee.

In Dr. Korir's application for the MSD award, one of her nominators described how exceptional her work was as a rabies educator: "Last month I joined [Dr. Korir] during dog vaccination campaigns in her home county Nandi and was deeply inspired to see her passion as she shared her story with the local communities, moving from one vaccination site to another. I saw her console a man who had lost his 12-year old girl in April 2016 and watched her give her own money to another family so that their boy could get post-exposure prophylaxis after he was bitten by a suspect rabid dog."

Dr. Korir, less formally known as Mama Sharon, often uses her own personal story to draw attention to the devastation that rabies can cause. "Whenever I get the opportunity I always share the rabies story for it is not known by many and it is just a story until they understand that it can kill their loved ones. I live to help share the message and eradicate the rabies." By reaching out and engaging Kenyans in their rabies story, the Korir family continues to motivate and engage local leaders and policy makers to help make the drive towards a rabies-free Kenya a reality.



Agnes Korir (Mama Sharon) shares her story with a fellow Kenyan, who also lost a child to rabies. (Source: Sharon Live On Foundation)



## 3000 Want a Friend, Be a Friend booklets for Children in Rural South Africa

Thanks to the generosity of our community and a gift from the University of Pretoria, the Onderstepoort Veterinary Institute will have 3000 Want a Friend, Be a Friend booklets to distribute to children in rural South Africa. The booklets are chock full of fun and engaging activities that teach children how to look after animals, how to avoid dog bites and how to prevent rabies. This is a substantial resource which encourages families to keep it so the information is to hand when needed.

Education is the first and most cost effective way to stop the spread of the rabies and Want a Friend, Be a Friend makes learning fun. As part of the campaign, we made an animation of the booklet – if you haven't seen it, you can watch it [here](#).

Want a Friend, Be a Friend is available to download and reproduce (for non-commercial use) free of charge [here](#). Please note, copyright is retained and no alternations may be made to the content.

If you do use it, please share pictures with us – we love to see it in action.

And, on that note, we'll be sharing pictures of the children receiving their Want a Friend, Be a Friend booklets via our [Facebook](#) and [Twitter](#) pages when we get them.

The online campaign raised £472 (approximately US\$584). A huge thank you to everyone who donated and shared the campaign. You helped make this happen!



## Documenting Rabies Control in Communities

GARC's collaboration with students of journalism at the University of the Philippines Los Baños has resulted in a series of short documentary films that explore aspects of animal bite treatment and rabies control in communities in the Philippines. Filming aspects of the Communities Against Rabies Exposure (CARE) projects in Ilocos Norte and Sorsogon the students were able to vividly capture insights into how rabies impacts individuals and how whole communities come together to support control efforts.

The short video [Barangay Health Worker](#) describes the work of this group of volunteers in Sorsogon. The program has found that Barangay Health Workers can provide a vital link between a rabies control program and their communities, helping to support both human and animal health prevention efforts.

GARC's work in elementary schools in Sorsogon is featured in the video [Rabies Education in Elementary schools](#), shows how teachers are arming children with the knowledge to prevent rabies deaths, and how this

can spreading from children to their parents.

“[Panaghoy sa Bulan](#)” (“Mourning in Bulan”) explores the common practice of consulting a tandok (traditional healer) for dog bite treatment, and how one mother learned that this alone cannot prevent fatal rabies cases. Importantly, it describes ongoing efforts to encourage tandoks to also advise bite victims to seek modern medical care.

The variety of methods were used to communicate rabies control messages to all sectors of the community in Ilocos Norte, from preschool children to



the general public, are presented in the videos “[Community Empowerment Through Rabies Education](#)” and “[Education for a Rabies free Ilocos Norte](#)”.

We invite you to watch these short 3 to 6 minute videos on the [GARC YouTube channel](#), and express our sincere appreciation for the efforts of these journalism students in producing them.

## Collecting Bite Victim's Stories

*This story was contributed by Louise Taylor, GARC Scientific Director, who recently visited the Philippines GARC office where the team are starting a new project to assess the effectiveness of free animal bite treatment centers.*



I was struck by the pile of papers on top of the cupboard in the ABTC (Animal Bite Treatment Center) at Tarlac City Provincial Hospital. Each piece of paper is the record of treatment for one bite victim who had to come to the clinic up to four times for vaccine. The ABTC is tiny, but very busy - two or three folders of records are produced every month. Last month they had 2,000 new patients who were all carefully registered, had their wounds cleaned and almost all of them were given rabies

vaccination and many received immunoglobulin too.



Somewhere in that pile is the record of a lady we had interviewed in nearby San Miguel barangay earlier in the day, testing out our survey questionnaire.



The lady described that she had to go to the clinic last year when she was bitten by a neighbour's dog. She told us that it was important that she stayed healthy, because her pension provided most of the household income. She is lucky that she knew about the risk of rabies, lucky that the provincial hospital is not far away for her, and lucky that the rabies vaccine is provided free by the Department of Health.

As we left, she pointed out a dog in a collar resting in the middle of the street. It was the dog that had bitten her. Clearly the dog was still in good health, and the lady had not in fact been exposed to rabies. But there lies the problem. Wherever canine rabies persists, the risk is there. It is very hard to be sure that

any particular dog could not have transmitted rabies when it bit. With a fatal disease, you can't afford to take chances, and so everybody with a dog bite is advised to get vaccinated.

We had been worried that we may not find enough bite victims to interview in the short time we had, but the barangay officials who accompanied us quickly had the team overwhelmed with offers to complete our survey. It seemed like every 4th or 5th house had someone there who had been bitten in the past few years. There were certainly plenty of dogs and puppies to be seen during our short walk around.



Almost without exception, all the bite victims had consulted the tandok (the traditional healer) first, but then almost all of them had gone for vaccination at the ABTC. Sometimes neighbors or the barangay officials had made sure they knew what they should do.

In the next couple of months we will be asking a lot of people what they did when they got bitten. Most of them will live a lot further away from an ABTC than this, perhaps some couldn't afford to travel to get vaccination, some may not have known about the need for vaccination, some may believe that rabies is caused by evil spirits and not related to dog bites at all.



As I looked at the pile of records, I wondered what a complete set of records for the country would look like. The ABTC in Tarlac City is possibly one of the busiest, but it is still just one of over 450 such centers in the Philippines that between them administered rabies vaccine to over 1 million in the Philippines last year. There are private facilities as well, for those that can afford them. This is the cost of endemic canine rabies. Yet even with public health efforts on this scale, around 200 – 250 people still die of rabies every year in the Philippines. Whilst dog vaccination is not comprehensive enough to halt transmission of the disease, deaths are almost inevitable.

*The study "Evaluation of Operating Animal Bite Centers in the Philippines" is being carried out in collaboration with the Philippines Department of Health, and supported by GSK.*

## NEWS FROM THE COMMUNITY

## A Better Way Forward for Rabies Control in India?



Tamil Nadu, a state in Southern India with a population of 77.9 million people, could improve upon its current rabies control strategy and reduce its human rabies deaths by 90% if it embraced the One Health concept that links the health of animals to the health of humans more fully.

[A new study](#) has demonstrated the risks and costs of the current strategy, which relies on providing vaccination (PEP) to people bitten by dogs and with just 34% of owned dogs vaccinated against rabies. With this approach, over 31,000 individuals are treated with PEP for dog bites annually, (at a cost of \$1.68 million), and the model predicted 82 annual human deaths from rabies, numbers that agree well with the reported data from 2014. Clearly, although PEP is provided free, not everyone is able to access it in time to prevent the fatal disease from developing. However, using local data and modelling, the study suggested a cost-effective way to improve upon it, by incorporating interventions aimed at supporting the health of the stray dog population.

Rabies is a classic example of a One Health disease, where control measures in the dog population can benefit human health. Tamil Nadu has recently established a pioneering One Health committee to facilitate the cross sectoral collaboration needed, and this study will support their efforts to provide the most cost-effective solution to protecting people from rabies.

Starting from their model of the current situation, the authors considered additional strategies involving vaccination only, or vaccination and sterilisation, of between 100,000 and 500,000 dogs per year, out of a total population of 1.65 million dogs. These strategies focused primarily on the stray dog population (estimated at 700,000 dogs). Even targeting this small additional fraction of the total dog population, the impact was dramatic, with human rabies deaths predicted to fall steeply within just 2 to 3 years. Annual human rabies deaths could be reduced to fewer than 10 after five years if 200,000 stray dogs (around 13% of the total dog population) were vaccinated each year, and down to just 6.4 deaths annually if dogs were sterilized as well as vaccinated. Importantly, sterilisation was not predicted to affect the number of dogs, but to reduce turnover in the population. Because of decreased competition for resources, all stray dogs are predicted to live longer when sterilization programs are in effect, and vaccinated animals will comprise an increasing fraction of the total population.

The Animal Welfare Board of India already stipulates that municipalities should vaccinate and sterilize stray dogs, but cost is critical to how widely these recommendations are enacted. Using data already collected on the cost of providing services in a small part of the state, the study estimated state-wide programmatic costs and concluded that several of the interventions, those focussed on vaccination alone, would be a cost-effective (according to WHO standards) way to reduce the toll of the disease in people. The combined vaccination and sterilization of dogs approach, though more effective at controlling rabies, was deemed considerably more expensive and consequently less cost-effective than just vaccinating dogs.

Costs are always the key in rabies control. In the future, it is hoped that injectable canine sterilization methods could realise the benefits of sterilization in a much more cost effective way, but currently the infrastructure required for sterilization operations in shelters is a huge impediment that limits widespread use. Catching dogs on the streets is also relatively costly, and the authors also suggest pilots to see if owners would bring their dogs to vaccination points in sufficient numbers to enable a vaccination team to reach a much higher target for the number of dogs vaccinated. This could also be very cost effective if used alongside vaccination of street dogs.

By providing a detailed analysis of the current and possible future rabies control strategies, the study provides exactly the sort of data that policy makers need to make informed decisions on how best to invest in rabies control efforts.

Although this is a case study for Tamil Nadu, many aspects of the findings should be applicable across India, a country struggling with approximately a third of the global human deaths from rabies. Tamil Nadu has a relatively efficient delivery system for free PEP, but this is not the case everywhere in India. In those areas where PEP is harder to come by, the authors conclude that the benefits of canine vaccination are likely to be even greater, and are the only way to reduce the risk to human lives in the long term.

*Written by Louise Taylor, based on the paper "[One Health approach to cost-effective rabies control in India](#)" published by Fitzpatrick et al. in PNAS in December 2016.*



## Bat Rabies Outbreak in Peru Claims One, but Others Survive: Mass Vaccination Campaign Underway

An alarming post in ProMED’s [January 9th report](#) described 85 suspected human rabies cases stemming from bat bites in Peru. This report was based on a story originally reported in English in [Outbreak News Today](#) that was in turn based on a [Publimento report](#) written in Spanish. Further investigation of the news story revealed that the 85 suspected cases were actually 82 potential exposures to bat-transmitted rabies and just 3 clinical rabies cases, illustrating a common reporting error when writing about rabies outbreaks, which was most likely exacerbated by a computer-generated translation.

The 85 exposures occurred in December 2016 in the Cusco region, home of the UNESCO World Heritage Site, Machu Picchu. Dozens of potential exposures to rabies were reported in La Convención province, but of the 85 suspected of having contact with rabid bats, only three clinical cases have been confirmed at the time of this report. Other unverified reports of deaths possibly due to rabies are currently under investigation by Peruvian health officials.

Of the three rabies cases confirmed in humans, two were military personnel stationed in the area with their unit, and the other was a civilian—a two-year old girl. One soldier is still alive and recovering slowly, but one of the soldiers is now deceased. Additionally, the child is still alive although not yet in stable condition, but she has continued to survive after a month’s hospitalization. All of the remaining soldiers in the unit were sent to the military hospital in Lima for post-exposure prophylaxis (PEP), even though no bat bites were documented amongst them.

All three clinical cases were treated in Lima using the Milwaukee Protocol, an experimental therapy that involves medically inducing a coma to provide neuroprotection to patients with active clinical symptoms. That there were two rabies survivors is extremely rare and quite remarkable, although prognosis for a complete neurological recovery has typically not been favorable after survival from a full-blown rabies infection, which is usually 99.9% fatal.

The two infected soldiers were also given the anti-viral favipiravir, which was administered for the first time under special licensing from the US Food and Drug Administration (FDA) as a treatment for an active human rabies infection. Favipiravir (originally known as T-705) has been in Phase 3 clinical trials as a treatment for influenza, but because it is active against a broad range of RNA-based viruses, favipiravir is being trialed as an experimental drug for the treatment of rabies. The drug was obtained through the efforts of the Peruvian Military Hospital and the National Institute of Health in Peru, and the administration of the drug was overseen by Dr. Carol Epstein, Executive Vice President of Medi Vector, a US company that is managing favipiravir’s clinical trials.

In response to the outbreak, ProMED reports that Peruvian government has provided more than 912 civilians and 680 soldiers stationed in the Cusco region with PEP. A mass vaccination campaign to provide pre-exposure prophylaxis (PrEP) for rabies immunity to area residents is also currently underway.

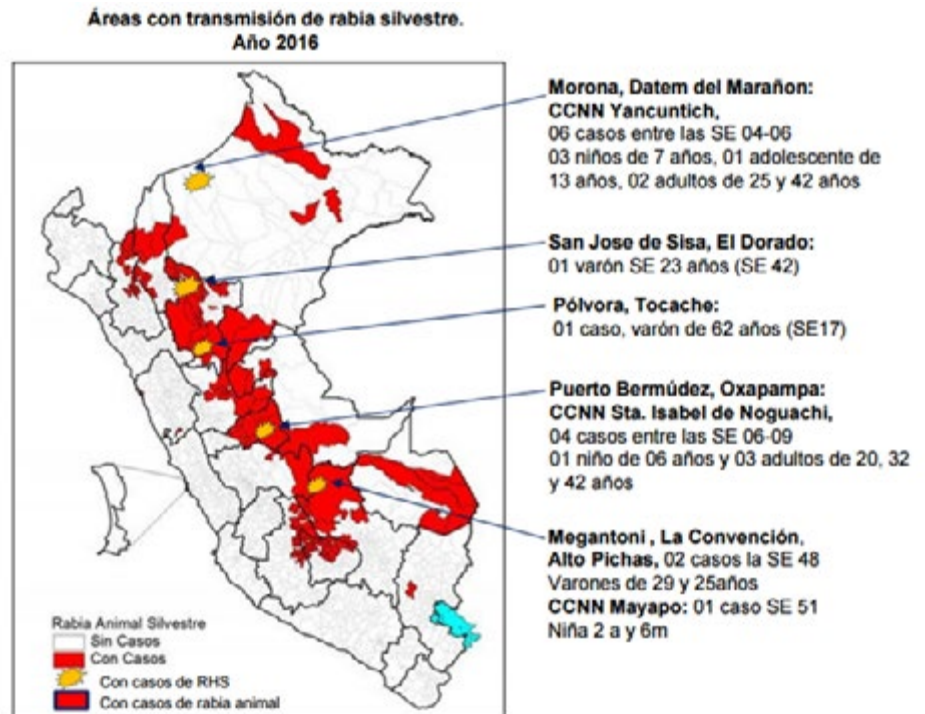


Figure 1 Areas in Peru where rabies was transmitted from wild animals in 2016. Source: Peru Ministerio de Salud, “[Vigilancia de Rabia Silvestre.](#)”

Continued on page 8...

...**Bat Rabies Outbreak** continued from page 7.

La Convención province is deep in the Amazonian jungle and is home to vampire bats that serve as reservoirs of the rabies virus. The bats, which are also found in many regions in South America, typically feed on wildlife for their blood meal, but they can also target humans and livestock. Educating people living in bat-endemic areas about vampire bat-transmitted rabies has not been appropriately prioritized. Additionally, indigenous Peruvians living in insolated communities have little contact with government-sponsored health initiatives and are often not aware of the dangers of exposure to vampire bats nor have many campaigns been conducted to immunize these people against rabies. Bat-transmitted rabies has also been economically challenging for livestock farmers in the Amazon region due to the loss of non-immunized cows and sheep to bites from infected bats.

Summarized by Laura Baker, GARC, and Sergio Recuenco, UNMSM, Universidad Nacional Mayor de San Marcos, Lima, Peru, based on reports from ProMed; OutbreakNewsToday, "[Peru: 85 suspected human rabies cases reported in jungle of Cusco](#)"; Hospital Cayetano Heredia website, "[Especialistas del Hospital Cayetano Heredia Confirman Caso de rabia silvestre en menor mordida por murciélago](#) (Specialists of the Hospital Cayetano Heredia confirm a case of wild bat rabies in a minor)"; RPP Noticias, "[Soldado mordido por murciélago en Alto Pichas murió en Hospital Militar \(Soldier bitten by bats in Alto Pichas dies in Military Hospital\)](#)"; Andina, "[Helicóptero del Ejército traslada a Arequipa restos de sargento fallecido por rabia](#) (Army helicopter transports remains of sergeant killed by rabies to Arequipa)"; and Pressreader, "[Muere sargento de la Policía mordido por un murciélago cuando patrullaba en el Vraem](#) (Police sergeant who was bitten by bat while patrolling Vraem died).

## World Spay Day



February is National Spay/Neuter Awareness Month in the US, and February 28th is World Spay Day this year.

Many rabies control programmes include some form of dog population management (DPM), usually sterilization. If it can be carried out on a large enough scale, sterilization can enhance rabies control efforts by contributing to a more stable population of longer lived (vaccinated) dogs. Particularly where uncontrolled reproduction in dog populations causes problems, building more responsible dog ownership, including improved veterinary care, vaccination and sterilization, leads to a healthier relationship between humans and dogs.

For more information about how to get involved, see information and resources from the Humane Society International [here](#). If you are providing sterilisation services in a rabies endemic country – always remember to vaccinate against rabies when needed.



## Recent Research

### PEP

[Role of systemic injection of rabies immunoglobulin in rabies vaccination.](#) The role of systemic injection of rabies immunoglobulin (RIG) in rabies vaccination was investigated in a mouse model. Analyzing anti-rabies virus antibody levels in the serum of mice given various doses of RIG combined with rabies vaccine, the results showed that systemic injection of RIG does not contribute detectably to passive or adaptive immunization. Thus the main function of RIG is to neutralize rabies virus by local infiltration of the wound.

### Laboratory testing

[A Comparative Study of the RAPINA and the Virus-Neutralizing Test \(RFFIT\) for the Estimation of Antirabies-Neutralizing Antibody Levels in Dog Samples.](#) The rapid neutralizing antibody test (RAPINA) is a novel, immunochromatographic test that uses inactivated virus to quantify anti-rabies antibodies, avoiding cell culture and the use of live virus. The vaccination status of 1135 dogs in the Philippines, Thailand and Japan were analysed by the RAPINA and compared to the standard RFFIT test. The RAPINA results were highly homologous and reproducible among different laboratories, suggesting that this test is appropriate to survey vaccination coverage in countries with limited resources.

[Inactivation of Rabies Virus.](#) Various reagents for the effective inactivation of rabies virus were tested. Virkon S (1%) solution effectively reduced rabies virus in culture medium supplemented with 10% foetal calf serum within 1 minute. Isopropyl alcohol (70%) is a suitable agent for surface decontamination whereas 70% ethanol was ineffective. Rabies virus was also inactivated when cell cultures were fixed with 3% or 4% paraformaldehyde for 30 minutes.

### Surveillance / Diagnosis

[Development and validation of sensitive real-time RT-PCR assay for broad detection of rabies virus.](#) Two real-time quantitative RT-PCR assays were developed for large-spectrum detection of RABV, with a focus on African isolates. The primer and probe sets targeted highly conserved regions of the nucleoprotein (N) and polymerase (L) genes. No non-specific amplification or cross-reaction with a range of other viruses was found. The effective detection and high sensitivity of these assays on African isolates showed that they can be successfully used for general research and in diagnosis and surveillance using a double-check strategy.

Continued on page 9...



...*Recent Research* continued from page 8.

#### [A Pan-Lyssavirus Taqman Real-Time RT-PCR Assay for the Detection of Highly Variable Rabies virus and Other Lyssaviruses.](#)

A newly developed multiplex real-time RT-PCR assay named LN34, uses degenerate primers and probes along with probe modifications to achieve superior coverage of the Lyssavirus genus while maintaining sensitivity and specificity. The LN34 assay was able to detect all RABV variants and other lyssaviruses in a validation panel. It can be quickly adapted in a laboratory to enhance the capacity of rabies molecular diagnostics, especially in rural areas.

#### **Epidemiology**

[Re-emerging of rabies in Shaanxi Province, China, 2009 to 2015.](#) Sequencing of virus from 269 human rabies cases revealed viral migration paths from Sichuan, Guizhou and Hunan to the Hanzhong prefecture of Shaanxi and then further spread to Xi'an and other prefectures.

[Human Rabies - Puerto Rico, 2015.](#) The first reported case of human rabies associated with a mongoose bite in North America. A 54 year old Puerto Rican man died in early December after an untreated bite from a mongoose during the first week of October.

#### [Quantitative risk assessment of the introduction of rabies into Japan through the importation of dogs and cats worldwide.](#)

The risk of rabies introduction into Japan through international importation of dogs and cats was quantified, using a stochastic scenario tree model. The number of years until the introduction of a rabies case was estimated to be 49,444 years, suggesting that current import controls are effective. Modelling suggested some simplification could be justified, but that serological testing should not be stopped. Non-compliance or smuggling activities could substantially increase the risk of rabies introduction, so compliance must be promoted.

#### [The Epidemiological Importance of Bats in the Transmission of Rabies to Dogs and Cats in the State of São Paulo, Brazil,](#)

[Between 2005 and 2014.](#) In São Paulo, Brazil the rabies virus lineage associated with dogs has not been found since 1998. Rabies cases in dogs and cats in São Paulo between 2005 and 2014 were investigated. Sequencing of the N gene nucleotide sequences from 10 samples from dogs and cats revealed that the viruses in all samples were circulating in Brazilian bats.

#### **Mass Dog Vaccination**

[Optimal frequency of rabies vaccination campaigns in Sub-Saharan Africa.](#) While previous studies have considered optimal coverage of animal rabies vaccination, variation in the frequency of vaccination campaigns has not been explored. A rabies virus transmission model was parameterised for two districts of northwest Tanzania, Ngorongoro (pastoral) and Serengeti (agro-pastoral). We found that optimal vaccination strategies were every 2 years, at 80% coverage in Ngorongoro and annually at 70% coverage in Serengeti and the optimality of these strategies was sensitive to the rate of rabies reintroduction from outside the district. Coordinated campaigns may provide monetary savings in addition to public health benefits.

#### **Dog Ecology**

[Ecology and Demography of Free-Roaming Domestic Dogs in Rural Villages near Serengeti National Park in Tanzania.](#) For four years, 2,649 free-roaming domestic dogs in four rural villages in Tanzania (two villages with and two without a rabies vaccination campaign) were examined for body condition, sex, age, survivorship and reproduction. Overall survival was related to body condition, and in one non-vaccination village survival was lower than in the other three villages, all of which were similar. Within vaccination villages, vaccinated dogs had higher survivorship than unvaccinated dogs. Dog population growth was similar in all the villages suggesting village characteristics and ownership practices likely have a greater impact on overall dog population dynamics than vaccination.

#### **Advocacy**

[Novel Financing Model for Neglected Tropical Diseases: Development Impact Bonds Applied to Sleeping Sickness and Rabies Control](#) A discussion of the potential for Development Impact Bonds to speed up progress to rabies elimination.

## Upcoming Conferences

[The 8th International Conference on Emerging Zoonoses](#), will be held in Manhattan, Kansas, from May 7 – 10, 2017.

CISTM15, the [15th Conference of the International Society of Travel Medicine](#) will be held in Barcelona, Spain, 14-18 May 2017 and will include a workshop entitled "Rabies Prevention Strategy".

[WSAVA 2017](#), the annual congress of the World Small Animal Veterinary Association 2017 will be held in Copenhagen, 25-28 September, 2017

The 28th Rabies in the Americas meeting, RITA XXVIII, will be in Calgary, Canada from 22-25th October, 2017

The 10th Asia for Animals conference will be held in Kathmandu, Nepal from November 27th to 29th 2017. The theme is Changing Human Behaviour. For more information see <http://afakathmandu.com>

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