

# OIE Reference Laboratory Reports Activities

## *Activities in 2019*

**This report has been submitted : 2020-01-10 22:22:18**

<b>Name of disease (or topic) for which you are a designated OIE Reference Laboratory:</b>	Rabies
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<b>Name (including Title) of Head of Laboratory (Responsible Official):</b>	Professor Anthony R. Fooks (PhD) Head of OIE Reference Laboratory (Rabies)
<b>Name (including Title and Position) of OIE Reference Expert:</b>	Professor Anthony R. Fooks (PhD) Head of OIE Reference Laboratory (Rabies)
<b>Which of the following defines your laboratory? Check all that apply:</b>	Governmental

**ToR 1: To use, promote and disseminate diagnostic methods validated according to OIE Standards**

1. Did your laboratory perform diagnostic tests for the specified disease/topic for purposes such as disease diagnosis, screening of animals for export, surveillance, etc.? (Not for quality control, proficiency testing or staff training)

Yes

Diagnostic Test	Indicated in OIE Manual (Yes/No)	Total number of test performed last year	
		Nationally	Internationally
Indirect diagnostic tests			
FAVN	Yes	9360	6353
Direct diagnostic tests			
FAT	Yes	516	0
RTCIT	Yes	10	0
Real time Taqman / SYBR RT-PCR	Yes	201	6
Reverse-transcriptase Polymerase Chain	Yes	3	0

**ToR 2: To develop reference material in accordance with OIE requirements, and implement and promote the application of OIE Standards. To store and distribute to national laboratories biological reference products and any other reagents used in the diagnosis and control of the designated pathogens or disease.**

2. Did your laboratory produce or supply imported standard reference reagents officially recognised by the OIE?

No

3. Did your laboratory supply standard reference reagents (non OIE-approved) and/or other diagnostic reagents to OIE Member Countries?

Yes

Type of reagent available	Related diagnostic test	Produced/ provide	Amount supplied nationally (ml, mg)	Amount supplied internationally (ml, mg)	No. of recipient OIE Member Countries	Region of recipients
Rabies RNA panel	PCR	Provided	0	56 x 20µg	2	<input type="checkbox"/> Africa <input type="checkbox"/> Americas <input type="checkbox"/> Asia and Pacific <input checked="" type="checkbox"/> Europe <input type="checkbox"/> Middle East
Rabies Virus	PCR	Provided	0	1ml	1	<input type="checkbox"/> Africa <input type="checkbox"/> Americas <input type="checkbox"/> Asia and Pacific <input checked="" type="checkbox"/> Europe <input type="checkbox"/> Middle East
OIE positive canine serum	FAVN	Provided	1 x 225µl	4 x 225µl	0	<input type="checkbox"/> Africa <input type="checkbox"/> Americas <input type="checkbox"/> Asia and Pacific <input type="checkbox"/> Europe <input type="checkbox"/> Middle East
Canine serum	FAVN	Provided	1 x 200µl	10 x 200µl	0	<input type="checkbox"/> Africa <input type="checkbox"/> Americas <input type="checkbox"/> Asia and Pacific <input type="checkbox"/> Europe <input type="checkbox"/> Middle East

4. Did your laboratory produce vaccines?

No

5. Did your laboratory supply vaccines to OIE Member Countries?

No

***ToR 3: To develop, standardise and validate, according to OIE Standards, new procedures for diagnosis and control of the designated pathogens or diseases***

6. Did your laboratory develop new diagnostic methods validated according to OIE Standards for the designated pathogen or disease?

Yes

7. Did your laboratory develop new vaccines according to OIE Standards for the designated pathogen or disease?

No

Name of the new test or diagnostic method or vaccine developed	Description and References (Publication, website, etc.)
Pan lyssavirus Real-Time RT-PCR assay (SYBR Green assay)	Where capabilities allow, real-time PCR platforms enable a more rapid evaluation of the presence or absence of lyssavirus RNA in suspect samples. Results are generated in real time enabling rapid and quantitative assessment of status of the sample. The use of a universal SYBR Green one-step RT-PCR kit for the detection of Lyssavirus species from clinical specimens has been demonstrated by APHA to be both highly sensitive and specific for lyssavirus RNA. This protocol has been published: Marston et al. Pan-lyssavirus Real Time RT-PCR for Rabies Diagnosis. J Vis Exp. 2019 Jul 10;(149). The protocol has been incorporated into the OIE Manual of Diagnostic Tests and Vaccines for Terrestrial Animals (Chapter 3.1.17; section 1.3.4 ii).

***ToR 4: To provide diagnostic testing facilities, and, where appropriate, scientific and technical advice on disease control measures to OIE Member Countries***

8. Did your laboratory carry out diagnostic testing for other OIE Member Countries?

Yes

Name of OIE Member Country seeking assistance	Date (month)	No. samples received for provision of diagnostic support	No. samples received for provision of confirmatory diagnoses
ETHIOPIA	March	38	0
ETHIOPIA	April	2	0
ETHIOPIA	May	6	0
ETHIOPIA	June	5	0
ETHIOPIA	July	10	0
ETHIOPIA	August	18	0
ETHIOPIA	October	39	0
SOUTH AFRICA	October	560	0
SOUTH AFRICA	November	960	0
ETHIOPIA	December	9	0
SOUTH AFRICA	December	800	0

9. Did your laboratory provide expert advice in technical consultancies on the request of an OIE Member Country?

Yes

Name of the OIE Member Country receiving a technical consultancy	Purpose	How the advice was provided
TAJIKISTAN	Improve laboratory capability.	Via email.
INDIA	Improve laboratory capability.	In-country training.
ETHIOPIA	Improve laboratory capability.	Via email.

***ToR 5: To carry out and/or coordinate scientific and technical studies in collaboration with other laboratories, centres or organisations***

10. Did your laboratory participate in international scientific studies in collaboration with OIE Member Countries other than the own?

Yes

Title of the study	Duration	Purpose of the study	Partners (Institutions)	OIE Member Countries involved other than your country
EU-funded H2020 'Development of Next-Generation Dual-Target Rabies/Flavivirus Infectious DNA (iDNA) Vaccine' [RABYD-VAX; <a href="https://rabyd-vax.eu">https://rabyd-vax.eu</a> ]	4 years (2016/20)	Vaccine development.	3	BELGIUM
EU-funded H2020 'European Virus Archive Global [EVAg; <a href="https://www.european-virus-archive.com">https://www.european-virus-archive.com</a> ]	4 years (2015/19)	Characterisation of rabies virus isolates.	~50	FRANCE
Feasibility and efficacy of oral rabies vaccine SAG2 in endangered Ethiopian wolves.	3 years (2016/19)	Determination of oral rabies vaccination in wild canids.	3	ETHIOPIA

***ToR 6: To collect, process, analyse, publish and disseminate epizootiological data relevant to the designated pathogens or diseases***

11. Did your Laboratory collect epizootiological data relevant to international disease control?

Yes

If the answer is yes, please provide details of the data collected:
These data included genomic sequence data of rabies virus isolates from animals.

12. Did your laboratory disseminate epizootiological data that had been processed and analysed?

Yes

If the answer is yes, please provide details of the data collected:
These data have been used to demonstrate transmission pathways between animal species and to show vaccine efficacy against circulating rabies virus strains in rabies-endemic countries.

**13. What method of dissemination of information is most often used by your laboratory?  
(Indicate in the appropriate box the number by category)**

a) Articles published in peer-reviewed journals: 14

Amarasinghe, G. K., M. A. Ayllon, Y. Bao, C. F. Basler, S. Bavari, K. R. Blasdel, T. Briese, P. A. Brown, A. Bukreyev, A. Balkema-Buschmann, U. J. Buchholz, C. Chabi-Jesus, K. Chandran, C. Chiapponi, I. Crozier, R. L. de Swart, R. G. Dietzgen, O. Dolnik, J. F. Drexler, R. Durrwald, W. G. Dundon, W. P. Duprex, J. M. Dye, A. J. Easton, A. R. Fooks, P. B. H. Formenty, R. A. M. Fouchier, J. Freitas-Astua, A. Griffiths, R. Hewson, M. Horie, T. H. Hyndman, D. Jiang, E. W. Kitajima, G. P. Kobinger, H. Kondo, G. Kurath, I. V. Kuzmin, R. A. Lamb, A. Lavazza, B. Lee, D. Lelli, E. M. Leroy, J. Li, P. Maes, S. L. Marzano, A. Moreno, E. Muhlberger, S. V. Netesov, N. Nowotny, A. Nylund, A. L. Okland, G. Palacios, B. Palyi, J. T. Paweska, S. L. Payne, A. Prospero, P. L. Ramos-Gonzalez, B. K. Rima, P. Rota, D. Rubbenstroth, M. Shi, P. Simmonds, S. J. Smither, E. Sozzi, K. Spann, M. D. Stenglein, D. M. Stone, A. Takada, R. B. Tesh, K. Tomonaga, N. Tordo, J. S. Towner, B. van den Hoogen, N. Vasilakis, V. Wahl, P. J. Walker, L. F. Wang, A. E. Whitfield, J. V. Williams, F. M. Zerbini, T. Zhang, Y. Z. Zhang and J. H. Kuhn (2019). Taxonomy of the order Mononegavirales: update 2019. *Arch Virol* 164(7): 1967-1980.

Banyard, A. C., K. L. Mansfield, G. Wu, D. Selden, L. Thorne, C. Birch, P. Koraka, A. Osterhaus and A. R. Fooks (2019). Re-evaluating the effect of Favipiravir treatment on rabies virus infection. *Vaccine* 37(33): 4686-4693.

Dufkova, L., J. Sirmarova, J. Salat, V. Honig, M. Palus, D. Ruzek, A. R. Fooks, K. L. Mansfield, N. Tordo, D. Jochmans, J. Neyts, B. Martina, P. Koraka, A. Osterhaus and A. consortium (2019). Mannitol treatment is not effective in therapy of rabies virus infection in mice. *Vaccine* 37(33): 4710-4714.

Echevarria, J. E., A. C. Banyard, L. M. McElhinney and A. R. Fooks (2019). Current Rabies Vaccines Do Not Confer Protective Immunity against Divergent Lyssaviruses Circulating in Europe. *Viruses* 11(10).

Fooks, A. R. (2019). Preface. *Vaccine* 37(33): 4659.

Fooks, A. R., A. C. Banyard and H. C. J. Ertl (2019). New human rabies vaccines in the pipeline. *Vaccine* 37 Suppl 1: A140-A145.

Maes, P., G. K. Amarasinghe, M. A. Ayllon, C. F. Basler, S. Bavari, K. R. Blasdel, T. Briese, P. A. Brown, A. Bukreyev, A. Balkema-Buschmann, U. J. Buchholz, K. Chandran, I. Crozier, R. L. de Swart, R. G. Dietzgen, O. Dolnik, L. L. Domier, J. F. Drexler, R. Durrwald, W. G. Dundon, W. P. Duprex, J. M. Dye, A. J. Easton, A. R. Fooks, P. B. H. Formenty, R. A. M. Fouchier, J. Freitas-Astua, E. Ghedin, A. Griffiths, R. Hewson, M. Horie, J. L. Hurwitz, T. H. Hyndman, D. Jiang, G. P. Kobinger, H. Kondo, G. Kurath, I. V. Kuzmin, R. A. Lamb, B. Lee, E. M. Leroy, J. Li, S. L. Marzano, E. Muhlberger, S. V. Netesov, N. Nowotny, G. Palacios, B. Palyi, J. T. Paweska, S. L. Payne, B. K. Rima, P. Rota, D. Rubbenstroth, P. Simmonds, S. J. Smither, Q. Song, T. Song, K. Spann, M. D. Stenglein, D. M. Stone, A. Takada, R. B. Tesh, K. Tomonaga, N. Tordo, J. S. Towner, B. van den Hoogen, N. Vasilakis, V. Wahl, P. J. Walker, D. Wang, L. F. Wang, A. E. Whitfield, J. V. Williams, G. Ye, F. M. Zerbini, Y. Z. Zhang and J. H. Kuhn (2019). "Taxonomy of the order Mononegavirales: second update 2018." *Arch Virol* 164(4): 1233-1244.

Marston, D. A., D. L. Jennings, N. C. MacLaren, D. Dorey-Robinson, A. R. Fooks, A. C. Banyard and L. M. McElhinney (2019). "Pan-lyssavirus Real Time RT-PCR for Rabies Diagnosis." J Vis Exp(149).

Mechlia, M. B., A. Belaid, G. Castel, C. Jallet, K. L. Mansfield, A. R. Fooks, K. Hani and N. Tordo (2019). Dermaseptins as potential antirabies compounds. Vaccine 37(33): 4694-4700.

Noad, R. J., K. Simpson, A. R. Fooks, R. Hewson, S. C. Gilbert, M. P. Stevens, M. J. Hosie, J. Prior, A. M. Kinsey, G. Entrican, A. Simpson, C. J. M. Whitty and M. W. Carroll (2019). UK vaccines network: Mapping priority pathogens of epidemic potential and vaccine pipeline developments. Vaccine 37(43): 6241-6247.

Phoolcharoen, W., A. C. Banyard, C. Prehaud, D. Selden, G. Wu, C. P. D. Birch, T. H. Szeto, M. Lafon, A. R. Fooks and J. K. Ma (2019). In vitro and in vivo evaluation of a single chain antibody fragment generated in planta with potent rabies neutralisation activity. Vaccine 37(33): 4673-4680.

Shibley, R., E. Wright, D. Selden, G. Wu, J. Aegerter, A. R. Fooks and A. C. Banyard (2019). Bats and Viruses: Emergence of Novel Lyssaviruses and Association of Bats with Viral Zoonoses in the EU. Trop Med Infect Dis 4(1).

Smith, S. P., G. Wu, A. R. Fooks, J. Ma and A. C. Banyard (2019). Trying to treat the untreatable: experimental approaches to clear rabies virus infection from the CNS. J Gen Virol 100(8): 1171-1186.

Taylor, E., A. C. Banyard, H. Bourhy, F. Cliquet, H. Ertl, C. Fehlner-Gardiner, D. L. Horton, R. S. Mani, T. Muller, C. E. Rupprecht, M. J. Schnell, V. Del Rio Vilas and A. R. Fooks (2019). Avoiding preventable deaths: The scourge of counterfeit rabies vaccines. Vaccine 37(17): 2285-2287.

b) International conferences: 2

International Symposium on Zoonoses, Anhui, Hubei, China (Invited keynote speaker) [May 2019]

13th Vaccine Congress, Bangkok, Thailand (Session chair and conference organiser) [Sept 2019]

c) National conferences: 1

The Institute for Biomedical science (IBMS), Birmingham, UK (Invited speaker) [Sept 2019]

d) Other:

(Provide website address or link to appropriate information) 7

EVAg Follow-on mtg, Paris, France [Feb 2019] <https://www.european-virus-archive.com/>

Changchun University of Agriculture and Animal Sciences, China (Invited speaker) [May 2019]

<http://cie.jlu.edu.cn/info/1138/1687.htm>

Rabies EURL meeting, Bucharest, Romania [June 2019] <https://eurl-rabies.anses.fr/en/minisite/rabies/workshops>

Medical Research Club Meeting (Invited speaker) [Jul 2019] [https://en.wikipedia.org/wiki/Medical\\_Research\\_Club](https://en.wikipedia.org/wiki/Medical_Research_Club)

Partners for Rabies Prevention meeting, London, UK [July 2019] <https://rabiesalliance.org/about/partners>

4th RABYD-VAX meeting, Rijswijk, the Netherlands [Nov 2019] <https://rabyd-vax.eu/>

Inauguration ceremony for the supply of oral vaccination against rabies, Turkey (Invited speaker) [Dec 2019]

<http://www.cfcu.gov.tr/>

**ToR 7: To provide scientific and technical training for personnel from OIE Member Countries**

**To recommend the prescribed and alternative tests or vaccines as OIE Standards**

14. Did your laboratory provide scientific and technical training to laboratory personnel from other OIE Member Countries?

Yes

a) Technical visits: 0

b) Seminars: 0

c) Hands-on training courses: 0

d) Internships (>1 month): 1

Type of technical training provided (a, b, c or d)	Country of origin of the expert(s) provided with training	No. participants from the corresponding country
D	Brazil	1

**ToR 8: To maintain a system of quality assurance, biosafety and biosecurity relevant for the pathogen and the disease concerned**

15. Does your laboratory have a Quality Management System?

Yes

Quality management system adopted	Certificate scan (PDF, JPG, PNG format)
UKAS accredited to BS EN ISO 17025:2005.	1769Testing Multiple_APHA.pdf

16. Is your quality management system accredited?

Yes

Test for which your laboratory is accredited	Accreditation body
Fluorescent antibody virus neutralisation test (FAVN)	UKAS (ISO17025:2005)
Fluorescent antibody test (FAT)	UKAS (ISO17025:2005)
Taqman real-time RT-PCR (Real time RT-PCR)	UKAS (ISO17025:2005)
SYBR real-time RT-PCR	UKAS (ISO17025:2005)
Conventional reverse-transcriptase PCR (RT-PCR)	UKAS (ISO17025:2005)
Rabies tissue culture isolation test (RTCIT)	UKAS (ISO17025:2005)
Detection of Rabies Virus Antigen by H&E and IHC	UKAS (ISO17025:2005)

17. Does your laboratory maintain a “biorisk management system” for the pathogen and the disease concerned?

Yes

(See *Manual of Diagnostic Tests and Vaccines for Terrestrial Animals, Chapter 1.1.4*)



**ToR 9: To organise and participate in scientific meetings on behalf of the OIE**

18. Did your laboratory organise scientific meetings on behalf of the OIE?

No

19. Did your laboratory participate in scientific meetings on behalf of the OIE?

No

**ToR 10: To establish and maintain a network with other OIE Reference Laboratories designated for the same pathogen or disease and organise regular inter-laboratory proficiency testing to ensure comparability of results**

20. Did your laboratory exchange information with other OIE Reference Laboratories designated for the same pathogen or disease?

Yes

21. Was your laboratory involved in maintaining a network with OIE Reference Laboratories designated for the same pathogen or disease by organising or participating in proficiency tests?

Yes

Purpose of the proficiency tests: <sup>1</sup>	Role of your Reference Laboratory (organiser/participant)	No. participants	Participating OIE Ref. Labs/ organising OIE Ref. Lab.
VETQAS National rabies serology proficiency scheme (FAVN)	Participant	2	APHA UK (VETQAS organiser).
ANSES international rabies serology proficiency scheme	Participant	>80	UK, France (organiser), Germany, Canada, South Africa, USA.
ANSES international rabies diagnostic proficiency scheme (FAT, RTCIT and PCR)	Participant	>50	UK, France (organiser), Germany, Canada, South Africa, USA.

<sup>1</sup> validation of a diagnostic protocol: specify the test; quality control of vaccines: specify the vaccine type, etc.

22. Did your laboratory collaborate with other OIE Reference Laboratories for the same disease on scientific research projects for the diagnosis or control of the pathogen of interest?

Yes

Title of the project or contract	Scope	Name(s) of relevant OIE Reference Laboratories
FLI Lateral Flow Devices ring trial.	Comparative assessment of various LFDs for rabies diagnosis.	UK (APHA), Germany (FLI), France (ANSES), South Africa (Ondestepoort), USA (CDC).
OIE twinning Project 'Supporting rabies control in India'	Building a diagnostic testing capability and QMS system for ISO17025 accreditation with the overall goal to be considered an OIE Reference Laboratory for Rabies representing the Indian subcontinent.	UK (APHA) and USA (CDC).
Assessment of Vaccine Efficacy in animals.	Investigating the use of counterfeit rabies vaccines.	UK (APHA), Canada (CFIA); Germany (FLI) and France (ANSES).

**ToR 11: To organise inter-laboratory proficiency testing with laboratories other than OIE Reference Laboratories for the same pathogens and diseases to ensure equivalence of results**

23. Did your laboratory organise or participate in inter-laboratory proficiency tests with laboratories other than OIE Reference Laboratories for the same disease?

Yes

Note: See Interlaboratory test comparisons in: Laboratory Proficiency Testing at: <http://www.oie.int/en/our-scientific-expertise/reference-laboratories/proficiency-testing> see point 1.3

Purpose for inter-laboratory test comparisons <sup>1</sup>	No. participating laboratories	Region(s) of participating OIE Member Countries
Provided proficiency panel(s) for KVAFSU/CVA/ Crucell Rabies Diagnostic Laboratory Bangalore Veterinary College Hebbal, Bangalore, India.	1	<input type="checkbox"/> Africa <input type="checkbox"/> Americas <input checked="" type="checkbox"/> Asia and Pacific <input type="checkbox"/> Europe <input type="checkbox"/> Middle East

**ToR 12: To place expert consultants at the disposal of the OIE**

24. Did your laboratory place expert consultants at the disposal of the OIE?

No

25. Additional comments regarding your report:

APHA remains committed to place expert consultants to participate in ad hoc expert groups, as required by the OIE.