

WHO Expert Consultation on Rabies

Second report

Although there is debate about the estimated health burden of rabies, the estimates of direct mortality and the DALYs due to rabies are among the highest of the neglected tropical diseases. Poor surveillance, underreporting in many developing countries, frequent misdiagnosis of rabies, and an absence of coordination among all the sectors involved are likely to lead to underestimation of the scale of the disease. It is clear, however, that rabies disproportionately affects poor rural communities, and particularly children. Most of the expenditure for post-exposure prophylaxis is borne by those who can least afford it. As a result of growing dog and human populations, the burden of human deaths from rabies and the economic costs will continue to escalate in the absence of concerted efforts and investment for control.

Since the first WHO Expert Consultation on Rabies in 2004, WHO and its network of collaborating centres on rabies, specialized national institutions, members of the WHO Expert Advisory Panel on Rabies and partners such as the Gates Foundation, the Global Alliance for Rabies Control and the Partnership for Rabies Prevention, have been advocating the feasibility of rabies elimination regionally and globally and promoting research into sustainable cost-effective strategies. Those joint efforts have begun to break the cycle of rabies neglect, and rabies is becoming recognized as a priority for investment.

This Consultation concluded that human dog-transmitted rabies is readily amenable to control, regional elimination in the medium term and even global elimination in the long term. A resolution on major neglected tropical diseases, including rabies, presented for submission to the World Health Assembly in May 2013 aims at securing Member States' commitment to the control, elimination or eradication of these diseases. Endorsement of the resolution would open the door for exciting advances in rabies prevention and control.



The World Health Organization was established in 1948 as a specialized agency of the United Nations serving as the directing and coordinating authority for international health matters and public health. One of WHO's constitutional functions is to provide objective and reliable information and advice in the field of human health, a responsibility that it fulfils in part through its extensive programme of publications.

The Organization seeks through its publications to support national health strategies and address the most pressing public health concerns of populations around the world. To respond to the needs of Member States at all levels of development, WHO publishes practical manuals, handbooks and training material for specific categories of health workers; internationally applicable guidelines and standards; reviews and analyses of health policies, programmes and research; and state-of-the-art consensus reports that offer technical advice and recommendations for decision-makers. These books are closely tied to the Organization's priority activities, encompassing disease prevention and control, the development of equitable health systems based on primary health care, and health promotion for individuals and communities. Progress towards better health for all also demands the global dissemination and exchange of information that draws on the knowledge and experience of all WHO's Member countries and the collaboration of world leaders in public health and the biomedical sciences.

To ensure the widest possible availability of authoritative information and guidance on health matters, WHO secures the broad international distribution of its publications and encourages their translation and adaptation. By helping to promote and protect health and prevent and control disease throughout the world, WHO's books contribute to achieving the Organization's principal objective – the attainment by all people of the highest possible level of health.

The *WHO Technical Report Series* makes available the findings of various international groups of experts that provide WHO with the latest scientific and technical advice on a broad range of medical and public health subjects. Members of such expert groups serve without remuneration in their personal capacities rather than as representatives of governments or other bodies; their views do not necessarily reflect the decisions or the stated policy of WHO.

For further information, please contact WHO Press, World Health Organization; 1211 Geneva 27, Switzerland; www.who.int/bookorders; tel.: +41 22 791 3264; fax: +41 22 791 4857; e-mail: bookorders@who.int.

SELECTED WHO PUBLICATIONS OF RELATED INTEREST

WHO Position Paper on Rabies Vaccines

Weekly Epidemiological Record, 2010, 85: 309-320

WHO Expert Consultation on Rabies. First report.

Geneva, World Health Organization, 2005

WHO Technical Report Series, No. 931

WHO Expert Committee on Rabies. Eighth report.

Geneva, World Health Organization, 1992

WHO Technical Report Series, No. 824

Laboratory Techniques in Rabies. Fourth edition.

Geneva, World Health Organization, 1996

Further information on these and other WHO publications can be obtained from
WHO Press, World Health Organization ■ 1211 Geneva 27, Switzerland ■ www.who.int/bookorders
tel.: +41 22 791 3264; **fax:** +41 22 791 4857; **e-mail:** bookorders@who.int

W H O T e c h n i c a l R e p o r t S e r i e s
9 8 2

WHO Expert Consultation on Rabies

Second report

This report contains the collective views of an international group of experts and does not necessarily represent the decisions or the stated policy of the World Health Organization



**World Health
Organization**

WHO Library Cataloguing-in-Publication Data

WHO Expert Consultation on Rabies: second report.

(WHO technical report series ; no. 982)

1.Rabies – prevention and control. 2.Rabies – diagnosis. 3.Rabies – epidemiology. 4.Rabies vaccines. 5.Rabies virus. 6.National health programs. I.World Health Organization. II.Series.

ISBN 978 92 4 120982 3

(NLM classification: WC 550)

ISBN 978 92 4 069094 3 (PDF)

ISSN 0512-3054

©World Health Organization 2013

All rights reserved. Publications of the World Health Organization are available on the WHO web site (www.who.int) or can be purchased from WHO Press, World Health Organization, 20 Avenue Appia, 1211 Geneva 27, Switzerland (tel.: +41 22 791 3264; fax: +41 22 791 4857; e-mail: bookorders@who.int).

Requests for permission to reproduce or translate WHO publications –whether for sale or for non-commercial distribution– should be addressed to WHO Press through the WHO web site (www.who.int/about/licensing/copyright_form/en/index.html).

The designations employed and the presentation of the material in this publication do not imply the expression of any opinion whatsoever on the part of the World Health Organization concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. Dotted lines on maps represent approximate border lines for which there may not yet be full agreement.

The mention of specific companies or of certain manufacturers' products does not imply that they are endorsed or recommended by the World Health Organization in preference to others of a similar nature that are not mentioned. Errors and omissions excepted, the names of proprietary products are distinguished by initial capital letters.

All reasonable precautions have been taken by the World Health Organization to verify the information contained in this publication. However, the published material is being distributed without warranty of any kind, either expressed or implied. The responsibility for the interpretation and use of the material lies with the reader. In no event shall the World Health Organization be liable for damages arising from its use.

This publication contains the collective views of an international group of experts and does not necessarily represent the decisions or the policies of the World Health Organization.

Design: WHP (Sophie Guetaneh Aguettant)

Printed in XXXX

Contents

| | |
|--|----|
| Introduction | 1 |
| 1. The burden of rabies | 2 |
| 1.1 Methods for estimating the burden of rabies | 2 |
| 1.2 Estimated burden of rabies in the world | 3 |
| 1.3 Global summary | 8 |
| 1.4 References | 10 |
| 2. Classification of lyssaviruses | 13 |
| 2.1 Distinguishing features of lyssaviruses | 13 |
| 2.2 Criteria for differentiating between lyssaviruses | 13 |
| 2.3 Present structure of the <i>Lyssavirus</i> genus | 14 |
| 2.4 References | 15 |
| 3. Pathogenesis | 19 |
| 4. Diagnosis | 23 |
| 4.1 Standard case definitions for rabies | 23 |
| 4.2 Clinical diagnosis | 24 |
| 4.3 Biosafety, sampling and specimen transport for laboratory diagnosis | 25 |
| 4.4 Laboratory techniques for post-mortem diagnosis of rabies | 27 |
| 4.5 Techniques for intra-vitam diagnosis of rabies in humans | 28 |
| 4.6 Virus identification with molecular techniques: epidemiological considerations | 30 |
| 4.7 References | 31 |
| 5. Management of patients before and after death | 34 |
| 5.1 Rabies survivors and treatment protocols | 34 |
| 5.2 Clinical management of rabies patients | 35 |
| 5.3 Transmission via organ transplantation | 35 |
| 5.4 Recommendations for health care personnel and patients' family members | 36 |
| 5.5 Management of the bodies of patients who have died of rabies | 36 |
| 5.6 References | 36 |
| 6. Vaccines and rabies immunoglobulin for humans | 37 |
| 6.1 Vaccine types | 37 |
| 6.2 WHO prequalification of human rabies vaccines | 39 |
| 6.3 Requirements for human rabies vaccines | 40 |
| 6.4 Routes of vaccine administration | 41 |
| 6.5 Adverse events after active immunization | 42 |
| 6.6 Duration of immunity | 42 |
| 6.7 Rabies vaccine and full post-exposure prophylaxis failures | 42 |
| 6.8 Rabies immunoglobulins | 43 |
| 6.9 References | 44 |

| | |
|--|----|
| 7. Vaccines for animals | 47 |
| 7.1 Vaccine types | 48 |
| 7.2 Potency requirements for animal rabies vaccines | 49 |
| 7.3 Safety of animal vaccines | 50 |
| 7.4 Parenteral rabies vaccination | 51 |
| 7.5 References | 51 |
| 8. Prevention of human rabies | 54 |
| 8.1 General considerations | 54 |
| 8.2 Pre-exposure prophylaxis | 54 |
| 8.3 Post-exposure prophylaxis | 55 |
| 8.4 Requirements for periodic booster injections | 59 |
| 8.5 Vaccination of immunocompromised individuals | 59 |
| 8.6 Rabies immunoglobulin for passive immunization | 60 |
| 8.7 Contraindications and precautions | 60 |
| 8.8 Travellers to and residents of rabies-affected countries and areas, and indications for pre-exposure prophylaxis | 61 |
| 8.9 References | 62 |
| 9. National programmes for dog rabies control | 63 |
| 9.1 Canine mass parenteral vaccination campaigns | 64 |
| 9.2 Strategic planning and management of vaccination campaigns | 66 |
| 9.3 Implementing and monitoring dog vaccination campaigns | 67 |
| 9.4 Increasing access to dogs for vaccination | 69 |
| 9.5 Supplementary measure: humane dog population management | 70 |
| 9.6 Main components of a dog rabies control programme | 70 |
| 9.7 Operational research for dog rabies control | 72 |
| 9.8 References | 74 |
| 10. Prevention and control of rabies in wild animals | 77 |
| 10.1 Epidemiology and ecology of rabies in carnivore species | 77 |
| 10.2 Epidemiology and ecology of rabies in bats | 80 |
| 10.3 Rabies in rodents | 82 |
| 10.4 Wildlife species of special concern | 83 |
| 10.5 Elimination of rabies in wild carnivores | 83 |
| 10.6 Bat rabies control | 88 |
| 10.7 Other public health measures | 88 |
| 10.8 References | 88 |
| 11. Rabies surveillance | 92 |
| 12. Rabies-free countries or areas | 94 |
| 13. International movement of animals | 97 |
| 13.1 International transport of dogs, cats and ferrets from rabies-infected countries or areas | 97 |
| 13.2 International transport of livestock and animals for zoos, research, shows and other activities from rabies-infected countries or areas | 97 |

| | |
|--|------------|
| 13.3 Special exemption of guide dogs for people with disabilities and of other service dogs | 98 |
| 13.4 References | 98 |
| 14. Global and regional activities on rabies | 98 |
| 14.1 WHO global and regional activities | 99 |
| 14.2 Examples of activities by partners | 102 |
| 14.3 References | 107 |
| 15. Research | 110 |
| 15.1 Diagnostics | 110 |
| 15.2 Epidemiology | 110 |
| 15.3 Molecular, genetic and epidemiological characterization of new viral isolates | 111 |
| 15.4 Biological medical products | 112 |
| 15.5 Human rabies prophylaxis | 113 |
| 15.6 Pathobiology | 113 |
| 15.7 Host ecology | 114 |
| 15.8 References | 114 |
| Concluding remarks | 117 |
| Acknowledgements | 118 |
| Annex 1 | |
| List of participants | 119 |
| Annex 2 | |
| Record form for cases of possible exposure to rabies | 125 |
| Annex 3 | |
| Four steps for replacing nervous tissue vaccine by modern rabies vaccines produced on cell culture or embryonated eggs | 127 |
| Annex 4 | |
| Technique for intradermal administration of rabies vaccine and precautions to be taken | 128 |
| Annex 5 | |
| Recommended post-exposure prophylaxis according to type of exposure | 130 |
| Annex 6 | |
| Suggested rabies vaccination certificates for humans | 131 |
| Annex 7 | |
| International rabies vaccination certificate for dogs, cats and ferrets | 134 |
| Annex 8 | |
| WHO collaborating centres on rabies, neurovirology, viral zoonoses and zoonoses control | 138 |

预览已结束，完整报告链接和

<https://www.yunbaogao.cn/report/index/report>