Public Health England

Protecting and improving the nation's health

Guidelines on timing of rabies boosters based on antibody levels

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Contents

Introduction	4
Purpose and scope	5
Current practice in England and Wales	6
Review of response to rabies pre-exposure prophylaxis (PrEP)	7
Recommendations	8
Table 1	9
References	10

Introduction

Rabies is an acute viral encephalomyelitis caused by several members of the Rhabdoviridae family. It transmits through infected saliva via bites or scratches from rabid animals (in particular, dogs). It is almost invariably fatal once symptoms develop.

Rabies still poses a significant public health problem in many countries in Asia and Africa where 95% of human deaths occur. Post-exposure treatment (PET) using rabies vaccine with or without rabies immunoglobulin (HRIG) is highly effective in preventing disease if given correctly and promptly after exposure.

The UK has been free of rabies in terrestrial animals since 1922. However, European Bat Lyssavirus 1 (EBLV1) was found for the first time in serotine bats (Eptesicus serotinus) in southern England in 2018, and European Bat Lyssavirus 2 (EBLV2), a rabies-like virus, has been found in Daubenton's bats (Myotis daubentonii) across the UK.

Further information, guidance and the risk assessment form are available on the rabies pages of the PHE website: www.gov.uk/government/collections/rabies-risk-assessment-post-exposure-treatment-management.

Purpose and scope

This guidance provides a practical guide for assessing the need for pre-exposure rabies vaccine booster doses based on the results of rabies serology testing. It is aimed at duty doctors at Colindale, health protection teams and other health professionals who may be involved in the assessment and need for rabies pre-exposure vaccine booster doses. It should not be used for assessing the need for post-exposure treatment, or managing a case of possible rabies, both of which are covered in separate documents. (https://www.gov.uk/government/publications/rabies-post-exposure-prophylaxis-management-guidelines)

Requests for pre-exposure vaccine are outside the scope of this document and should be managed as:

- vaccines prior to travel – refer caller to NaTHNaC: www.travelhealthpro.org.uk, or for complex queries, the advice line: 0845 602 6712
- vaccines for those with occupational risk (see Green Book) – who are the responsibility of their employer and will no longer be provided through PHE

Vaccine will only be provided from PHE for those who regularly handle bats on a voluntary basis (that is, not part of employment). Requests should be made using the pre-exposure risk assessment form available at: www.gov.uk/government/publications/rabies-pre-exposure-request-form and returned by secure e-mail to: lg.clerks@nhs.net

Current practice in England and Wales

The requirement for booster doses is dependent on an individual's indication for pre-exposure prophylaxis (PrEP) and the likely frequency of ongoing exposures. In those who may have frequent unrecognised exposures to the virus, such as bat handlers, a single reinforcing dose of vaccine should be given one year after the primary course has been completed. Further booster doses should then be given every 3 to 5 years or based on serology. Laboratory staff routinely working with rabies virus should have rabies antibody testing every 6 months, with boosters provided if required.

Routine booster doses are not recommended for most travellers. A single booster dose of vaccine can be considered, following a risk assessment, in those who have completed a primary course more than one year before and are travelling again to a high risk (enzootic) area. A complete pre-exposure primary course is considered to be either 3 doses over 21 to 28 days, or an accelerated 3-dose course (over 7 days) plus an additional dose of vaccine at one year.

Antibody testing to guide PrEP boosters is not offered on the NHS, although some individuals opt to pay for antibody testing. Currently there are no specific guidelines on how to interpret the antibody levels, although antibody titres of at least 0.5 IU/ml are considered protective (World Health Organization (WHO), 2018).

Review of response to rabies pre-exposure prophylaxis (PrEP)

In 2016, a review of the British experience of testing of laboratory workers for rabies antibody was published (Mansfield et al, 2016). The paper describes the results of 280 workers who had periodic rabies antibody testing for occupational purposes.

The results indicated that although some individuals can maintain antibody levels greater than 0.5 IU/ml for many (>10) years, there are some ‘poor responders’ who quickly lose their measurable rabies antibody (although presumably still maintain their cellular immunity). Antibody test results taken one year after the primary course of PrEP or a booster was the best predictor of future antibody responses, and it was calculated that there was a 27% reduction (CI 25-28%) per 2-fold change in time since the last vaccination/booster. This rate of decline could be used to calculate the need for future boosters/blood tests (Table 1).

Recommendations

1. For laboratory workers handling lyssavirus containing material, provide booster vaccination one year after primary pre-exposure vaccination. Maintain current recommendations for serology every 6 months. Antibody levels should be maintained above 1 IU/ml for this group and boosters provided if levels fall below 1 IU/ml.

2. For those who may have frequent unrecognised exposures to lyssaviruses, such as bat rehabilitators, a primary course of PrEP with a booster at one year is recommended and then either regular boosting or blood tests/boosters as per the recommended schedule in Table 1.

3. For those at infrequent risk of exposure, but who are likely to have an unrecognised exposure (that is, recreational cavers, veterinarians investigating suspect rabies cases and non-compliant imported pets, engineers maintaining rabies laboratory equipment or those entering rabies laboratories but not directly working with virus) a primary course of PrEP is recommended followed by testing and boosting as per the recommended schedule in Table 1.

4. If the individual becomes immunosuppressed at any point after receiving a primary course of PrEP, or after having an antibody test or booster, then they should be advised to seek medical advice as they may no longer be able to produce an effective immune response following a rabies virus exposure. Any previous recommendations about frequency of testing or booster vaccinations would need to be reviewed. The individual should be advised about the potential risks of continuing with activities that might lead to rabies virus exposures, as they may not respond to post-exposure vaccine and may not be protected against rabies.

5. In individuals who do not respond (<1 IU/ml) following a full pre-exposure primary course with a particular vaccine, consider offering an alternative licenced vaccine as a booster, if available.

Table 1

Antibody result at least one year after last dose of vaccine	Recommendation
>10 IU/ml	Test again 10 years later or give booster vaccination in 10 years
>3 IU/ml	No booster required, test again 5 years later
>2 IU/ml	No booster required, test again 3 years later
>1 IU/ml	No booster required, test again 1 year later
< 1IU/ml	Booster vaccination and then retest 1 year later

References

Mansfield, KL, Andrews N, Goharriz H, Goddard T, McElhinney LM, Brown KE, Fooks AR. 2016. Rabies pre-exposure prophylaxis elicits long-lasting immunity in humans. Vaccine 34:5959-5967.

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