XXXIII RITA

REUNIÓN INTERNACIONAL DE LA RABIA EN LAS AMÉRICAS MÉXICO

MEMORIA 2022

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XXXIII Conferencia Internacional de la Rabia en las Américas 2022

XXXIII Conference on Rabies in the Americas 2022

XXXIII Conferência Internacional sobre Raiva nas Américas 2022

XXXIII Conférence internationale sur la rage dans les Amériques 2022

Acerca de la RITA / About RITA / Sobre RITA / En parlent sur la RITA

XXXIIIRITA
REUNIÓN INTERNACIONAL DE LA
RABIA EN LAS AMÉRICAS
MÉXICO
23-27 OCTUBRE

ACERCA DE LA RITA

RITA Inc. es una organización internacional no gubernamental sin fines de lucro, con un enfoque profesional en la rabia. La conferencia de Rabia en las Américas (RITA) es una reunión científica internacional que RITA Inc. lleva a cabo anualmente desde 1990. El enfoque de la conferencia RITA es la presentación y discusión de los desarrollos recientes en la investigación, vigilancia, control y prevención de la rabia.

Entre los participantes de la conferencia se incluyen investigadores, académicos, oficiales normativos, estudiantes y profesionales médicos, de salud pública y veterinarios, entre otros. La conferencia RITA ofrece oportunidades incomparables para el aprendizaje, con respecto a los últimos desarrollos en el campo de la rabia, para establecer contactos con colegas de todo el mundo y para elevar el perfil de las agencias patrocinadoras en un escenario global. Como la rabia es una enfermedad zoonótica, esta conferencia es un excelente foro para las interacciones productivas entre científicos, médicos, veterinarios, funcionarios de salud pública, biólogos de vida silvestre y otros profesionales biomédicos, promovidos por la filosofía Un Mundo, Una Salud.

Desde la primera conferencia celebrada en Atlanta, Georgia, EE. UU., RITA ha pasado de ser una pequeña reunión de colegas con ideas afines a un evento internacional reconocido y de gran valor para todos en el campo de la rabia. La RITA es ahora la conferencia anual más amplia, abierta, independiente y más grande específicamente para la rabia en el mundo. Aunque centrado en la región, RITA atrae entre 250 y 400 delegados de todo el mundo, no solo de las Américas. Otras reuniones importantes a menudo se llevan a cabo en conjunto con RITA, como el Plan de Control de la Rabia de América del Norte (NARMP) y la REDIPRA (Reuniones de Directores de los Programas Nacionales de Control de Rabia en América Latina).

La organización de la conferencia RITA ha sido compartida entre Estados Unidos, Canadá, México, Brasil y Argentina durante los últimos 30 años.

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ABOUT RITA

RITA Inc. is an international not-for-profit, non-governmental organization, with a professional focus upon rabies. The Rabies in the Americas (RITA) conference is an international scientific meeting that has been held annually by RITA Inc. since 1990. The focus of the RITA conference is the presentation and discussion of recent developments in rabies research, surveillance, control and prevention.

Conference participants include researchers, academics, regulators, students, and medical, public health, and veterinary professionals, among others. The RITA conference provides unparalleled opportunities for learning, regarding the latest developments in the field of rabies, for networking with colleagues from around the world, and for raising the profile of sponsoring agencies on a global stage. As rabies is a zoonotic disease, this conference is an excellent forum for the productive interactions among scientists, physicians, veterinarians, public health officials, wildlife biologists and other biomedical professionals, promoted by the One World, One Health philosophy.

Since the first conference held in Atlanta, Georgia, USA, RITA has grown from a small meeting of like-minded colleagues to a well-recognized, international event of value to all in the rabies field. RITA is now the longest running, open, independent and largest annual conference specific to rabies in the world. Although focused upon the region, RITA attracts between 250-400 delegates from across the globe, not just from the Americas. Other meetings of importance are often held in tandem with RITA, such as the North American Rabies Management Plan (NARMP) and the REDIPRA (Reuniones de Directores de los Programas Nacionales de Control de Rabia en América Latina).

The hosting of the RITA conference has been shared amongst United States, Canada, Mexico, Brazil yArgentina for the past 30 years.

XXXIIIRITA
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MÉXICO
23-27 OCTUBRE

SOBRE RITA

A RITA Inc. é uma organização internacional não-governamental sem fins lucrativos com foco profissional na raiva. A conferência Raiva nas Américas (RITA) é um encontro científico internacional que a RITA Inc. realiza anualmente desde 1990. O foco da conferência RITA é a apresentação e discussão dos recentes desenvolvimentos na investigação, vigilância, controlo e prevenção da raiva.

Os participantes da conferência incluem investigadores, académicos, decisores políticos, estudantes e médicos, profissionais de saúde pública e veterinária, entre outros. A conferência RITA oferece oportunidades inigualáveis de aprendizagem, no que diz respeito aos últimos desenvolvimentos no campo da raiva, à rede com colegas de todo o mundo e a elevar o perfil das agências patrocinadoras num palco global. Como a raiva é uma doença zoonótica, esta conferência é um excelente fórum para interações produtivas entre cientistas, médicos, veterinários, funcionários de saúde pública, biólogos da vida selvagem e outros profissionais biomédicos, promovidos pela filosofia One World, One Health.

Desde a primeira conferência realizada em Atlanta, Geórgia, EUA, a RITA cresceu de uma pequena reunião de colegas semelhantes para um evento internacional reconhecido de grande valor para todos no campo da raiva. Rita é hoje a maior, mais aberta, independente e maior conferência anual especificamente para a raiva no mundo. Apesar de focada na região, a RITA atrai entre 250 e 400 delegados de todo o mundo, não apenas das Américas. Outras reuniões importantes são muitas vezes realizadas em conjunto com RITA, como o Plano de Controlo de Raivas norte-americanas (NARMP) e REDIPRA (Reuniões de Diretores de Programas Nacionais de Controlo de Raivas na América Latina).

A organização da conferência RITA tem sido partilhada entre Estados Unidos, Canadá, México, Brasil y Argentina en nos últimos 30 anos.

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EN PARLENT SUR LA RITA

RITA Inc. est une organisation internationale non gouvernementale à but non lucratif, spécialisée dans la rage. Depuis 1990, chaque année RITA Inc. organise une réunion scientifique internationale – la Conférence sur la Rage dans les Amériques (RITA). La conférence RITA se concentre sur la présentation et la discussion des développements récents dans la recherche, la surveillance, le contrôle et la prévention de la rage.

Les participants à la conférence comprennent des chercheurs, des universitaires, des organismes de réglementation, des étudiants et des professionnels de la santé, de la santé publique et des vétérinaires, entre autres. La conférence RITA offre des opportunités inégalées d'apprentissage, concernant les derniers développements dans le domaine de la rage, de réseautage avec des collègues du monde entier et de rehausser le profil des agences de parrainage sur la scène mondiale. La rage étant une maladie zoonotique, cette conférence est un excellent forum pour les interactions productives entre scientifiques, médecins, vétérinaires, responsables de la santé publique, biologistes de la faune et autres professionnels biomédicaux, promus par la philosophie « Un Monde, Une Santé ».

Depuis la première conférence tenue à Atlanta, en Géorgie, aux États-Unis, RITA est passée d'une petite réunion de collègues partageant les mêmes idées à un événement international bien connu et intéressant pour tous dans le domaine de la rage. RITA est désormais la conférence annuelle la plus ancienne, ouverte, indépendante et la plus importante du monde consacrée à la rage. Bien que centrée sur la région, RITA attire entre 250 et 400 délégués du monde entier, pas seulement des Amériques. D'autres réunions importantes sont souvent organisées en tandem avec RITA, comme le Plan nord-américain de gestion de la rage (NARMP) et le REDIPRA (Reuniones de Directores de los Programas Nacionales de Control de Rabia en América Latina).

L'organisation de la conférence RITA a été partagée entre les États-Unis, le Canada, le Mexique, le Brésil et l'Argentine, au cours des 30 dernières années.

Bienvenida / Welcome / Bem-vindo / Bienvenue

BIENVENIDA / WELCOME / BEM-VINDO / BIENVENUE

A nombre de la Universidad Autónoma de Querétaro (UAQ), el Patronato de la UAQ, el CA. Mejoramiento Animal Integral de la FCN-UAQ y del Comité Organizador Local, les damos la más cordial bienvenida a la XXXIII Reunión Internacional de la Rabia en las Américas 2022 México. Esta es la primera vez que RITA tiene como anfitriona a una institución académica en México lo cual representa un honor para esta máxima casa de estudios del Estado de Querétaro, México.

La UAQ es sede de una de las mejores escuelas de Veterinaria en el continente americano y siempre ha mantenido una constante ocupación e interés por participar y apoyar eventos de carácter científico con una gran representatividad a nivel internacional. En la UAQ sabemos que es gracias a la ciencia que podemos construir un mundo mejor. Estamos seguros de que la proximidad científica-académica a los diferentes sectores de salud pública y animal involucrados en la planificación e innovación de estrategias de prevención, vigilancia y control de la rabia en el mundo debe ser transversal en la alianza de lucha contra esta enfermedad "Unidos contra la rabia" bajo la perspectiva de "Una Sola Salud".

Para México, ser el primer país reconocido por la OMS de haber eliminado las defunciones de personas a causa de la rabia transmitida por perros significa una gran responsabilidad que implica un compromiso de servicio con los desafíos y esfuerzos en el cumplimiento de los objetivos claves del nuevo plan estratégico mundial de eliminación de la rabia para el 2030, los cuales consisten en asegurar de manera oportuna la gestión de las acciones de contención para la vigilancia y control de la enfermedad con el afán de prevenir su reintroducción en países donde ha sido controlada y que aún circula entre los animales silvestres, principalmente los murciélagos. Es así, que deseamos que la XXXIII RITA 2022 en nuestro país sea un encuentro que abrigue experiencias que permitan la visibilidad e incorporación de estrategias multidisciplinarias de la difusión del conocimiento científico, acciones planificadas por campañas sanitarias y perspectivas de solución ante las diferentes problemáticas de la rabia en diferentes países generadas por investigadores, estudiantes, académicos, personal de laboratorio, profesionales del sector ambiental, profesionales de la salud, jefes y responsables de los programas sanitarios internacionales, nacionales, regionales y locales de los representantes de los 22 países de diferentes continentes involucrados en el control y vigilancia epidemiológica de la rabia; para que de manera colaborativa y asertiva logremos una proximidad y territorialidad en la lucha contra la rabia para los países en vías de eliminación y los más vulnerables de la enfermedad para el 2030.

Como presidenta del comité local organizador quisiera expresarles el más sincero agradecimiento de nuestra UAQ al comité internacional de la Rabia en las Américas por su cercanía a la academia, apertura y mostrarse inabatibles en el compromiso y servicio frente a los desafíos de la rabia en las américas y otros continentes, a las diferentes instancias académicas por el acompañamiento e inclusión en el abordaje con diferentes perspectivas la problemática de esta zoonosis, conferencistas, a las y los que participan en la presentación de carteles o presentaciones orales y a todas y todos los participantes que en esta XXXIII RITA 2022 MEXICO que nutren la **proximidad académica y territorialidad de la salud pública en la lucha contra la rabia".**

Agradezco también al Patronato de la Universidad Autónoma de Querétaro que ha fungido como coordinador de la XXXIII RITA 2022 por su incondicionalidad y facilidades para la realización de ésta reunión de carácter internacional; y también expreso un agradecimiento a nuestros sponsors que hacen posible que este evento sea un espacio con un verdadero sentido de responsabilidad social, ambiental, salud pública y bienestar animal y ser respaldo en la realización de esta reunión que de manera anual refleja un incesante interés y participación en la lucha contra la rabia.

Quisiera invitarlos a disfrutar de la belleza que representa Querétaro y deseo que esta reunión resulte ser una experiencia sumamente agradable, llena de momentos trascendentes, caracterizados siempre por el gran entusiasmo de tener la oportunidad de ser canales de solución frente a la problemática de la rabia en la salud pública y animal. Así la UAQ los recibe con las puertas abiertas y con muchas ganas de que sientan Querétaro como su casa.

Bienvenidos a la XXXIII RITA 2022 MÉXICO

Sinceramente:

Dra. Isabel Bárcenas Reyes
PTC-FCN-UAQ
Presidenta del Comité Local Organizador de la XXXIII RITA 2022 MÉXICO

"La proximidad académica y territorialidad de la salud pública en la lucha contra la rabia"

BIENVENIDA / WELCOME / BEM-VINDO / BIENVENUE

On behalf of the Autonomous University of Queretaro (UAQ), the UAQ Board of Trustees, the CA. Mejoramiento Animal Integral de la FCN-UAQ and the Local Organizing Committee, we welcome you to the XXXIII International Meeting on Rabies in the Americas. This is the first time that RITA has hosted an academic institution in Mexico, which represents an honor for this maximum house of studies of the State of Queretaro, Mexico.

UAQ is home to one of the best veterinary schools in the American continent and has always maintained a constant interest in participating and supporting scientific events with great international representation. At UAQ we know that it is thanks to science that we can build a better world. We are sure that the scientific-academic proximity to the different sectors of public and animal health involved in the planning and innovation of strategies for prevention, surveillance and control of rabies in the world must be transversal in the alliance against this disease "United against rabies" under the perspective of "One Health".

For Mexico, being the first country recognized by the WHO to have eliminated human deaths due to dog-mediated rabies means a great responsibility that implies a commitment to serve the challenges and efforts to meet the key objectives of the new global strategic plan for rabies elimination by 2030, which consist of ensuring the timely management of containment actions for the surveillance and control of the disease in order to prevent its reintroduction in countries where it has been controlled and still circulates among wild animals, especially bats. In this way, we hope that the XXXIII RITA 2022 in our country will be a meeting that will host experiences that allow the visibility and incorporation of multidisciplinary strategies for the dissemination of scientific knowledge, actions planned by sanitary campaigns and perspectives of solutions to the different rabies problems in different countries generated by researchers, students, academics, laboratory personnel and professionals in the environmental sector, health professionals, heads and managers of international, national, regional and local health programs of the representatives of the 22 countries from different continents involved in the control and epidemiological surveillance of rabies; to collaboratively and assertively achieve proximity and territoriality in the fight against rabies for countries in the process of elimination and those most vulnerable to the disease by 2030.

As president of the local organizing committee, I would like to express the most sincere gratitude of our UAQ to the International Committee of Rabies in the Americas for its closeness to academia, openness and unwavering commitment and service in the face of the challenges of rabies in the Americas and other continentsto the different academic instances for the accompaniment and inclusion in the approach with different perspectives to the problem of this zoonosis, lecturers, to those who participate in the presentation of posters or oral presentations and to all the participants in this XXXIII RITA 2022 MEXICO that nourish the **academic proximity and territoriality of public health in the fight against rabies.**

I also thank the Patronage of the Universidad Autónoma de Querétaro, which has served as coordinator of the XXXIII RITA 2022, for its unconditional support and facilities for the realization of this international meeting; I would also like to thank our sponsors who make it possible for this event to be a space with a true sense of social, environmental, public health and animal welfare responsibility and to support the realization of this meeting that annually reflects an incessant interest and participation in the fight against rabies.

I would like to invite you to enjoy the beauty that Querétaro represents and I hope that this meeting will prove to be a very pleasant experience, full of transcendental moments, always characterized by the great enthusiasm of having the opportunity to be channels of solution to the problem of rabies in public and animal health. Thus the UAQ welcomes them with open doors and with great desire to make them feel Querétaro as their home.

Welcome to the XXXIII RITA 2022 MEXICO

Sincerely:
Dr. Isabel Bárcenas Reyes
PTC-FCN-UAQ
President of the Local Organizing Committee of XXXIII RITA 2022 MEXICO

"Academic proximity and territoriality of public health in the fight against rabies"

BIENVENIDA / WELCOME / BEM-VINDO / BIENVENUE

Em nome da Universidade Autónoma de Querétaro (UAQ), do Conselho de Curadores da UAQ, da AC. Melhoria Integral dos Animais da FCN-UAQ e do Comité Organizador Local, damos-lhe calorosas boas-vindas ao XXXIII Encontro Internacional de Raiva nas Américas 2022 México. Esta é a primeira vez que a RITA acolhe uma instituição académica no México que representa uma honra para esta casa máxima de estudos do Estado de Querétaro, México.

A UAQ é o lar de uma das melhores escolas veterinárias das Américas e sempre manteve uma ocupação constante e interesse em participar e apoiar eventos científicos com grande representação internacional. Na UAQ sabemos que é graças à ciência que podemos construir um mundo melhor. Estamos certos de que a proximidade científico-académica com os diferentes sectores da saúde pública e animal envolvidos no planeamento e inovação de estratégias para a prevenção, vigilância e controlo da raiva no mundo deve ser transversal na aliança para combater esta doença "Unida contra a raiva" na perspetiva de "Uma Saúde".

Para o México, ser o primeiro país reconhecido pela OMS a eliminar a morte de pessoas devido à raiva transmitida pelos cães significa uma grande responsabilidade que implica um compromisso de serviço com os desafios e esforços para cumprir os principais objetivos do novo plano estratégico global para a eliminação da raiva até 2030, que consistem em assegurar em tempo útil a gestão das ações de contenção para a vigilância e o controlo da doença, com o objetivo de impedir a sua reintrodução nos países onde foi controlada e que ainda circula entre os animais selvagens, principalmente os morcegos. Assim, queremos que a XXXIII RITA 2022 no nosso país seja um encontro que acolhe experiências que permitam a visibilidade e incorporação de estratégias multidisciplinares para a divulgação do conhecimento científico, ações planeadas por campanhas de saúde e perspetivas de solução para os diferentes problemas da raiva em diferentes países gerados por investigadores, estudantes, académicos, pessoal laboratorial, profissionais ambientais, profissionais de saúde, chefes e gestores de programas de saúde internacionais, nacionais, regionais e locais dos representantes dos 22 países dos diferentes continentes envolvidos no controlo e vigilância epidemiológica da raiva; de modo a que, de forma colaborativa e assertiva, consigamos a proximidade e a territorialidade na luta contra a raiva pelos países em processo de eliminação e os mais vulneráveis da doença até 2030.

Como presidente do comité organizador local, gostaria de expressar a mais sincera gratidão da nossa UAQ ao Comité Internacional de Rabies nas Américas pela sua proximidade com a academia, abertura e insondável no compromisso e serviço face aos desafios da raiva nas Américas e noutros continentes, às diferentes instâncias académicas para o acompanhamento e inclusão na abordagem com diferentes perspetivas o problema desta zoonose, oradores, a quem participa na apresentação de cartazes ou apresentações orais e a todos os participantes que neste XXXIII MÉXICO RITA 2022 alimentam a **proximidade académica e territorialidade da saúde pública na luta contra a raiva".**

Agradeço também ao Conselho de Curadores da Universidade Autónoma de Querétaro que tem servido como coordenador da XXXIII RITA 2022 pela sua incondicional e facilidades para a realização deste encontro de natureza internacional; e também expresso a minha gratidão aos nossos patrocinadores que possibilitam que este evento seja um espaço com um verdadeiro sentido de responsabilidade social, ambiental, de saúde pública e de bem-estar animal e que seja apoiado na realização deste encontro que reflete anualmente um interesse incessante e participação na luta contra a raiva.

Gostaria de convidá-lo a desfrutar da beleza que Querétaro representa e espero que este encontro venha a ser uma experiência extremamente agradável, repleta de momentos transcendentes, sempre caracterizado pelo grande entusiasmo de ter a oportunidade de ser canais de solução para o problema da raiva na saúde pública e animal. Assim, a UAQ acolhe-os com portas abertas e ansiosos por sentir Querétaro como sua casa.

Bem-vindo ao XXXIII RITA 2022 MÉXICO

Sinceramente:

Dra. Isabel Bárcenas Reyes
PTC-FCN-UAQ
Presidente da Comissão Organizadora Local do XXXIII RITA 2022 MÉXICO

"A proximidade académica e territorialidade da saúde pública na luta contra a raiva"

BIENVENIDA / WELCOME / BEM-VINDO / BIENVENUE

Au nom de l'Universidad Autónoma de Querétaro (UAQ), du Conseil d'administration de l'UAQ, le CA. Mejoramiento Animal Integral de la FCN-UAQ et du Comité Organisateur Local, nous vous souhaitons la bienvenue à la XXXIII Réunion Internationale sur la Rage dans les Amériques 2022 México. C'est la première fois que RITA est accueilli par une institution académique au Mexique, ce qui représente un honneur pour cette maison d'études maximale de l'État de Querétaro, au Mexique.

L'UAQ abrite l'une des meilleures écoles vétérinaires du continent américain et a toujours maintenu un intérêt constant pour la participation et le soutien à des événements scientifiques à haut niveau de représentation internationale. À l'UAQ, nous savons que c'est grâce à la science que nous pouvons construire un monde meilleur. Nous sommes certains que la proximité scientifique et académique avec les différents secteurs de la santé publique et animale impliqués dans la planification et l'innovation des stratégies de prévention, de surveillance et de contrôle de la rage dans le monde doit être transversale dans l'alliance contre cette maladie "Unis contre la rage" dans la perspective de "Une Seule Santé".

Pour le Mexique, être le premier pays reconnu par l'OMS comme ayant éliminé les décès humains dus à la rage à médiation canine est une grande responsabilité qui implique un engagement à servir les défis et les efforts pour atteindre les objectifs clés du nouveau plan stratégique mondial pour l'élimination de la rage avant 2030, il s'agit d'assurer la gestion en temps utile des actions de confinement pour la surveillance et le contrôle de la maladie afin d'empêcher sa réintroduction dans les pays où elle a été contrôlée et où elle circule encore chez les animaux sauvages, principalement les chauves-souris. Ainsi, nous espérons que la XXXIII RITA 2022 dans notre pays sera une réunion qui rassemblera les expériences permettant la visibilité et l'incorporation de stratégies multidisciplinaires pour la diffusion des connaissances scientifiques, les actions planifiées pour les campagnes de santé et les perspectives de solutions aux différents problèmes de la rage dans différents pays générés par les chercheurs, les étudiants, les universitaires, le personnel de laboratoire, les professionnels de l'environnement, les professionnels de la santé, les chefs et les responsables des programmes de santé internationaux, nationaux, régionaux et locaux des représentants des 22 pays de différents continents impliqués dans le contrôle et la surveillance épidémiologique de la rage; afin que, dans un esprit de collaboration et d'affirmation, nous puissions atteindre la proximité et la territorialité dans la lutte contre la rage pour les pays en voie d'élimination et les plus vulnérables à la maladie avant 2030.

Comme président du Comité Organisateur Local, je voudrais exprimer la plus sincère gratitude de notre UAQ au Comité international de la rage dans les Amériques pour sa proximité avec le monde universitaire, son ouverture et son engagement et service sans faille face aux défis de la rage dans les Amériques et les autres continents, aux différents organismes académiques pour leur soutien et leur inclusion dans l'approche du problème de cette zoonose à partir de différentes perspectives, aux intervenants, à ceux qui participent à la présentation de posters ou d'exposés oraux et à tous les participants à cette XXXIII RITA 2022 MÉXICO qui entretiennent la **proximité académique et la territorialité de la santé publique dans la lutte contre la rage.**

Je remercie également le Conseil d'administration de l'Universidad Autónoma de Querétaro, qui a agi comme coordinateur de la XXXIII RITA 2022, pour son soutien inconditionnel et ses installations pour cette réunion internationale; et je voudrais également remercier nos sponsors qui permettent à cet événement d'être un espace avec un véritable sens de la responsabilité sociale, environnementale, de santé publique et de bien-être animal et de soutenir la tenue de cette réunion, qui reflète chaque année un intérêt et une participation incessants dans la lutte contre la rage.

Je vous invite à profiter de la beauté que représente Querétaro et j'espère que cette réunion sera une expérience extrêmement agréable, pleine de moments transcendants, toujours caractérisée par le grand enthousiasme d'avoir l'opportunité d'être des canaux de solution au problème de la rage dans la santé publique et animale. Ainsi, l'UAQ vous accueille avec des portes ouvertes et avec le désir de faire en sorte que Querétaro se sente comme chez lui.

Bienvenue à la XXXIII RITA 2022 MÉXICO

Sincèrement:

Dre. Isabel Bárcenas Reyes
PTC-FCN-UAQ
Présidente du Comité Organisateur Local de la XXXIII RITA 2022 MÉXICO

"La proximité académique et la territorialité de la santé publique dans la lutte contre la rage"

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Índice / Index/ Índice

INDICE / INDEX/ ÍNDICE

INDICE

Programa / Program / Programa

24 DE OCTUBRE / OCTOBER/ OUTUBRO/ OCTOBRE

"Rabia en el mundo: alianzas de éxito, una salud / *Rabies in the world: successful alliances, one health / A raiva no mundo: alianças de sucesso, uma saúde"*

Por invitación/ By invitation/ Por convite/ Par invitation/
Moderator/Moderator:
Dra. Verónica Guitérrez Cedillo

9:10 - 9:40
Dra. Bernadette Abela-Rider
OMS

(Vidememorias/Vidememoirs)

1º SESIÓN. Situación actual del control de la rabia urbana en el mundo /Current Situation of Urban Rabies Control in the World/ Situação atual do controle da Raiva urbana no mundo

9:40 - 11:00
Por invitación/ By invitation/ Por convite/ Par invitation/
Moderadores/Moderators: Dr. Ruy López Ridaura and Dr. Charles E. Rupprecht

Conference by invitation

9:40 - 10:00
Dr Rachel Tidman Global Rabies Coordinator World Organisation for Animal Health

United Against Rabies Forum: Implementing Zero by 30.

Eliminación de la rabia humana transmitida por perros en las Américas/ Elimination of human Rabies transmitted by dogs in the Americas/ Eliminação da raiva humana mediada por cães nas Américas

10:00 - 10:20
Dr. Marco Antonio Natal Vigilato PANAFTOSA/ PAHO-OMS

(Vidememorias/Vidememoirs)

Estrategias tras la eliminación de la rabia transmitida por perros en México/ Strategies after the elimination of dog transmitted Rabies in Mexico/ Estratégias após a eliminação da raiva mediada por cães no México

10:20 - 10:40
Dra. Verónica Gutiérrez Cedillo CENAPRECE-México

Strategies after the elimination of dog transmitted Rabies in Mexico.

2º SESIÓN. Profilaxis post-exposisción en rabia humana/Post-exposure profilaxis in human rabies/ Profilaxia pós-exposição da raiva humana

11:20 - 12:50
Moderadores/Moderators: Dr. Alan C. Jackson Dr. Ignacio Chávez Flores

- OR2-Immunogenicity of rabies vaccines in postexposure prophylaxis (PEP) or simulated PEP regimens: a systematic literature review and meta-analysis
- OR6-Inference, prophylaxis, and mass exposures: celestial guidance in the light of epidemiological uncertainty?
- OR3-Occupational profile of victims of work-related animal bites in Brazil, 2018-2020: a

possible route to identify risk groups for rabies?
- OR35-Awareness-raising aimed at doctors and patients in the appropriate approach at the first level of care of the person exposed to the rabies virus by an animal susceptible to this zoonosis
- OR5-Using Integrated Bite Case Management to examine the performance of rabies surveillance, prevention and control measures in the Philippines
- OR1-Preliminary results of the rabies pre-exposure (PrEP) pilot project in riverine populations in the Amazon at risk of rabies by vampire bats, lessons learned and challenges

3º SESIÓN. "Patogénesis, terapia y diagnóstico de la rabia en humanos /Pathogenesis, Therapy and Diagnosis of humans rabies/ Patogênese, Terapia e Diagnóstico da Raiva humana

14:30-16:45
Moderadores/Moderators: Dr. Sergio Recuenco - Dra. Christine Fehlner-Gardiner

- OR18-Antibody Detection by Agglutination PCR for anti-rabies specific antibodies

Dave Lowe
- OR40-A proposed clinical trial protocol for investigational rabies treatments in naturally infected dogs

Darryn Knobel
- OR8-Reported Case of Rabies from 2003 in Kentucky was Unlikely Rabies

Alan C. Jackson
- OR7-Intranasal favipiravir (T-705) treatment in experimental rabies infection: molecular and clinical evaluation

Camila Appolinario
- OR27-ASSESSMENT OF THE COLLECTION, HANDLING AND SENDING OF SAMPLE FOR DIAGNOSIS OF RABIES IN THE HEALTH SERVICES OF COAHUILA, MEXICO

María Susana Moreno Fenández
- OR71-Human rabies in Jalisco Mexico (Clinical-epidemiological approach under the "One Health" approach)

Jesús Vladimir Arriaga Ponce
- OR79- Dejar una hoja porque se está esperando el resumen.

25 DE OCTUBRE /
OCTOBER/ OUTUBRO/ OCTOBRE

1º SESIÓN. Programas nacionales para la eliminación de la rabia en humanos y perros: Oportunidades y fortalezas/ National programs for the elimination of rabies in humans and dogs: Opportunities and strengths /Programas nacionais para a eliminação da Raiva em humanos e cães: Oportunidades e pontos fortes

8:30-10:00
Por invitación/ By invitation/ Por convite/ Par invitation/
Moderadores/Moderators: Dra. Verónica Gutiérrez Cedillo -Dr. Marco Antonio Natal Vigilato

Bolivia / Grover Paredes
Argentina / Natalia Casas
Ecuador / Ana Sánchez
Situación de la rabia en el Perú: Estrategias de prevención y control / José Luis Bustamante Navarro-Memoria Virtual
Epidemiological Situation on Rabies Program in Brazil / Marcelo Toshito Wada

2º SESIÓN. Avances en la investigación de la rabia en perros / Advances in rabies research in dogs/ Avanços na pesquisa da Raiva em cães

11:25-12:40
Moderadores/Moderators: Dr. Marcelo Toshito Wada -Dr. Juan Manuel Balderas Torres

- OR11-FACTORS ASSOCIATED WITH THE RESULT OF ANTIBODY TITERS DUE TO

RABIES VACCINATION IN PETS OF MEXICO IN 2021
Israel Nicolás Reyes
- OR28-Modeling the prospects of dog rabies elimination through a 6-month-long staggered mass vaccination campaign

Brinkley Raynor
- OR13-On the road toward rabies elimination: Comparing domestic dog rabies vaccination delivery strategies and their impacts at scale across the Mara Region in Tanzania

Anna Czupryna
- OR15-Why do we still have dog rabies in Arequipa? An implementation analysis to evaluate previous and current vaccination plans and strategies

Ricardo Castillo-Neyra
- OR9-Genetic typing of rabies virus: a tool that allowed monitoring RABV variants in Mexico

Dr. Andrés Velasco-Villa

3ºSESIÓN. Vacunación de la rabia en perros: Actuales y futuros desafíos/ Advances in rabies research in dogs/ Avanços na pesquisa da Raiva em cães

12:40-15:55
Moderadores/Moderators: Dr. Ryan MacLaren Wallace -MSPAS. Alejandro Enríquez Vázquez

- OR55-Filter Papers to Collect Blood Samples from Dogs: An Easier Way to Monitor the Mass Vaccination Campaigns against Rabies?

Marine Wasniewski
- OR51-CANINE AND FELINE RABIES CONTROL OPERATION IN 2014, IN THE CITY OF TUXTLA GUTIÉRREZ, CHIAPAS

Jordán Edgardo Bermúdez Casillas
- OR63-Analysis of delays in detection, reporting, and response to canine rabies cases in Arequipa, Peru

Elvis Diaz
- OR54-Canine Rabies Vaccine Campaigns in Arequipa, Peru Post COVID-19: A Qualitative Study

Valerie A. Paz-Soldan
- OR70-The International Rabies Taskforce – Tailored support to achieve elimination

Lohr Frederic
- OR74-Strategies to Increase Canine and Feline Rabies Vaccination Coverage After the COVID-19

Juanita Marylú Aguilera Salas
- OR48-Impact of an educational comic book on rabies related knowledge in school children in Haiti, 2020

Yasmeen Ross

4ºSESIÓN. Biotecnología en vacunas contra la rabia/ Rabies vaccination in dogs: Current and future challenges/ Vacinação contra a raiva em cães: Desafios atuais e futuros

16:25-17:40
Moderadores: Dra. Edith Rojas Anaya
Dr. Carlos Adolfo Palacios

- OR34-Urban/suburban oral rabies vaccine field trial, ecology studies and refined baiting strategies targeting raccoon rabies in Vermont.

Kathleen M. Nelson
- OR57-Safety and immunogenicity of three dosages of an investigational, highly purified Vero cell rabies vaccine: Phase II study with a simulated post-exposure regimen in healthy adults

Andrea-Clemencia Pineda-Peña
- OR16-Safety and Efficacy of SYN023 Anti-Rabies mAb Cocktail

Eric Tsao
- OR19-Evaluation of oral iophenoxic acid biomarkers in raccoons for measuring bait uptake

Shylo R. Johnson
- OR72-Rabies Glycoprotein expression in HeLa cells by an mRNA vaccine candidate

Joaquin Bozzo

26 DE OCTUBRE / OCTOBER/ OUTUBRO/ OCTOBRE

1º SESIÓN Genómica: Una herramienta para el diagnóstico, vigilancia y control de la rabia/ Genomics: A tool for rabies diagnosis, surveillance and control/ Genômica: Uma ferramenta para o diagnóstico, vigilância e controle da Raiva

Por invitación/ By invitation/ Por convite/ Par invitation/

8:40-9:50
Moderadores/Moderators: Dra. Christine Fehlner-Gardiner-Dr. Juan Antonio Montaño Hirose

- Desarrollo de biológicos y vacunas antirrábicas en Argentina

Dr. Carlos Adolfo Palacios

- Tracking rabies virus in wildlife in North America

Dra. Crystal M Gigante

- Perspectivas de los métodos moleculares para el diagnóstico y control de la rabia en México

Dra. Elizabeth Loza Rubio

2º SESIÓN. Rabia en hervíboros en América Latina I/ Rabies in herbivores in Latin America I/ A raiva em herbívoros na América Latina I

9:50-11:00
Moderadores/Moderators: Dr. Daniel Stricker - Dra. Isabel Bárcenas Reyes

Programa regional para el manejo de rabia de los herbívoros en las Américas

Por invitación/ By invitation/ Por convite/ Par invitation/
Dr. Marco Antonio Natal Vigilato/ PANAFTOSA/PAHO-OMS

- OR47-GEOGRAPHICAL DISTRIBUTION OF RABIES TRANSMITTED BY THE COMMON VAMPIRE BAT (DESMODUS ROTUNDUS) IN CATTLE IN THE AMERICAS

Diego Soler-Tovar

Panorama de la Campaña nacional para la prevención y control de la rabia en bovinos y especies ganaderas en México-Vídeo.

Por invitación/ By invitation/ Por convite/ Par invitation/
MVZ. Baltazar Cortes García/SENASICA

- OR60-Endemic area of Desmodus rotundus bats classification associated to the presence of rabies in livestock in Mexico, using Risk Analysis.

Alejandro Jiménez

2º SESIÓN. Rabia en hervíboros en América Latina I/ Rabies in herbivores in Latin America I/ A raiva em herbívoros na América Latina II

11:30-12:30
Moderadores/Moderators: MVZ. Luis Lecuona Olivares-MVZ.Baltazar Cortes García

- OR20-Spatial-temporal trend of paralytic rabies cases in Mexico

Reyna Ortega Sánchez

- OR61-RABIES CASES REPORTED IN PARAGUAY DURING 2021-2022

Mirtha Colman

- OR76-Comprehensive public health interventions in a rabies outbreak in Morelos, 2022

Angelita Gómez-Gómez

- OR43-INCLUSION OF WORKING EQUIDS IN RABIES PREVENTION CAMPAIGNS IN THE OAXACA STATE, MEXICO.

Arturo Herrera Leon

3º SESIÓN. Epidemiología molecular de la rabia/ Molecular epidemiology of rabies/ Epidemiologia molecular da raiva

12:30-13:15

Moderadores/Moderators: Dra. Elizabeth Loza Rubio - Dr. Charles E. Rupprecht

- OR23-High-throughput genotyping to track the geographic origin of rabies positive raccoons in raccoon-variant free areas of the United States

Matthew W. Hopken

- OR22-Implementing genomic surveillance of vampire bat rabies across Central America using Whatman FTA cards and next generation sequencing

Hollie French

- OR21-Optimization of the pan-lyssavirus RT-qPCR assay LN34 in multiplex format to improve rabies diagnostics

Yu Li

4º SESIÓN. Eco-epidemiología de la rabia/ Rabies Eco-epidemiology/Eco-epidemiologia da Raiva

14:45-16:30

Moderadores Dra. April Davis - Dr. Feliciano Milián Suazo

- OR65-APLICATION OF GEOGRAPHIC INFORMATION SYSTEM (GIS) FOR DECISION MAKING IN A RABIES CONTROL OPERATION (RABIES OUTBREAK), IN THE STATE OF CHIAPAS

Mario Armando Bocanegra Alegria,

- OR26-Spatio-temporal analysis of bat death reports in urban areas in Brazil, 2011 to 2020 and their possible relationships with human rabies cases

Alexander Vargas

- OR25-Modelling modifiable factors associated with the probability of human rabies deaths in Nigeria in the context of sparse dog bite surveillance data

Philip P. Mshelbwala

- OR14-Grading on a Curve: Analysis of available animal testing data to propose a peer-derived quantitative threshold for determining adequate surveillance capacity for rabies

Faisal S. Minhaj

- OR24-Rabies Surveillance in the United States during 2021

Xiaoyue Ma

27 DE OCTUBRE /
OCTOBER/ OUTUBRO/ OCTOBRE

1º SESIÓN. Avances de investigación de la rabia en fauna silvestre/Advances in wildlife rabies research/Avanços na pesquisa da Raiva em animais silvestres

9:00-11:25

Moderadores Dr. J. Álvaro Aguilar Setién - Dr. Richard Chipman

Evaluation of the effects of vampire bat culling on the spatial spread and transmission of rabies virus"

Por invitación/ By invitation/ Por convite/ Par invitation/
Dr. Daniel Streicker

- OR29-VIRAL CROSS SPECIES TRANSMISSION AND SHIFTS FROM BATS INTO MESOCARNIVORES: 'THE FLAGSTAFF PHENOMENON'

Charles E. Rupprecht

- OR77-Rabies virus spillover and host shifts from bats into mesocarnivores

Amy Gilbert,

- OR66-Results on 21 years of enhanced bat rabies surveillance in France

Alexander Servat

- OR69-Rabies in Canada – 2021

Dra. Christine Fehlner-Gardiner

- OR31-Identifying factors that influence the adoption of a vampire bat rabies vaccine among personnel of the rabies control program in México

Elsa Cárdenas Canales

- OR33-Epidemiology of human, canine and wild rabies in the State of Sinaloa, 1993-2021

Carlos Hernández Ramírez

- OR68-Rabies in Chiropteran in the state of San Luis Potosí Mexico 1997-2021

Juan Carlos Camacho Martínez

2º SESSION. Rabia urbana no transmitida por perros/ Urban rabies not transmitted by dogs/ Raiva urbana não transmitida por cães

Moderadores: Dra. Verónica Gutiérrez Cedillo -Natalia Casas

- OR37-THE NEW EPIDEMIOLOGY OF RABIES IN THE COLOMBIAN ANDES: RECENT CAT-RELATED HUMAN CASES

Samir Meriño-Olivella

- OR75-RABIES IN DOMESTIC FELINES IN MEXICO DURING THE PERIOD FROM 2019 TO 2022

Dra. Verónica Gutiérrez Cedillo

- OR38-Case of rabies in a domestic cat

Omar Alejandro Torres Ramírez

3º SESIÓN. Impacto del movimiento de animales, como riesgo de transmisión y diseminacion de la rabia / Impact of animal movement as a risk of rabies transmission and dissemination/Impacto do movimento animal, como um risco de raivada transmissão e disseminação da raiva

Por invitación/ By invitation/ Por convite/ Par invitation/

12:30-15:00
Moderador: Dr. Diodoro Batalla Campero

Título de su charla
Dr. Ryan Wallace/CDC

Why is it important to comply with sanitary measures when traveling with pets?-Vídeo
Dra. María del Rocío Campuzano Hernández

Sesión. Pósters/Posters/ Pósteres

23-27/Octubre
OCTOBER/ OUTUBRO/ OCTOBRE

- OR44 Treatment seeking behaviour in animal bite victims of Nepal

Rakesh Chand

- OR46 Awareness of rabies and its prophylaxis through the vero cell vaccine in population at risk from wildlife

Luis Antonio Montoya

- OR17 Immunogenicity of rabies vaccines in pre-exposure prophylaxis (PrEP) regimen: a systematic literature review and meta-analysis

Fernando Morelli

- OR39 AGGRESSIONS OF ANIMALS ON HUMANS IN THE MUNICIPALITY OF PEDREIRAS, MARANHÃO (BRAZIL) DURING THE YEARS 2021 AND 2022

Roberto Carlos Ribeiro

- OR73 Epidemiological profile of people exposed to rabies in Haiti from 2017 to 2021

Parlo César

- OR4 Unattended bites: An updated approach to bite exposures in the era of One Health and beyond Zero by 30

Sergio E. Recuenco

- OR49 Human rabies in Nayarit, a disease with social determinants

Mariana Mena Alcantar

- OR10 Evaluating the cost-effectiveness of dog vaccination campaigns against rabies in Tanzania: A comparison between free-of-charge vaccination campaigns in 2016 and owner-charged in 2021.

Maganga Sambo

- OR50 Implementation of the Can Census Computerized System for the use of data which was generated in health actions carried out in the canine and feline population in Navojoa, Sonora

Damaris García Flores

- OR52 Relationship between animal rabies vaccination and human rabies cases in the state of Guerrero between 1990 and 2021

Ricardo Ramírez

- OR53 National day of canine and feline vaccination against COVID-19 in Colima, Mexico 2020-2021

Diana Karen Peralta Corona

- OR56 EDUCATING AND MODIFYING: FOOTPRINTS OF THE HEART

THERESITA LEGASPI PAUL

- OR45 Gaps in the Animal Rabies control programs in Nepal

Rakesh Chand

- OR12 Rabies Management in the North. Analysis of Alaska, Northwest Territories and Svalbard.

Karsten Hueffer

- OR41 Esquivel DETECTION OF THE PRESENCE OF RABIES IN BATS FROM OAXACA

Oscar Ezequiel Blanco

- OR58 INTERVENTIONS FOR RABIES CONTROL OUTBREAKS BY THE NATIONAL PROGRAM OF ZOONOSES CONTROL AND RABIES NATIONAL CENTER IN PARAGUAY (2021-2022)

Jorge Miret

- OR59 Rabies in animals of economic interest in Guerrero from 2005 to 2021

Ricardo Ramírez

- OR62 APPROACH TO CASE OF PARALYTIC RABIES IN LIVESTOCK SPECIES IN MANZANO, VERACRUZ 2021

Lorena Sánchez Sandré

- OR32 Factors related to the distribution and displacement of the Common Vampire Bat (Desmodus rotundus) in the state of San Luis Potosí, Mexico

Ignacio Amezcua Osorio

- OR42 Operation Jame Canyon

Mario Eduardo Solís

- OR30 Cross-evaluation of rabies surveillance and case detection in Puerto Rico and the continental United States

Sarah Bonaparte

- OR64 Detection and counting of chiroptera with optical methods in the Altiplano region of San Luis Potosí

Israel Cruz Rangel

- OR67 Reduction of the hematophagous bat population with continuous captures

María Luisa Mendez Ojeda

- OR36 Skunk rabies in Mexico

Paola Puebla Rodríguez

24 DE OCTUBRE /
OCTOBER / OUTUBRO / OCTOBRE

Rabia en el mundo: alianzas de éxito, una salud
Rabies in the world: successful alliances, one health
A raiva no mundo: alianças de sucesso, uma saúde

Dra. Bernadette Abela-Rider/OMS

1º SESIÓN. Situación actual del control de la rabia urbana en el mundo / Current Situation of Urban Rabies Control in the World / Situação atual do controle da Raiva urbana no mundo Eliminación de la rabia humana transmitida por perros en las Américas / Elimination of human Rabies transmitted by dogs in the Americas / Eliminação da raiva humana mediada por cães nas Américas.

Moderadores/Moderators/Moderadores
Dr. Ruy López Ridaura- México/Mexico/México
Dr. Charles E. Rupprecht
E.E. U.U. /USA/E.E. U.U.

United Against Rabies Forum: Implementing Zero by 30

Rabies in the Americas
24-28 October 2022
Mexico

Speaker. Dr Rachel Tidman
Global Rabies Coordinator
World Organisation for Animal Health (WOAH, founded as OIE)

Abstract. The United Against Rabies Forum was launched by the Tripartite organisations in 2020 to implement the objectives set out in 'Zero by 30: the Global Strategic Plan to end human deaths from dog-mediated rabies by 2030'. This network now encompasses more than 45 organisations from diverse backgrounds, sharing experience and ideas, and working together to support countries and regions in progressing towards rabies freedom.
Over the past two years, Working Groups of the Forum have produced outputs that will support the development and implementation of National Strategic Plans, maximise the use of existing tools and resources, and build advocacy and resource mobilisation strategies.

Eliminación de la Rabia Humana Transmitida por Perros en las Américas

Marco A. N. Vigilato[1], Felipe Rocha[1], Baldomero Molina-Flores[1], Larissa Cacho Zanette[1], Ottorino Cosivi[1]
1. Centro Panamericano de Fiebre Aftosa y Salud Pública Veterinaria, Organización Panamericana de la Salud/Organización Mundial de la Salud (PANAFTOSA/SPV-OPS/OMS)

En los últimos 40 años, los países de las Américas han demostrado una notable disminución de la incidencia de casos de rabia por variante canina en humanos, con disminución de más de 95% de la ocurrencia de la rabia humana transmitida por el perro. Eso se debe a una estrategia basada en 04 ejes de ejecución por parte de los servicios de salud pública de los países: (a) Implementación de campañas

masivas de vacunación canina anualmente y cobertura vacunal de al menos 80% de la población total de perros; (b) Aseguramiento de atención efectiva de personas expuestas y mejora de la calidad y disponibilidad de inmunobiológicos; (c) Fortalecimiento de la vigilancia y capacidad del diagnóstico laboratorial; (d) Educación sanitaria y tenencia responsable. Sin embargo, algunas áreas siguen presentando importantes desafíos a los gobiernos locales y nacionales para la ejecución de sus programas de vigilancia y control de esta enfermedad. Los logros en el control de la enfermedad en la región permiten afirmar que la rabia humana de origen canina puede ser eliminada en el continente americano. En 2013, durante la Reunión de los Directores y Jefes de Programas de Rabia de las Américas (REDIPRA), en Lima, Perú, se aprobó el Plan de Acción para la Eliminación de la Rabia Canina en las Américas, pero los cambios epidemiológicos y la situación de la enfermedad cambio en los últimos 10 años en la región, y por eso se hace necesario una actualización del Plan. El está siendo desarrollado para apoyar tanto a los países con endemicidad de la rabia por variante canina en su población canina, así como aquellos con la enfermedad ya eliminada, basada en actividades prioritarias para cada escenario epidemiológico de la enfermedad, para lograr metas y cumplir objetivos comunes a la región. La actualización del Plan de Acción para Eliminación de la Rabia Canina va a apoyar a los países con el establecimiento de objetivos, metas, actividades e indicadores para el desarrollo y seguimiento de sus programas nacionales; presentar los requisitos para lograr la validación y verificación de la eliminación de la rabia humana por el perro y de la rabia canina, respectivamente.; fortalecer la capacidad de vigilancia, diagnóstico, control y atención oportuna para la rabia, evitando muertes de personas, disminuyendo su área de endemicidad, y previniendo la reintroducción de la enfermedad; y gestionar el compromiso político de eliminar la rabia humana transmitida por el perro, así como assegurar recursos para el cumplimiento con la meta de su eliminación para el 2030.

Strategies after the elimination of dog transmitted Rabies in Mexico

Gutiérrez-Cedillo Verónica, Chávez Flores Ignacio Antonio, Fernández Colín José Ramón, Vargas Pino Fernando, Lecuona Olivares Luis Armando, López Ridaura Ruy

The National Program for Prevention and Control of Human Rabies was born in the last century with the Regulations for the Anti-Rabies Campaign (1938-1950) and the National Health Plans (1974-1976 and 1977-1983) in an effort to reduce the 1,200 deaths caused by dog-mediated rabies registered in the period from 1970 to 1989; by following the main strategy recommended by the World Health Organization (WHO) on canine rabies vaccination, together with medical care for rabies, using cell culture biologicals and the others available at that time (from nerve tissue).

During the following years, this strategy continued to be applied in the National Health Programs (1984 to 2000), in the Rabies Action Program (2001-2006) and finally in the Specific Action Programs (2007-2012 and 2013-2018), in addition to the political decision of eliminating dog-transmitted human rabies as a public health

problem as part of the continental project promoted by the Pan American Health Organization (PAHO) with the countries of the Region, to achieve this goal at the beginning of the 21st century.

Therefore, it was necessary to adjust the rabies vaccination strategy, such as implementing massive, intense and free of charge vaccination campaings for dogs from one month of age with re-vaccinations at three months old and then annually. The biological used in these campaing had its quality proven and authorized for use by the Ministry of Health during these National Weeks. In addition to incorporating human anti-rabies biologicals in cell cultures since 1996, the 14-dose scheme (nerve tissue) was replaced by the five-dose scheme (Vero Cells and PCEC), and the 4-dose scheme is used currently throughout the Health Sector.

On the other hand, it was important to implement a weekly system of rabies surveillance in dogs as the main reservoir and collaterally in humans, as proposed by PAHO, which would allow the authorities to make decisions and was reflected in two adjustments made to the National Week. The first adjustment was to set a date in March for celebrating the National Rabies Vaccinnation Week to reduce rabies transmission among dogs between May and June. This decision was based on the records of the surveillance system and the epidemiological investigations of each canine case, both revealed that most cases occurred in unvaccinated puppies that had not been born at the time of the National Week. The second adjustment was to implement a re-vaccination week, to accelerate the reduction of registered canine rabies cases, and pair it with rabies outbreak control activities in the states where cases persisted, linking state and municipal authorities in the mobilization of resources.

Laboratory surveillance is also prioritized, as it supports preventive rabies care for people at risk, allowing the evaluation of the quality and enhancement of the National Dog Vaccination Weeks by the incorporation of molecular studies for viruses isolated from human and animal rabies cases.

The annual increase of vaccinated dogs, led to the proposition of a control strategy for its population, which was also demanded by the society at this time, forced to establish sterilization activities on the canine population to limit its growth in specific areas of the country.

Therefore, the Ministry of Health throughout these years has implemented activities in compliance with the WHO recommendations, in order to obtain the validation by the WHO for having eliminated dog-transmitted rabies as a public health problem in October 2019, making Mexico the only country that has completed this process until now.

Currently, the country has zero cases of human rabies transmitted by dogs, compared to those caused by wild animals, which accumulate five deaths up to September 2022 : one in 2015 (Chihuahua state, by skunk), two in 2016 (Guerrero and Tamaulipas states, by hematophagous bat), one in 2020 (Veracruz state, by an unidentified species bat) and the last one in April 2022 (Jalisco state, by non-hematophagous bat).
Regarding canine rabies, the cases presented since 2017 correspond to antigenic va-

riants associated with wild viruses; moreover, rabies vaccination of dogs and cats is maintained with an annual average of 18 million applied doses, free of charge, reaching 90% of the national programmed goal.

To address canine overpopulation as a public health problem, which is linked to the number of aggressions, massive sterilization campaings are implemented with shared responsibility among the three levels of government, as well as the celebration of the National Month of Canine and Feline Sterilization in the month of October, accumulating 716 thousand animal free of charge sterilizations at the end of the year. In conclusion, the prevention and control of this zoonosis is fundamental, as its presence is more frequently observed in marginalized populations with lags in their development, which reflects the lack of equity in our society, caused by the lack of attention to the social determinants of health and risk factors.

Therefore, it is necessary to design and implement public policies, rules, regulations and protocols to guide the forms of organization, as well as to have a regionalization for the implementation of post-elimination strategies that contribute to the prevention and control of rabies according to the epidemiological situation, considering the local level as priority to promote and address the social and health delays caused by this disease.

Furthermore, having early-reaction mechanisms for outbreaks, is more cost-effective than handling it when it has already spread. From a public health point of view, early warning of possible animal outbreaks will allow control measures to be put into place to prevent or minimize morbidity and mortality in the population.

Additional to the mentioned above, and in order to contribute to the welfare of people, within the scope of the Specific Program for the Attention of Zoonoses in Public Health 2020-2024, it is essential to effectively coordinate actions with the different sectors that address this zoonosis, along with the continuous training of primary health care personnel in the medical assessment and timely administration of anti-rabies prophylaxis for people who have been exposed to rabies, determine the quality of the programs, actions and services that compose the National Health System. Likewise, it is imperative to continue the surveillance of rabies virus in animals in a focused and directed manner, i.e., presence of nervous sygnology to justify the taking of a sample.

Finally, Rabies care, within the Public Health programs, is a priority issue with emphasis on its intersectoral, inter-disciplinary and trans-disciplinary approach, since the origin of this pathology is found in animals and therefore, it must be addressed in an integrated way, following the One Health approach.

2° SESIÓN. Profilaxis post-exposisción en rabia humana/Post-exposure profilaxis in human rabies/ Profilaxia pós-exposição da raiva humana

Moderadores/Moderators/Moderadores

Dr. Alan C. Jacson -Canadá/Canada/Canada
Dr. Ignacio Chávez Flores -México/ Mexico/ México
11:30-13:00

OR2-Immunogenicity of rabies vaccines in postexposure prophylaxis (PEP) or simulated PEP regimens: a systematic literature review and meta-analysis

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Keywords. Vaccines, Rabies Prevention

Introduction. Different Rabies vaccines and dosing regimens have been used with consistent efficacy as PEP since the 19th century. Scientific knowledge in vaccination, industrial advancements and laboratory methods describing immunogenicity have progressed. However, the expected immunogenicity acceptance criteria remains unchanged since 1978.

Objective. Describe the immunogenicity of rabies vaccines, as measured by rabies virus neutralizing antibody (RVNA).

Materials and Methods. Review of scientific databases and internal Sanofi sources, searching publications using HDCV, PVRV, or PCECV, as PEP, presenting RVNA geometric mean titers (GMT) and/or seroconversion rates (SC ≥ 0.5 UI/mL) using rapid fluorescent focus inhibition tests, from 1985 to 2022.
We conducted a random-effect meta-analysis, calculating means GMT/SC at day 14 in each study group with inverse variance method for pooling. Meta-means were compared by vaccine type, study year, or testing laboratory, and stratified by rabies immunoglobulins (RIG) coadministration.

Results. 90 interventional groups (5,701 individuals) were included. 59% of subjects received PVRV, 32.8% PCECV, 8.2% HDCV. 55.2% of participants received intradermal vaccination, 47.1% received RIG coadministration. Doses received varied by assigned regimen, but all subjects had 2 or 3 doses by day 7.
Mean GMT and SC were not statistically different between vaccines, regardless of RIG coadministration (meta-mean= 9.15 IU/mL, p= 0.2, SC: 98%, p = 0.98). However, there was a difference between GMT obtained before and after year 2000 (p< 0.01). This difference is significant with or without RIG coadministration, although use of RIG

was associated with lower GMT in both periods. This was not seen in seroconversion. Comparisons by laboratories revealed different meta-means ($p < 0.01$); time-effect was seen in laboratories for which enough data before/after 2000 were available.

Conclusions. Reasons for GMT decline after 2000 are multifactorial, and additional investigations are needed to fully understand this time-effect. Laboratory methods and associated acceptance criteria might need to be reevaluated and further standardized to better describe immunogenicity.

Funding. The work that led to this abstract was funded by Sanofi.

OR6-Inference, prophylaxis, and mass exposures: celestial guidance in the light of epidemiological uncertainty?

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Keywords. Exposure, prophylaxis, risk assessment

Modern human postexposure prophylaxis (PEP) is a very safe and highly effective method to prevent rabies, when administered in a timely and appropriate manner. Typically, after a bite from a clinically suspect or laboratory confirmed animal, PEP decisions are straight forward. Most individuals will recognize readily when they have been bitten or scratched by rabid domestic animals or wildlife species. Given the detention of mesocarnivores (e.g., dogs, foxes, raccoons, skunks, etc.), outright pain, frank blood, and visible lesions seem obvious. Most exposed individuals should recognize a bite from a rabid animal, even from smaller-bodied animals, such as bats. Importantly, the safe capture, euthanasia, submission, and laboratory testing of suspect animals will provide an answer as to their rabies status within hours, as most will be negative, rapidly alleviating concerns as to an ideal medical response.

However, there are multiple instances where an exposure event may not be elicited or apparent, particularly involving rabid bats, such as with infants and non-verbal children, in persons during instances of deep sleep or due to the impacts of medication or disability, in patients with dementia or other conditions, etc. Under such circumstances, when there is a reasonable probability of a viral exposure, but no animal is available for laboratory testing, PEP may be recommended on a case-by-case basis. Today, some practitioners may consider that there are no down sides to individual PEP, and be unaware or disinterested with the broader medical, social, economic, or public health concerns related to unnecessary use, when no actual exposure has occurred. Clearly, the adage of 'do no harm' is not equivalent to 'accept no risk'. For example, all biologics are associated with adverse events (albeit rarely seriously, compared to the prior century's nerve tissue-based or crude heterologous serum products), and there is a considerable 'cost' to PEP, including the non-compensated time of health care visits for multiple vaccine dose delivery, the inconvenience of visiting emergency

facilities with contact to other patients with a variety of ailments (especially during a pandemic), and the inappropriate delivery of products that may be in limited supply (even in highly developed countries such as the USA on occasion), among other factors. Rabies PEP is always a serious undertaking, with a decision made ultimately between a patient and health care provider, under public health scrutiny. This latter expertise becomes even more important in mass exposure events (such as in schools, hospitals, petting zoos, etc.), when hundreds of persons may be involved, and risk assessment tools are critical to providing sound guidance. Variables include the species involved, the availability for testing, the nature of the contact, the epidemiology of rabies in the area, and specific details of each event. The utility of such applications is apparent not only in LMIC during the rapidly approaching 2030 global goal towards the elimination of human rabies caused by dogs, but also in all countries that have already met that goal, yet wildlife rabies predominates.

OR3 - Occupational profile of victims of work-related animal bites in Brazil, 2018-2020: a possible route to identify risk groups for rabies?

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Keywords (3). Rabies Vaccines, Rabies Exposure, Rabies Prevention & Control, Occupational Injuries, Occupational Exposure

Introduction. Preventing exposure to rabid animals and providing appropriate pre-and post- exposure prophylaxis can prevent human rabies. Pre-exposure immunization is traditionally focused on high-risk populations, such as veterinarians, laboratory workers, and other animal handlers. However, some jobs may incidentally expose workers to animals carrying the rabies virus, which can be aggravated by the recent decrease in rabies vaccination rates for dogs in Brazil (after COVID-19 pandemic).

Objectives. To describe the occupational profile of victims of work-related animal bites in Brazil, 2018-2020.

Materials and Methods. This is a descriptive epidemiological study, including notifications of work-related accidents among workers caused by contact with dogs (ICD-10 W54) or other mammals (ICD-10 W55) that occurred in Brazilian individuals ≥16 years between 2018-2020, registered in the official database of the Ministry of Social Security (CAT). Statistical analyses include absolute and relative frequencies of accidents according to the following variables: age, sex, occupation, injury site, and animal.

Results. 4,592 work-related dog/other mammal bites were registered between 2018-

2020, corresponding to 0.5% of all work-related accidents among registered workers in Brazil. Dogs were the agent in most accidents (88%). 67.9% of the victims were males; age ranged from 16 to 76 years (median=37). Injuries were most frequently located on the upper (50.5%) and lower limbs (41%). The most affected occupational categories were mail carriers (16.9%), public/community health agents (15.8%), household garbage collectors (12.3%), and water/electricity meter readers (11%). Accidents with animal handlers and veterinarians/veterinary technicians corresponded to only 3.5% and 1.8% of all exposures, respectively. Three workers were awarded social security sickness benefits as they were unable to work for more than 15 days consecutively.

Conclusions. Our results suggest that dog bites are an occupational hazard among several essential services workers. The higher probability of exposure to potentially rabid animals may prompt these professional groups eligible for prophylaxis.

Funding. All authors are Sanofi employees, but no specific funding was provided for the development of this project.

OR35 - Awareness-raising aimed at doctors and patients in the appropriate approach at the first level of care of the person exposed to the rabies virus by an animal susceptible to this zoonosis

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CDMX´s Public Health Care System, TIII Dr. Luis Mazzotti Galindo Health Center Iztacalco Jurisdiction.

Keywords. Awareness-raising, surveillance, and training.

Introduction. In 2019, Mexico became a country that received WHO validation for eliminating human rabies transmitted by dog bites. It was observed that this validation began to generate confusion in the first contact physicians since they no longer consider it necessary to carry out the 10-day surveillance.

Objectives. Establish strategies to sensitize doctors and patients to achieve a correct approach to persons exposed to the rabies virus.

Materials. Epidemiological monitoring of patients, surveillance internal format and training about rabies to the physicians.

Methods. From January 2021 to July 2022 at the Dr. Luis Mazzotti health center, animal accidents were ranked ninth in the cause of health attention; 59.6% occurred on public roads and 40.4% were domiciliary. As strategies, we implemented internal training on rabies disease and its transmission for physicians belonging to the health center and invited physicians from clinics in the region. We developed an in-

ternal surveillance format to inform patients, highlighting the importance of their cooperation and the impact on their health about carrying out the surveillance, and we provided support during the process.

Results. With these actions, we stimulated the physicians by recommending the vigilance of the aggressor animal. 60% of the patients returned to the health center to report the aggressor animal's health, 20% reported by phone messages and videos, 19% had to make follow-up calls and 1% had a home visit. Three post-exposure prophylaxis started, but they were interrupted because the patients found the animal, encouraged by the sensitization achieved with our awareness program. Three patients who sued the dog's owner for disappearing the animal allowed us to make the necessary observations on these cases.

Conclusions. The implemented strategies sensitized and increased the correct medical management, as well as the adherence and commitment of the patients to carry out the animal surveillance.

OR5 - Using Integrated Bite Case Management to examine the performance of rabies surveillance, prevention and control measures in the Philippines

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Keywords. Integrated Bite Case Management, One Health, cost-effective

Introduction. Despite national efforts to control and eliminate dog-mediated rabies in the Philippines, it remains endemic. Widespread establishment of Animal Bite Treatment Centers (ABTCs) with free provision of post-exposure prophylaxis (PEP) to bite patients have reduced rabies mortality to a plateau of around 200-300 deaths annually.

Objectives. We used Integrated Bite Case Management (IBCM), a One Health approach, to enhance rabies surveillance, and estimate the burden of rabies, the costs and benefits of current PEP policies and the performance of surveillance approaches.

Materials and Methods. Using IBCM we collected data over a 3-year period (2020 to 2022) on the risk of rabies for bite patients and provisioning of PEP in Oriental Mindoro province.

Results. The incidence of bite patients seeking PEP was high (>900,000 persons/year). Yet, the majority of bites were from healthy animals, with <2.5% deemed high-risk for rabies exposure (<30/100,000 persons/year). Although this might suggest high health seeking behavior, we find that just 77% of rabies-exposed patients obtain PEP. Routine rabies surveillance confirmed around <2% of circulating animal rabies cases, whereas IBCM resulted in a fivefold increase in case detection. These data suggest that between 200-700 dogs develop rabies per year in Oriental Mindoro, equating to a rabies incidence between 0.1-0.5% of the dog population. On average, 16-35 human deaths per year were averted by PEP at a cost of >$500,000 USD/year, i.e. $15,000-$34,000 USD per death averted.

Conclusion. Our results highlight that while current PEP policies/practices are preventing rabies deaths, they are very costly and the needs of the most vulnerable remain unmet, suggesting alternative strategies are necessary. We conclude that integrating a One Health IBCM approach into national policy has potential to provide more accurate data on the circulation of rabies to target mass dog vaccination and help achieve/maintain rabies elimination in the Philippines.

OR1 - Preliminary results of the rabies pre-exposure (PrEP) pilot project in riverine populations in the Amazon at risk of rabies by vampire bats, lessons learned and challenges.

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4. Secretary of Health of the State of Pará - SESPA
5. Pasteur Institute - Health Department of the State of São Paulo

Keywords. Rabies; Pre-exposure prophylaxis; Serology;

Introduction. In recent years in Brazil, outbreaks of human rabies caused by

hematophagous bats have been observed in riverine/indigenous populations, representing a public health problem.

Objectives. to prevent the occurrence of human rabies cases using rabies pre-exposure (PrEP) and to evaluate the neutralizing antibodies titration.

Material and methods. study in Rio Pacajá, Portel-PA, Brazil, in the Amazon, first stage in September/2019. Two doses of rabies vaccine (0.1 mL) were applied intradermally (ID), with an interval of 7 days. By convenience, serum was collected before vaccination, one and two years after the vaccination. A Linear Model was used to look for correlation between individual variables and population residences, bat aggression, and rabies antibodies.

Results. 2,987 people were vaccinated in 411 dwellings. There was a correlation between attacks on domestic animals and location of dwellings as risk factors for attacks in humans; sex and age were not related. There would be 2.42 more chances of attacks by bats in individuals in dwellings with attacks on domestic animals than in individuals in dwellings without attacks on domestic animals and 4.76 more chances of attack by bats in more distant homes. The first sampling prior to vaccination collected 192 individuals, mostly men (53.6%), adults (70.3%), 105 dwellings reported bats attacks (33.8%) and domestic animals (85.7%) and none had titers greater than 0.5 IU/ml. One and two years after the vaccination action, 92 and 75 people were sampled, and titers higher than 0.5 UI/mL were observed in more than 62% in both years, maintaining the protection.

Conclusion. This project can support public policies on PrEP for vulnerable populations at risk of vampire bat rabies. Serological follow-up showed that vaccination promoted protective titers against rabies. The ID route proved to be cost-effective. The challenge is to expand the action to other areas and populations at risk.

3º SESIÓN. "Patogénesis, terapia y diagnóstico de la rabia en humanos /Pathogenesis, Therapy and Diagnosis of humans rabies/Patogênese, Terapia e Diagnóstico da Raiva humana.

Moderadores/ Moderators/ Moderadores
Dr. Sergio Recuenco -Perú/Peru/ Perú
Dra. Cristine Fehlner-Gardiner -Canadá-Canada/ Canadá
14:30-16:45

OR18 - Antibody Detection by Agglutination PCR for anti-rabies specific antibodies.

Dave Lowe[1], Lalita Priyamvada[1], Michael Niezgoda[1], Cheng-ting Tsai[2], Peter Robinson[2], David Seftel[2], andPanayampalli S. Satheshkumar[1]

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[2]Enable Biosciences Inc, South San Francisco, CA, USA Keywords: diagnostic testing, serology, PCR

Introduction. The antemortem diagnosis and surveillance of rabies relies on serological tests such as rapid fluorescentfoci inhibition test (RFFIT) and indirect fluorescent antibody (IFA) test for detection of rabies virus specific antibodies. These gold-standard rabies serological tests involve cell culture and live virus manipulation, making them more challenging to implement than other test systems particularly in resource limited settings.

Objectives. We tested the ability of antibody detection by agglutination PCR (ADAP) to detect rabies virus specificantibodies in human serum and compared it to gold standard RFFIT and IFA assays.

Methods. ADAP uses recombinant antigenic proteins with DNA oligos covalently attached. When antigen specific antibodies are present, they bind and agglutinate the DNA-protein complexes. The agglutination brings the DNA oligos close enough to allow ligation and PCR amplification, DNA-protein complexes were prepared with full-length recombinant nucleoprotein and glycoprotein. We tested 21 archived specimens from rabies rule-out cases (10 confirmed positive, 11 negative), 19 vaccinated individuals, and 34 non-vaccinated individuals with ADAP, IFA, and RFFIT. Sensitivity and specificity were compared.

Results. ADAP detected both anti-glycoprotein and anti-nucleoprotein antibodies in human rabies cases and rabies-vaccinated sera using 1 µL serum. Vaccinated serum had higher sensitivity and specificity than serum from rabies cases, though ADAP was still a highly specific test for rabies cases. Combined testing for both anti-N and anti-G led to higher sensitivities but has lower specificity.

Conclusion. These results suggest that ADAP detect anti-rabies antibodies. ADAP may be useful for diagnosis in areas where other gold-standard serological tests are unavailable.

OR40 - A proposed clinical trial protocol for investigational rabies treatments in naturally infecteddogs

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Keywords. Treatment; One Medicine; canine; human

Introduction. Progress towards an effective therapeutic protocol for rabies has stalled. To accelerate this, we propose a program of clinical research in naturally infected rabid dogs, including compassionate use and systematic investigation of potential therapies.

Objectives. The objective of this paper is to propose an outline for a clinical trial protocol of potential therapies in naturally infected rabid dogs that are admitted to institutions for clinical observation. The goal of such a trial would be to show any effect of a therapy on survival.

Material and Methods. We followed the ARRIVE 2.0 guidelines (Animal Research: Reporting of In Vivo Experiments) in reporting the proposed design of the study.

Results. We propose a single arm, open label study. The rationale for no control group is that spontaneous recovery in confirmed rabies positive dogs showing clinical signs is not expected, nor is a placebo effect. The primary outcome measure proposed is 28-day survival. Inclusion criteria proposed are canine patients admitted with a presumptive clinical diagnosis of rabies confirmed on laboratory testing by RT-PCR of saliva. The treatment protocol to be tested would be decided by a panel of experts including a bioethicist. An effective protocol would likely be need to address several disease processes including viral propagation, neurodegeneration, neuroinflammation and systemic compromise, and might include investigational new drugs or repurposed drugs that show promise in vitro. Specific examples are discussed. Humane endpoints for patients would be established and monitored. Procedures would be established to minimize risk of virus exposure to staff, including patient sedation and restraint during procedures, staff PPE to prevent bites or mucosal exposure, and staff pre- and post-exposure prophylaxis protocols.

Conclusion. Systematic investigation and compassionate use of therapeutic options for rabies in naturally infected dogs will accelerate discovery and clinical translation of treatments for rabies in all patients.

OR8 - Reported Case of Rabies from 2003 in Kentucky was Unlikely Rabies

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Keywords. Human, rabies, seizures

Introduction. In 2017 Villamar et al. reported a 15-year old girl who had died of

rabies in Kentucky in 2003 (Neurol Clin Pract 7:421, 2017), although the CDC had not accepted this as a rabies case.

Objective. Evaluate whether this case was actually a rabies case.
Methods: Evaluate the clinical and laboratory / pathological evidence for and against a rabies diagnosis.

Results and Conclusion. There was no history of a rabies exposure. She presented with a one-month history of personality change and declining academic performance. There was a two-week gap between an initial seizure and the development of new-onset refractory status epilepticus, which is incompatible with rabies encephalitis that is characterized by rapid progressive neurological deterioration once neurological symptoms and signs develop. An illustrated Negri body associated with a neuron is not indisputably a Negri body. Failure to detect rabies virus antigen in formalin-fixed paraffin-embedded tissues would need to be explained by improper tissue preparation involving excessive fixation. Reverse transcription (RT) - polymerase chain reaction (PCR) on brain tissue was negative. The report of a positive RT in situ PCR with no supporting images or detailed description of the anatomical localization was inadequate. No controls were reported for immunohistochemical or RT in situ PCR studies. In response to our concerns, an update was subsequently published (Neurol Clin Pract 10:e1, 2020) with a single image of "locked-nucleic acid in situ hybridization" with questionable signal, but still no images of RT in situ hybridization PCR. No information was provided concerning the topographical distribution of the signal in the brain. RT in situ PCR allows for detection of low copy number viral (and also cellular) RNAs, but RNA copy numbers are very high in brain neurons in rabies. This patient likely did not have rabies and these recent flawed reports should be disregarded.

OR7 - Intranasal favipiravir (T-705) treatment in experimental rabies infection: molecular and clinical evaluation

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Keywords. Antiviral, favipiravir, rabies treatment

There are no efficient therapeutic protocols in rabies infections inciting the search for an efficacy antiviral drug. Favipiravir inhibits viral polymerase and causes lethal mutagenesis. The intranasal route was chosen for drug delivery once the blood-brain barrier is considered an obstacle. Forty days-old, female, SPF, Balb/c mice, were

separated into groups with 6 mice each. Mice were inoculated via the intramuscular route with variant 2 [dog (V2)], or were inoculated using the same route with variant 3 [vampire bat (V3)], being both street rabies virus; two treatment schemes were chosen; starting 48 hours post-inoculation (48h p.i) and starting after the onset of clinical signs (symptomatic group). Each treatment scheme has its own control. Animals were observed for clinical scores and weighted daily during 30 days. Animals received 300mg/kg of Favipiravir once daily, via intranasal route for 14 days. Brain samples from all dead animals were collected and submitted to real time-RT-PCR for RABV-N evaluation. No difference was showed among groups regarding the onset of clinical signs. There was a significant statistical difference in the clinical score among treated and controls for both types of treatments in V2 and only in 48h p.i in V3 group. Survival analysis showed no statistical difference between groups. Statistical analysis of RABV-N ΔCT showed a significant difference in V3 group for both treatments ($p<0.05$) but not in V2 group. Although the clinical difference observed, this was not correlated with the amount of virus in the brain, demonstrating that clinical evolution and survival rate are more related to the viral variant itself than to the total amount of virus. Additional studies with an increase in group size can provide more robust results regarding the efficacy of favipiravir, and alterations in the drug dose, administration interval, and a possible nanotechnology delivery could be also explored.

OR27 - ASSESSMENT OF THE COLLECTION, HANDLING AND SENDING OF SAMPLE FOR DIAGNOSIS OF RABIES IN THE HEALTH SERVICES OF COAHUILA, MEXICO

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Laboratorio Estatal de Salud Pœblica de Coahuila, México.

Rabies, Samples, Diagnostic.

INTRODUCTION. Mexico has been a global model in achieving important advances in the control of rabies in dogs. The Ministry of Health carries out vaccination campaigns every year, which show a decrease in registered rabies cases in dogs and cats. As a result, in October 2019, Mexico was declared the *first* country free of human rabies transmittedby dogs.

OBJECTIVE. Evaluate the collection, handling and shipment of samples for rabies diagnosis that arrive at the Coahuila State Public Health Laboratory.

MATERIALS AND METHODS. The 8 jurisdictions that the secretary of health has in the state were considered, the information was collected during the months of August, September and October 2019,through surveys of the personnel involved in the activities of obtaining, handling and shipping, as well as to the reception of samples

in the Laboratory.

Evaluation of the sample received:

- *Physical and chemical conditions:* Adequate/Inadequate, torn, bloody, consistency and temperature.
- Conditioned samples were included, as they are of high epidemiological value and clinical importance.

RESULTS. In the evaluation, 53 samples were received, most of them from dogs, some from cats and none from wildlife, 37 were adequate and 16 inadequate. Among the inadequate ones, temperature was a critical factor, since the higher the temperature, the greater the degradation of the sample, in the same way, the greater the days of transit, the greater alterations in its physical and chemical conditions are generated.

CONCLUSIONS. According to the evaluation carried out, the conservation temperature and the days oftransit are observed as a critical point, which affects the biological quality of the sample, compromising the results of samples of high epidemiological value, for whichreason training in anti-rabies centers is important to strengthen staff and minimize inadequate samples and ensure reliable results.

OR71-Human rabies in Jalisco Mexico (Clinical-epidemiological approach under the "One Health" approach)

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Keywords. Human Rabies, Zoonoses, Chiroptera, One Health

Introduction.

In Mexico and Jalisco, human rabies transmitted by dogs has been eradicated, this country being a creditor of Certification as free of cases of human rabies transmitted by this species.

In Jalisco, the last case of human rabies transmitted by dogs was in 1995 in the municipality of Lagos de Moreno, and as of this date, the chiroptero has positioned himself as the main transmitterof rabies to humans in the State.

Human rabies is still tangible today as the virus is circulating in wildlife, so generating

and implementing strategies to limit its transmission is of vital importance worldwide.

Objectives.

To present a case of a patient, resident of an urban area of the State of Jalisco, who died of human rabies whose clinical picture was initially diagnosed and managed as bacterial neuroinfection and who, after a second clinical-epidemiological approach, refers to a history of surgical aggression, This leads to a suspicion of rabies, confirmed by direct immunofluorescence in corneal and brain- imprinting biological samples.

Likewise, it seeks to refer to the epidemiological and public health approach of this case under the"One Health" model.

Material and methods.

Descriptive observational study on the detection, evolution, diagnosis, clinical management and
epidemiological and public health management with the "One Health" approach, of the last case of human rabies presented in Jalisco, Mexico.

Results.

A male aged 41 years who, after being assaulted by a surgical man on January 28, 2022, developed a clinical picture that was not specific for rabies of onset on April 4, 2022, and died on April 18 of the same year, The disease was confirmed by direct immunofluorescence technique.

At the community level, an epidemiological approach was carried out under the "One Health" model with the involvement of organized society as well as public and private instances.

Conclusions.

The application of the clinical epidemiological method by the different levels of health care should be favored.

Health promotion and education should be increased around the prevention of this zoonoses, which is aimed at the general population.

The clinical epidemiological approach under the "One Health" approach is the best way to reduce the risks of this zoonosis in the population.

OR79 - Antibody Gene Therapy for Rabies Encephalitis

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Van Kampen Group, Payson, UT.

Keywords. Antibody Gene Therapy, adeno-associated virus, rabies antibody

Introduction. Rabies causes a rapidly progressive encephalitis that is almost universally fatal onceinfection is established. Systemic antibodies are excluded from the nervous system; therefore, neutralizing antibodies must be introduced into brain rapidly at concentrations that inhibit viral injury. Recombinant adeno associated viral (AAV) vectors that cross the blood brain barrier can deliver antibodies to the nervous system, providing an opportunity to treat neuropathogenic infections such as rabies.

Objectives. An AAV9 vector expressing a broadly neutralizing human anti-rabies antibody againstrabies G glycoprotein (AAV-RAB) was evaluated for rabies neutralizing antibody production following a single intravenous administration.

Materials and Methods. Female C57BL/6J mice were treated intravenously (IV) with doses ranging from $1x10^{10}$ to $1x10^{13}$ vg/kg for a dose escalation study and $6x10^{13}$ vg/kg for a longitudinalstudy. Cats were treated via IV administration of either $2x10^{12}$ or $1x10^{13}$ vg/kg AAV-RAB (n=3 each) at approximately 4 months of age.

Results. Two weeks after treatment, mice treated with $1x10^{11}$, $1x10^{12}$, and $6x10^{13}$ vg/kg had serumrabies neutralizing titers well above the protective level of 0.5 IU/mL, ranging from 54.8 to >1,519 IU/mL. Neutralizing antibodies above protective titers persisted in mouse sera and brain for at least 60 days following treatment. Sera of mice dosed with $1x10^{10}$ vg/kg were negative for neutralizing antibodies. Antibody was expressed broadly in neurons and brain endothelial cells asshown by immunohistochemistry. Cats in both dose cohorts expressed persistent neutralizing antibody titers above the protective level in the sera for at least 15 months following treatment. Animals treated with the high dose displayed neutralizing antibodies in the CSF for 3 months posttreatment.

Conclusions. These results demonstrate that rabies neutralizing antibodies are expressed in brain within days following AAV antibody gene therapy and may be an effective treatment of rabies encephalitis.

25 DE OCTUBRE /
OCTOBER / OUTUBRO / OCTOBRE

1º SESIÓN. Programas nacionales para la eliminación de la rabia en humanos y perros: Oportunidades y fortalezas
National programs for the elimination of rabies in humans and dogs: Opportunities and strengths / Programas nacionais para a eliminação da Raiva em humanos e cães: Oportunidades e pontos fortes

Moderadores/ Moderators / Moderadores:
Dra. Verónica Guitiérrez Cedillo -México /Mexico/ México
Dr. Marco A. Natal Vigilato - Brasil/Brazil/ Brasil

(Vídeomemorias/ Videomemoirs)

Bolivia.
(Videomemorias/Videomemoirs)

Development of rabies vaccines and biologics in Argentina.
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Rabies is a viral preventable infectious disease responsible for an estimated 59,000 deaths annually, despite the availability of effective vaccines. Current prophylaxis is essentially 100% effective in preventing human rabies before and after exposure to this virus. Barriers to implementing rabies prophylaxis include, among others, vaccine availability and supply, cold chain requirements, product quality, and shelf life. The present work attempts to summarize the previous and the current vaccine developments in Argentina, mentioning the transition between the different technologies, from nerve tissue-based vaccines to cell culture-based technologies, up to the present with new technologies like viral-like particles and nucleic acid-based vaccines. All these developments generate and promote continuity in the search for solutions and improvements in rabies vaccines and other biologics' quality and production procedures. Like other countries in South America, Argentina presents different groups of research and development working on rabies solutions in private and public institutions.

Desarrollo del Programa Nacional para la Eliminación de Rabia en Perros: Ecuador.
(Videomemorias/Videomemoirs)

Situación de la rabia en el Perú: Estrategias de prevención y control.
(Videomemorias/Videomemoirs)

Epidemiological Situation on Rabies Program in Brazil
(Videomemorias/Videomemoirs)

2º SESIÓN. Avances en la investigación de la rabia en perros / Advances in rabies research in dogs/ Avanços na pesquisa da Raiva em cães.

Moderadores/Moderators/ Moderadores
Dr. Marcelo Toshito Wada- Brasil/Brazil/Brasil
Dr.Juan Manuel Balderas Torres - México/Mexico/Mexico
11:25-12:40

OR11 - FACTORS ASSOCIATED WITH THE RESULT OF ANTIBODY TITERS DUE TO RABIES VACCINATION IN PETS OF MEXICO IN 2021

Israel Nicolás Reyes, Diana Gonzalez Rodriguez, Paulina Fragoso Zamora, Carlos Enrique Jasso Villazul, Georgina Robles Pesina.

National Service of Agrifood Health, Safety and Quality,National Center for Diagnostic Services in Animal Health- Mexico.

Keywords. Rabies antibody titer, vaccination, immune response.

Introduction. Worldwide, some countries are accredited as free of urban rabies and in many others a great effort is made to control and eradicate this disease, therefore, pet travel for non-commercial purposes has been subjected to strict regulations that apply to the mobilization of dogs and cats.

Among other requirements, they demand an official certificate that confirms vaccination against rabies, as well as a minimum titer of anti-rabies antibodies, through tests validated by the OMSA and thus determine the efficacy of vaccination in pets, so it was evaluated the results obtained from the sera worked on at CENASA during the year 2021.

Objectives. Review the protection titles of different biologicals against rabies applied to pets, and analyze some characteristics of pets that can influence the obtaining of antibody titers in the FAVN test.

Methods. A retrospective study was carried out that included sera from pets vaccinated against rabies, whose antibody response was determined by means of the FAVN test, and some characteristics of the pets that could influence obtaining satisfactory antibody titers were analyzed based on the variables of size, sex, species, age and days elapsed between vaccination of pets.

Results. A total of 119 samples were processed, from 89 canines (74.79%) and 30 felines (25.21%). The animals ranged in age from 5 months to 15 years, as well as different breeds. 10 different brands of vaccines were compared.

Conclusions. Some studies have shown that the probability of success of rabies vaccination in order to move a pet depends on some characteristics such as: brand of biological used, number of vaccinations, size of the pet, age of vaccination and the number of days

between vaccinations. vaccination and sample collection. In this work, these variables were reviewed and how they affect the titer of antibodies produced by pets.

OR28 - Modeling the prospects of dog rabies elimination through a 6-month-long staggered mass vaccination campaign

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Keywords. mass vaccination, mathematical models, canine rabies

Introduction. Mass dog vaccination is the mainstay of rabies control. There is consensus that a sustained 70-80% vaccination coverage is required for elimination, but little is known about the effect of the time over which this coverage is reached. Conventional dogma suggests that mass vaccination over a short time frame, for example a campaign done in one weekend, will 'stamp out' rabies, while a drawn out campaign will allow the virus to recover and persist regionally dueto high dog population turnover. More broadly, little is known about the dynamics of asynchronously pulsed vaccinations in different spatial 'patches' in infectious diseases with significant incubation periods.

Objectives. To analyze conditions in which asynchronously pulsed mass vaccination will theoretically succeed and to examine the ongoing vaccination campaign against canine rabies inArequipa, Peru.

Methods. We constructed a generalized patch SEIR mathematical model to explore the conditions under which patch and systemic elimination of infectious diseases with significant incubation periods occur. We applied our model to canine rabies by parameterizing the model specifically for Arequipa. Parameters were based on current plans for vaccination campaigns at the sub-district level, dog population parameters based on field data, and population estimates and case numbers from the Ministry of Health.

Result. Using a spatial SEIR patch model and different generalized scenarios we found that regional (patch) and systemic (model system) elimination can be achieved. We examined the currently planned rabies campaign in Arequipa and found that an ongoing (across several years) campaign of this type has the potential to theoretically eliminate rabies in the city under WHO and PAHO recommended vaccine coverage targets (70 and 80%).

Conclusion. Though the successful implementation of a mass dog vaccination campaign involves many nuanced factors (communication, logistics, etc), there are scenarios in which anasynchronous pulsed vaccination campaign could be successful.

OR13 - On the road toward rabies elimination: Comparing domestic dog rabies vaccination delivery strategies and their impacts at scale across the Mara Region in Tanzania

Authors.
Anna Czupryna[1], Ahmed Lugelo[2,4], Kennedy Lushasi[1,3], Joel Changalucha[2,3], Maganga Sambo[1,3], Christian Duamor[1,3], Machunde Bigambo[2], Lwitiko Sikana[3], Malick Mussa[2], Hussein Hassan[2], Rachel Steenson[1], Elaine Ferguson[1], Tito Kagize[4], David Anderson[1], Emmanuel Swai[5], Hezron Nonga[5], Felix Lankester[2], Katie Hampson[1]

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Keywords. Canine rabies, vaccination, community-led

Dog-mediated rabies continues to cause devastating human deaths and major economic losses despite the availability of effective vaccines for both humans and animals. Mass dog vaccination implemented consistently and comprehensively to achieve high vaccination coverage can interrupt transmission, but delivery at scale in African settings remains challenging.

In September 2020 we began a large-scale cluster randomized controlled trial across the Mara region in Tanzania, investigating the effectiveness of a novel community-led dog vaccination delivery strategy versus a team-led annual vaccination delivery strategy. We are assessing these strategies in terms of vaccination coverage achieved and sustained and the resulting public health impacts through Integrated Bite Case Management (IBCM) to measure human rabies exposures and animal rabies cases.

We present an update of the vaccination work across Mara. As of September 2022, over 130,000 dog vaccinations have been administered throughout more than 400 villages in Mara Region. Surveys indicate that vaccination coverage has been maintained above 50% coverage across the region, with higher coverage in the community-based delivery arm of the trial versus the team-led. Within this period circulation of rabies continues, but incidence has remained low compared to areas outside of the Mara region. Ongoing analyses of these data will further quantify these impacts.

Achieving and sustaining effective vaccination coverage against dog-mediated rabies remains a challenge in resource-limited settings. Our data suggest that using trained local Rabies Coordinators and One Health Champions can greatly improve the delivery and reach of vaccinations. Collaborating with local authorities and sustaining strong communication channels across these communities has been critical.

OR15 - Why do we still have dog rabies in Arequipa? An implementation analysis to evaluate previous and current vaccination plans and strategies

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Keywords. Dog rabies, Implementation research, Mass vaccination

Introduction. In the city of Arequipa, Peru, the rabies virus is established in the dog population. Efforts to control the epidemic have consisted of a combination of annual citywide mass dog vaccination campaigns (MDVC), ring vaccination around cases, and uninformed sporadic elimination of free-roaming dogs. Despite these continued efforts, canine rabies continues to spread, largely unchecked; during the last 7 years in Arequipa, hundreds of rabid dogs have been detected at a rate of approximately 1 rabid dog per week.

Objective. To retrospectively and prospectively identify key implementation gaps in the MDVC.

Materials and Methods. We conducted a retrospective and prospective analysis of the implementation of the MDVC. First, we conducted a retrospective analysis of the policies of the rabies control program in Arequipa and their subsequent enactment, focusing primarily on the MDVC. Second, we provided the health authorities with 30 vaccination teams and 5 supervisors over several months and prospectively identified key implementation gaps unrelated to insufficient human resources. We used a staggered campaign to identify implementation gaps in real time in the field. Together with local authorities, we applied "practice facilitation" and "motivational interviewing" to overcome barriers to the implementation of the MDVC and to build organizational capacity for future campaigns.

Results. We found severe discrepancies between the planning and the implementation of dog vaccination activities. Using an evidenced-based organizational change framework, we identified strategic, human resources, structural, procedural, and contextual barriers and gaps.

Conclusions. The know-how that made dog rabies elimination possible in Arequipa was lost in the years after elimination was accomplished. Other dog rabies-free cities could be affected by the same amnesia. We present an implementation science framework generalizable to other areas where mass dog vaccination campaigns could have been victims of their own success.

OR9 - Genetic typing of rabies virus: a tool that allowed monitoring RABV variants in Mexico

Andres Velasco-Villa[1], Veronica Gutierrez-Cedillo[2] and Fernando Vargas-Pino[3]

1. Centers for Disease Control and Prevention. National Center for Emerging and Zoonotic Infectious Diseases, Division of High Consequence Pathogens and Pathology, Poxvirus and Rabies Branch
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3. RITA Emeritus member

Keywords. Genetic typing, rabies virus cycles, human rabies.

Reporting rabies in target species, based on standard clinical definitions, was for decades the best indicator to measure the impact of rabies control. The broad application of the direct fluorescent antibody test, through decentralized laboratory networks, not only enhanced rabies virus (RABV) detection but also allowed ruling out suspicious cases in humans and dogs. In the 1990's, directors of National Rabies Control Programs from the Americas (REDIPRA), with PAHO and the Centers for Disease Control and Prevention (CDC), implemented RABV antigenic typing with a reduced panel of eight monoclonal antibodies. Although this test discriminates among major rabies variants prevalent across Latin-America and the Caribbean, it has limitations to differentiate dog rabies variants from those established in coyotes, foxes, mongoose and skunks that have evolutionary origins in primal dog rabies variants. To overcome such limitations, the CDC developed RABV genetic typing protocols implemented across Latin America. The consistent identification of dog rabies variants associated with geographically circumscribed rabies pockets (rabies foci) was paramount to follow up on the progress of dog rabies elimination. RABV genetic typing that continues at the core of rabies laboratory-based surveillance in Mexico, not only assisted to reveal persistent dog rabies foci, but also made evident control inequities that identified where more comprehensive and intense interventions were required. More than a decade long of genetic typing results provided solid evidence that Mexico no longer presented human rabies cases caused by the dog rabies variant V1. Successful integration of a RABV genetic typing framework requires a multidisciplinary, academic, interagency, multinational collaboration under a One Health goal.

3º SESIÓN. Vacunación de la rabia en perros: Actuales y futuros desafíos/ Advances in rabies research in dogs/ Avanços na pesquisa da Raiva em cães

Moderadores/Moderators/Moderadores
Dr. Ryan MacLaren Wallace - E.E. U.U./USA/E.E. U.U.
MSPAS. Alejandro Enríquez Vázquez-México/Mexico/México
12:14-15:55

OR55-Filter Papers to Collect Blood Samples from Dogs: An Easier Way to Monitor the Mass Vaccination Campaigns against Rabies?

Marine Wasniewski [1], Jacques Barrat [1,†], Samia Ben Maiez [2], Habib Kharmachi [2,†],Mariem Handous [2] and Florence Cliquet [1]

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Keywords. Filter papers, dogs, mass vaccination campaign

Introduction. Domestic dogs serve as a major reservoir for RABV in many low-income countries. In recent years, disease elimination programs using mass vaccination of dogs have greatly reduced or even eliminated human rabies cases in some countries. Vaccination coverage and immune coverage are two key elements to consider for assessing the performance of mass vaccination campaigns and the success of the control strategy.. Even if the ELISA is recognized as an appropriate serological tool in this context, several problems can occur during the sampling in the field making the analyses difficult or even not feasible. Therefore, the sampling method must be simple, practical, reliable and usable under any field conditions. The collection of blood on filter paper (FP) is a promising sampling method that can satisfy these conditions. It has been validated on European bats for active surveillance and on wildlife for the monitoring of oral rabies vaccination campaigns.

Objectives. The objective of this preliminary study was to assess the feasibility, the reliability and consistency ofthis sampling method in dogs, before investigating its use at a large scale.

Materials and methods. Two hundred and sixteen samples were collected from 111 experimental dogs in France and from 29 field dogs in Tunisia. Sera were analysed by using both the Fluorescence Antibody Virus Neutralization test (FAVNt) and the BioPro ELISA.

Results and conclusion.
The specificity for the FP method was equal to 98.0%.
The results of the comparison between FP eluates and serological testing provided percentages ofagreement around 88%.

This preliminary study demonstrated the feasibility of the FP sampling method to collect blood samples from caged and field dogs associated with the BioPro ELISA to evaluate the herd immune response. However, additional studies should be conducted in the field to proceed to a rigorous validation of thismethod.

OR51 - CANINE AND FELINE RABIES CONTROL OPERATION IN 2014, IN THE CITY OF TUXTLA GUTIÉRREZ, CHIAPAS

MPH. Jordán Edgardo Bermúdez Casillas[1]
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Keywords. Rabies, Operative, Vaccination.

Introduction. Between 2007 and 2014, there were 30 cases of canine rabies in Chiapas, 18 (60%) occurred in Health District (HD) I "Tuxtla Gutiérrez", 7 (23.3%) in HD II "San Cristobal de las Casas", 4 (13.3%) in HD V "Pichucalco", and one (3.3%) in HD IV "Villaflores". Of the 18 cases in HD I, 15 (83.3%) were identified in the city of Tuxtla Gutierrez.

Objectives. Reduce the occurrence of canine and feline rabies cases in the city of Tuxtla Gutiérrez, belonging to HD I, in the state of Chiapas.

Materials and Methods. A house-to-house sweep operation was carried out with the participationof human, financial and supply resources from federal, state and municipal levels, in 450 neighborhoods in the city of Tuxtla Gutiérrez during the months of April to August 2014, following the methodology of the 2012 Guide for the Control of Rabies Outbreaks in Companion Animals. There were 26 work brigades (52 people).

Results. A total of 161,929 homes were visited and 112,278 (69.3%) were surveyed, 37,121 (22.9%)were detected as absent or reluctant, and 12,530 (7.7%) were uninhabited. A total of 73,317 dogs and cats were identified, with an average dog and cat/household ratio of 0.7. A change in rabies vaccination coverage of dogs and cats was achieved from 36.8% to 79.5% post-sweep.

Conclusion. The increase in rabies vaccination coverage resulting from the 2014 house-to-house sweep allowed bringing to zero the incidence of cases in dogs and cats in the city of Tuxtla Gutierrez during the seven subsequent years (2015-2021). This demonstrates the usefulness of the rabies outbreak methodology when each of its stages are executed and focused, from planning to recovery and presentation of results.

OR63 - Analysis of delays in detection, reporting, and response to canine rabies cases in Arequipa, Peru

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Keywords. Focus containment, surveillance, canine rabies

Introduction. Prompt reporting of rabid dogs allows health authorities to respond quickly to prevent secondary dog cases and detect potentially exposed people. Understanding the mechanisms of rabies case reporting and response have important implications for preventing urban rabies. However, little is known about the sources of delays and the stakeholders involved in the response process. In Arequipa, Peru, where the health authorities are fighting an ongoing canine rabies outbreak, understanding these delays is crucial to decrease the time it takes for both the public to report rabies cases and for health authorities to respond to reports.

Objective. To map the processes and stakeholders involved in detecting, reporting, and responding to canine rabies cases.

Methods. We responded to 102 positive canine rabies cases (confirmed by DFA or PCR) in Arequipa over the course of three years and collected data on the onset of clinical signs, reporting times, and public health response times. Additionally, we retrospectively analyzed the disease progression timelines on more than 100 cases detected at the beginning of the outbreak in Arequipa. We examined the distribution of delay times stratifying them by source/stakeholder.

Results. We found a wide range of delay sources. Delays at the community level, the process of identifying a suspected dog and reporting it, tended to be the longest. Within the health system, important delays were found: the time report, the time to euthanize and collect a sample, the time to process the sample, and finally the time to undertake further control measures. Barriers could be categorized as procedural (lack of euthanasia equipment), economical (insufficient funds to submit the samples to the lab), and technical (lack of knowledge within communities).

Conclusions. Despite years of community-based health promotion and officials' apparent commitment to strengthen the dog rabies surveillance program, reporting rabid dogs was significantly delayed in communities, and control responses were delayed by logistical and economical barriers.

OR54 - Canine Rabies Vaccine Campaigns in Arequipa, Peru Post COVID-19: A Qualitative Study

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Keywords. Dog rabies, Mass vaccination, Qualitative study

Introduction. There has been a canine rabies epidemic in the city of Arequipa, Peru, since March 2015. Ongoing mass dog vaccination campaigns (MDVC) have been organized by the local regional health authorities; however, rabid dogs have been consistently detected for years.In the last two years, there has been a dramatic decrease in the number of individuals bringing their dogs to these vaccination campaigns.

Objective. To examine qualitatively factors contributing to decrease in participation in MDVCpost COVID-19.

Materials and Methods. Seven focus groups with a total of 56 participants were conducted insix districts of Arequipa, representing both urban (n = 3) and peri-urban (n = 4) regions.

Results. Barriers at both the systems and individual level were identified. At the systems level, participants described issues related to inadequate information about the upcoming event, as well as limited time that the fixed vaccination points are at specific locations. At the individual level, barriers included a decreased perception of risk for rabies since both people and their dogs spent more time indoors due to the COVID-19 pandemic (urban regions), a decreased prioritization of their dogs' vaccinations compared to their own protection from COVID-19 (prioritizing their vaccines and avoiding crowded spaces), and less time on weekends to vaccinate dogs due to longer work hours related to a financial impact of the pandemic (specifically in peri-urban regions). Participants described confusion created by private veterinarians who stated government subsidized vaccines were of poor quality. Actionable recommendations by focus group participants included increasing virtual and physical publicity for events within their districts, ensuring vaccinators remained in their fixed spots for several hours at a time, and offering vaccination campaigns on afternoons as well.

Conclusion. The MDVC in Arequipa has been impacted by numerous individual and system level barriers, including various barriers associated with the COVID-19 pandemic.

OR70-The International Rabies Taskforce – Tailored support to achieve elimination

Lohr, Frederic[1]; Wallace, Ryan M.[2]; King, Alasdair[3]; Gibson, Andrew D.[1]; Gamble, Luke R.[1]

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Keywords. Mass vaccination, integrated disease surveillance, public-private partnership

Attaining the audacious goal of global dog mediated human rabies elimination by 2030 requires the mobilisation of effective programmes at the municipal and village level across countries of Africa and Asia. The International Rabies Taskforce is a private-public partnership between international NGO Mission Rabies, the US Centers for Disease Control and Prevention, and vaccine manufacturer MSD Animal Health, which provides free expert support to governments in developing effective rabies control interventions.

Since its inception in 2021, the IRT has successfully assisted numerous stakeholders in the staged expansion of their rabies elimination efforts. In collaboration with the Bangalore Municipal Cooperation, a city-wide framework for rabies elimination was created, resulting in the implementation of Integrated Bite Case Management (IBCM). This intensification of rabies surveillance efforts enabled the detection and humane removal of more than 35 rabid dogs per month within the city limits, as well as stimulating the government expansion of canine mass vaccination efforts.

Department of Veterinary Services in Zambia has developed capacity to set up and manage large scale vaccination efforts and rabies surveillance through a 3-phased strategy. This collaboration enabled the department to also secure a large donation of rabies vaccines through the WOAH vaccine bank, further supporting the elimination efforts.

These examples demonstrate the effectiveness of using a bespoke toolkit tailored to local needs for close field-level collaboration through IRT experts. Through this combination of direct tangible action and sustainable capacity building on a national level, the goal of eliminating the disease in line with national strategies and priorities can be achieved.

OR74 - Strategies to Increase Canine and Feline Rabies Vaccination Coverage After the COVID-19

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In Mexico, rabies prevention and control actions have been strengthened in the reservoir, which has made it possible to obtain Certification as the first Country free of human rabies transmitted by dogs. However, since 2019 the COVID-19 Pandemic occurred, which caused itto be necessary to establish prevention measures to limit the transmission of this virus in thepopulation, since the pandemic made it impossible to have volunteer personnel and of the health services that it supported in the Vaccination Days to carry out house-to-house vaccination strategies as was done in previous years, which had repercussions, in the coverage of Canine and Feline Rabies Vaccination, which decreased to 36% coverage of vaccination in the State during the year 2020. This generated a higher risk condition for a newcase of canine, feline rabies or even a case of human rabies to be registered. For the year 2021, with the decrease in COVID-19 infections, Sanitary Jurisdiction No. 2 focused onreinforcing vaccination strategies with the Municipalities to increase their vaccination coverage, implementing the first Drive Thru module for anti-rabies vaccination of pets, as wellas vaccination posts in coordination with the Municipalities. These strategies made it possibleto increase their vaccination coverage from 25% for the year 2020, to 64.5% vaccination coverage for the year 2021.

OR48 - Impact of an educational comic book on rabies related knowledge in school children in Haiti, 2020

Authors: Yasmeen Ross[1], Pierre Dilius[2], Kelly Crowdis[3], Melissa D. Etheart[4], Alasdair King[5], HaimJoseph[2], Ryan Wallace[1]

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Keywords. Rabies education, Bite prevention, Comic book

Introduction. Haiti is one of four countries in the Western Hemisphere where human rabies persists. Children are particularly susceptible to dog-mediated rabies exposure due to their inquisitive nature.
Rabies education for community members is a core component to reduce rabies burden by promoting good dog-ownership practices and post-bite healthcare seeking behaviors.

Objective. While rabies sensitization is an integral part of Haiti's rabies control efforts, the impact of educational materials has not been evaluated.

Methods. To evaluate the effectiveness of materials, public and private schools in urban and rural areas of Haiti were randomly sampled to participate in a guided reading of a rabies educational comic book using a well-known character "Ti Joel". Students in the same classroom received a pre-test before guided-reading and a post-test immediately after. Approximately five months later, a third assessment was conducted to measure retention. Themes that were evaluated included: general knowledge on rabies, rabies prevention, and how to avoid dog bites. Students were evaluated based on their ability to identify correct answers. Bite rates were also calculated for the pre-test and the third assessment.

Results. A total of 658 students across 21 schools participated in surveys to evaluate the efficacy of the intervention. The average rabies knowledge and prevention score increased from 42% during the pre-test to 60% during the third assessment (retention rate = 2.7). Bite avoidance scores remained low at 44% and 46% respectively. The monthly bite rate reported by respondents during the pre-test was 2.2% and during the third assessment was 2.3%, suggesting that theeducational training did not directly impact bite avoidance.

Conclusion. While the Ti Joel comic books increased the knowledge of students in this study group, there appears to be a need for a more robust approach to reduce the number of dog bites in this population.

4º SESIÓN. Biotecnología en vacunas contra la rabia/ Rabies vaccination in dogs: Current and future challenges/ Vacinação contra a raiva em cães: Desafios atuais e futuros

Moderadores/Moderators/Moderadores/
Dra. Edith Rojas Anaya-México/Mexico/México
Dr. Carlos Adolfo Palacios-Argentina/Argentina/Argentina
16:25-17:40

OR34 - Urban/suburban oral rabies vaccine field trial, ecology studies and refined baiting strategies targeting raccoon rabies in Vermont, USA

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Key Words. ONRAB, oral rabies vaccination, raccoon

Introduction. Wildlife rabies management in the USA is focused on stopping the spread of and eventually eliminating the raccoon rabies virus (RRV). Effective management occurs through oral rabiesvaccination (ORV) targeting raccoons in rural and urban/suburban landscapes across 16 states.
Annually, >9 million ORV baits are distributed, which has prevented the appreciable spread of RRV and led to local elimination in some areas. However, RRV management in developed landscapes remains difficult and requires a multi-faceted research and adaptive management approach to address increased raccoon densities, smaller home ranges, abundant food sources, nontarget bait competition, habitat fragmentation and challenges with effectively baiting preferred habitats.

Objectives. We evaluate the field effectiveness of an experimental oral rabies vaccine (ONRAB) targeting raccoons over 3 years, the ecology of raccoons, striped skunks and Virginia opossums, and the implementation and effectiveness of refined ORV baiting in an urban/suburban area.

Materials and Methods. Methods involved the distribution of ONRAB by ground strategies, estimation of post-ORV raccoon rabies antibody seroprevalence via modeling, target and nontarget animal movement and habitat use with radio telemetry and relative density estimations, as well as refining ground bait distribution strategies.

Results and Conclusions. Post-ORV raccoon seroprevalence during the field trial remained below target levels recommended for RRV elimination. Raccoon seroprevalence decreased as abundance increased yet increased with the average age of raccoon populations. Telemetry studies showed that raccoon home ranges were

larger than skunks and density studies showed that raccoon densities decreased between pre- and post-ORV periods, whereas opossum densities increased 2-3 fold. Refined ORV ground baiting strategies led to better bait coverage but showed an increase in personnel effort and overall cost, with negligible impact to raccoon seroprevalence. Additional research on strategies to vaccinate raccoons in urban/suburban habitats is critical to successful elimination of RRV from North America.

OR57 - Safety and immunogenicity of three dosages of an investigational, highly purified Vero cell rabies vaccine: Phase II study with a simulated post-exposure regimen in healthy adults

Authors.
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Keywords. Rabies vaccines, immunogenicity, post-exposure prophylaxis

Introduction. A serum-free, highly purified rabies Vero vaccine-next generation (PVRV-NG) isunder development. The initial formulation, PVRV-NG, was evaluated in four Phase II studies and has subsequently been reformulated (PVRV-NG2).

Objectives. This multicenter, observer-blinded Phase II study (NCT03145766) investigated immune response and safety of three different dosages (antigen content) of PVRV-NG2 versusa licensed human diploid cell rabies vaccine (HDCV; Imovax¨ Rabies, Sanofi) and PVRV-NG.

Materials and Methods. Healthy adults (N= 320) were randomized to receive PVRV-NG2 (low-,medium-, or high-dosage), PVRV-NG, or HDCV (2:2:2:1:1 ratio), according to a five-dose simulated post-exposure regimen administered on Days (D)0, 3, 7, 14, and 28. All participants received intramuscular administration of human rabies immunoglobulin (HRIG) at D0, and were followed for 6 months after final study vaccine injection. Immunogenicity was assessed at D0, 14, 28, 42, and month 7 using the rapid fluorescent focus inhibition test (RFFIT). The percentage of participants achieving Rabies Virus Neutralizing Antibody (RVNA) titers ≥ 0.5 IU/mL was calculated. All analyses were descriptive.

Results. All subjects achieved RVNA titers ≥ 0.5 IU/mL in the high-dosage PVRV-NG2 (100%; 95%CI 94.7-100) and HDCV (100%; 95%CI 89.4-100) groups at D28. At each ti-

mepoint, geometric mean titers (GMTs) increased with antigen content. High-dosage PVRV-NG2 GMTs were the highest at all timepoints, medium-dosage PVRV-NG2 GMTs were like those with HDCV, and low-dosage PVRV-NG2 GMTs were like PVRV-NG. The safety profile of PVRV- NG2 was comparable to PVRV-NG. Fewer adverse events, particularly solicited reactions, were reported with PVRV-NG2 or PVRV-NG (range 36.7–47.5%) compared with HDCV (61.5%). No major safety concerns were observed.

Conclusion. This study shows a dosage effect of antigen content at all timepoints. In a post- exposure prophylaxis setting, the immunogenicity and safety profiles of the high-dosage PVRV-NG2 group were satisfactory when compared to HDCV. The high-dosage PVRV-NG2 was selected for the phase III studies.

Funding. The study was funded by Sanofi.

OR16 - Safety and Efficacy of SYN023 Anti-Rabies mAb Cocktail.

Eric Tsao and J. Bruce McClain Synermore Biologics Co., Ltd.

SYN023 is a mixture of two anti-rabies humanized monoclonal IgG1κ antibodies which bind to distinct and non-overlapping antigenic sites on the rabies virus glycoprotein. A Phase 2b and a Phase 3 trials were conducted to assess the safety and efficacy of SYN023 in Category III rabies patients. Both trials are randomized double-blinded studies to evaluate SYN023 compared to human rabies immune globulin in post exposure prophylaxis of rabies in adults with different rabies exposure risks. SYN023 was found to be safe and well tolerated with an AE profile that was acceptable and manageable. The serum geometric mean RVNA concentration was superior in SYN023 recipients 7 days after the study drug administration and the immune response rate ratio to the rabies vaccine showed noninferiority of SYN023 with vaccine than HRIG at around 3 months after the study drug administration. No probable or confirmed rabies cases were reported during the 12-month studies.

OR19 - Evaluation of oral iophenoxic acid biomarkers in raccoons for measuring bait uptake

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Keywords. Biomarker, raccoon (Procyon lotor), oral rabies vaccination

Introduction: Oral rabies vaccination (ORV) is the primary strategy to control wildlife rabies inthe United States. ORV relies on target species, such as raccoons (*Procyon lotor*), locating and consuming baits. Biomarkers incorporated into the baits may be used to assess bait uptake by target and non-target species.

Objectives. We evaluated four different analogues (ethyl, butyl, methyl, and pentyl) of the iophenoxic acid (IPA) biomarkers given to raccoons to assess serum marking ability and decay.We also tested two IPA analogues (ethyl and propyl) incorporate into an ORV bait matrix.

Materials and Methods. We offered raccoons the biomarkers at three different dosages (2 mg, 5mg, and 10 mg) delivered orally by encapsulating the powder and placing capsules inside marshmallows. We collected serial serum samples for testing between Day 1 and Day 572 post-consumption. We offered IPA marked placebo baits to raccoons at a concentration of 1 mg biomarker/bait and collected serum samples for testing at Day 7. Serum samples were tested byliquid chromatography with tandem mass spectrometry.

Results and Conclusion. All raccoons readily consumed the encapsulated biomarkers and 100% of the raccoons were marked at every dosage and every IPA analogue tested on Day 1 post- consumption. By Day 572 post-consumption, only the pentyl IPA was no longer detected in 29%of the raccoons expected to be marked. Higher treatment doses corresponded to greater IPA concentrations detected in individual raccoon sera for each biomarker. For the marked ORV baits, 90% of the raccoons consumed > 25% of the bait matrix containing the ethyl- or propyl- IPA and the analogues were readily detected in raccoon sera post-consumption. The analytical methods could successfully discriminate whether an individual raccoon consumed one or multiple IPA analogues. The IPA biomarkers have utility for comparing and refining ORV baiting strategies on the landscape targeting raccoon populations.

OR72 - Rabies Glycoprotein expression in HeLa cells by an mRNA vaccine candidate.

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Keywords. mRNA, vaccine, glycoprotein G.

Despite the undoubted success of current rabies vaccines, there have been numerous attempts to develop alternatives using different technologies to address this public health concern. mRNA vaccines represent a promising alternative due to their high potency, rapid development capabilities,and potentially low manufacturing cost. Furthermore, recent technological advances have largely overcome many mRNA technology constraints and vaccines have shown encouraging results in animals and humans. Considering this novel technology's potential advantages, we aimed to develop an mRNA platform to test vaccine candidates for the rabies virus.

To this aim, we designed two DNA molecules as templates containing a 5'UTR, an open reading frame (ORF), 3'UTR, and the d(A/T) homopolymeric region of approximately 100bp. The ORFs encoded the glycoprotein (gpG) ectodomain of the Pitman Moore rabies strain and, as a control, eGFP. These two templates were subcloned in the pGEM plasmid under the transcriptional control of the T7 promoter for subsequent *in vitro* transcription (IVT), obtaining the gpGm-pGEM and eGFPm-pGEM constructs. Both were linearized by enzymatic restriction, yielding the template for the IVT reaction. IVT mRNA capping was performed co-transcriptionally by CleanCap® technology,obtaining a mature mRNA to be purified by LiCl precipitation.

HeLa cells transfection conditions with mRNA were set up using eGFP-mRNA and Lipofectamine™ reagent, achieving eGFP expression confirmed by fluorescence microscopy. Then gpG expression by IVT gpG-mRNA transfected cells was detected by immunofluorescence using a specific anti- rabies rabbit serum, confirming the gpG-mRNA translatability.

In conclusion, we synthesized functional mRNAs containing the necessary elements for their translatability. The synthesis of two different proteins, GFP as control and gpG, was confirmed by detecting their expression in HeLa cells. In the next future, this platform will allow the evaluation of new rabies vaccine candidates.

26 DE OCTUBRE /
OCTOBER / OUTUBRO / OCTOBRE

El rápido ritmo en el que se están desarrollando y aplicando nuevas herramientas de análisis genómico al estudio de los virus de la rabia y de sus hospedadores seguramente dará lugar a importantes avances en la vigilancia y el control de la rabia./
The rapid pace at which new tools for genomic analysis are being developed and applied to the study of rabies viruses and their hosts will surely lead to significant advances in surveillance and control of rabies.

Christine Fehlner-Gardiner
Rabies in the Americas

1º SESIÓN. Genómica: Una herramienta para el diagnóstico, vigilancia y control de la rabia / Genomics: A tool for rabies diagnosis, surveillance and control / Genômica: Uma ferramenta para o diagnóstico, vigilância e controle da Raiva.

Moderadores/Moderators/Moderadores
Dra. Christine Fehlner-Gardiner Canadá/Canada/Candá
Dr. Juan Antonio Montaño Hirose México/Mexico/México

Development of rabies vaccines and biologics in Argentina

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Rabies is a viral preventable infectious disease responsible for an estimated 59,000 deaths annually, despite the availability of effective vaccines. Current prophylaxis is essentially 100% effective in preventing human rabies before and after exposure to this virus. Barriers to implementing rabies prophylaxis include, among others, vaccine availability and supply, cold chain requirements, product quality, and shelf life. The present work attempts to summarize the previous and the current vaccine developments in Argentina, mentioning the transition between the different technologies, from nerve tissue-based vaccines to cell culture-based technologies, up to the present with new technologies like viral-like particles and nucleic acid-based vaccines. All these developments generate and promote continuity in the search for solutions and improvements in rabies vaccines and other biologics' quality and production procedures. Like other countries in South America, Argentina presents different groups of research and development working on rabies solutions in private and public institutions.

Tracking rabies virus in wildlife in North America

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Keywords. Wildlife, sequencing, molecular epidemiology

Introduction. The Americas are home to a wide diversity of rabies virus in bats and other wildlife.

Methods and Materials. Rabies virus nucleoprotein, glycoprotein and complete genome sequencing was performed using Oxford Nanopore and Illumina technologies.

Objectives. Characterization of rabies virus variants in wildlife and domestic animals is important for confirming the absence of canine rabies as well as monitoring for important changes in rabies virus in wildlife that may require control actions.

Results. Genomic surveillance of rabies virus in the United States helped identify early expansion ofraccoon rabies virus variant into new territories, emergence of a new variant in bats and two potentialearly host shift events in 2019 - 2021.

Conclusion. Rabies virus sequencing provides more resolution and detail than antigenic typing and is animportant tool in wildlife rabies surveillance.

Theme. 3. Rabies in Wild Animals

Subaxes. 4. Molecular Epidemiology

Perspectivas de los métodos moleculares para el diagnóstico y control de la rabia en México
(Videomemorias/Videomemoirs)

2º SESIÓN. Rabia en hervíboros en América Latina I/ Rabies in herbivores in Latin America I/ A raiva em herbívoros na América Latina I

Moderadores/Moderators/Moderadores
Dr. Daniel Stricker- E.E. U.U./USA/E.E. U.U.
Dra. Isabel Bárcenas Reyes México/Mexico/México
Dra. Catherine Filejski- Canadá/Canada/Canadá/
MVZ. Luis A. Lecuona Olivares - USDA-México
MVZ. Baltazar Cortes García-México/Mexico/México
9:50-12:15

Programa Regional de Rabia en Herbívoros Domésticos

Marco A. N. Vigilato[1], Felipe Rocha[1], Baldomero Molina-Flores[1], Larissa Cacho Zanette[1], Ottorino Cosivi[1]
1. Centro Panamericano de Fiebre Aftosa y Salud Pública Veterinaria, Organización Panamericana de la Salud/Organización Mundial de la Salud (PANAFTOSA/SPV-OPS/OMS)

Durante el período de 2017 hasta 2021, 21 países notificarán en el Sistema Regional de Información para la Vigilancia Epidemiológica de la Rabia de las Américas (SIRVERA) 4,526 focos de rabia en herbívoros domésticos responsables por 7,255 casos positivos de rabia en bovinos, ovinos, caprinos, equinos y cerdos Las variantes antigénicas asociados a estos casos fueran la 3, 5, 8 y 11, variantes esas asociadas al murciélago hematófago *Desmodus rotundus*, siendo que 97.5% de los focos y 95.9% de los casos ocurrieran en el área de distribución de esa especie murciélago en la región de las Américas. No fueran todos los países de la región que notificaran los casos en el sistema, y algunos no notificaran todos los años del período, además es conocido que hay dificultades para identificación de todos los casos por parte de la vigilancia de los servicios veterinarios oficiales, sea por dificultades operativas y diagnósticos para unos, o por subnotificación por parte de los productores rurales en otros. Así, es notable el impacto de la enfermedad para la producción de los países y los riesgos a la salud pública y económica de las familias. En los servicios veterinarios oficiales hay distintos entendimientos a cerca del problema, así como heterogeneidad de actividades y metodologías de trabajo para control de la enfermedad y desafíos operativos y de recursos variados a nivel local y regional. Por lo expuesto, en mayo de 2021, PANAFTOSA/SPV-OPS/OMS lanza el Programa Regional de Rabia en Herbívoros Domésticos (PRRH), construyendo en conjunto con 8 directores de programas de rabia en herbívoros de países de las Américas, aprobado en 2021 por todos los directores y jefes de programas de rabia

en herbívoros de los países de las Américas en reunión virtual de la REDIPRA. El objetivo de este programa es desarrollar políticas regionales armonizadas para orientar los programas nacionales para la prevención y control de la rabia en herbívoros domésticos transmitida por murciélagos hematófagos (*D. rotundus*), definiendo metas y resultados, evaluados por medio de indicadores. El primer paso del Programa Regional es el diagnóstico de los programas nacionales de la región en relación con la enfermedad. En seguimiento al Programa Regional de Rabia en Herbívoros, se desarrolló una herramienta para conocer la situación de los países, basada en un sistema de autoevaluación del propio país en el SIRVERA. Con la herramienta, se espera desarrollar un Plan de Acción para el direccionamiento de las metas y actividades para los países y sus programas, y para la cooperación técnica entre los países.

OR47 - GEOGRAPHICAL DISTRIBUTION OF RABIES TRANSMITTED BY THE COMMON VAMPIRE BAT (DESMODUS ROTUNDUS) IN CATTLE IN THE AMERICAS

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Keywords. Biogeography, chiropteran, livestock, *Lyssavirus*.

Abstract. Rabies impacts animal health and food security due to the economic losses in livestock production. *Desmodus rotundus* is the main reservoir and transmitter of rabies virus to domestic herbivores. Rabies from *D. rotundus* is known to have an impact on the bovine industry in Latin America. The ***objective*** of this study is to identify the geographic distribution of *D. rotundus* transmitted rabies in cattle in Latin America. SIRVERA data from 1970 to 2020 of *D. rotundus* transmitted rabies (lineage variant 3) in bovine was collected, curated, and analyzed. We performed spatiotemporal longitudinal analyses of the burden of rabies in cattle in Latin America. Mexico, Peru, and Brazil, revealed the highest number of rabies outbreaks in the analysis period. The continental annual average of rabies outbreaks in cattle was higher between 2003 and 2020 (>40 cases annually per country), compared to cases between 1970 and 2002 (<10 cases per country). Cattle rabies outbreaks in the 2010s were significantly more frequent than in previous decades, suggesting an increase in rabies spillover in recent years. The size of outbreaks, however, revealed a significant decrease in recent years, suggesting that although more outbreaks are

reported, the size of subsequent epidemics is smaller in cattle. Peru, El Salvador, and Brazil showed the highest association between the rate of rabies incidence in *D. rotundus* and the rate of rabies in cattle. Results show that the number of rabies spillover events from *D. rotundus* to cattle in Latin Americahas increased over time. Although, the size of *D. rotundus* rabies outbreaks has remained stable or decreased, suggesting an improved response to outbreaks. *D. rotundus* populationscould serve as sentinels to inform the spatiotemporal patterns of rabies virus circulation to forecast when, where, and in which intensity rabies spillover events are likely to occur in Tropical Latin America.

Panorama de la Campaña nacional para la prevención y control de la rabia en bovinos y especies ganaderas en México.
(Videomemorias/Videomemoirs)

OR60 - Endemic area of Desmodus rotundus bats classification associated to the presence of rabies in livestock in Mexico, using Risk Analysis.

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Keywords. Hematophagous bat, Risk Analysis, Epidemiology.

Even though we know the endemic area of vampire bats in the American continent and its possible territorial extension, one of the current complications of animal health and public health services is being able to currently predict rabies cases in a particular region, or in the near future due to the presence of this disease within the endemic area, the objective of this work is to contribute a different way of observing the presence of this disease in the endemic area, classifying these regions through an analysis of risk based on the incidence of rabies transmitted by vampires in the different municipalities as well as the report and presence of populations of hematophagous bats and in this way catalog these regions in 6 categories where we will reclassify the endemic zone and the actions to follow for its prevention and effective control . With this system, it has been possible to identify and classify these regions so that economic and human resources are used more efficiently in the fight against this disease.

We considered the registration of the cases of rabies transmitted by vampire in the 25 affected states in Mexico and the municipalities that make it up for a period of 25 years, as well as the report of the presence of populations of vampire bats (*Desmodus rotundus*) by 8 years. In this way, with an epidemiological analysis file that, combined with a risk analysis matrix, provides us with basic data for the care of communities in different radios and the type of risk that exists in an area where rabies cases are being suffered in animals; At the same time, it indicates the type of

activities that should be carried out for the prevention, mitigation or control of these cases in the event of outbreaks or in a programmed manner, knowing the type of risk that exists in the region or municipality.

OR20 - Spatial-temporal trend of paralytic rabies cases in Mexico

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Keywords. Rabies, livestock, epidemiology.

In Mexico, the main reservoir and potential transmitter of the rabies virus is the hematophagous bat *Desmodus rotundus* (*D. rotundus*), causing paralytic rabies (PR) in livestock, modifying annually its spread in regions considered free of rabies disease. The **aim** of this study was to identify spatio-temporal risk factors for dissemination of cases of RP using a geostatistical method Co-kriging. With geo-referenced information of 3,469 cases of rabies in livestock species from 2010 to 2019 in 25 States of México provided by the National Service of Health, Safety and Agri- Food Quality, a database was homologated with regionalized variables (RV) of minimum and maximum temperature, rainfall, urban area, rural area, type of relief, water, roads and mines, distribution of *D. rotundus*, population of cattle, sheep and goats for each federal entity. A bivariate correlation was performed between the number of cases and the RV by the interpolation method co-kinging. The interpolation of the RV with the number of rabies cases in different livestock species showed that the municipalities that have minimum temperatures of 16^{0}C, maximum temperatures of 29^{0}C, rainfall of 1,232 mm, a livestock population of 5,481 Cattle, 1,057 sheep and 1,260 goats, refuges such as caves, mines and tunnels, presence of the *D. rotundus* bats in rural areas are the most at risk. For the municipalities free of the disease, the presence of the vector and the topographical variables are the ones that best explained the potential spread of the disease, mainly in rural areas. The presence of risk of paralytic rabies in different livestock species has been estimated with multivariate geostatistical methods based on climatic, topographic and demographic variables together with the livestock population and *D. rotundus*. The result showed the potential risk factors for the spread of rabies in cattle in non-endemic areas of the disease.

OR61 - RABIES CASES REPORTED IN PARAGUAY DURING 2021-2022

CASOS DE RABIA REPORTADOS EN PARAGUAY DURANTE 2021-2022

Mirtha Colmán[1], Zunilda Garcia[1], Juan Trinidad[2], Guzmán Sienra[2], Antonio Rodríguez[3], Jorge Miret[2]

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Keywords. Rabies, Paraguay, epidemiology

Introduction. Rabies is a zoonotic disease caused by viruses from the genus *Lyssavirus* associated with neurological signs because of the de development of encephalitis or meningoencephalitis. In Paraguay, rabies is one the causes of large economic losses in the productive sector (animal deaths) as well as in the public sector due to the elevated costs of monitoring and control programs. The Paraguayan Program for Rabies Control in herbivores aims to prevent the disease in cattle by focusing on the control of vampire bats (*Desmodus rotundus*), on strategic vaccination and active/passive epidemiological surveillance in humans, dogs and cats.

Objectives. The aim of this study was to describe the epidemiological situation of rabies in Paraguay. It was carried out by using data from the government agency responsible for animal health in Paraguay the National Service of Quality and Animal Health (SENACSA), the National Program of Zoonoses and National Rabies Center (PNCZ y CAN) and the Laboratory of Veterinary Diagnosis (CEDIVEP), which covers diagnosis from animals suspected of rabies carried out between 2021 and June of 2022.

Materials and Methods. The samples came from all regions of the country and were sent voluntarily by farmers or by both private and public veterinarians. The samples sent to the government animal health laboratory were subjected to the direct immunofluorescence technique and to the biological proof (inoculation in mice).
Results From 2021 to June of 2022, positive rabies cases were detected in 67 animals (54 cattle, 3 horses, 1 fox, and 9 vampire bat).

Conclusions. Rabies in Paraguay is part of a complex situation and further research is needed. Several socioeconomic and environmental factors must be taken in accounted. Nevertheless, the method applied in this study allowed us to establish priorities for epidemiologic surveillance.

OR76 - Comprehensive public health interventions in a rabies outbreak in Morelos, 2022 .

González-Acosta Cassandra[1], Tenorio-Ramírez Andrés[2], **Gómez-Gómez Angelita[3]**, Martínez-Blancas Leonardo[4], Sánchez-Rojo Frida Liliana[5], RodríguezDelgado Gustavo Adolfo[6]

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Key words. Rabies outbreak, public health measures, Morelos.

Introduction. The relationship of zoonotic exposure of humans with companion and wild animals and other economic-interest animals, results in a One-Health approachin order to manage the deployment of several control and preventive measuresagainst transmission of rabies.

Objective. We aim to describe the results of control measures implemented in this rabies outbreak in an economic-interest animal in Xicatlacotla, Morelos in 2022.

Methods. A rabid-index-case approaching methodology was carried out in a rural community of Morelos where there has been confirmed a rabies case in a horse. Consequently, 5 and 8 km intervention areas were established as control andpreventive measures in human population and economic-interest and wild animals were managed. Moreover, risk communication and health promotionmessages were broadcasted to the population. Promotion press material about rabies disease was provided to the community, as well.

Results. All pet and economic-interest animals were registered in a general census: Respect to anti-rabies vaccine coverage, it reaches 90% in pet animals (i.e. catsand dogs), and 80% in cattle and horses. Moreover, 100% anti-rabies preexposure vaccine coverage in human contacts was achieved; also, human rabiespreventive messages were transmitted in social media.

Conclusions. One-Health approach includes preventive actions and environmental controlmeasures, and in wild and economic-interest animals and humans, as well, inorder to hold an appropriate control of rabies outbreaks. Integral approach isnecessary in order to limit spreading transmission from urban settings to a ruralone.

OR43 - INCLUSION OF WORKING EQUIDS IN RABIES PREVENTION CAMPAIGNS IN THE OAXACA STATE, MEXICO

Arturo Herrera Leon
Oscar Ezequiel Blanco
Equids – Inclusion – Rabies campaigns

Introduction. Working equids (donkeys, mules and horses) play a very important role in the development of some activities in communities of several states of the country. In Oaxaca, a state of the Mexican Republic considered one of the places with high rates of marginalization and where more donkeys, mules and horses contribute their work to activities such as loading supplies or implements, transporting people, pulling carts, plowing land and even herding cattle have not been visible to be part of that species that get the application of vaccines to prevent paralytic rabies. Inclusion of equids in government-led programs that address animal welfare issues is critical to improve the quality of life for this species.

Goal. Together with CEFPPO (state committee for the promotion and protection of livestock in the state of Oaxaca) raise awareness among authorities, animal owners, key people, of the importance of vaccination against rabies in equids. Therefore, their inclusion in programs of government will be originated, the importance of working equids in the communities will be visualized and they get animal welfare that they need.

Materials and methods. Implementation of course - workshop to learn and develop skills in the staff (handling and application of the vaccine in equines). Application of vaccines to equids in regions where there are greater needs, as well as generating and delivering informative material to owners. Carrying out of surveys that allow to know the welfare conditions of the equids, their use and relevant information cited by the owners.

Result. 3,000 equids were vaccinated where more than 1,600 owners received information on the importance of vaccinating against rabies. The use of informative talks in the communities helped raise awareness for welfare of the species.

Conclusion. The application of the vaccine, the information and talks given, raise awareness among the owners of the need to look after the equids, to cause the generation of reports of the signs produced by rabies and request or build government support.

3º SESIÓN. Epidemiología molecular de la rabia/ Molecular epidemiology of rabies/ Epidemiologia molecular da raiva

Dr. Charles E. Rupprecht- E.E. U.U./ USA/ E.E. U.U.
Dra. Elizabeth Loza-Rubio- México/ Mexico/ Mexico
12:15-13:00

OR23 - High-throughput genotyping to track the geographic origin of rabies positive raccoons in raccoon-variant free areas of the United States

Matthew W. Hopken[1,2], Antoinette J. Piaggio[1], Zaid Abdo[2], Richard Chipman[3], Amy T. Gilbert[1]

Author affiliations. [1]USDA, APHIS, Wildlife Services National Wildlife Research Center, Fort Collins, Colorado, USA; [2]Department of Microbiology, Immunology, and Pathology, Colorado State University, Fort Collins, Colorado, USA; [3]USDA, APHIS, Wildlife Services, National Rabies Management Program, Concord, New Hampshire, USA

Keywords. Raccoon, population genomics, rabies virus

Introduction. The USDA Wildlife Services National Rabies Management Program (NRMP) has been congressionally funded since 1998 to coordinate national scale oral rabies vaccination campaigns in the eastern United States to control the spread of and eventually eliminate the raccoon variant of rabies virus. As part of this program, the NRMP and USDA Wildlife Services National Wildlife Research Center are collaborating on research for the delineation of raccoon population genetic structure and movement patterns across rural and developed landscapes to help refine disease management units, strategies, and response actions.

Objective. Our goal was to develop a raccoon genotyping assay and population genomic analyses to assist rabiesvirus management the eastern U.S.

Material and Methods. We used high-throughput sequencing and a genotyping approach called RADcapture to delineate raccoon population structure in the eastern United States, quantify genetic diversity, and conductassignment tests for individual rabid raccoons.

Results. Broadly, isolation-by-distance was the dominant population structure observed among raccoons in the eastern US, but genetic clusters were identifiable within smaller geographic regions. While clear demarcations between clusters were challenging to detect, gradations of genotypes were identified that shifted from one nearby cluster to another providing the capability to assign an individual to a particular region based on shared alleles. Genotype assignment tests of rabid raccoons revealed which geographic clusters were the highest probability match to the rapid raccoons.

Conclusions. The raccoon is one of the most ubiquitous and iconic mammals in North America and can adapt to diverse habitat types, including rural and developed landscapes where conflict with humans occurs. Our genomic approach is a useful tool for wildlife rabies management but also for broadly understanding raccoon

movement ecology to help wildlife biologists develop strategies to mitigate disease and damage conflicts at a landscape scale.

OR22 - Implementing genomic surveillance of vampire bat rabies across Central America using Whatman FTA cards and next generation sequencing

Hollie French[1], Bernal Le—n Rodriguez[2], Flor Barquero[3], Federico Chaverri[3], Baltazar CortŽs Garc'a[4], Israel Nicolas Reyes[4], Emilio Venegas Cureno[4], Edwin Ulises Nieves Garcia[4], Rogelio Estrada Rodriguez[4], Georgina Robles Pesina[4], Donaldo Yah[5], Vanessa Maribel Salazar[6], Olson Palala[6], Jorge Ligorria[6], Diana Luc'a Sevilla[7], Norma Acosta[7], Margarita Arango[8], Arlin Vanessa Hern‡ndez[8], Wilmer Ju‡rez[9], Nohemy Pineda[9], Leonel PŽrez[10], Irving Monfante[11], Miguel Cesar[11], Carmen Santana[12], Griselda Lopez[12], Abelardode Gracia Scanapieco[13], Ronald Antonio Bernal Guardado[13], Daniel Streicker[1]

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10. Laboratorio Instituto Hondureño de Investigaciones Médico Veterinarias (IHIMV), Secretaria de Agricultura y Ganader'a (SAG)-Servicio Naciona e Inocuidad Agroalimentaria (SENASA), FranciscoMoraz‡n, Honduras
11. Ministerio de Agricultura y Ganader'a (MAG), San Salvador, El Salvador
12. Instituto de Protección y Sanidad Agropecuaria (IPSA), Managua, Nicaragua
13. El Ministerio de Salud, Managua (MINSA), Nicaragua
14. Ministerio de Desarrollo Agropecuario (MIDA), Panama City, Panama
15. Viceministerio de Salud Colectiva, Laboratorio Nacional de Referencia en Salud Publica Dr. Defilló, Santo Domingo, Dominican Republic
16. Organismo Internacional Regional de Sanidad Agropecuaria (OIRSA), San Salvador, El Salvador

Keywords. Wildlife rabies, molecular epidemiology, biotechnology

Introduction. Vampire bat-transmitted rabies virus (VBRV) threatens human heal-

th and causes chronic economic losses from livestock mortality across Latin America. Current efforts to reduce the burden of VBRV including vaccinating humans and livestock and controlling bat populations would benefit from deeper understanding of viral circulation in thebat reservoir. However, it is increasingly evident that long term viral maintenance arises through complex spatial processes, including transboundary viral invasions and co-circulation of viral lineages. Existing surveillance systems remain largely disjoined and lack homogenized molecular methods to understand epidemiological linkages within and across countries.

Objectives. Here we present a cooperation between the 9 member countries of the Organismo Internacional Regional de Sanidad Agropecuaria (OIRSA) to develop a regionalnetwork for whole genome sequencing (WGS) of VBRV.

Material and Methods. In the pilot round, 79 rabies positive brain samples were obtained from wild and domestic animals from Costa Rica, Dominican Republic, Guatemala, Honduras, Nicaragua and Panama, and preserved on Whatman FTA cards, enabling room temperature shipment. Methods for eluting RNA from FTA cards were optimised, and whole genome sequencing was carried out using Oxford Nanopore Technologies MinION following multiplex amplification. Overlapping 400bp amplicons were generated in two PCR reactions,covering the full rabies genome, to detect virus even at low concentrations. A scheme of 76 primers was optimised across the broad geographical range.

Results. High quality rabies virus RNA was obtained from the majority of FTA cards. Phylogenetic analyses of newly generated whole genomes provided new insight into the genetic diversity and international transmission of VBRV in Central America, a region fromwhich few full genomes were previously available.

Conclusion. Our centralized hub for rabies virus genomics promotes data sharing and optimises WGS cost for countries with low rabies incidence by enabling parallel processing.WGS data will enable phylogeographic and spatial modelling studies that inform the distribution of limited resources for rabies prevention.

OR21 - Optimization of the pan-lyssavirus RT-qPCR assay LN34 in multiplex format to improve rabies diagnostics.

Yu Li, Kimberly Wilkins, Vaughn Wicker, Rene Condori, Hui Zhao, and Crystal Gigante

Poxvirus and Rabies Branch, Division of High Consequence Pathogens and Pathology, NationalCenter for Emerging and Zoonotic Infectious Diseases, Centers for Disease Control and Prevention, Atlanta, GA 30333.

Pan-lyssavirus RT-qPCR assay LN34, multiplex PCR, rabies diagnostics

Organization for Animal Health (WOAH) as a primary rabies diagnostic assay and has been used as a confirmatory rabies test in over 37 international and 32 domestic laboratories since 2018. Most of the participating laboratories can adopt the LN34 assays following the protocols, which include the LN34 assay and the β-actin RT-qPCR assay as host/sample quality control. Running the LN34 assay with β-actin assay in a multiplex format can further simplify the assay's set-up and reduce potential errors caused by mis-pipetting. However, the relatively high level of host RNA in brain tissue can interfere with the performance of lyssavirus detection by the LN34 assay, especially when the rabies viral level is low. We performed optimization for the multiplex LN34 assays by reducing the primer concentrations of the β-actin assay in different combinations to retain the sensitivity of LN34 assay at a cost of reduced sensitivity of the β-actin assay. The optimized LN34 multiplex assay can be used to test fresh or properly stored specimens which comprise the majority of suspected rabies samples. For samples in degraded condition and antemortem samples, the LN34 and β-actin assays should be run separately to retain the sensitivity of the β-actin assay.

4º SESIÓN. Eco-epidemiología de la rabia/Rabies Eco-epidemiology/Eco- epidemiologia da Raiva

Dra. April Davis- E.E. U.U. /USA/ E.E. U.U.
Dr. Feliciano Milián Suazo- México/ Mexico/ México
Dra. Isabel Bárcenas Reyes-México/Mexico/México
14:30-16:30

OR65 - APLICATION OF GEOGRAPHIC INFORMATION SYSTEM (GIS) FOR DECISION MAKING IN A RABIES CONTROL OPERATION (RABIES OUTBREAK), IN THE STATE OF CHIAPAS

AUTHORS. Engr. Mario Armando Bocanegra Alegria[1], MPH. Jordán Edgardo Bermúdez Casillas[2], ZVD. Gilberto Erwin Pérez Hernández[3]

[1]Responsible for Geographic Information System (GIS) in the deparment of ETV´s and Zoonoses of the Health Institute of the State of Chiapas, [2]State zoonosis coordinator of the Health Institute of the State of Chiapas, [3]Responsible for the Rabies Outbreak Control Operation of the Health Institute of the State of Chiapas.

Keywords. GIS, Spatial Analisys, rabies and control.

Introduction. Geographic Information System (GIS) is a tool that helps us to process spatialdata that allows us to analyze and represent them in various ways: risk maps, coverage maps spatial-intro, human and canine population maps, population-pet relationship maps, etc. The analisys is carried out based on evidence so that the people in charge know the current situation and allow them to make decisions in rabies control operations (rabies outbreaks).

Objective. Demostrating that the use of the GIS in rabies control operations is useful for making decisions and make efficient the resources allocated to these operations.

Material and methods. To carry out the information analysis, data matrices were generated by filling in primary, standardized and homogeneous formats using excel sheets. For data processing we use geoprocessing tools, cluster and colorimetric maps applied to cartography through oficial sources such as the INEGI Geoestadistical Framework or the INE Electoral Geographical Framework, mapping tools that were extracted from satellite images of free servers such as Google Maps. Fort he creation and interpretation of the risk maps, the free Access software QGIS 3.22 Białowieża was used.

Results. Through GIS, visual and dynamic information is obtained on the current status of rabies outbreak control operations, coverage maps, variable analysis, heat maps, delimitation of intervention areas and risk maps that are useful for decision making during the evolution of rabies control operations.

Conclusion. The GIS are a computer tool that support us in the control of rabies, they are proposed in an intelligent, timely and precise manner where the level of analysis can be per inhabitant and/or pet to facilitate planning, execution and presentation of results.

OR26 - Spatio-temporal analysis of bat death reports in urban areas in Brazil, 2011 to 2020 and their possible relationships with human rabies cases.

Alexander Vargas[1,2], Márcio Botelho de Castro[2]

1. Department of Strategic Coordination of Health Surveillance (DAEVS), Secretariat ofHealth Surveillance (SVS), Ministry of Health (MS)
2. Postgraduate Program in Animal Sciences, Faculty of Agronomy and VeterinaryMedicine (FAV) - University of Brasília (UnB)

Keywords. Bat; Rabies Virus; Public Health.

Introduction. Despite the continuous control of rabies in dogs and cats in Brazil, sporadiccases of human rabies transmitted by cats with viral bat strains have occurred in urban areas, becoming a growing concern for Public Health.

Objectives. Evaluation of notifications of bat deaths in urban areas and their possible relationship with human cases of rabies in Brazil, 2011 to 2020.

Materials and methods. The Spatio-temporal distribution of bat death records in urban areas, frequency of post-exposure prophylaxis (PEP) related with bats contact, and cases of human rabies transmitted by cats with viralbat strains were evaluated

in Brazil from 2011 to 2020.

Results. In 10 years, 15,436 bat death were recorded in urban areas in Brazil, with a significant increase in frequency between 2018-2020 (n=9,858/53.7%). The states of São Paulo 5,875 (38.0%) and Paraná 5,515 (35.7%) had the highest frequency of notifications, most of which were recorded in households 13,294 (88.7%). In the period, 48,529 PEP were recorded related to contact with bats in urban areas, with an increase of 50% in the frequency of PEP between 2018-2020. Four human deaths from rabies associated with cats infected with viral bat strains occurred in Paraíba in 2015, Roraima in 2016, in Pernambuco in 2017, and another in Santa Catarina in 2018.

Conclusion. There was a considerable increase inrecords of deaths in bats and PEP related to contact with bats in urban areas in Brazil, mainly between 2018 and 2020. These findings may indicate an increase in the circulation of rabies among bats in urban areas and a possible relationship with cases ofhuman rabies transmitted by cats infected with bat strains. Rabies vaccination of cats must be strengthened, and environmental studies to understand the dynamics of rabiesin bats have to be conducted in urban areas.

OR25 - Modelling modifiable factors associated with the probability of human rabies deaths in Nigeria in the context of sparse dog bite surveillance data

Philip P. Mshelbwala[1,2] *, Ricardo J. Soares Magalhães[1,6], J. Scott Weese[3], Nasir O. Ahmed[4],Charles E. Rupprecht[5], and Nicholas J. Clark[1]

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ABSTRACT. Rabies is a vaccine-preventable zoonotic disease with a substantial global burden. In Abuja, Nigeria there have been multiple rabies outbreaks, with associated human deaths. However, the lack of quality data on human rabies hinders advocacy and resource allocation for effective prevention and control. We obtained 20 years of dog bite surveillance data across 19 major hospitals in Abuja, incorporating modifiable and environmental covariates. To overcome the challenge of missing data, we used a novel Bayesian approach with expert-solicited prior information to guide multiple imputations for missing data to model the additive effects of the covariates on the predictive probability of death after rabies virus exposure (RABV) exposure. Of 1,155 dog bite victims reported, 4.2% (n=49/1155) died of rabies. The odds for risk of death were predicted to decrease among individuals

who were bitten by owned dogs (OR= 0.230,95% CrI: 0.075- 0.683) compared to those bitten by free-roaming dogs. Similarly, there was a predicted decrease in the probability of death among victims bitten by owned vaccinated dogs (OR= 0.111 (95% CrI: 0.021-0.447) compared to those bitten by unvaccinated dogs. The odds for the risk of death after bitten individuals received at least one human rabies vaccine were predicted to decrease (OR=0.001, 95% CrI: 0.0001-0.008) compared to zero doses. This study highlights the importance of human post-exposure prophylaxis (PEP), canine vaccination, and responsible dog ownership in preventing human rabies deaths. It underscores the need for more innovative strategies to manage free-roaming dogs and the urgency to advocate for responsible dog ownership to avert rabies fatalities. Our analytic pipeline demonstrated the practical application of regularized Bayesian approaches to model sparse dog bite surveillance data to uncover risk factors for human rabies with broader applications in other endemic rabies setting.

Keywords. Bayesian, Epidemiology, Lyssavirus, Nigeria, One Health, Rabies, Zoonosis

OR14 - Grading on a Curve: Analysis of available animal testing data to propose a peer-derived quantitative threshold for determining adequate surveillance capacity for rabies.

Authors. Faisal S. Minhaj, Sarah Bonaparte, Ryan M. WallaceKeywords: surveillance capacity

Introduction. Historical quantitative targets for animal rabies testing were abandoned due to ethical and welfare concerns with the interpretation of terminal-testing healthy animals. Current standards assume countries are conducting surveillance for rabies suspect animals. To-date, there has been no quantitative threshold established for evaluating adequate surveillance capacity specific to suspectedrabid animals.

Objectives. Propose a quantitative rabies testing threshold for rabies suspected animals that can be used to assess a country's rabies surveillance capacity.

Methods. Animal rabies testing data was obtained from official and unofficial rabies surveillance platforms from 2010–2019. This was supplemented with official country reports and with literature search from January2010 to December 2021. Data from the literature was included if the publication had testing data, end date was >2012, and data covered the entire country. Testing rates were divided into all-animal and dogrates, and standardized per 100,000 estimated human population, with the dog rate also standardized per 100,000 estimated dog population. Rates were compared across WHO canine rabies status.
Countries with the WHO status of "controlled dog rabies" or "sporadic human rabies" were used topropose a peer-derived testing rate threshold.

Results. Data was found for 129/240 (54%) countries and territories; 114 (48%) reported surveillance data eligible for analysis. Countries with the most of data were countries with WHO endemic human rabies
(42) or with no dog rabies (44). The median of all-animal testing rate was 1.53 animals/100,000 humanpopulation annually (IQR 0.27–8.78). Among 13 countries listed by WHO as "controlled dog rabies" (8) or "sporadic human rabies" (5), the median dog rate per human population was 3.44 (IQR 0.64–5.84); the median dog rate per dog population was 140.8 (IQR 39.2–197.2).

Conclusion. We proposed two peer-derived rabies testing thresholds for passive surveillance of rabies suspect dogs to facilitate assessment of a country's rabies surveillance capacity.

OR24 - Rabies Surveillance in the United States during 2021.

Xiaoyue Ma[1], Sarah Bonaparte[1], Crystal Gigante[1], Lillian Orciari[1], Jordona Kirby[2], Richard Chipman[2],Ryan Wallace[1]

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[2]Wildlife Services, APHIS, USDA, Concord, NH, USA

Keywords. Rabies, Surveillance, Epidemiology

Human and animal rabies have been nationally notifiable conditions in the United States since 1944. The US National Rabies Surveillance System (NRSS) is a laboratory-based system comprised of approximately 130 public health, agriculture, and academic laboratories that conduct rabies testing as well as 53 state, district, and territorial public health jurisdictions that conduct epidemiological investigations. In addition, the USDA Wildlife Services conducted active rabies surveillance and submitted rabies testing data to the NRSS. Data submitted by 50 states, District of Columbia, New York City, Puerto Rico and the USDA Wildlife Services were analyzed to provide critical information on the temporal, geographic, and demographic occurrence of animal rabies in the US to facilitate its prevention and control. National rabies management decisions, vaccination recommendations, public education, and numerous other rabies activities rely on an accurate portrayal of the national rabies landscape. The annual rabies surveillance report presents the official statistics for human and animal rabies in the US. The present report summarizes laboratory and epidemiological data collected during 2021 from 54 US reporting jurisdictions. Reported cases of rabies by location will be provided with distribution figures for major terrestrial reservoir hosts. Rabies virus variants identified in domestic and wild animals will be described with detailed information. The 2021 rabies surveillance report will also provide a summary of human rabies cases from January 2000 through September 2022.

OR78 - Population Density of the small Indian mongoose (Urva auropunctata) across multiple habitat.

Types on Puerto Rico. Preliminary results

Are R. Berentsen[1], Mel J. Rivera-Rodriguez[2], Fabiola B. Torres-Toledo[1], Caroline C. Sauvé[3],

Richard B. Chipman[4] and Amy T. Gilbert[1].
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Keywords. Mongoose, Puerto Rico, Rabies

Introduction. The small Indian mongoose (*Urva auropunctata*) is a non-native invasive species and rabies reservoir on the island of Puerto Rico. Oral rabies vaccination is a recognized method to control rabies in wild carnivores and has been proposed for use with mongooses. Vaccine application rates may depend in part upon the population density of the target species, which may be habitat and/or site dependent.

Objectives. Our objective was to calculate mongoose population density estimates across multiple habitat types and seasons on Puerto Rico.

Materials and Methods. We live captured, marked and released mongooses on six sites representing four habitat types during 2016 – 2021: 1) grassland [two sites], 2) flooded shrub/herbaceous cover [one site], 3) rainfed cropland [one site] and 4) closed to open canopy broadleaved evergreen tree cover [two sites]. We used capture-mark recapture analysis in program MARK to calculate mongoose abundance and density estimates.

Results and Conclusions. We marked 445 individual mongooses across 593 capture events (12,530 trap days, 0.047 captures/trap-day). Mean (SE; 95% confidence interval) population densities were 79 (13; 67-92) mongooses/km^2 for the closed to open broadleaved evergreen canopy habitat, 19 (5; 15-25) mongooses/km^2 for the flooded shrub/herbaceous cover habitat, 43 (10; 35-55) mongooses/km^2 for grasslands and 26 (10; 18-38) mongooses/km^2 for rainfed cropland. Mongoose population density estimates in the closed to open broadleaved evergreen canopy habitat were greater than in other sampled habitats. In general, higher densities were observed during spring

and summer than during autumn or winter, although sampling was not conducted evenly across seasons or sites.
Results suggest mongoose densities may be habitat-dependent and vary seasonally. Oral rabies vaccine baiting density may need to be greater targeting populations in closed to open broadleaved evergreen habitats and grasslands, while lower density applications may be appropriate for populations in flooded shrub/herbaceous cover or rainfed cropland habitats.

27 DE OCTUBRE /
OCTOBER / OUTUBRO / OCTOBRE

Unidos contra la Rabia: Visibilidad de la rabia en otras especies
United against Rabies: Visibility of rabies in another species

Verónica Guitérrez Cedillo
Presidenta del Comité Directivo Internacional RITA/International Steering Committee president of RITA

1º SESIÓN. Avances de investigación de la rabia en fauna silvestre/ Advances in wildlife rabies research/ Avanços na pesquisa da Raiva em animais silvestres.

Moderadores/Moderators/ Moderadores
Dr. Álvaro Aguilar Setién-México/Mexico/Mexico
Dr. Richard Chipman E.E. U.U. /USA/ E.E. U.U.
9:00-11:25

Evaluating of the effects of vampire bat culling on the spatial spread and transmission of rabies virus

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Abstract. Controlling pathogen circulation in wildlife reservoirs is notoriously challenging. In Latin America, vampire bats have been culled for decades in hopes of mitigating lethal rabies infections in humans and livestock. Whether culls reduce or exacerbate rabies transmission remains controversial. Using Bayesian state-space models, we show that a 2-year, spatially-extensive bat cull in an area of exceptional rabies incidence in Peru failed to reduce spillover to livestock, despite reducing bat population density. Viral whole genome sequencing and phylogeographic analyses further demonstrated that culling prior to rabies outbreaks slowed viral spatial spread, but reactive culling accelerated spread, suggesting culling-induced changes in bat dispersal promoted viral invasions into previously unaffected areas. Our findings question the core assumptions of density dependent transmission and local viral persistence which underlie culling bats as a rabies prevention strategy and provide a generalizable epidemiological and evolutionary framework to understand the outcomes of interventions in complex wildlife disease systems.

OR29 - VIRAL CROSS SPECIES TRANSMISSION AND SHIFTS FROM BATS INTO MESOCARNIVORES: 'THE FLAGSTAFF PHENOMENON'

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KEYWORDS. Bat, cross species transmission, mesocarnivores

Given the current pandemic and zoonotic impacts, there is global interest in understanding pathogen emergence and cross species transmission (CST) via wildlife. In North America, rabies virus (RABV) perpetuates as distinctive variants in reservoir populations of wild mesocarnivores and bats. Pathogen spillover occurs commonly, usually as discrete, dead-end transmission events, when RABV variants are transmitted to non-reservoir taxa or when reservoirs are infected with atypical variants. Uncommon are CST episodes involving more than a single infection or leading to shifts into wildlife populations.
Together with public health surveillance focused primarily upon human exposures, the enhanced rabies surveillance (ERS) of wildlife using a field-friendly direct, rapid, immunohistochemical test has proved essential for detection of CST in the USA.

Unusual CST events of a bat RABV to wild mesocarnivores were detected in Flagstaff, Arizona during 2001 (19 striped skunks), 2004-05 (6 striped skunks, 2 gray foxes), and 2009 (23 gray foxes, 6 striped skunks, and a ringtail). During 2021, CST involving the same bat variant re-occurred (>16 striped skunks to date). Clear and concise explanations for these Arizona CST events remain elusive, but likely involve climatic, ecological, environmental, and epidemiological components. Such events raise concerns among the One Health community regarding potential drivers of CST and impacts to human and animal health. Recent rabies management actions have focused on public education, animal quarantine, domestic animal and wildlife vaccination, as well as ERS. Defining a practical set of diagnostic tools and surveillance targeting at-risk wildlife remains fundamental for timely detection and management, predictive modeling, and by extension, approaches for studying CST of other pathogens. As such, the continued and unprecedented 'Flagstaff phenomenon' (as an example of seemingly rare biological events that reoccur without readily apparent explanations) serves as a basis for understanding infectious disease origins and adaptations, as well as feasible, long term, longitudinal studies designed for the detection, prevention, and control of zoonoses associated with wildlife.

OR77 - Rabies virus spillover and host shifts from bats into mesocarnivores

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Keywords. Spillover, emergence, wildlife

Introduction. In North America, rabies virus (RABV) perpetuates as distinct variants in reservoir populations of wild mesocarnivores and bats. Spillover occurs commonly, usually as discrete, dead-end transmission events, when RABV variants are transmitted to non-reservoir wildlife or reservoirs are infected with an atypical RABV variant. Together with public health surveillance addressing human exposures to RABV, the enhanced rabies surveillance (ERS) of wildlife using a field- friendly direct, rapid, immunohistochemical test has proven essential for detection of CST in the USA. Unusual CST events of a big brown bat (Ef) RABV variant infecting mesocarnivores were detected in Flagstaff, Arizona during 2001 (19 striped skunks), 2004-05 (6 striped skunks, 2 gray foxes), and 2009 (23 gray foxes, 6 striped skunks, and a ringtail). During 2021-2022, CST involving an Ef RABV has re-emerged (17 striped skunks).

Objectives. This study evaluates the ecology of rabies virus transmission in Flagstaff, determines the relationship of 2021 cases to earlier outbreaks, and quantifies the potential for transmission of Ef RABV in skunk salivary glands.

Methods and Materials. Techniques including real-time PCR and sequencing were used to variant type and characterize RABV and quantify the virus load from brain and salivary gland tissues of rabid skunks infected with skunk versus Ef RABV variants.

Results. Multiple ecological factors may support the CST of bat RABV in mesocarnivores in Flagstaff, Arizona. Genetic comparison of recent cases with prior outbreaks suggests a distinct outbreak of Ef RABV infecting skunks during 2021. Rabies management actions in response to the recent cases have focused on public education, animal quarantine, domestic animal and wildlife vaccination, along with ERS.

Conclusions. Defining practical diagnostic tools and surveillance strategies targeting at-risk wildlife remains fundamental for timely detection of CST and the 'Flagstaff phenomenon' may serve as a basis for understanding RABV emergence in the Americas.

OR66 - Results on 21 years of enhanced bat rabies surveillance in France

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Keywords. Rabies, bat lyssaviruses, surveillance

Introduction. Bat rabies surveillance was first implemented in France in 1989 after the discovery of the first positive case in aserotine bat in the northeastern part of the country. From 2000, bat rabies surveillance has been improved by consolidatingthe local veterinary services network with the involvement of the French Society for the Study and Protection of Mammals (SFEPM - Société Française pour l'Etude et la Protection des Mammifères) and centers for the rescue of wild animals. As a result, the number of collected specimens has significantly increased with an average of more than 400 bats submitted everyyear to our laboratory during the last decade.

Objectives. Here, we report the results from this enhanced passive bat rabies surveillance covering years 2000 to 2021.

Material and Methods. More than 6500 bats were collected and diagnosed for lyssaviruses using the Fluorescent antibodyTest (FAT) and molecular biology techniques. Positive samples were subsequently typed by partial SANGER sequencing of theN protein.

Results and conclusion. A total of 89 bats were positive tested for rabies and subsequently confirmed by SYBR Green RT-PCRand/or hnRT-PCR. More than 96% (n=86) of this cases were associated to EBLV-1 lyssavirus (Lyssavirus hamburg) in Serotine bats *(Eptesicus serotinus)*. Futhermore, 3 cases associated with novel bat lyssaviruses, belonging to phylogroups 1 and 3, werealso reported on the East side of France: two Bokeloh bat lyssaviruses (BBLV) in Natterer's bats (*Myotis nattereri*), and one Lleida bat lyssavirus (LLBV) in a common bent-wing bat (*Miniopterus schreibersii*).

OR69 - Rabies in Canada – 2021

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In 2021, the CFIA laboratories tested 2443 samples for rabies. The majority of samples came from animals with a history of human exposure (71.9%); all other samples had only domestic animal contact (19.6%) or no documented contact (8.6%). One hundred and five (4.3%) tested positive; of these, 23 (21.9%) were confirmatory tests on wildlife surveillance samples, initially analysed in provincial laboratories. An additional 10 cases positive on immunohistochemistry were reported, but were not submitted to CFIA for confirmatory testing. At CFIA most samples were analysed by the direct fluorescent antibody test (n=2441), and 3 by quantitative RT-PCR (2 human, 1 horse - all negative). The2015 Ontario rabies outbreak due to raccoon-variant virus (RVV) persisted, with a slightly higher case count in 2021 (n=14) compared to 2020 (n=9); whereas the RRV outbreak in New Brunswick appears resolved, with the last case detected in July 2019. Rabies due to arctic fox-variant virus (AFVV) re- emerged in northern regions in 2021 (12 cases in 2021 vs just 1 in 2020). This outbreak, along with the slight increase of RVV cases likely explains the small increase in case detection in 2021 (3.9% in 2020). Bats accounted for the highest proportion of cases in 2021 (51, 48.6%), followed by skunks (27, 25.7%), foxes (13, 12.8%), and raccoons (2, 1.9%). Among domestic animals, rabies was detected in 6 dogs, 2 cats, 2 bovines, 1 goat, and 1 llama; most due to spill-over of skunk-variant virus in western Canada (n=9). Three remaining dogs were infected with AFVV (one each from northern Quebec and NorthwestTerritories) or a Middle East canine variant virus, in an imported dog. Two spill-over cases due to bat- variant viruses were detected in skunks in 2021. Although most rabies cases were in wildlife species (93/105, 88.6%), domestic species accounted for 43.2% (1056/2443) of specimens analysed.

OR31 - Identifying factors that influence the adoption of a vampire bat rabies vaccine among personnel of the rabies control program in México

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Keywords. Rabies, vaccine adoption, vampire bats

In Latin America, vampire bat-transmitted rabies (VBR) is a burden to public health and veterinary sectors, predominantly affecting livestock production. The main strategies currently used to control VBR focus on vaccinating livestock and culling vampire bats. Yet, VBR remainsa threat, and thus, there is a need for alternative control strategies- such as vaccination of bats.
Recently, we demonstrated that vaccinating vampire bats with a recombinant-mosaic rabies vaccine (using Raccoon pox virus as its vector) blocked virus shedding in the saliva of bats thatsuccumbed to rabies after experimental infection. A vaccine that reduces rabies transmission inthe reservoir (bats) is very promising. However, the adoption of a bat-rabies vaccine as a wide-scale tool for disease control depends on its acceptance by key stakeholders.

We surveyed the personnel of the rabies control program in México (n=86) online, from Nov 2022-Apr 2021, to assess factors influencing the acceptance of vampire bat vaccination as a potential control strategy. Participants were supportive of vaccinating vampire bats against rabies(a score of 7.4 on a scale of 1 - 10), and this was influenced by two main factors: the availability of vaccines with some desired characteristics (e.g., price, efficacy) and the belief that vaccinationhelps control rabies. Other variables, such as demographics or the belief that vaccination would impact bat populations, did not predict support for vaccination.

More research is needed before vaccination of vampire bats becomes a reality (e.g., vaccine efficacy field trials in wild bat populations). Still, early in the process of implementing a novel strategy (bat vaccination), this study identifies factors that might influence public acceptance and will help us to design effective communication approaches to obtain support for future field trials from agencies responsible for the control of VBR.

OR33 - Epidemiology of human, canine and wild rabies in the State of Sinaloa, 1993-2021.

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ABSTRACT. Rabies in the state of Sinaloa, Mexico, has been perpetuated in wildlife, mainly in the rural area of the entity. To associate the cases of human, dog and wildlife rabies to the zoogeographical characteristics of the state, an investigation was carried out related to the rabies outbreaks that have occurred in the period between 1993-2021, through the collection and integration of published and official scientific information available, which was analyzed together with the characteristics of the territory of the state of Sinaloa to identify its geography and the biodiversity of wildlife. An observational, cross-sectional, retrospective and analytical study was carried out, 18 positive cases of rabies were identified, records of positive cases of rabies were found, being able to establish the antigenic variant of the virus, for wild animals and dogs as well as one case of human rabies in 2004. The skunk represented the highest percentage of cases with 7 (39%), followed by dogs with 4 (22%), the lynx with 3 (17%), fox 2 cases (11%), one positive sample from bat (5.5%), one from human (5.5%). In the rabies virus, the variables V-1, V-7, V-8 were characterized. The dogs perform important tasks in support of the inhabitants of the rural areas of the Sierra Madre Occidental, the presence of rabies in these areas is fully demonstrated by means of the identification of the virus, which represents an important danger for this population this situation implies a consequent risk for human beings who live in very remote and difficult-to-access locations where they can be attacked by wild animals or by their own infected non-immunized dogs or cats.

Keywords. Rabies cases, wildlife, canines, Sinaloa.

OR68 - Rabies in Chiropteran in the state of San Luis Potosí Mexico 1997-2021

MPH. Juan Carlos Camacho Martínez. Health Services of San Luis Potosí Rabies in Chiropteran

INTRODUCTION. The quantity of chiropteran analyzed has increased over the years, as have the cases of rabies, in the state of S.LP. it's important to acknowledge cases, species, affected municipalities and antigenic variants, to take preventive measures in the population at risk.

OBJECTIVES.
To Know:
1. Species that circulate in the state.
2. Species positive for rabies.
3. Municipalities most affected by rabies in Desmodus rotundus, and other non-hematophagous species.
4. Circulating Antigenic Variants
5. The advance of Desmodus rotundus towards the center of the state.

MATERIALS AND METHODS. Retrospective study of the analyzed samples in the Zoonoses Laboratory dependent on the SPHL of S.L.P in the indicated period.

RESULTS. During this period, 3,328 chiropteran samples were processed; of which 2180 were from Desmodus rotundus (65.5%), of these samples 52 resulted positive: 31 from Desmodus rotundus and 21 from other species such as: Taradira, Myotis, and other non-hematophagous species.

CONCLUSIONS.
- **Circulating species:** Desmodus rotundus, Diphylla ecaudata, Taradira brasilensis mexicana, Myotis sp, Leptonycteris sp, Mormoops sp. Artibeus sp. Sturnira sp. Molossus Rufus, Choeronycteris mexicana, Vespertilionidae sp. Glossophaga sp. Anoura geoffrogi, Macrotus sp. Pipistellus. Sp. Pteronotus sp. and other unclassified non-hematophagous.
- **Species positive for rabies:** Desmodus rotundus, Mexican Taradira brasilensis, Myotis sp and other unclassified non-hematophagous species.
- **Municipalities with the highest number of cases of D. Rotundus:** Rioverde, Aquismón and Tamasopo,

Non hematophagous species: Rio Verde, Santo Domingo, and S.L.P
- Antigenic Variants in Desmodus rotundus: V11

Non-hematophagous species: V9
- Initially the samples of Desmodus Rotundus came from municipalities of the Huasteca, currently they increased to municipalities near the state capital: Armadillo, Villa de Arista, Zaragoza, and Hidalgo.

2º SESIÓN. Rabia urbana no transmitida por perros/ Urban rabies not transmitted by dogs/ Raiva urbana não transmitida por cães

Moderadores/Moderators/Moderadores
Dra. Verónica Gutiérrez Cedillo -México/Mexico/México
Dra. Natalia Casas- Argentina/Argentina/ Argentina
11:45-12:30

OR37 - THE NEW EPIDEMIOLOGY OF RABIES IN THE COLOMBIAN ANDES: RECENT CAT-RELATED HUMAN CASES

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Keywords. Bat-borne rabies; cat; Colombia; sylvatic cycle; wildlife

Introduction. Forty-four Rabies human cases have been reported in Colombia since 1990, where a greater proportion corresponds to bat-borne viral variants, where cats are the aggressor animal toward humans.

Objective. To characterize cat-borne Rabies cases in humans reported in Colombia.

Materials and Methods. A comprehensive review of scientific, official, and gray literature recovered epidemiological metadata of cat-related Rabies in humans. The inclusion criteria involved cats as the source of the infection, fatal cases in humans, and identification of the viral variant.

Results. The distribution of cases among years was constant. However, between 2003 and 2012 a peak was observed, especially in rural areas. Cats were generally reported unvaccinated against Rabies, or vaccination status was unknown by their owners. Clinical signs of cats at the time of the report of the human cases included hypersalivation and irritability. Human patients were mainly females and the exposure primarily corresponded to bite and puncture laceration in hands. The Rabies lineage detected in most cases corresponded to variant 3, linked to vampire bats. The geographical presentation of cat-borne Rabies in humans occurred along the Andes mountains, known by the national sanitary authorities as the Rabies red Andean corridor.

Conclusion. Information on the 14 Rabies cases in humans derived from cats reveals a tendency of occurrence in highlands, kids, and in recent years. The national

protocol for disease control and prevention must be reviewed, including cats as the main sources of Rabies in the country. Prioritized Rabies vaccination for outdoor cats must be implemented.

OR75 - RABIES IN DOMESTIC FELINES IN MEXICO DURING THE PERIOD FROM 2019 TO 2022

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Keywords. Rabies, feline.

Introduction. Mexico presented its last case of rabies in dogs with the result of V-1 antigenic characterization in November 2016, in contrast, 4 cases of canine rabies transmitted by wild animals have been reported. However, the report of 5 cases in domestic felines in the period from 2019 to 2022 (1 in Veracruz, 3 in Yucatan and 1 in Zacatecas) generate alert because this domestic species has greater difficulty being vaccinated in rural áreas and with greater exposure to wild animals that transmit this disease.

Objectives. Carry out field epidemiological research and activities for the control of rabies outbreaks before the presentationof cases of rabies in domestic felines in Mexico during the period from 2019 to 2022.

Materials and methods. The approach of control of rabies outbreaks that implies, the epidemiological field investigation to identify the details in the transmission. During this investigation, the anti-rabies attention of the people identified as assaultedor in risky contact with positive animals is paramount. And finally, performing rabies vaccination actions of dogs and cats from house to house, delimiting the focal and perifocal areas.

Results. In these 5 rabies outbreaks, anti-rabies prophylaxis schedules were applied to 24 people (9 assaulted and 15 by riskcontact); during the vaccination actions from house to house, an initial vaccination coverage in dogs and cats of 32.8% is identified; 1,959 doses of vaccine were applied to reach a coverage of 88.8%.

Conclusions. The attention given to people at risk allowed no cases to occur in the human population. Similarly, the coverage achieved in dogs and cats delimits the presentation of other cases, however, in these áreas where feline rabies cases occurred latent risks are identified due to the significant presence of wild animals potentially transmitting rabies, coupled with the difficulty of vaccinating domestic felines in rural areas and their captivity by people from animal protection groups without any vaccination protection to be adopted later.

OR38 - Case of rabies in a domestic cat.

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Keywords. Domestic cat, rabies, risk of transmission.

Introduction. Zacatecas has not registered rabies cases in humans for 34 years and only one case of rabies in canines in the last 18 years; however, in April 2022, a positive case of rabies was registered in a domestic cat in the municipality of Monte Escobedo. The owner of the cat reported that the animal had had a fight with a skunk approximately 20 days before the onset of symptoms, and was not vaccinated since it was only 2 months old and would not allow itself to be handled.

Objectives. To describe the actions implemented for the control of the rabies outbreak in the entity in response to the case of rabies in a domestic cat in Monte Escobedo, Zacatecas.

Materials and Methods. A descriptive and retrospective study of the actions implemented was carried out.

Results. Control actions of rabies outbreaks were carried out with 10 brigadistas, after training for the approach and use of the sweeping card according to the technical guide for the attention of rabies outbreaks. Five people started antirabies prophylaxis due to contact with the positive cat. In that home there were several cats used for rodent control, so the owner agreed to hand over 4 of them to be sent to the LESP to determine if any of them already had the disease. In addition, information campaigns were carried out to make the population aware of the risk of transmission by wild species and what to do in case of being attacked by one of them.

Conclusion. The InDRE classified the case by indirect immunofluorescence, identifying the V-8 vampire/skunk variant, which is why vaccination actions were reinforced in that area, since there is a strong presence of bats. Cats may be a future problem for rabies control due to their poor management.

3º SESIÓN. Impacto del movimiento de animales, como riesgo de transmisión y diseminacion de la rabia / Impact of animal movement as a risk of rabies transmission and dissemination/Impacto do movimento animal, como um risco de raivada transmissão e disseminação da raiva.

Compliance versus Science: Are global dog movement regulations contributing to illegal importations and does science support a change?

Ryan Wallace, Todd Smith, Sarah Bonaparte, Emily Pieracci, Thomas Muller, Conrad Freuling, David Lowe

Over 130 countries are recognized as free from the dog-maintained rabies virus variant; yet with 114 endemic countries, there remains the potential for re-establishment of this viral variant if appropriate precautions are not taken. The risk of reintroduction is multifactorial and involves the incidence of rabies in the origin country, ownership status of the dog, vaccine quality, and dog-importation regulations of the receiving country. When importation events occur, a threshold of susceptible animals must be available to support re-introduction. Jeon et. al. estimated that herd immunity levels as low as 38% can prevent re-establishment of dog-maintained rabies, suggesting that re-establishment in countries that maintain modest post-elimination dog vaccination coverages may be unlikely. However, typical public health responses to dog rabies importation events have been reported to exceed $300,000 per event. If mitigation efforts fail, the cost of re-establishment of dog-mediated rabies can exceed tens of millions of dollars, in addition to human fatalities. The World Organization for Animal Health (WOAH) provides international standards for 181 member-countries, including standards for dog movement from endemic countries. The dog should (1) be permanently identified, (2) be vaccinated against rabies, (3) have proof of adequate antibody titer, (4) have a 90-day waiting period after proof of adequate antibody, (5) be healthy at the time of importation. Under this 90-day waiting period, there have been no legally imported rabid dogs, globally. However, over the last 20 years, 43 rabid dogs were illegally imported into the United States and Europe; many of these importations were attributed to fraudulent records, potentially to avoid the 90-day waiting period. Recent evidence has suggested a 30-day waiting period is scientifically justified to prevent importation of rabid dogs and may reduce the frequency of illegal importations. This presentation will review the scientific evidence for a reduced waiting period, and the potential impacts on legal and illegal dog importation events.

Why is it important to comply with sanitary measures when traveling with pets?

Campuzano Hernández, María del Rocío. *International consultant.*

Key words. Rabies, travel, prevention

Summary.: Rabies virus can remain in infected animals for varying periods, although in most cases rabies develops within six months post-exposure. Dogs are known to be the most common source of human exposure to the virus, especially in urban areas. Trade and trafficking of other susceptible species increases the chances of entry of animals with subclinical infections to other countries. The objective of this presentation is to emphasize that the health measures implemented by the veterinary and public health authorities contribute to reducing the possibility that companion animals, particularly dogs, cats, and ferrets, can be transported between different regions and be a potential source of rabies infection for other animal populations and, particularly, for humans. Veterinary or public health authorities are responsible for defining the requirements for the importation of companion animals into their territories and imposing restrictions, depending on the sanitary status of the country of origin or in-transit country, based on international recommendations. Some studies have shown the increasing entry of companion animals, including some too young to have been immunized against rabies, as well as non-compliance with quarantine, leading to the issuance of public health risk alerts. Risk analysis (including a rapid risk assessment) of introduction of infected animals, negotiation and establishment of import requirements as well as conditions for export certification, including measures to ensure animal welfare from the preparation of the trip, during the journey and upon arrival in the country of destination, continuous training of personnel responsible for verifying the health status and veracity of export certifications, are tools and obligations of the authorities responsible for animal health that can reduce the risks of introduction of infected animals. As conclusion, it is essential to remain vigilant, reinforce sanitary measures and increase health promotion activities, so that the population can take preventive measures.

Sesión. Pósters / Posters / Pósteres

OR44 Treatment seeking behaviour in animal bite victims of Nepal

Theme. Human rabies Subaxes: Prophylaxis

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Keywords. Treatment seeking, Nepal, animal bites

Introduction. 32 human rabies deaths and 35,681 animal bites were reported from Nepal in 2017. Not receiving a Post-Exposure Prophylaxis (PEP) after exposure with a rabid animal is the main reason for human rabies deaths. Rabies vaccine (ARV) and immunoglobulin (RIG) are providedfree of cost at governmental medical centres in Nepal. Despite this, people do not take PEP and human rabies deaths are encountered frequently in the country. To control this, we mustbe able to increase the uptake of PEP and for this, we must understand people's PEP seekingbehaviour.

Objectives. Understanding the patterns and determining factors of treatment seeking behaviour of animal bite victims in Bagmati province of Nepal

Materials and Methods. A qualitative community level study at 4 different local levels of Lalitpur district, Bagmati province in Nepal was performed. In-depth face-to-face interviews in the communities were conducted with the human victims of animal bites from April to July 2022. An open-ended questionnaire consisting of the details of the bite incident, treatment seeking trajectories and determinants etc. was administered. The interviews were audio recorded, transcribed and then a qualitative analysis was performed using the Atlas.ti software.

Results and Conclusion. People were not taking formal PEP. Majority visited local pharmacy rather than governmental medical institutions. Unavailability of vaccines, lack of awareness, economic condition, misinformation, local remedies, local beliefs, negligence, nature of bite etc were some of thereasons for this. The cost of the ARV, repeat offender dogs, unavailability of PEP/consultation, people having to travel several hours or even days for a single shot, were some of the major issues identified. Availability, distribution, and easy accessibility of PEP services in the local health with educating the communities must be done if we aim to reduce the annual numberof human deaths due to rabies in Nepal.

OR46 Awareness of rabies and its prophylaxis through the vero cell vaccine in population at risk from wildlife.

Introduction. Rabies is a preventable viral disease of mammals. The rabies virus infects the central nervous system and can cause death, it is considered a public health problem.

Objective. Carry out prevention measures in the fields of education and prophylactic rabies in population at risk for wildlife in the State of Querétaro.

Method. An ecological study will be carried out in three stages;

The first, focused on identifying, managing, approving and generating a situational diagnosis of the population at risk in public and private instances. The second is to develop the logistics and carry out the rabies training. The third will consist of prioritizing the population at highest risk, to carry out pre-exposure prophylaxis through the application of the vero cell vaccine, in a staggered manner over a period of three years.
The analysis will be carried out through rates, frequencies and percentages of the population at risk in each region, which becomes the independent variable, while the averages of the exposure variables will be the independent variables, and will be carried out using the SPSS statistical package expressing the results in tables and graphs.

Results/ Progress. In the first stage, 9 instances that have a population at risk in the state were identified, from 2020 to July 2022, 60 trainings have been given, with the assistance of more than 900 people and 99 pre-exposure prophylaxis with vero cell vaccine have been applied.

Conclusions. Awareness of rabies and its prophylaxis through the vero cell vaccine in population at risk for wildlife is a public health issue and the State of Querétaro is no exception, so the importance of continuing with this project in order to reach 100% of the municipalities of the state to provide coverage in the areas of training and pre-exposure prophylaxis.

OR17 Immunogenicity of rabies vaccines in pre-exposure prophylaxis (PrEP) regimen: a systematic literature review and meta-analysis.

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Keywords. Vaccines, Rabies Prevention

Introduction. Rabies vaccines are life-saving interventions. They have been studied since their development two centuries ago, and the expertise related to their production and laboratory methods measuring their immunogenicity have alsoprogressed. PrEP use is increasing thanks to the shortened immunization schedules but the conservative seroconversion threshold defining booster need remains unchanged since 1978.

Objective. Describe the immunogenicity of rabies vaccines used in PrEP regimen, asmeasured by rabies virus neutralizing antibody (RVNA).

Materials and Methods. Review of scientific databases and internal Sanofi sources, looking for publications using HDCV, PVRV, or PCECV, as PrEP, with at least two doses in the first week (comparable to current one-week regimen), presenting RVNA geometric mean titers (GMT) or seroconversion rates (≥ 0.5 UI/mL), from 1985 to 2022.
We conducted a random-effect meta-analysis, calculating means GMT and seroconversion rates at day 21 (i.e., 14 days after day 7), for each study group, with inverse variance method for pooling. Meta-means were compared by vaccine type and study year.

Results. 11 interventional groups were included (n= 1,002). Out of all participants, 65.1% received PVRV, 32.4% HDCV, 2.5% PCECV. 57.1% received intramuscular vaccination.
Meta-analysis showed GMT and seroconversion statistically equivalent between different vaccines (GMT: meta-mean= 13.44 IU/mL, p= 0.69, Seroconversion: meta-mean= 98% [CI 95%: 97 – 99%], p= 0.24). There was, however, a difference between GMT obtained before and after year 2000 (before= 22.71 IU/mL, after= 7.14 IU/mL, p= 0.02). Nevertheless, this difference in GMT was not reflected in seroconversion as titers were still higher than the threshold (98% [97 – 99%], p= 0.61).

Conclusions. Vaccine seroconversion remained consistent over time, despite reported GMT declining after the year 2000. Reasons for this are certainly multifactorial and investigations are needed to understand this time effect. Laboratory methods and associated acceptance criteria might need recalibration to better describe immunogenicity.

Funding. The work that led to this abstract was funded by Sanofi.

OR39 AGGRESSIONS OF ANIMALS ON HUMANS IN THE MUNICIPALITY OF PEDREIRAS, MARANHÃO (BRAZIL) DURING THE YEARS 2021 AND 2022.

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Keyword. Encephalitis; Central nervous system; Zoonosis

Introduction. The human rabies is transmitted mainly by the inoculation of the virus present in the saliva of the infected animal, clinically characterized as an acute and progressive encephalitis, which can be prevented with veterinary and medical attention to the cases. The municipality of Pedreiras, located in Maranhão, has an area of 288.43 km^2 and a population of 39,229 inhabitants, with no occurrence of human rabies.

Objective. survey of animal aggressions on humans, which would have potential transmission ofrabies in the municipality (spillover).

Materials and methods. In excel spreadsheets, percentages of animal aggressions on humans wereraised.

Results. Of the 273 aggressions from January to December 2021, of these: 207 (75.82%) were from dogs, 54 (19.78%) from cats, 05 (1.83%) from non-hematophagous bats, 03 (1 .09%) by monkeys, 01 (0.36%) by fox, 01 (0.36%) by swine and another 02 (0.73%) by rats. In 2022, from January to August, there were 201 aggressions, 154 (76.61%) were by dogs, 42 (20.89%) by cats, 03 (1.49%) by monkeys and 01 (0.49%) by mouse. According to the Ministry of Health, dogs and cats are the main sources of infection. Bats, monkeys and foxes in rural areas are high risk, economically bred domestic animals are medium risk, and rats are considered low risk. Depending on each case of exposure to the rabies virus, there is careful cleaning and disinfection at the site of aggression and prophylactic vaccination, which can be pre-exposure or post-exposure, the latter consisting of receiving a

dose of human anti-rabies immunoglobulin and rabies vaccine administered on the day of exposure to rabies and then a dose of vaccine administered again on days 3, 7 and 14.

Conclusion. As preventive actions are shared responsibilities between veterinarians and human doctors, in the theme of 'a world, one health', where dogs and cats are the biggest aggressors (96%) in urban areas and foxes, monkeys and chiroperes are important in rural areas.

OR73 Epidemiological profile of people exposed to rabies in Haiti from 2017 to 2021

Epidemiological profile of people exposed to rabies in Haiti from 2017 to 2021

Introduction. Rabies is a public health problem in Haiti. The objective of this work is to describe the epidemiological profile of people exposed to rabies from 2017 to 2021 in Haiti.

Methodology. This is a retrospective descriptive cross-sectional study. The study included all patients over the period from 2017 to 2021 who were bitten by an animal suspected of rabies and who attended a health institution that is part of the national epidemiological surveillance network.

Results. During the study period, 22,763 people were exposed, i.e., approximately 5 exposures per 100,000 people. The proportion is almost the same, (50.2%) for men and (49.7%) for women. The most affected age group is the 15–49-year-old female group, (25%) of cases, followed by the 15–49-year-old male group with (21.38%). The most affected department during this period is the West department (31.92%) followed by the Center department (16.81%). The most affected municipalities are : Port de Paix (8%), Port au Prince (6.65%). The institutions that received the highest number of cases are: Immaculé Conception Hospital in Les Cayes (4.58%), Immaculé Conception Hospital in Port de Paix (4.40%). During this period, 7 cases of human rabies were confirmed. The western department confirmed the highest number of human rabies cases, 57.14% of cases. The most affected sex is the male sex with 57.1% and the most affected age group is 50 years and over (28.5%.) the most affected municipality is Aquin (28.5%).

Conclusion. It is imperative to strengthen the monitoring of cases in the country, with an emphasis on the western and central departments with the availability of rabies vaccines in all health institutions.

Keywords. Epidemiological profile - exposure - rabies - Haiti.

OR4 Unattended bites: An updated approach to bite exposures in the era of One Health and beyond Zero by 30

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Animal bite is a key event for rabies transmission. In most countries its surveillance is weak o lacking. Knowledge of bite frequency, type of animal, victims' behavior and other characteristics can be used to enhance rabies prevention and control intervention, and wouldallow to target better interventions and improve their efficiency. Lack of attention to bite knowledge is fostered by the belief that PEP access is enough to prevent human rabies, an approach that favor urban areas over rural settings where more rabies risk is expected.

A look of current scenarios and potential new scenarios when the goals of the "Zero by 30" campaign are achieved are presented related to bite information needed. A renewed attentionis in order to bite surveillance where knowledge of molecular dynamics is limited due to country resources and to preserve advances in elimination of human cases. Important issues will be considered: 1) Improved surveillance of exposures, and 2) expanded surveillance to other diseases likely to be transmitted by known rabies reservoirs, 3) bites form wildlife not previously reported and potentially emerging reservoirs.

As an expanded vision to approach bites, the Amazonian Initiative for Research of Tropical Bites-IAIMT is presented, though as a transdisciplinary approach to cooperate with other groups researching diseases transmitted by bites and join forces to answer research gaps thatcan result in innovative technologies to stop or reduce frequency of bites as exposures to rabies and other diseases.

OR49 Human rabies in Nayarit, a disease with social determinants

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[1,2]Servicios de Salud de Nayarit, [3] Universidad Autonoma de NayaritKey words: *Desmodus rotundus*, chiropteran, zoonosis

Introduction. The Nayarit state mountain region, located at Mexican Norwest, possesses ideal conditions for human rabies exposure due to the presence of the rabies reservoir *Desmodus rotundus*, a hematophagous bat. We aim to analyze the main aspects ofthe last five human rabies cases in Nayarit, which occurred between 2008 and 2012.

Materials and methods. Variables such as municipality, community, age, sex, date of aggression, date of symptoms onset, date of decease, aggressor species and the

injury site were collected from a public database of rabies. Descriptive statistics were used to analyze the data.

Results. The 80% of the patients were less than 15 years old (n=4) and 60% were females (n=3); the main symptoms were local pain and hypersalivation, with 80% and 60%, respectively. All the cases were autochthonous from communities in the municipalities of La Yesca, El Nayar, Huajicori and Ruiz located in the mountain region of the state. All the cases have antecedent of aggression from *D. Rotundus*.

Conclusion. The main affected population were children in indigenous mountain communities with limited access to health services. In Nayarit, the rabies incidence is mainly related to social determinants. Therefore, local health services are actively deployingpublic health measures in order to reduce social disparities and diminish the zoonoticexposure in this region.

OR10 Evaluating the cost-effectiveness of dog vaccination campaigns against rabies in Tanzania: A comparison between free-of-charge vaccination campaigns in 2016 and owner-charged in 2021.

Keywords. *Dog rabies vaccination, cost per dog, dog owners' participation*

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Abstract:

Introduction: As rabies-endemic countries are scaling-up dog vaccinations, to achieve the global target for the elimination of dog-mediated human rabies by 2030. Sustainability of a rabies vaccination campaigns is crucial if dog-mediated human rabies is to be eliminated. Free-of-charge vaccination campaigns have been a highly effective method of achieving higher vaccination coverages in rabies-endemic countries, in which vaccines are purchased by national, and regional or do-

nated by non-governmental organisations. However, there has been a debate on cost-recovery attempts that charging dog owners could support the sustainability of these campaigns. Therefore, quantitative data are urgently needed to evaluate the cost-effectiveness of these delivery strategies.

Materials and Methods. We compared the number of dogs vaccinated, delivery cost per dog vaccinated and average dogs vaccinated per household between the campaigns that were implemented in 30 villages of Ulanga rural district in Tanzania. The campaign was implemented in2016 and was delivered free-of-charge while in 2021 dog owners were charged US$ 0.69 per dog.

Results. About 3900 dogs were vaccinated in 2016 during free-of-charge vaccination versus 458 dogsvaccinated during owner-charged campaigns in 2021. The delivery cost per vaccinated dog was US$
0.66 in 2016 versus US$ 5.59 in 2021. The average vaccinated dogs per household was 3.54 (1-7 dogs) in 2016 versus 1.29 (range 1-3 dogs) in 2021. These findings indicated that when dog owners were charged for vaccination, the delivery costs per dog vaccinated increased because fewer dog owners participated. The fewer dogs vaccinated per household in 2021 indicated that dog owners were unable to pay for all their dogs and opted to bring fewer of their dogs, that would be otherwisedifficult to reach the required herd immunity to eliminate rabies.

Conclusion. Therefore, providing dog rabies vaccination free-of-charge is the best strategy foreffective vaccinations i.e. at scale and with high coverage.

OR50 Implementation of the Can Census Computerized System for the use of data which was generated in health actions carried out in the canine and feline population in Navojoa, Sonora.

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KEYWORDS. CENSOCAN, NAVOJOA SONORA

INTRODUCTION. The Zoonosis Program performs 2 annual intensive vaccination phases, during a close contact is also kept

MATERIALS AND METHODS. The CENSOCAN computerized tool was used along with the lodging in the cloud. As a data collection tool, the animal health card for dogs and cats wasused, as well as the nominal census format for dogs and cats.
No extra personnel were required to come up with the Census survey, theassigned personnel to the local program were used.

RESULTS. The census of 11,829 records belonging to the town of Navojoa was obtained, the data was collected during a period of 3 months with 6 brigade members. 1,171 replacing cards were obtained due to loss or damage, which represents 9% of the total population of the surveyed dogs and cats.

CONCLUSION. Within the State Health Program, there are specific scheduled actions for dogs and cats, as part of the Zoonosis Program. These contacts during the year allow the dog census to be taken and updated without the need for extra human resources in order to obtain the data; however, a platform fordata management and a tool for the standardization of data such as the name of the owner and the actions taken regarding the registered dogs or cats are required.

OR52 Relationship between animal rabies vaccination and human rabies cases in the state of Guerrero between 1990 and 2021

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Keywords. rabies vaccine, human rabies, human aggression.

Introduction. In an analysis of the information of the casuistry of the last 30 years, it is highlighted that in the 90's, the rabies disease was part of a serious public health problem, however, when applying strategies and lines of action in the reservoir (dog/cat), thus controlling at the end of the 20th century, the problem in the reservoir,but realizing the implication of rabies in domestic animals of livestock interest and the risk that the hematophagous bat performs in rural areas and high marginalization.

Objective. To describe the relationship between cases of human rabies, doses of rabies vaccine administered and assaults on people.

Methodology. a descriptive, retrospective, retrolective study was carried out.

Results. Since 1990, a decrease in human rabies cases has been identified, going from 9 to 0; the last case due to dog transmission was in 1999; however, in 2006, 2010, 2016 and 2018 there were cases due to transmission from wild animals. Animal aggressions to people presented an increase between 1990 and 2000, goingfrom 46.19 aggressions per 100,000 inhabitants to 96.72; subsequently between 2000 and 2014 there was a higher rate of aggressions, being 2005 the year with thehighest rate with 107. 96 aggressions per 100,000 inhabitants; followed by 2001 (106.39), 2004 (103.43) and 2004 (103.43).With respect to the doses applied of rabies vaccine to animals, an

increase has been seen since 1990 where 287,184 doses were applied with a peak of 649,716 doses applied in 2017.

Conclusions. the increase in the application of rabies vaccines has been very useful in reducing cases of human rabies, especially in dog-transmitted rabies; however, a very important area of opportunity is rabies transmitted by bats.

OR53 National day of canine and feline vaccination against COVID-19 in Colima, Mexico 2020 -2021

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Keywords. Raby, vaccination, COVID-19

Introduction. The national day of canine and feline vaccination against rabies, presents a contribution to public health. On February 27, 2020, the first case of COVID-19 was presented in Mexico, a pandemic was subsequently declared, resulting in which attention was focused on said disease, with the risk of neglecting other health programs. In the stateof Colima, there was an increase in cases of COVID-19 in September, which coincides with the month in which the National Canine and Feline Vaccination Day is held (JNVACyF, by itsacronym in Spanish).

Objective. Know the evolution of the JNVACyF carried out in the state of Colima, in order to make decisions to take efficient and vaccinate the largest possible canine and felinepopulation, having into account the current epidemiological overview.

Materials and methods. An analysis of the JNVACyF was carried out during the year 2020 and 2021, comparing it with 2019, through the reports filed by the Rabies and other Zoonoses Coordination of Colima.

Results. In the year 2020, 92 104 animals were vaccinated, representing an increase of 2.4%, compared to the 2019 pre-pandemic year, 85 850 doses were applied in the JNVACyF (7.3%increase) and 6 254 the rest of the year (permanent phase) representing a decrease in the 37.5%.
In 2021, 91 013 canines and felines were vaccinated (increase of 1.2% compared to 2019), 82 876 in the JNVACyF (increase of 3.6%) and 8 137 in the permanent phase (decrease of 18.6%).

Conclusion. In the state of Colima, during the COVID-19 pandemic, there was a decrease in the number of rabies vaccines applied during the permanent phase, compared to 2019, however, there was no decrease in the annual number of vaccinated animals, presenting an increase during the JNVACyF.

OR56 EDUCATING AND MODIFYING: FOOTPRINTS OF THE HEART

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Key words. Education, Sterilization, Vaccination

Introduction. Education is the instrument of transformation of the community, it allows the development of skillsfor decision making. The community of V‡zquez Vela, Municipality of Tezonapa, Veracruz, has 300 inhabitants and approximately 600 dogs and 250 cats.

Objective. To describe how animal welfare talks affect in the attitude of the community regarding pet care,this is evaluated by conducting surveys and measuring pet vaccination and sterilization.

Methodology. The students of the Veracruz High School conducted animal welfare talks at the beginning of theproject, and before each sterilization and vaccination day, whose effect is measured through theapplication of surveys on pet care at the beginning, three and six months later, and the change between each one of them is evaluated. The effect of these talks is also evaluated with the fulfillment of the sterilization and rabies vaccination goals on a monthly basis.

Results. An increase in sterilization surgeries was observed after the talks, going from three to ten surgeries (10% of the goal at six months), three talks have been held, 60 doses of canine rabiesvaccine were applied (7% of the goal at three months) and 10 surveys, through which areas of opportunity are identified to reinforce in the following talks.

Conclusions. Through the educational process, the community develops changes in attitudes, modifying behaviors in the face of everyday life situations, these changes drive the renewal of values, and respect for animal life, even with the same society obtaining benefits by working as a team with the health and education sectors.

OR45 Gaps in the Animal Rabies control programs in Nepal

Theme. Rabies in Herbivores
Subaxes. Prophylaxis

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Keywords. Rabies control, Nepal, animal rabies

Introduction. Government's approach to rabies control being traced back to 1979 when it established a national coordinating committee for dog rabies expulsion in Nepal. Vaccine being nationally produced, laboratory confirmatory diagnosis available, nationwide passive surveillance performed, animal rabies given a notifiable status etc., in theory Nepal seems to be walking the correct path towards rabies control.

Objectives. Despite these necessary control measures in place, why is animal rabies still a big problem inNepal remains a major question. To answer this, our study makes assessments on the various governmental animal rabies control activities and tries to identify the issues and gaps in the current system.

Materials and Methods. A series of key informant and in-depth interviews were conducted with the key stakeholdersand designated animal health government officials. The official annual animal rabies data from 2001 to 2018 from the various institutions along with the current rabies related policieswere reviewed. A qualitative analysis of the interview transcripts and collected reports was performed.

Results and Conclusion. Several discrepancies in the rabies data (outbreak/death), with poor data verification processwas seen. Although animal rabies having a notifiable status, almost all the stakeholders (veterinary clinics, animal welfare organisations etc.) didn't report the rabies cases they comeacross to the Department of Livestock Services. The stakeholders were also not taking the suspected rabies cases to the designated governmental laboratory for a confirmatory laboratory diagnosis. Lack of nationwide mass dog immunization program, rabies vaccine potency standard different from the WOAH, vaccine delivery system, poor disease outbreak response, lack of coordination with the private animal health sector, absence of a rabies control strategy etc. just adds to show the various challenges the Nepalese animal health authorities need to overcome to effectively control animal rabies and reach the 2030 rabies elimination goal in Nepal.

OR12 Rabies Management in the North. Analysis of Alaska, Northwest Territories and Svalbard.

Expanding on previously presented results I compared rabies management in Alaska, Northwest Territories and Norway (Svalbard archipelago) using semi-structured interviews and document review. Challenges in rabies management differed among the three cases of this study. While remoteness, dog population management, and dog vaccination are of main concern in Alaska and Northwest Territories these issues were not mentioned by public health officials in Norway. On the other hand, safety of reindeer hunters was a concern only in Norway. The governmental scale of rulemaking in the three cases differs. Norway takes a more national approach while in the federal nations of US and Canada the rulemaking authority largely rests with regional or local officials, national public health institutions provide crucial technical expertise and support in the USA and Canada. Relationships between scales of governments and animal and human public health authorities are generally described as positive but some challenges are also identified. In this presentation I will discuss these differences in the context of One Health that combines human animal and environmental health in a multidisciplinary approach but poses significant administrative challenges interagency collaborations.

OR41 Esquivel DETECTION OF THE PRESENCE OF RABIES IN BATS FROM OAXACA

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Introduction. The hematophagous bat Desmodus rotundus is the main carrier and transmitter of rabies in cattle in Mexico. Although it has been recorded that it can be found in other species of bats. In this work, the presence of rabies in bats in Oaxaca will be reduced.

Objective. Know the presence of rabies virus in hematophagous bats captured in the State of Oaxaca.

Materials and methods. A historical review of the records of rabies in bats was carried out on the page of the National Center for Diagnostic Services in Animal

Health (CENASA). additionally, bats were captured in the State. To determine if the individuals were positive for rabies, the direct immunofluorescence test (DIF) was performed.

Results. In the period 2018-2022, Oaxaca ranks 15th in bovine rabies outbreaks according to CENASA with 14 positive cases, so far none in 2022. 2018 and 2021 were the years with the most positive records, with five respectively. For the field work, 63 bats were captured. All individuals were negative to the direct immunofluorescence test.

Conclusions and/or recommendations. Although the number of positive cases in the State of Oaxaca is low compared to others such as Veracruz (227), hematophagous bites are a problem that needs to be addressed, due to the economic losses it entails for ranchers. It has been observed that the above generates conflict, and those seeking quick solutions resort to disturbing caves, in which the presence of Desmodus rotundus is not certain and that it may be evolving to other species, as well as the ecosystem services they provide.

OR58 INTERVENTIONS FOR RABIES CONTROL OUTBREAKS BY THE NATIONAL PROGRAM OF ZOONOSES CONTROL AND RABIES NATIONAL CENTER IN PARAGUAY (2021-2022)

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Introduction. Rabies is a zoonotic disease, causes by a virus from the *Lyssavirus* genus. The Paraguayan Program for Rabies Control in herbivores aims to prevent the disease in cattle by focusing on the control of vampire bats (*Desmodus rotundus*), strategic vaccination and epidemiological surveillance of animal's rabies outbreaks cases based in the vaccination of human, dogs and cats exposed to the virus. Veterinary immunization is mostly provided by the Public Veterinary Services in coordination with the local municipalities; private veterinary services also provide vaccination.

Objectives . The aim of this study was to show the interventions for rabies control outbreaks occurred from 2021 to June of 2022 in Paraguay.

Materials and Methods Since the notified rabies cases by the National Service of Qualityand Animal Health (SENACSA), the National Program of Zoonoses Control

and Rabies National Center and the Veterinary Diagnostic Laboratory (CEDIVEP) there were vaccinated the dogs, cats and persons exposed to the virus.

Results. There were notified 67 animals with rabies (54 cattle, 3 horses, 1 fox, and 9 vampire bat), from all the 17th departments of the country. There were vaccinated withVerorab® Sanofis®, France, and Rabivax-s®, Serum Institute of India®, vaccines against rabies in humans, 188 persons that were exposed to the virus (farmers, animal'sowners), and 3364 dogs and cats living in a ratio of 5 kilometers around the animal's rabies case were immunized with the Rabimic®, Laboratorios Microsules®, Uruguay, andRabigen® Mono, Virbac®, India, veterinary vaccine against rabies. Implementation of control measures for rabies we recommend.

Conclusion. Interventions that include regular animal's vaccination campaigns for farmers and dogs and cat's owners, improvement in vaccines provision for humans andanimals, accompanied by regular campaigns of education in communities and sanitary professionals in public health centers for appropriate prevention and control strategiesagainst rabies were carried out.

Keywords. Rabies, interventions, Paraguay

OR59 Rabies in animals of economic interest in Guerrero from 2005 to 2021

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Keywords. rabies, animals of economic interest, bats.

Introduction. In the state of Guerrero, beginning the decade of the 90's the rabies virus in the population, marked a serious problem of Public Health, in the process of the actions allowed to glimpse that there was an apparent control of the reservoir (dog) but that some cases, were also caused by the aggression of wildlife and animals of commercial interest, in these animals the contagion is produced by the aggression of a bat. Humans can be infected by handling the offal and viscera of infected animals.

Objective. To describe the cases of rabies in animals of commercial interest by sanitary jurisdictions in Guerrero.

Methodology. a descriptive, retrospective, retrolective study was carried out.

Results. Between 2005 and 2021, 238 cases of rabies have been reported inanimals of commercial interest, with cattle presenting the highest number of cases with 218 (91.6%), followed by equines with 12 (5%). In this period the year with the

years with the highest detection were 2015 (33 cases), 2019 (30 cases) and 2014(26 cases). Making the analysis by jurisdictions we observe that the highest numberof cases have been identified in Costa Chica (28.6%), followed by Centro (23.5%),Costa Grande (18.9%) and Norte 15.5%. Each year Costa Chica reports the highestnumber of cases with the exception of 2005, 2009 and 2019 where the highestnumber of cases was reported by Centro.

Conclusions. 3 micro-regions have been identified as the ones where most cases of rabies in humans occur; however, these differ from the micro-regions where cases of rabies in animals of economic interest occur. Therefore, campaigns are being carried out to raise awareness among the population about the implications of hematophagous bats for the health of the human and animal population.

OR62 APPROACH TO CASE OF PARALYTIC RABIES IN LIVESTOCK SPECIES IN MANZANO, VERACRUZ 2021

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Key words. Rabies, Paralytic, Cattle.

Introduction. Bovine paralytic rabies is transmitted mainly by hematophagous bats when feeding of cattle. Veracruz is one of the livestock state´s with the highest incidence at the nationalevel. During 2021, 39 cases of paralytic rabies were reported to the state Ministry of Health. One of the most affected Health Districts was Poza Rica.

Objectives. To carry out the rabies outbreak response actions after the detection of a confirmed case of bovine paralytic rabiesin the community of El Manzano, belonging to the Poza Rica Health District.

Materials and methods. The case was notified by the National Service of Agro-Alimentary Health Safety and Quality to thestate´s Health Ministry, who carried out the actions of contact tracing and application of rabies vaccine to dogs and cats in the affected locality, through the zoonosis program.

Results. A brigade was deployed in the municipality of Zacualpan, which worked on the rabies outbreak in February 2021. A total of 12 people were visited in El Manzano, 7 adults and 5 children, during the house-to-house search. A talk was given to raise awareness on rabies and 100 health promotion leaflets were handed out.

Twelve human contacts were identified, four of them owners ofivestock species; 12 animal contacts, seven dogs and five cats, which were vaccinated with the canine and feline rabies vaccine (VACyF). In addition, 1,000 doses of VACyF were delivered to the municipality to cover the neighboring communities of Atixtaca and Batda.

Conclusion. The health of people and domestic animals around æase of paralytic rabies is compromised when in contact with the sick animal. The rabies fencing actions allowed reducing the risk of transmission, and no new cases derived from the reported case have been identified.

OR32 Factors related to the distribution and displacement of the Common Vampire Bat (*Desmodus rotundus*) in the state of San Luis Potosí, Mexico.

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Keywords: *Desmodus rotundus*; shelters; displacement.

Abstract. The common vampire bat (*D. rotundus*) in San Luis Potosi has bibliographic records (Dalquest 1953; Villa 1966; M. Greenhall 1983) and data from the Livestock Committee's bovine paralytic rabies campaign; distributed in the Huasteca and Media regions; currently it has been registered in the Centro and Altiplano areas, being present in 44 municipalities of the 59 that make up the state, where previously, only 27 were registered, with these data the objective was formulated: To know factors by which the displacement of colonies of *D. rotundus* from tropical to arid zones; work was carried out for 2 years in the three geographic areas of the state, monitoring through capture and recapture, three roosts with colonies of *D. rotundus*; taking as a hypothesis that, the displacements are due to factors such as: a) habitat destruction for the expansion of agricultural and livestock frontiers and urbanization, b) floods, c) forest fires, among others; However, in the results obtained when comparing the tropical, subtropical and arid regions where this species is located, these factors are not directly related to the distribution of the species, instead the availability of food and the microclimatic conditions of the shelters in the tropical and arid areas are very similar, which may be the main factor for the establishment of colonies. Concluding, these displacements occur in small groups, which are installed in shelters that provide them with temperature conditions from 20¡C to 30¡C and humidity from 80 to 90%, optimal for their establishment; These abiotic conditions do not have a significant difference in the three zones, so the colonies can be established without any problem, even when the abiotic conditions outside the shelters in the arid zones have a significant difference vs the tropical zone.

OR42 Operation Jame Canyon

Jame Coahuila

M.V.Z. Mario Solís Perales. Health Services of Coahuila de Zaragoza

Introduction. In Mexico the BPR was experimentally reproduced in 1932 (Téllez Girón); it is currently "zoned" by the OIE 2021; these endemic areas are in the control phase; the state of Coahuilais not classified with that category, the last cases were registered in 2008.
In 2018, the state of Nuevo León faced cases of paralytic bovine rabies, transmitted by hematophagous bats in the southern region; at the end of 2020 the outbreak was located 30 kilometers from the state of Coahuila. There the control zone was established. Due to the proximity to the neighboring state, in Coahuila a work plan was implemented with the authorities involved Senasica, the Animal Health Committee and the Ministry of Health.

Objectives. Establish active surveillance on the presence of hematophagous bat causing rabies in the neighboring state.

Materials and Methods. The social determinants of the region were identified and we proceeded to carry out thepopulation, livestock and dog and cat census, later an action plan was elaborated.
Villagers were surveyed regarding possible sightings of Desmodus rotundus bats.
We held a workshop to address issues related to Paralytic Bovine Rabies.
We carried out the human rabies vaccination pre-exposure to veterinarians to carry out the search for hematophagous bat, the professionals received training by experts to carry out the collection of chiroptera.
We integrate rabies vaccination brigades in 19 locations.
Resources were requested before federal authorities since the State did not receive them,there is no reference to obtain support for these actions.

Results and Conclusion. Resources of $596.0 were obtained for active surveillance and biological human rabies for the brigades' schemes, distribution of triptychs and placement of information posters and we applied 1,443 doses of rabies vaccine.

OR30 Cross-evaluation of rabies surveillance and case detection in Puerto Rico and the continental United States

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Keywords. surveillance, cryptic bat rabies, health disparities

Introduction. The epidemiology of rabies in Puerto Rico (PR) presents a sharp contrast to that of the continental United States (CONUS). Mongooses are the primary reservoir in PR with spillover cases appearing on other mammals such as dogs. Recent evidence from a 2020 study suggests that rabies virus may be present in bats, with 6.5% of bats tested in the study showing rabies antibodies. If true, batrabies in PR can be considered "cryptic," since a clear history of exposure to rabies has not been documented. Identification of a cryptic rabies reservoir in PR would pose a significant financial burden on their already strained health system.

Objectives. This analysis aims to identify disparities in rabies testing between PR and the CONUS, tomeasure requirements needed to identify the presence of cryptic bat rabies in PR, if present, and toevaluate resulting public health implications.

Materials & Methods. US National Rabies Surveillance System data was analyzed to compare testing rates between the CONUS and PR. Bayesian methods were used to determine the sample size thresholdof testing for detection of cryptic bat rabies in the PR bat population. Using the sample size threshold identified, a correlating increase in PEP required throughout PR was calculated. WHO and ACIP rabies post-exposure prophylaxis (PEP) schedule recommendations were compared to determine which wouldprovide more cost-effective guidance.

Results & Conclusions. A large disparity was detected between the rate of bat and non-bat submissions for rabies testing between the CONUS and PR. Public health surveillance was determined to be the sampling method with the highest probability of rabies detection in bats, with a need to test 114 bats toidentify cryptic bat rabies. WHO's PEP regimen would cost PR 42% less than ACIP's for PR to address increased PEP demands if bat rabies is detected.

OR64 Detection and counting of chiroptera with optical methods in the Altiplano region of San Luis Potosí

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Keywords. Bats, counting, LIDAR

Currently, in Latin America and the Caribbean, the risk of rabies in humans and livestock is related to the bite of the hematophagous bat ***Desmodus rotundus*** In Mexico, different studies have reported that ***D. rotundus*** has increased its distribution range within the same geographic area, which has favored the spread of rabies in cattle due to frequent attacks by vampires infected with the rabies virus. Strategies for the control of rabies in cattle implemented by the National Campaign against Paralytic Rabies are the vaccination and control of populations of bats ***D. rotundus***. Having a census of individuals in bat colonies within the caves would be of great value for planning strategies for the control of ***D. rotundus*** and the conservation of other bat species. This work aims to census bat colonies in caves with a fully automated counting method.

To estimate the number of individuals in a colony of bats, a neural network with an FWIR camera and a LIDAR was developed. The system has not been challenged with real bats. However, we have tested the counting algorithm in similar situations observing that the designed prototype can count individuals within a large number of similar disordered objects. With these favourable results, it is planned to test it during the lactation months of this fall (November-December) 2022 in the caves located in the Altiplano region of the state of San Luis Potos' in Mexico. A region where interactions between vampire bats and cattle are frequent and the number ofcases of rabies in livestock species has been increasing.

OR67 Reduction of the hematophagous bat population with continuous captures

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Vampire, vampiricides, hematophagous bats

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The control of hematophagous bats (*Desmodus rotundus*) populations is governed by NOM-067-ZOO- 2007, however, the existing vampiricide products on the market are not widely available. To evaluate the effect of captures in corral in the reduction of aggressions by hematophagous bats without the use of these products, a study was carried out in a ranch located in the municipality of Emiliano Zapata, Ver. Five captures were made in a period of twelve months, in addition to the revision of the cattle, every 45 days to count the number of aggressions inflicted by *D. rotundus*. A total of 70 bats were captured in the five captures (31 males and 39 females), being in the first capture 30 (11/19) and in the second capture only 12(4/8), which represented

a 60% reduction (P < 0.05) and in the last capture only 4 (2/2), 86.67% reduction (P < 0.05) with respect to the first capture. Regarding bites by *D. rotundus*, 235 (59.95%) bites were counted in the neck area, followed by the ears with 53 (13.52%), tail 49 (12.50%), hip 40 (10.20%), limbs 10 (2.55%) and shoulder with 5 (1.28%). The ratio of the first to the second bite count was reduced by 41.54 % (130/76),in the beginning, an average of 5 bites per animal, in the last revision 0.50 bites per animal. The reduction of aggressions per animal was 96.16% (130/5) (P < 0.05). It is concluded that it is possible to carry out population control of hematophagous bats without the use of chemical products (vampiricides) by carryingout consecutive captures.

OR36 Skunk rabies in Mexico

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Key words. Skunks, antigenic variants, taxonomic identification.

Mexico occupies the third place in the world of mammal species biodiversitiy with a total of 564 species. Recently, new potential reservoirs for the maintenance of the rabies virus (RV) have been identified, such as the white-nosed coatis (*Nasua narica*) and skunks (*Mephitis macroura*). It has been recorded that these wild species can be a source of RV transmission to humans and domestic animals, since they have played an important role in the maintenance of wildlife-related variants, which could jeopardize the advance achieved by Mexico controlling human rabies transmitted by dogs.

During the years 2000-2022, there have been 48 cases of human rabies transmitted by wildlife in Mexico, 6 of them have been due to skunks. Throughout the country, the presence of 8 species of skunks is described, but the correct identification of these species has been a limitation to associate them with a specific antigenic variants and RV lineages. In this work, we will present the total of positive skunk samples (n=31) diagnosed in the Rabies Laboratory of the Instituto de Diagnostico y Referencia Epidemiologico (InDRE) and antigenic variants detected: V10, V8 (south central skunk), V1 (northern skunks) and Yucatan sylvatic. Current taxonomy casts doubt on the natural distribution in the Mexican territory of *Spilogale putorius*, the species that traditionally has been considered the natural reservoir of V8, while other species are widely distributed and could be the ones that keep RV in circulation in Mexico as *Spilogale gracilis, Conepatus leuconotus*, and *Mephitis macroura*. Although skunks have been found to be a species with the potential to maintain and transmit RV successfully, there is a lack of knowledge of the identity of the reservoir species. Therefore, the correct identification will be helpful for the understanding of the dynamics of the rabies virus in skunk populations and the distribution of the variants by region and host.

Patrocinadores

Seminario en Línea / Webinar

Retos de Una Salud para la prevención del control del murciélago hematófago en las Américas: Impacto en la Salud Pública, la fauna silvestre y Medicina veterinaria

One Health Challenges for Hematophagous Bat Control Prevention in the Americas: Public Health, Wildlife and veterinary medicine Impact

Moderador/Moderator/Moderador
Dr. Charles E. Rupprecht

EXPERIENCE OF MEXICO IN THE SURVEILLANCE, PREVENTION AND CONTROL OF RABIES BY THE HEMATOPHAGOUS BAT TO LIVESTOCK

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Keywords. México, Vampire, Rabies.

The common vampire bat, *Desmodus rotundus*, is the main transmitter of rabies virus to cattle and other livestock species. Besides agricultural impacts, vampire bats can prey upon and infect humans and other species, creating public health and wildlife problems.This bat species feeds exclusively on blood. During the process of feeding, there is a high probability that vampire bats transmit rabies virus through saliva. In addition, vampire bats directly affect the production of meat and milk, as well as the value of the skins of the animals that are attacked.

Bovine rabies in Mexico is prevented and controlled through joint actions of the public, social and private sectors, offering objective information on the species and its impacts. Engement allows maintenance of effective epidemiological surveillance used for the management of vampire bat populations, as well as timely vaccination of livestock species at risk of viral exposure.

The objective of this presentation is to describe the distribution of these hematophagous bats in Mexico and the technical and scientific efforts for its control as one of the main transmitters of rabies virus to livestock species. In addition, the techniques for treatment with vampiricides, the application of methods for the diagnosis of rabies and its disease notification, the development of biologics for the immunization of susceptible livestock species, the establishment of applicable legislation and regulations for prevention and epidemiological surveillance will be reviewed. Similarly, challenges and opportunities for ideal operational management of this hematophagous bat will be discussed.

“New insights in control of the common vampire bat”

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In Brazil and other Latin American countries, the rabies surveillance and control is divided between human and animal health authorities. This division is not always mutually beneficial but could be significantly improved if information regarding vampire bat rabies circulation could be used by both parties. Traditionally, once a

rabies outbreak is notified, an Euclidean radius is proposed in order to determine the search for vampire bat roosts and implementation of culling. The same principle is used to implement emergency vaccination of susceptible inside this radius. Despite the criticisms about the vampire bat culling strategy, the current rabies surveillance and control lacks the incorporation of the biology of the vampire bat, which is a key factor in the improvement of the efficacy of the system. Recent information regarding the use of the feeding sources by vampire bats point out that these animals tend to browse in areas below their roosts. This simple information could be used to search for (known and unknown) vampire bat roosts if bat aggression is observed in herds or, on the contrary, search farms at which bat aggression occurs from the location of a vampire bat roost. Moreover, with this information, it is possible to recompose roost-roost and roost-farms contact networks and form their metrics, model the spread of rabies and implement focal and strict vampire bat control at selected roosts. This strategy could significantly reduce the costs of the rabies surveillance and control and greatly increase its effectiveness.

Rabia paralítica, Vampiro Común.

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La rabia paresiante o paralítica es una enfermedad epidémica y recurrente causada por el virus rábico transmitido por el vampiro común *Desmodus rotundus*, que afecta principalmente a los bovinos, a los equinos, con menor frecuencia a otras especies domesticas, al hombre y a algunos animales silvestres. Es una peligrosa zoonosis.

Área endémica**:** en los últimos años ha avanzado más al sur, llegando al noroeste de la provincia de Córdoba, Este de La Rioja y Norte de San Luis.

Estrategia del Programa de Rabia.

Se trabaja en:
a) Vigilancia epidemiológica.
1. Buena atención de las sospechas.
2. Comunicación ágil con los laboratorios de diagnóstico.
3. Determinación del brote (10 kilómetros de radio desde el Caso índice.)
4. Interdicción de los campos del brote por 30 días posteriores a la última vacuna aplicada.
5. Educación permanente.

b) Combate al Vampiro.
- La principal forma es la de capturar los vampiros y tratarlos individualmente con Warfarina (método toxico que debe ser realizado por personal calificado). Estos trabajos se realizan en los refugios, frente a los refugios y en los corrales.

- Vampiro Común: Si bien el *Desmodus rotundus* provoca pérdidas económicas por trasmitir rabia, la mayor merma que ocasiona a la ganadería la realiza por el efecto de la sangría permanente.
- Además, en áreas ganaderas la densidad poblacional del vampiro es muy superior a las áreas naturales.
- Debido a la alta capacidad de adaptación a situaciones nuevas se ha convertido en una plaga, siendo la rabia el principal control biológico efectivo que tiene esta especie.
- La vacunación antirrábica a murciélagos en peligro de extinción es una buena herramienta, no así para Vampiro Común.
- Es preciso desarrollar un método no químico para bajar la población de esta plaga a limites no peligrosos.

Paralytic rabies, Common Vampire.

Paralytic rabies is an epidemic and recurrent disease caused by the rabies virus and transmitted by the common vampire bat *Desmodus rotundus*. This dangerous zoonosis mainly affects cattle, horses, and, less frequently, other domestic species, man, and some wild animals.

Endemic area: in recent years, it has advanced in the south direction, reaching the northwest of the province of Córdoba, east of La Rioja, and north of San Luis.
In the Rabies Program Strategy, we are working on:

a) Epidemiological surveillance.
1. Comprehensive attention to suspicious cases.
2. Quick communication with diagnostic laboratories.
3. Determination of the outbreak area (10 km radius from the Index Case.)
4. Interdiction of the outbreak fields for 30 days after the last applied vaccine.
5. Permanent education.

b) Combat the Vampire:
- The main way is to capture the vampires and treat them individually with Warfarin (a toxic method that must be performed by qualified personnel). These works are carried out in the shelters, in front of the shelters, and the pens.
- Common Vampire: Although *Desmodus rotundus* causes economic losses by transmitting rabies, the most significant loss it causes to livestock is due to the effect of permanent bleeding.
- In addition, in livestock areas, the population density of the vampire bat is much higher than in natural areas. Due to its high capacity to adapt to new situations has become a plague, with rabies being this species's main effective biological control.
- Rabies vaccination for bats in danger of extinction is a good tool, but not for the Common Vampire.
- It is necessary to develop a non-chemical method to lower the population of this pest to non-dangerous limits.

XXXIIIRITA
REUNIÓN INTERNACIONAL DE LA RABIA EN LAS AMÉRICAS
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Bites, outbreaks, and vaccines: Vampire Bat rabies in the Amazon Basin in the 21st Century

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The Peruvian Amazon Basin was the main source of human rabies cases in the Americas in the first decade of the 21st Century. Clusters of cases, where dozens of children died in each outbreak, without getting access to life saving vaccines, triggered the need of increased research and innovative interventions. Field studies found that bites from vampire bat to humans in the region are the most intense undesired human animal interactions in the world, and a serious ongoing risk to contract a 100% fatal disease, rabies, for local and native population in the Amazon Basin. Rabies viral dynamics studies in vampire bats indicated potential expansion of the risk to other regions and other studies demonstrated also a diversity of pathogens that are potentially transmissible along with rabies in the bites. A large massive vaccination campaign was designed an applied in Peru at areas with the highest risk. This campaign successfully stopped human rabies outbreaks and led to the development of policies and programs to expand the intervention and make it sustainable. Novel approaches to vaccinate vampire bats emerged as potential intervention in the future. Strategies to stop exposures among affected populations are still needed and initiatives to approach the issue are ongoing. The COVID-19 pandemic renewed attention in zoonoses prevention and potential sources for new pandemics. For the third decade of the century, vampire bat rabies exposures in the Amazon Basin emerge as a highly relevant issue demanding the development of updated strategies to prevent and control rabies and other zoonoses in the post pandemic era.

Vaccination as a potential tool to manage vampire bat rabies

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Vampire bat transmitted rabies (VBR) is an economic and public health burden in Latin America, despite decades-long efforts to control the disease by culling bat populations. Culling has been shown to disperse bats, leading to an increased spread of rabies and is not a sustainable practice. Non-lethal control strategies to control VBR, such as the use of oral rabies vaccines, offer an alternative to manage the disease at the reservoir level. Our vaccine candidate, RCN-MoG, uses raccoon pox (RCN) as a viral vector for a mosaic gene expressing rabies glycoprotein (MoG). We orally or topically vaccinated wild-caught vampire bats with RCN-MoG and found that only a

small proportion produced neutralizing antibodies after vaccination, and their survival to challenge with rabies virus was not significantly improved compared to unvaccinated bats. Notably, however, vaccinated bats that succumbed to rabies did not shed virus in their saliva. Our findings revealed a previously unknown but important benefit of vaccinating vampire bats: preventing viral shedding by rabid bats, which could reduce the spread of disease among bats and other animals.

INFECTIOUS DISEASES, RABIES, VAMPIRE BATS, & 'SELF-SPREADING' VACCINES

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Abstract. Proposals to intentionally develop self-spreading vaccines for use in wildlife are not new. Current motivations provided by the developer nations (the USA and Europe) are for rats and primates in Africa and bats in the Americas. In this talk, the historically cyclic nature of interest in self-spreading vaccines will be outlined. It will also be considered what, if any, technological breakthroughs underlie the current projects and IP. Finally, the probable impact on the capacity to innovate and develop new conventionally deployed vaccines (including oral baits), in geographic areas where self-spreading vaccines have also been proposed will be explored in terms of vaccine disinformation/misinformation hazards. For additional information see: http://web.evolbio.mpg.de/HEVIMAs/.

A One Health Approach to Vampire Bat Surveillance and Management Along the US - Mexico Border

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The common vampire bat (VB), *Desmodus rotundus*, poses a significant health concern to humans, domestic animals, and wildlife throughout their range. In addition, VBs are the leading reservoir of rabies virus in Latin America. Fossil records indicate VBs were once widely distributed in the USA, although they are not present currently. Ecological niche models suggest the potential for future range expansion into southern Texas and southern Florida. Enhanced rabies surveillance efforts in targeted US-Mexico border areas provide an early detection system for VBs and vampire bat rabies virus (VBR). During 2016, the USDA Wildlife Services (WS) began a limited pilot project in Texas, Arizona, and Florida to trial methods for VB surveillance by surveying cattle for evidence of VB bites and the distribution of VBR outreach materials to educate and sensitize livestock producers, agriculture agencies, and the public on both sides of the border. During September 2020, the WS National Rabies Management Program and National Wildlife Research Center co-hosted a virtual 2-day expert elicitation workshop titled a "Blue Ribbon Panel on Surveillance, Management and Research of Vampire Bats and Vampire Bat Rabies in the US." The meeting objective was to solicit and synthesize expert consensus opinions to optimize surveillance and management approaches and targeted communication strategies relative to a natural range expansion of VB and VBR into the US. Research gaps were also identified. Thirty-four experts from 20 different Federal and State agencies, universities, and non-government organizations participated. Coordination among Federal, state, and local agencies was identified as a critical element to effectively manage VBs, as was the need to develop an interagency plan of action involving a multipronged approach, including transdisciplinary professional and public education strategies. Once VBs are confirmed in the USA, recommendations may likely include rabies vaccination of domestic animals at risk of exposure, and routine PEP for humans exposed to VBR. Collaboration under the North American Rabies Management Plan and the US National Plan for Wildlife Rabies Management provides a model for multilateral and multidisciplinary information transfer, surveillance and monitoring, rabies prevention and control and research to develop future management approaches for limiting the impacts from the introduction of a novel species and establishment of a new rabies virus variant in the USA.

XXXIII Reunión Internacional de la Rabia en las Américas México 2022

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