



**Global Alliance
for Rabies
Control**

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RABID BYTES

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EDITORIAL

Progress Towards the Goal of Eliminating Rabies Deaths by 2030

World Rabies Day is many things to many people – it reminds the world that people and animals are still dying of rabies, it raises awareness of organisations and individuals who are working to end these deaths and celebrates their efforts, and it unites the global rabies community and reminds us all that no matter where we are, we are not alone in our efforts. We have an international network of potential support and experience to call upon.

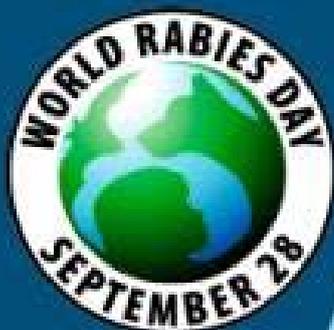
Now that a global goal of elimination of rabies deaths by 2030 has been set, World Rabies Day is more relevant than ever, as it provides an annual marker to showcase progress at all levels – from the international to the community - towards every country's rabies elimination efforts. ***Rabies: Zero by 30***, the theme for World Rabies Day, 2017, supports these efforts.

We encourage registration of your event on our website, to share your Zero by 30 efforts with the rest of the rabies community – you can [view](#) other events and register your own. [Create](#) posters for your events with your logos and in your own language. Get ideas and checklists for your event from our event [toolkit](#), and [add your organisation](#) to the year-round End Rabies Now campaign to support elimination by 2030.

You can promote your efforts with [themed banners and badges](#) for your website and social media networks. Nominations are over for this year's World Rabies Day Awards, and we'll be announcing the shortlisted entries on World Rabies Day – thank you to everyone who has shone a light on rabies champions in their communities, we'll be sharing some of their inspiring stories over the next few months.

If you aren't organising an event, please support other events in your community – you can look for events in your area [here](#), and promote their efforts online. If you use the hashtag #WorldRabiesDay and tag us (Twitter [@rabiesalliance](#); Facebook [@GlobalAllianceforRabiesControl](#)) we'll cross-promote your posts where we can.

Working together, the goal of zero rabies deaths by 2030 can become reality – this World Rabies Day, let us all reaffirm our commitment to being part of this journey toward a rabies-free world.



RABIES: ZERO BY 30

www.rabiesalliance.org/world-rabies-day

NEWS FROM GARC AND WRD

The Use of Ivermectin in a Rabies Vaccination Campaign

The Zanzibar mass rabies vaccination campaign began in August 2017. Global Alliance for Rabies Control (GARC) representatives offered their guidance in the first two weeks of the campaign to assess, assist and guide the teams in a number of areas, including humane animal handling, vaccination techniques and reaching adequate vaccination coverage.

The total estimated canine population of Zanzibar is 9,000 dogs, and GARC and World Animal Protection donated 10,000 doses of Rabisin vaccine. The campaign was primarily conducted by the Zanzibar Agriculture Department and they determined that it was important to give a shot of Ivermectin to every dog along with the rabies vaccine.

Ivermectin is a widely utilized and effective anti-parasiticide with a [broad spectrum of activity utilized in a variety of species](#). However, Neurotoxicity is possible in dogs ([particularly in those with a defect in the MDR1 gene](#)), with shock, vomiting, hypothermia and depression commonly encountered. In non-sensitive breeds, and at appropriate dosage of less than 1mg/kg (1000 micrograms/kg), toxicity is rarely seen.

In Zanzibar, the GARC team observed more minor negative reactions in approximately 60% of the treated dogs. Reactions ranged from a subtle itching at the injection site to a more frantic rolling on the ground and running around to an even more problematic reaction of screaming, scratching and running. These reactions seemed very unpleasant for the dog and although short lived, they had a detrimental influence on the campaign. Dogs brought to be vaccinated are typically under a heightened level of stress and anxiety, and witnessing the distress of other dogs may cause some to react negatively. Owners could lose control of these dogs resulting in a lack of vaccination for these animals, thus reducing the overall percentage of the dogs vaccinated.

The team felt it was important to look for a solution that could minimize reaction and stress to the dogs. The GARC team set about observing the location of the injection site, as well as the manner in which Ivermectin was drawn into the syringe. In this campaign, the size of the needle (23 gauge) or syringe (1 ml) could not be changed.

Dogs were injected subcutaneously (SQ), with the commonly utilized site being over the ribs on the opposite side of the dog that the rabies vaccine had been given. The team changed the injection site to the scapular region while still utilizing the SQ route. In general dogs should not be vaccinated or given injections around the ribs as this site is typically more sensitive and painful. The change in site appeared to decrease the number of reactions observed but did not eliminate them.

The team also observed that the needle was fully pushed into the Ivermectin bottle, and coated with the solution before being drawn into the syringe. The team then advised that only the tip of the needle be inserted to minimize coating, as it was not known whether reactions were localized to the dermis or the sub-dermis. This remedy, combined with the change in location site to the scapular region, further reduced reactions.

Our theory, that the reactions the dogs were experiencing were localized to the dermis, has been observed by the veterinary profession but not well documented and thus the solution noted above as a standard of practice made the team feel comfortable. Another commonly utilized veterinary practice is to insert and leave a needle in the Ivermectin bottle, to be utilized to draw up solution into each syringe and inject the dogs with fresh, uncoated needles.

These simple modifications reduced canine reactions, leading to less discomfort and pain for the dog, and thus improved the vaccination coverage. It is important for any vaccination team to strive for the best experience for both the dog and the owner as this leads to positive word of mouth and increased vaccination rates at future mass vaccination campaigns. No vaccination campaign occurs one time, and increasing the human animal bond, and building the trust of the community with the vaccination team is vital.

Contributed by Daniel Stewart, an animal behaviourist working with GARC who was part of the advisory team in Zanzibar



*A puppy is vaccinated during the campaign on Zanzibar
Photo:GARC*

The Partners for Rabies Prevention Support Progress Towards 'Zero by 30'

The Partners for Rabies Prevention meeting held in August brought together over 40 representatives from 27 organizations to discuss international efforts to support countries as they move forward in their canine rabies elimination efforts. The delegates reflected a diverse range of stakeholders in rabies control, including International organizations, rabies experts, academics, vaccine manufacturers and non-governmental organizations.



Over 40 participants met in Switzerland for the 2017 PRP meeting. Photo: GARC

What emerged was a strong commitment from organisations at the international level to work together to provide concrete support to countries planning and implementing rabies elimination strategies, in the move towards an end to canine-transmitted human rabies by 2030.

Attendees highlighted several recent international meetings involving rabies experts, and reported that coordinated revisions of both OIE and WHO guidance documents are currently being discussed. The OIE reported that its Rabies Vaccine Bank is now able to handle requests from any member country, and payments can be received through several different mechanisms, allowing for endemic country purchases as well as donations. A vaccine stockpile for human vaccine is being planned by WHO to fulfil a similar need on the human side.

Recent modelling work presented the scope of what reaching zero human rabies deaths globally by 2030 would entail. It provided the canine vaccine forecasting data necessary and an appreciation of the scale of capacity building in terms of human resources that will be necessary to achieve this goal.

There was a detailed review of recent developments in tools that are already, or soon will be available to all countries in support of their rabies elimination planning and capacity building.

It is very clear that improved data and reporting will be vital in assessing global progress towards freedom of human rabies. With this in mind, an encouraging update was provided on how integration of the African Rabies Epidemiological Bulletin into WHO's global health observatory data is envisaged for the near future. And discussions were initiated on what other mechanisms might be useful to monitor progress towards the global goal and advocate for further funding to be directed towards rabies elimination efforts.

As always in this forum, there was scope for participation from all attendees and suggestions of improvements and further work still needed. Overall, however, it was clear that the tools and mechanisms worked on over the last decade by the PRP group and others around the world are maturing into a comprehensive package of support that countries can access to support their elimination efforts.

At the end of the meeting, the group [endorsed the global goal](#) of zero human deaths from dog-transmitted rabies by 2030, and called for the accelerated implementation of these tools in rabies-endemic countries; for all countries to make rabies elimination a priority; and for further cooperation and concerted action from all players to bring freedom from rabies closer to all communities.

Contributed by Louise Taylor, GARC's PRP coordinator.

NEWS FROM THE COMMUNITY

Desi Apnao, Rabies Bhagao (Eradicate Rabies, Not Stray Dogs)

After completing GARC’s Rabies Educator Certificate, a group of students from Enactus Motilal Nehru College carried out rabies awareness campaigns for other school students and for children from a nearby slum.

They called the campaign *Desi Apnao, Rabies Bhagao (Eradicate Rabies, Not Stray Dogs)*. As a part of a rabies awareness drive to celebrate World Rabies Day, they held interactive sessions August through September with students at the Ryan International School, Gurgaon; with children from the slum at Sanjay Gandhi Camp, Chanakyapuri, New Delhi; and at Sarvodaya Bal Vidyalaya, a boys’ government school in Vikaspuri, New Delhi.

The awareness drives began with an enactment of a stray dog being teased and hit by teenagers in order to give a glimpse of the treatment given to stray dogs in India. When asked, “Was the way the dog was treated right?” all the children shouted a big “no!”

Later the youngsters were asked questions like “Who likes pet dogs?” and “Who likes stray dogs?” prompting comments such as “I don’t like stray dogs because they are dirty and ugly” and “They bite us.” The children were really intrigued to learn more about the distinctions made between pedigree and desi (Indian street) dogs and surprised to learn that the desi breed was better adapted to India and able to live more healthily.



The REC graduates passing on rabies prevention knowledge at Sarvodaya Bal Vidyalaya school through interactive activities. Photo: Bhavya Taneja



Children from Sanjay Gandhi Camp enjoying the presentations by the REC graduates. Photo: Bhavya Taneja

The awareness drive covered many topics including avoiding dog bites, what exactly is rabies, and the laws governing cruelty to animals. The REC students demonstrated all the do’s and don’ts in the event of a dog bite, and a few children shared their experiences of being bitten by a dog and the procedure they followed. The children learned how to recognize a vaccinated dog (by the notched ear given at the time the dog is vaccinated).

In some sessions, the students also watched a play *Kutton se Nafrat Hatao, Haath Badhao DESI Apno* by the team members in collaboration with People for Animals (PFA), an animal welfare NGO. The play showcased various myths related to the

street dogs and the treatment given to them, focusing on animal protection laws and how people’s participation in the DESI (Duty to Empathize, Sterilize and Immunize) Model can help in making a safer environment for the desi dogs.

The sessions were very insightful and engaging, and everyone participated with a lot of enthusiasm. A quick recap session at the end helped us to see the change in the students’ mind-sets, and the children promised to look after the desi breed and not fear them because of rabies and other myths.

A class VII student from Ryan International School, Gurgaon was quoted as saying, “We would’ve never treated desi dogs with love and care had we not seen this presentation.” A child from Sanjay Gandhi Camp shared the story of his desi pet dog named Jacky. If like these children, all of us are able to change our mind-set, we can remove the stigma and live in harmony with our desi dogs!



Teaching children the do’s and don’ts of dog bites and that staying safe around dogs saves lives. Photo: Bhavya Taneja

Contributed by Bhavya Taneja, the president of Enactus Motilal Nehru College, in New Delhi and Navya Puri, member of Enactus Motilal Nehru College on behalf of the REC students who carried out the awareness drive.

Vaccine Fails to Save Chinese Rabies Victim, Leading to Investigation of Vaccine Industry in Shaanxi Province

A Chinese woman from Xi'an in Shaanxi province was bitten in the ankle by a rabid dog in June and died 28 days later, despite receiving post-exposure prophylaxis (PEP) immediately after the bite. Reports from government authorities indicate that the vaccine she obtained was effective, properly stored, and purchased from a reputable source. The woman sought medical help from a government-run facility, receiving a series of rabies vaccinations from the Xi'an Central Hospital, but she succumbed to the virus in July soon after symptoms of rabies began to appear. In China, the standard treatment for dog bites is five doses of rabies vaccine provided within 28 days.

No detailed reports were available to indicate if RIG was administered to the victim, and it is not clear if she received all five of the rabies vaccinations to complete her PEP treatment. In many rabies endemic areas, RIG is in short supply or not available at all, and people fail to return for their final doses of vaccine. Experience in these settings suggests that most patients are protected against rabies by a complete series of vaccine even if they do not receive RIG, but incomplete series of vaccine alone does carry a risk of the disease developing. Patients may not respond well to the rabies vaccine if they are immuno-compromised or if a large viral-load was delivered during a severe bite incident. The vaccine may also be less effective if the victim is bitten close to the head and the incubation time is too short for the victim to develop antibodies against the virus.



Xi'an city in Shaanxi Province, China. Google Maps

This patient may have been just one of those very unlucky victims of incomplete PEP, where vaccine alone was insufficient for protection. However another complexity has arisen in this community. Despite reports from the health authorities that the vaccine administered to the deceased patient was safe and produced by a certified company, there was a large public outcry on Chinese social media about the circumstances of the victim's death, which many attributed to a faulty vaccine. In response, authorities in Shaanxi province have indicated that they would investigate the woman's death more closely, as well as thoroughly examine conditions

for the storage, transportation and use of vaccines in the city of Xi'an. Authorities also are planning to review how healthcare personnel treat patients exposed to the rabies virus. Additionally, anyone found to be involved with illegally storing or transporting vaccines will be face a "severe crackdown" from the local government.

Vaccine distribution through non-authorized sources has been a long standing problem in China, where fraudulent vaccines and rabies certificates for pets have become easy to obtain. Only certified animal vaccination hospitals licensed by the Animal Husbandry Bureau can legally distribute rabies and distemper vaccines for animals. Yet, the distribution of fake animal vaccines has been a problem as buyers and sellers seek to circumvent government-controlled prices or because buyers are just simply not aware that vaccinations from other sources, such as online stores, local pet shops, and grooming salons may not be trustworthy.

China has had on-going issues with faulty human vaccines as well. In 2010, more than 1,600 people were treated with counterfeit rabies vaccine in various provinces, resulting in the death of a 5-year old boy. Last year, a woman from Anhui province was sent to prison after selling fake rabies vaccines that also resulted in the death of a bite victim. Additionally, In 2009, more than 320,000 doses of a human rabies vaccine for was found to be contaminated with nucleic acid, an adjuvant used to improve vaccine effectiveness that has not yet been approved for human use. In response, China's State Food and Drug Administration ordered a recall of all vaccines produced by this manufacturer in 2008.

Past experience of faulty vaccines in China is clearly still very much on people's minds when failures such as this occur and there is serious need to rebuild trust in the provision of what should be a life-saving medical intervention.

Summarized by Laura Baker, GARC from ChinaDaily, "[Xi'an overhauls rabies vaccine industry](#)" and "[Xi'an scrutinizes rabies vaccines](#)"; from AsiaOne, "[Bitten Chinese woman dies despite rabies vaccine](#)"; from China.org.cn, "[China recalls more than 320,00 doses of flawed rabies vaccine](#)"; from the Asia Times, "[China regulations on rabies lead to 'dangerous' black market](#)"; and from the WHO "[Rabies Factsheet](#)".

Team Work Makes the Dream Work

In July 2017, Twala Trust, an animal welfare organization based outside Harare in Zimbabwe, coordinated a Rabies Awareness and Vaccination Programme for their local community. By teaming up with the Zimbabwe SPCA, Mr Lambert Gwenhure (a Government Rabies Scientist in the Department of Veterinary Services), Dr Kenneth Moyo (a Government veterinarian) and 5 vet students from Western University in California they made their impact so much stronger.



Lambert Gwenhure and a local child share information about safe behaviour around dogs and bite prevention. Photo:Twala Trust

Lambert Gwenhure gave impressive educational talks to community members, immediately inspiring community members and answering their many questions. His wealth of knowledge and experience, his kind and caring nature and his determination to eradicate rabies in Zimbabwe came across very clearly. He also came armed with informative, interactive educational materials in both Shona and English (some of which were developed by GARC and other partners) designed to help children relate to the information more easily.

With such information, owners in areas with no access to veterinary services, can still learn basic skills in caring for their animals, increasing the welfare, health, longevity and value of the animal. Community members left Lambert’s educational talks having gained knowledge in health care and dog handling, the importance of rabies protection and the

materials to share the message with other community members.

In rural areas across Zimbabwe, dogs are used for herding and guarding livestock kraals against predators and are “security guards”, cats keep rodents away from vital grain stores. However, both humans and their animals survive in extremely difficult circumstances, without running water, electricity and absence of basic health and veterinary care. With scarce means to feed dogs in rural communities and severe undernourishment, many dogs turn to scavenging or pack hunting in wildlife areas, further increasing the risk of injury and disease to these animals and their human owners. Providing much needed veterinary care to these animals ensures their longevity and wellbeing with such services having a direct impact on human health as well.

Contracting the dreaded rabies virus is a huge concern to Twala from the human and animal perspective. Twala staff have personal experience of the terrifying and tragic job of dealing with animals in the final furious stages of rabies, and are fully committed to stopping this terrible disease. By the end of 2017, Twala will have vaccinated at least 3,000 dogs in the rural areas surrounding Twala and they hold weekly clinics where local dogs can have health checks, vaccinations and treatment as necessary along with a good meal.

Common to the whole team involved in the awareness drive is the understanding that rabies is a killer of both people and animals in Zimbabwe and that working together is essential to raise awareness, reduce the risks and prevent rabies through vaccination.

This article is based on a Twala Trust newsletter article of the same title written by Tracey Hugill. You can read more about the Twala Trust at www.twalatrust.com.



Photo:Twala Trust



Twala staff vaccinating dogs to protect both them and their communities from rabies. Photo:Twala Trust

Thai Princess Campaigns for 2020 Rabies-Free Goal

“To eliminate rabies, you have to give people the knowledge they need and also teach them about their responsibilities,” said Professor Dr Her Royal Highness Princess Chulabhorn Mahidol during her recent visit to the WHO headquarters in Geneva in late August. Her country of Thailand is striving to become rabies-free by 2020, in advance of the worldwide goal to eliminate rabies by 2030. To aid in this effort, the Princess is lending her celebrity and her scientific expertise to promote stronger rabies-control programs as well as to raise awareness of the impact of rabies on Thailand, especially in rural areas.

Thailand has made great strides in reducing human rabies cases by 90% since the 1980’s through programs that have improved access to post-exposure prophylaxis (PEP) and through mass vaccination of dogs. Current efforts include making PEP more widely available by embracing an intradermal vaccine delivery, a cheaper, but just as effective vaccination regimen for human suspected rabies-exposures. WHO has been encouraging more extensive use of the intradermal route for PEP, a vaccination method that requires a reduced volume of vaccine, thereby lowering the overall cost per patient for the cell-cultured vaccine by 60% to 80%.

The Princess holds a doctorate in Chemistry and has been awarded the UNESCO Einstein Medal for her work in promoting scientific collaboration amongst Asian countries. Her current focus is to try to build a fleet of mobile veterinary stations that can travel to remote villages and provide medical treatment and vaccinations to both people and pets in rural areas who do not normally have access to healthcare. In addition, she is working on a sustainable plan for increasing rabies vaccination coverage in dogs and maintaining it at 70%, while also exploring cat and dog population management strategies to improve rabies control efforts.

With these novel rabies-control strategies in place and by improving PEP access in remote areas, Thailand may well reach its goal to become rabies-free by 2020.

Summarized by Laura Baker, GARC from the WHO website “[Towards a rabies-free Thailand by 2020](#)”



Princess Chulabhorn.
Photo: Government of Thailand , via Wikimedia Commons (under creative commons licence CCBY2.0)



Recent Research - September 2017

Surveillance

[A data platform to improve rabies prevention, Sri Lanka.](#) An electronic platform for rabies surveillance was rolled out in June 2016 in four districts of Sri Lanka, linking six rabies clinics, three laboratories and the public health inspectorate. Over 9-months, 12,121 animal bites were entered in the registry, and live information on treatment and outcomes of patients started on post-exposure prophylaxis (9,507) or receiving deferred treatment (2,614) was securely made available to clinicians. Laboratories rapidly communicated the results of rabies virus tests on dead mammals (328/907 positive). In two pilot districts SMS reminders were sent to 1,376 (71.2%) of 1,933 patients and daily SMS reports alerted 17 public health inspectors to bite incidents for investigation.

[Molecular characterization of atypical antigenic variants of canine rabies virus reveals its reintroduction by wildlife vectors in southeastern Mexico.](#) Molecular characterization of six rabies virus strains found in Yucatan and Chiapas showed four with atypical patterns after monoclonal antibody screening. Phylogenetic analyses on the RNA sequences suggested three were atypical strains from Yucatan associated with skunks, distinct from other known lineages. The Chiapas atypical strain was grouped in a lineage that was considered extinct, while the others are clustered within classic dog variants.

Strategic Planning

[The Formation of the Eastern Africa Rabies Network: A Sub-Regional Approach to Rabies Elimination.](#) The first sub-regional Eastern Africa rabies network meeting included Kenya, Ethiopia, Tanzania, Rwanda, and Uganda. The Stepwise Approach towards Rabies Elimination and the Global Dog Rabies Elimination Pathway tool were used to stimulate discussion and planning to achieve the elimination of canine-mediated human rabies by 2030. Our analysis estimated a total dog population of 18.3 million dogs in the region and current vaccination coverage of 5%, with an estimated 4,910 vaccinators available. There is an average annual shortfall of \$ 23 million USD in current spending if elimination by 2030 is to be achieved across the region.

Continued on page 8...

...Recent Research continued from page 7.

Canine Vaccination

[The Role of Dog Population Management in Rabies Elimination-A Review of Current Approaches and Future Opportunities](#). A review of dog population management (DPM) in the context of rabies control. Humane DPM tools, such as sterilization, could theoretically reduce dog population turnover and size, allowing rabies vaccination coverage to be maintained more easily. However, technical demands, costs, and the time necessary to achieve population-level impacts are major barriers, and evidence of population-wide impacts is currently scarce.

[Risk factors for inadequate antibody response to primary rabies vaccination in dogs under one year of age](#). Rabies antibody titers were measured after primary vaccination of 8,011 dogs under one year of age whose serum was submitted for routine diagnostics, and factors associated with failure to achieve 0.5 IU/mL were identified. Dogs vaccinated at >16 weeks showed higher titres than those vaccinated at <12 weeks and at 12-16 weeks (which were equivalent). Most dogs fail to show an adequate response after 3 days, the ideal test is 8-30 days after primary vaccination, and most dogs achieved an adequate response after a repeat test (in the absence of booster vaccination). Booster vaccination after failure provided the highest probability of an acceptable response.

[Dog ecology and its implications for rabies control in Gwagwalada, Federal Capital Territory, Abuja, Nigeria](#). Direct street counts and a house-to-house survey of city streets identified a dog-to-human ratio of 1:3.7, and a dog population estimate of 103,758. The majority of dogs in the urban (60.9%) and semi-urban (82.0%) were free roaming, and most did not have vaccination certificates. The presence of a collar, region, sex, use and having ever visited a veterinarian were significantly associated with rabies vaccination and respondents with higher education were willing to pay more for the healthcare needs of their dogs than those with a lower level of education.

Human Cases

[Rabies Virus Transmission in Solid Organ Transplantation, China, 2015-2016](#). Two recipients of organs were confirmed to have rabies and died. The donor, a young boy, had a diagnosis of viral encephalitis, but a rabies ELISA test was negative, permitting organ donation under China's organ transplant policy.

Wildlife Rabies

[The economic implications of sylvatic rabies eradication in Italy](#). After rabies' re-appeared in Italy in 2008, from winter 2009 to autumn 2016, a total of 15 ORV campaigns (four emergency, four regular and seven preventive ORV) were implemented through aerial distribution of baits. Cumulative costs per km² were estimated at €59.45 during emergency campaigns and ranged between €51.94 and €65.67 in the regular vaccinations. The main portion of costs for ORV programmes were related to baits supply and distribution, and reducing the density of dropped baits could potentially lead to a cost-saving of 22.81%, still maintaining a satisfactory level of bait intake by the fox population.

[Natural exposure of bats in Grenada to rabies virus](#). Brain tissue and sera from 111 insectivorous and frugivorous bats belonging to four species were tested. Rabies virus antigen and genomic RNA were not detected in brain tissues. Rabies virus neutralizing antibodies were detected in the sera of eight *A. jamaicensis* in four out of six parishes. Bats in Grenada continue to show natural exposure to rabies virus, but serology alone is insufficient to determine the strain of rabies virus circulating. Dispersion of infected bats to neighboring islands is possible.

Upcoming Conferences

The 28th Rabies in the Americas meeting, RITA XXVIII, will be in Calgary, Canada from 22-25th October, 2017. For further details see www.ritaconference.org

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 afakathmandu.com

The 18th ICID (International Congress on Infectious Diseases) will be held in Buenos Aires, Argentina from 1 March 2018 - 4 March 2018. Further details are available [here](#)

NECTM7, the 7th Northern European Conference on Travel Medicine, will be 2 May 2018 - 4 May 2018 in Stockholm, Sweden. Further details on their [website](#)

