CO.24
PERSISTENCE OF ANTI-RABIES NEUTRALIZING ANTIBODIES IN A RURAL AMAZONIAN COMMUNITY VACCINATED WITH PURIFIED VERO CELL RABIES VACCINE (PVRV) FOLLOWING VAMPIRE BAT RABIES OUTBREAK

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Human rabies transmitted by vampire bats is a constant threat in the Amazonian region, regularly exceeding in fatalities the classical dog transmitted rabies in recent years. In 2004-5, several outbreaks have occurred in Para, Brazil. In May-June 2005, following 15 deaths, mostly children, in Augusto Correa, a rural community of 53,000 people dispersed along the Amazon estuary, 3,500 subjects aged from 2 to 60 years received purified Vero cell rabies vaccine (PVRV Verorab®, Sanofi Pasteur, France) for post- or pre-exposure prophylaxis. The presentation will summarize the follow-up of this community during 4 years after vaccination. The persistence of anti-RABV neutralizing antibodies (VNAbs) levels was evaluated by RFFIT, FAVN, and Platelia ELISA (Bio- RAD®) against the PV and CVS reference strains as well as a vampire bat isolate. Subjects with VNAb levels <0.5 IU(EU)/mL were boosted. From a total of 507 subjects included in the study, 428 (84.4%) were available all along the follow-up, an excellent adherence considering the isolation, dispersion, and nomadic live of the community. Remarkably, 5% to 7% of the surveyed population were potentially re-exposed one to several times each year through animal bites (mainly dogs also bats, cats, monkeys). The persistence of the WHO minimum "seroprotective" level of VNAbs (≥0.5 IU/mL) four years after vaccination was observed in 85.8% of the non boosted population (346 patients). Interestingly, no statistical difference in VNAb persistence profiles were observed in pre-exposure (45 subjects) and post-exposure (301 subjects) treated populations. Globally, the VNAb level and persistence were better in young population than in elderly, and in females than in males, particularly the 16–40 years old males which showed lower GMT and seroprotection rates. No interference was observed between anti-malaria treatment and PVRV immunogenicity. At the methodological level, RFFIT and FAVN results appeared highly concordant. The concordance was lower with the ELISA results that showed a global increase in GMT value over the years paralleled by a decrease in statistical correlation with RFFIT (Pearson's correlation coefficient = 0.82 in 2007 to 0.42 in 2009). A hundred serum samples were selected randomly each year to evaluate the concordance of RFFIT results using the PV strain versus a local vampire bat isolate. In summary, this study demonstrated persistence of anti-rabies VNAbs in the vast majority of vaccinees (PVRV Verorab®) from this community at repeated risk of vampire bat bites.

CO.25
RABIES SURVEILLANCE IN THE UNITED STATES-EVALUATION OF RABIES VIRUS VARIANTS

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During 2011, 49 states and Puerto Rico reported 6,031 rabid animals representing a 1.9% decrease from the 6,153 rabid animals reported in 2010. Relative contributions by the major animal groups were as follows: 1,981 raccoons (32.8%), 1,627 skunks (27.0%), 1,380 bats (22.9%), 427 foxes (7.1%), 303 cats (5.0%), 65 cattle (1.1%), and 70 dogs (1.2%). Compared to 2010, a significant increase was reported among rabid skunks. Canine rabies virus transmission has been eliminated in the United States since 2004 and monitoring the rabies virus variant associated with rabid domestic animals is critical. We evaluated rabies diagnostic submission data for the US from 2008-2011 for reported rabid dogs, cats and coyotes. A total of 1,546 rabid cats, dogs and coyotes were reported, with rabies virus variants characterized in 35%. Cats comprised the majority of rabid animals not characterized. No canine rabies virus variants were reported. Most rabid domestic animals were infected with the rabies virus variant circulating in the predominant mesocarnivore reservoir from the geographic area of submission. However, isolated cases associated with bat rabies virus variants were reported. These findings highlight the need for enhanced surveillance to monitor the circulation of rabies virus variants in local carnivore populations to determine emergence of new rabies virus variants. State health departments may not test suspect rabid animals unless a human exposure occurs. Moreover, variant typing is not performed on all samples though CDC provides rabies virus characterization, if requested. The public health implications of host shifts and potential spillover of rabies virus variants from wildlife to domestic animals reinforces the need for additional laboratory diagnostics.

CO.26
RABIES AND RABIES PROBLEMS IN NIGERIA

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Official reporting of rabies in Nigeria started in 1912. The National Veterinary Research Institute (NVRI), Vom, within the last 77 years, confirmed 4809 cases of animal rabies in Nigeria. Rabies control through immunization programs has crashed woefully and consequently, the rabies situation has become chaotic and confounding. Locally, only 2,137,615 doses of dog anti-rabies vaccines were produced between 1956 and 2005 (average 43,625 per year) by NVRI, Vom. Dog population in Nigeria is currently estimated at 8 million. In the last 20 years of research and follow ups on rabies and associated problems, only 10% of the dogs' population received anti-rabies immunization. Within the immunized dogs, rabies outbreaks occurred frequently. Evidences on the trend of rabies cases recorded (1983-1991) confirmed 40%-60% increase in rabies positive cases for every decade in Nigeria. Molecular epidemiology and phylogenetic analysis study of some dog rabies isolates in Plateau State confirmed the flow of rabies virus from neighboring and far North African countries into Nigeria. Some studies of prevalence of rabies antigens in the brain and saliva of apparently healthy dogs slaughtered for human consumption in Nigeria; revealed a 28% prevalence of rabies antigen in the consumed dogs in North-West, 31% from North-East and 24% from North-Central regions of Nigeria. Similarly, 6%-8% of the dogs had rabies antigen in their saliva at the point of slaughter. A study of the epidemiology of rabies in wildlife in Bauchi State, revealed the presence of rabies antigen in mongoose (11%), jackals (9%), squirrels (8.3%), hydrax (17%) and wild cats (16%). This suggests an ongoing

spread of rabies within the wild animals in Nigeria. Conclusively, rabies is a problem in Nigeria such that even the apparently healthy dogs slaughtered for human consumption harbor the viral antigen in the brains and saliva. This is an obvious public health risk and may have serious implication. The low number of Nigerian dogs immunized (10% instead of 70-80%) leaves the country with abundance of epizootic siblings for rabies outbreaks. The wide spread of rabies in the wildlife is an emerging proof of the role of wildlife in the epidemiology of rabies in Nigeria. It is our recommendation that a RITA model to rabies control as employed in the Americas be applied in West Africa especially Nigeria. **Keywords:** Rabies, Rabies problem, Rabies virus, Apparently healthy dogs, Vaccination, Nigeria.

CO.27
TRANSLOCATION OF DOG RABIES IN ISRAEL BY TOURISM

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Rabies is enzootic throughout the Middle East. In Israel rabies is endemic and stray dogs (*Canis familiaris*) form the main reservoir and transmitter. Since 2004 and to the present the state of Israel has been forced to cope with a rabies strain new to the country, designated V7. Because dogs are in close contact with people the new V7 strain that circulated at the Northern region of Israel possesses a serious health threat to humans. In the present communication we report a tourism type of rabies translocation, in which a family from Jerusalem took their unvaccinated dog to the northern Israel. On 19 December, 2011 a dog was diagnosed positive for rabies in the Israeli National Rabies Laboratory at the Kimron Veterinary Institute. A case investigation revealed that on 13 December, a 3 years old Golden Retriever dog belonging to a family living in Jerusalem showed clinical symptoms of inappetence, salivation and incoordination. The dog was vaccinated twice against distemper and parvo virus Duramune Max® (Fort Dodge, Iowa, USA) but not against rabies. On 15 December the dog was admitted to a private veterinary clinic in Jerusalem and under clinical examination it showed unusually alert behaviour and reaction to external stimuli. The dog showed no clinical symptoms of aggression during the period of illness. On 16 December the dog showed ulterior deterioration of clinical symptoms with convulsions and unconsciousness and was treated with diazepam (Assival, Teva). As no health improvement was seen, the dog was euthanized on 18 December and was transferred to the Kimron Veterinary Institute. Rabies was diagnosed by direct fluorescence assay, and was confirmed by isolation of the rabies virus in tissue culture and its inoculation into a family of suckling mice. Reverse transcriptase – PCR and direct sequencing were applied to a 469 base pair (bp) G-L intergenic region fragment and to the entire 1350 bp of the nucleoprotein gene . A phylogenetic tree showed that the Jerusalem dog's sequence belonged to the V7 genetic variant that circulated in northern Israel. During the period of 2004 to 2011, 181 rabies viruses belonging to V7 genetic variants were isolated from rabid animals in northern Israel. The Jerusalem dog's rabies virus isolate was the only example of the V7 genetic variant that was ever isolated from an animal in Central Israel. The Jerusalem dog was probably bitten by the rabid stray dog that circulated on the eastern coast of the Lake Kinneret located in Northern Israel. After an incubation period of about 2 months the clinical symptoms appeared in Jerusalem. As a consequence of this rabies diagnosis, post-exposure vaccination was given to the two owners, two veterinarians and an additional 18 people, who had come into contact with the dog in Jerusalem. Various sanitary measures were imposed in Jerusalem, such as reinforcement of measures against stray animals, boosting of domestic dog vaccination and quarantine of unvaccinated dogs. Because domestic animals can serve as a bridge between wildlife rabies reservoirs and humans, their vaccination greatly effective as public health tools that are available to safeguard the human health.

CO.28
TRANSICIÓN EPIDEMIOLÓGICA DE LA RABIA CANINA EN MÉXICO

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En México como resultado de las campañas masivas de vacunación antirrábica canina a partir de 1990 y que se han mantenido a la fecha, el registro de casos confirmados por laboratorio por **IFD** en esta especie observó un decremento sostenido año con año; comparando este comportamiento en dos períodos, refiere que en el primero de los 90's se acumularon 13,811 casos en contraste se reduce para el segundo del 2000 a 921 casos con decremento del 93.3%, se describen a continuación algunas variables epidemiológicas asociadas a ellos. **Densidad de población**, en la década de los 90's los casos predominaron en municipios con características urbanas por arriba del 80%, afectando colonias o localidades populosas de clase media baja, el resto se ubicó en localidades de municipios con características rurales; en el período del 2000 se invierte esta proporción y predominan los casos en áreas marginadas de las grandes ciudades y de tipo rural. Destaca que los casos de los últimos 3 años comprenden lugares próximos a basureros descontrolados, viviendas en despoblado de alta marginación carentes de servicios públicos básicos (calles, electricidad, agua potable y drenaje) lo que favorece exceso de perros en situación de calle. **Entidades federativas afectadas**, en la década de los 90's los casos ocurrieron en 31 entidades de las 32 en que se divide el país, contrastando tres entidades que acumulan 56% del total de los casos; en el período del 2000 se reduce a 24 las entidades que registraron casos, de éstas dos acumulan el 65% del total. **Dosis aplicadas de vacuna antirrábica canina**, a través de centros de salud como punto de referencia para ubicar en la localidad los puestos o brigadas de vacunación ya identificadas por otras jornadas de salud por la comunidad; en la década de los 90's se aplicaron 101.3 millones de dosis, para el período del 2000 se incrementó a 196.2 millones de dosis. **Epidemiología molecular, de la transferencia de tecnología del CDC**, a partir de 1996 con la caracterización antigénica con panel de 8 anticuerpos monoclonales, se corroboró en algunas muestras (160) de perro o de personas fallecidas por rabia transmitida por este animal según interrogatorio, la presencia de la variante V1 (perro) en el 95% de las muestras y el resto V3 (zorrillo) y V11 (murciélago). A partir del año 2006 se realizó el secuenciamiento nucleotídico en algunas de estas muestras, se utilizó como referencia la clasificación que hizo el CDC (doce linajes de virus de rabia en perro), corroborando que en la región centro del país continúa presente el linaje D5 por persistir el foco enzoótico en el Valle de México, de manera aislada con casos únicos los linajes D8 en el foco enzoótico de Puebla, D9 en el foco enzoótico de Oaxaca y con casos permanentes en los últimos años el linaje D10 en el sureste en el foco rábico en Yucatán y Chiapas, recientemente se activó el D1 (asociado perro-coyote) en Nuevo León en la frontera con Estados Unidos (Texas).