

## **GUIDELINE:**

**OPTIMAL SERUM AND  
RED BLOOD CELL FOLATE  
CONCENTRATIONS IN WOMEN  
OF REPRODUCTIVE AGE  
FOR PREVENTION OF  
NEURAL TUBE DEFECTS**



**World Health  
Organization**



## **GUIDELINE:**

OPTIMAL SERUM AND  
RED BLOOD CELL FOLATE  
CONCENTRATIONS IN WOMEN  
OF REPRODUCTIVE AGE  
FOR PREVENTION OF  
NEURAL TUBE DEFECTS



## WHO Library Cataloguing-in-Publication Data

Guideline: Optimal serum and red blood cell folate concentrations in women of reproductive age for prevention of neural tube defects

1.Folic Acid – administration and dosage. 2.Folic Acid – blood. 3.Neural Tube Defects – prevention and control. 4.Congenital Abnormalities – etiology. 5.Nutritional Requirements. 6.Maternal Nutritional Physiological Phenomena. 7.Guideline. I.World Health Organization.

ISBN 978 92 4 154904 2

(NNLM classification: WQ 175)

© **World Health Organization 2015**

All rights reserved. Publications of the World Health Organization are available on the WHO web site ([www.who.int](http://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](mailto: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](http://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.

Design and layout: Alberto March

### ■ ***Suggested citation***

WHO. *Guideline: Optimal serum and red blood cell folate concentrations in women of reproductive age for prevention of neural tube defects*. Geneva: World Health Organization; 2015.

# Contents

Acknowledgements	vii
<i>Financial support</i>	vii
Executive summary	1
<i>Scope and purpose</i>	1
<i>Background</i>	2
<i>Guideline development methodology</i>	3
<i>Available evidence</i>	3
<i>Recommendations</i>	5
<i>Remarks</i>	6
<i>Implications for future research</i>	6
Scope and purpose	8
Background	9
<i>Determinants of folate status</i>	10
<i>Thresholds for folate status in populations</i>	11
<i>Measurement of folate status</i>	11
Summary of evidence	12
<i>Genetic, biological and sociodemographic determinants of folate status</i> <i>(serum, plasma or red blood cell folate) in women of reproductive age</i>	12
<i>Blood folate concentrations and risk of neural tube defects</i>	14
<i>Response of serum/plasma and red blood cell folate concentrations</i> <i>to nutrition interventions</i>	15
<i>Performance of laboratory assays for assessment of folate concentrations</i>	16
Recommendations	17
Remarks	17
Implications for future research	18

Dissemination, adaptation and implementation	19
<i>Dissemination</i>	19
<i>Adaptation and implementation</i>	19
<i>Monitoring and evaluation of guideline implementation</i>	20
<i>A harmonization programme for folate microbiological assays</i>	20
<i>Ethical considerations</i>	21
Guideline development process	21
<i>Advisory groups</i>	21
<i>Scope of the guideline and evidence appraisal</i>	22
<i>Management of competing interests</i>	23
Plans for updating the guideline	24
References	25
Annex 1. GRADE “Summary of findings” table	31
Annex 2. Summary of guideline development group members’ considerations for determining the strength of the recommendations	32
Annex 3. WHO steering committee, WHO guideline development group, WHO Secretariat, external resource experts, WHO Secretariat and external resource experts	34
<i>WHO steering committee</i>	34
<i>WHO guideline development group</i>	34
<i>WHO Secretariat</i>	35
<i>WHO regional offices</i>	36
<i>External resource experts</i>	36
Annex 4. Expert peer-reviewers	37
Annex 5. External reviewers (from call for public comments)	38

# Acknowledgements

This guideline was coordinated by the World Health Organization (WHO) Evidence and Programme Guidance Unit, Department of Nutrition for Health and Development. Dr Luz Maria De-Regil and Dr Juan Pablo Peña-Rosas coordinated the process, with technical input from Ms Amy Cordero, Dr Krista Crider and Ms Alina Flores from the National Center on Birth Defects and Developmental Disability, Centers for Disease Control and Prevention (CDC) and Dr Lisa M Rogers, Evidence and Programme Guidance Unit, Department of Nutrition for Health and Development, WHO. We would like to acknowledge the valuable technical input to this document from Ms Monica Crissel Flores-Urrutia, Dr Maria Nieves García-Casal and Mr Gerardo Zamora. We thank Dr Pierpaolo Mastroiacomo, Dr Maria Elizabeth Tejero Barrera and Dr Mindy Zhang for peer-reviewing a final version of this guideline.

We would also like to express our gratitude to Dr Susan L Norris from the WHO Guidelines Review Committee Secretariat and the members of the Guidelines Review Committee for their technical support throughout the guideline development process. Thanks are also due to Mr Issa T Matta from the WHO Office of the Legal Counsel, for his support in the management of conflicts of interest procedures. Ms Paule Pillard and Ms Jennifer Volonnino from the Evidence and Programme Guidance Unit, Department of Nutrition for Health and Development, provided logistic support.

WHO gratefully acknowledges the technical input of all the members of the WHO Steering Committee and the WHO guideline development group, especially of the chairs of the meetings related to this guideline, Dr Anne Molloy and Dr Lorenzo Botto. We thank the external reviewers for their contributions to the final version of this document. WHO is also grateful to staff of the National Center on Birth Defects and Developmental Disability, CDC, for their technical support during the development of the narrative and systematic reviews, as well as the modelling study that informed this guideline, particularly Dr RJ Berry, Ms Amy Cordero, Dr Krista Crider, Ms Alina Flores, Dr Heather Hamner, Dr Joseph Mulinare, Dr Joe Snizek, Ms Becky Tsang and Ms Aliko Weakland. We would also like to thank the staff of the Eunice Kennedy Shriver National Institute of Child Health and Human Development (NICHD), for their technical input in the review on biomarkers of folate status through the Biomarkers for Nutrition and Development (BOND) programme.

## ■ **Financial support**

WHO thanks the National Center on Birth Defects and Developmental Disability, CDC, Atlanta, United States of America, for providing financial support for this work. Donors do not fund specific guidelines and do not participate in any decision related to the guideline development process, including the composition of research questions, membership of the guideline groups, conduct and interpretation of systematic reviews, or formulation of recommendations.



预览已结束，完整报告链接和二维码如下：

[https://www.yunbaogao.cn/report/index/report?reportId=5\\_27478](https://www.yunbaogao.cn/report/index/report?reportId=5_27478)

