

The Immunological Basis for Immunization Series

Module 19: Human papillomavirus infection

Immunization, Vaccines and Biologicals



**World Health
Organization**

The Immunological Basis for Immunization Series

Module 19: Human papillomavirus infection

Immunization, Vaccines and Biologicals



**World Health
Organization**

WHO Library Cataloguing-in-Publication Data

The immunological basis for immunization series: module 19: human papillomavirus infection.

(Immunological basis for immunization series ; module 19)

1.Papillomavirus, Human - immunology. 2.Uterine cervical neoplasms - immunology. 3.Papillomavirus vaccines - therapeutic use.
4.Immunization. I.World Health Organization. II.Series.

ISBN 978 92 4 150159 0

(NLM classification: WP 480)

© World Health Organization 2011

All All rights reserved. Publications of the World Health Organization can be obtained 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 noncommercial distribution – should be addressed to WHO Press, at the above address (fax: +41 22 791 4806; e-mail: permissions@who.int).

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.

**The Department of Immunization, Vaccines and Biologicals
thanks the donors whose unspecified financial support
has made the production of this document possible.**

This module was produced for Immunization, Vaccines and Biologicals, WHO, by:

Mark H Einstein MD, MS
Associate Professor of Obstetrics & Gynecology and Women's Health and
Director of Clinical Research for Women's Health and Gynecologic Oncology
Albert Einstein College of Medicine and Albert Einstein Cancer Center
Montefiore Medical Center

Printed in May 2011

**Copies of this publication as well as additional materials
on immunization, vaccines and biological may be requested from:**

World Health Organization
Department of Immunization, Vaccines and Biologicals
CH-1211 Geneva 27, Switzerland
• Fax: + 41 22 791 4227 • Email: vaccines@who.int •

© World Health Organization 2010

All rights reserved. Publications of the World Health Organization can be obtained from WHO Press, World Health Organization, 20 Avenue Appia, 1211 Geneva 27, Switzerland (tel: +41 22 791 3264; fax: +41 22 791 4857; email: bookorders@who.int). Requests for permission to reproduce or translate WHO publications – whether for sale or for noncommercial distribution – should be addressed to WHO Press, at the above address (fax: +41 22 791 4806; email: permissions@who.int).

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.

The named authors alone are responsible for the views expressed in this publication.

Printed by the WHO Document Production Services, Geneva, Switzerland

Contents

<i>Abbreviations and acronyms</i>	<i>v</i>
<i>Preface</i>	<i>vii</i>
1. The organism and diseases	1
1.1 <i>Human papillomavirus (HPV)</i>	1
1.2 <i>HPV infection and development of cervical cancer</i>	2
1.3 <i>Additional HPV-associated cancers</i>	4
1.4 <i>Relationship of disease burden with HPV infection</i>	4
1.5 <i>HPV effects in HIV-infected and immunosuppressed individuals</i>	5
2. Immune response to HPV infection	6
2.1 <i>Initial immune responses to HPV infection</i>	6
2.2 <i>Host immune response to HPV infection</i>	7
2.3 <i>Innate immunity against HPV infection</i>	8
2.5 <i>Mechanisms of protective immunity against HPV infection</i>	9
3. Prophylactic HPV vaccines	11
3.1 <i>Available prophylactic HPV vaccines and mechanism of action</i>	11
3.2 <i>Adjuvants in HPV vaccines and clinical relevance</i>	12
4. Immunologic response to prophylactic HPV vaccines	15
4.1 <i>Neutralizing antibody response assays and measurements in prophylactic HPV vaccine trials</i>	15
4.2 <i>Neutralizing antibody responses in prophylactic HPV vaccine clinical trials</i>	16
4.3 <i>Immunogenicity of HPV vaccines across different covariates and in different regions/countries</i>	23
4.4 <i>Use of seroassays for vaccine programmes</i>	24
4.5 <i>Immune response in HIV-infected individuals</i>	25
4.6 <i>Reactogenicity and safety of prophylactic HPV vaccines</i>	25
4.7 <i>Prophylactic HPV vaccine immune response with co-administration of other vaccines</i>	26
5. Future prospects	27
5.1 <i>Questions regarding natural HPV immune response evaluation</i>	27
5.2 <i>Future vaccines from an immunologic perspective</i>	27
5.3 <i>Areas needed for future research regarding HPV vaccine immune responses</i>	29
References	30

Abbreviations and acronyms

AAHS	aluminium hydroxyphosphate sulfate
AIDS	acquired immunodeficiency syndrome
APC	antigen-presenting cell
BP	base pairs
CDC	Centers for Disease Control and Prevention
CIN	cervical intraepithelial neoplasia
cLIA	competitive Luminex immunoassay
CTL	cytotoxic T lymphocyte
CVS	cervical vaginal secretion
CVS	cervical vaginal secretion
DC	dendritic cell
DNA	deoxyribonucleic acid
ECM	extracellular matrix
ELISA	enzyme-linked immunosorbent assay
GACVS	Global Advisory Committee on Vaccine Safety
GBS	Guillain Barré Syndrome
GMT	geometric mean titre
GSK	GlaxoSmithKline
HAART	highly active antiretroviral therapy
HIV	human immunodeficiency virus
HPV	human papillomavirus
HSIL	high-grade squamous intraepithelial lesion
HSV	herpes simplex virus
IARC	International Agency for Research on Cancer
Ig	immunoglobulin
IU	International Unit
LSIL	low-grade squamous intraepithelial lesion
Orf	open reading frames

PBNA	pseudovirion-based neutralization assay
PPE	per protocol for efficacy population
RRP	respiratory papillomatosis
SEAP-NA	secreted alkaline phosphatase neutralization assay
Th	T-helper (cells)
TLR	toll-like receptor
TM	transverse myelitis
Tregs	regulatory T cells
TVC-E	total vaccinated cohort for efficacy population
TZ	transformation zone
URR	upstream regulatory region
VIN	vulvar intraepithelial neoplasia
VLP	virus-like particle
WHO	World Health Organization

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_28773

