Kansas Foundation for Medical Care

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2015
Quality Forum
The Burden of HPV Related Cancer

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Disclosure

I have no financial relationship with the KFMC or any company or product discussed today

Objectives

To review:

-HPV definition and prevalence

-Natural history of HPV

-Oncogenic potential of HPV

-HPV associated cancers

-HPV vaccines

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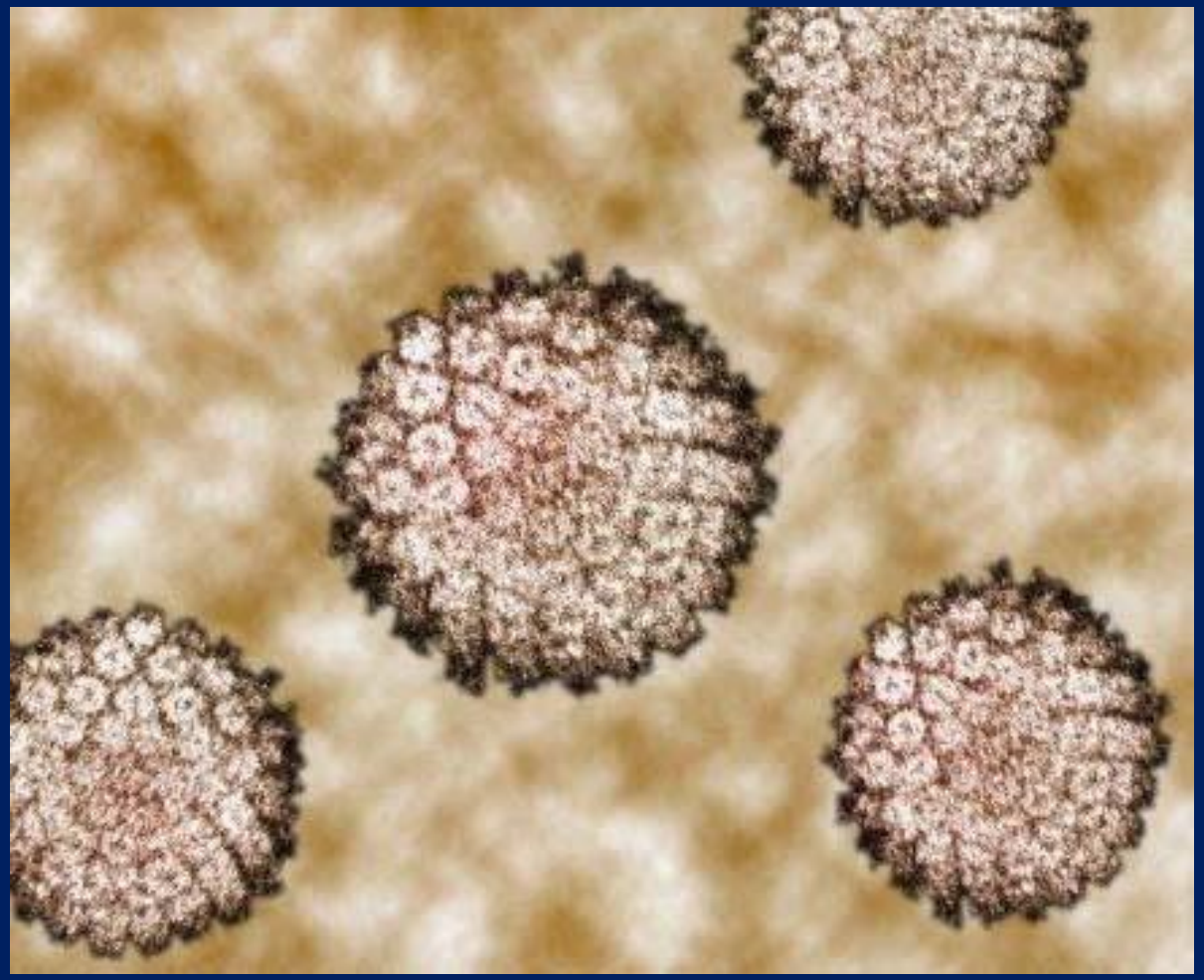


Human papillomavirus

- 2008 Dr. Harald zur Hausen awarded a Nobel prize for elucidating the infectious etiology of cervical cancer.
- Double-stranded DNA virus
- Species specific (i.e. HPV only infects humans)
- > 150 types identified
- Transmitted by intimate contact between epithelial/mucosal surfaces
- Divided into High Risk and Low Risk Types

Human papillomavirus
(continued)

- As many as 30 may be High Risk type, most commonly defined as 16,18,31,33,35,39,45,51,52,56,58,59,66 and 68.
- Types 16, 18, 31, 33, and 45 associated with high grade cervical dysplasia and cervical cancer with 16 and 18 accounting for 70% of cervical cancers
- Types 6 & 11 most commonly seen in genital warts
- No reliable animal model or invitro experimental systems

Human papillomavirus

Prevalence

- Males:
  - 1.3 – 72.9% by literature review. Average 24%. (Dunne et al)
  - 50.5% from prospective cohort study. (Giuliano et al)
- Females:
  - Overall 26.8% (NHANES Dunne et al)
    - Aged 14-19 24.5%
    - Aged 20-24 44.8%
    - Aged 25-29 27.4%
    - Aged 30-39 27.5%
    - Aged 40-49 25.2%
    - Aged 50-59 19.6%

Dunne et al, J Infec Dis 2006;194:1044. Giuliano et al, Cancer Epid Biomarker Res 2008: 17;2036.
Dunne et al. JAMA 2007;28:297.

Human papillomavirus

Lifetime Risk of Acquiring HPV Infection with at least one sex partner

- Males:
  - 91.3%
- Females:
  - 84.6%

- > 80% of men and women acquire HPV by age 45.

Chesson et al. Sex Transm Dis. 2014, 41;660.

Human papillomavirus

Natural History

Exposure & Infection with HPV

Follow-up study of college women:

- 553 Seattle-based college students with a mean age of 19 years
- Underwent HPV DNA and Pap testing every 4 months for up to 5 yrs
- Mean follow-up was 41.2 mos

Winer et al. (2003) Am J Epidemiol

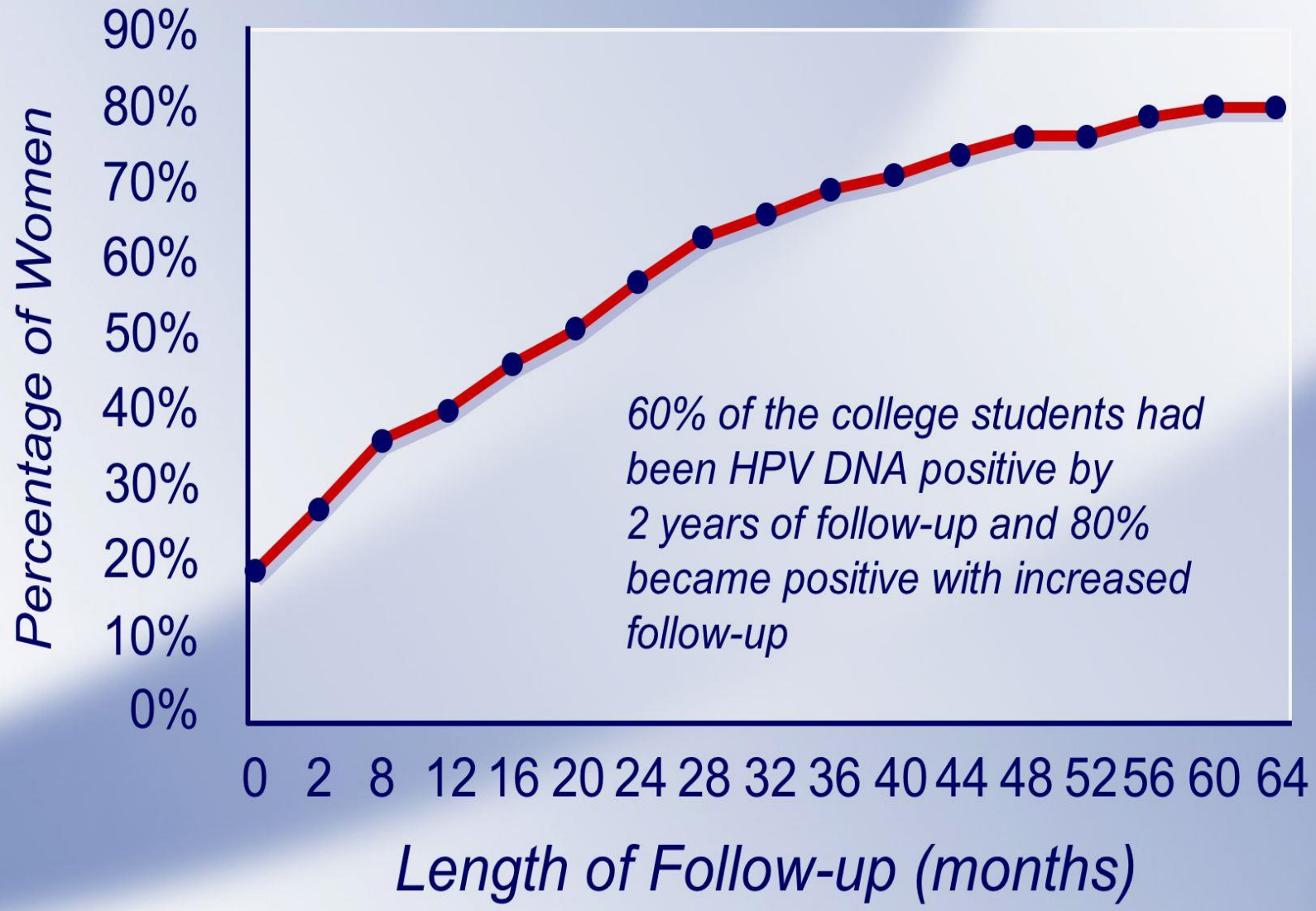
Exposure & Infection with HPV

Follow-up study of college women:

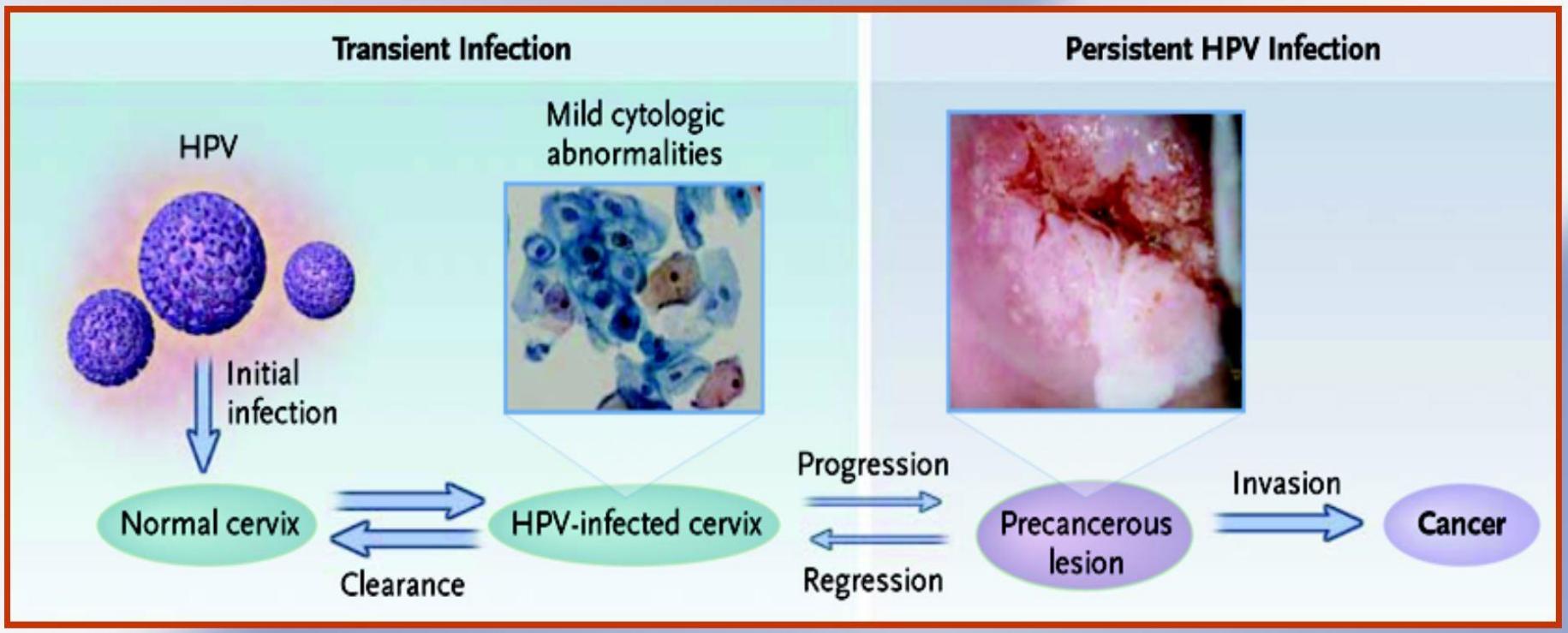
- At entry 19.7% already HPV positive
- Over 2 yrs, 39% of women initially HPV DNA negative became HPV positive
- High-risk types of HPV were most common - *16, 18, 51, 56, 33, 35, 39*

Winer et al. (2003) Am J Epidemiol

Development of HPV DNA Positivity



Natural History of HPV Infections



Wright and Schiffman (2003) NEJM

Oncogenic Potential

Oncogenic Potential of HPV Infection

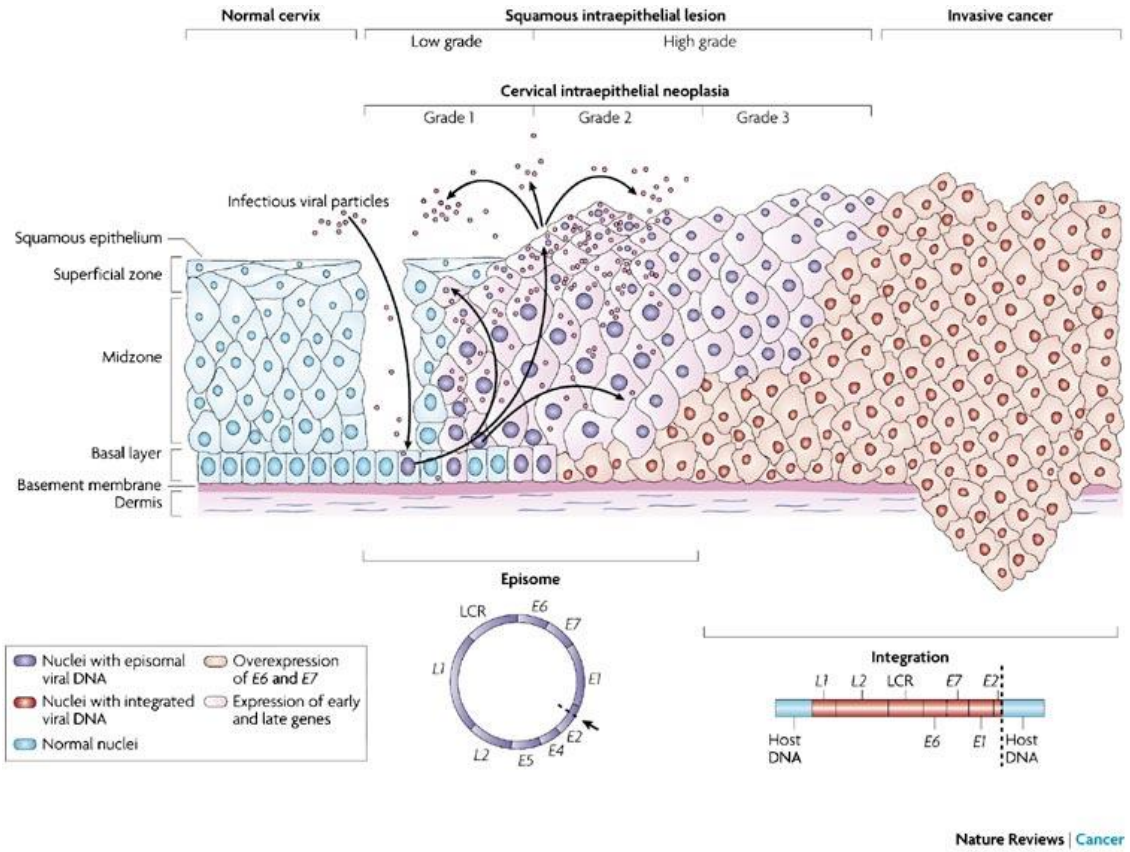
Cancer	% HPV Positive
Cervical	91
Anal	91
Vaginal	71
Oropharyngeal	70
Vulvar	69%
Penis	64%
Oral	32%
Laryngeal	21%

Saraiya et al. J Natl Cancer Inst. 2015:107(6)

Oncogenic Potential of HPV Infection

- HPV is incorporated into infected cells. Two proteins (E6 and E7) interfere with cell functions that prevent excessive growth and avoids cell death.

- Cofactors:
  - Tobacco use
  - Number of sexual partners
  - Altered immune system

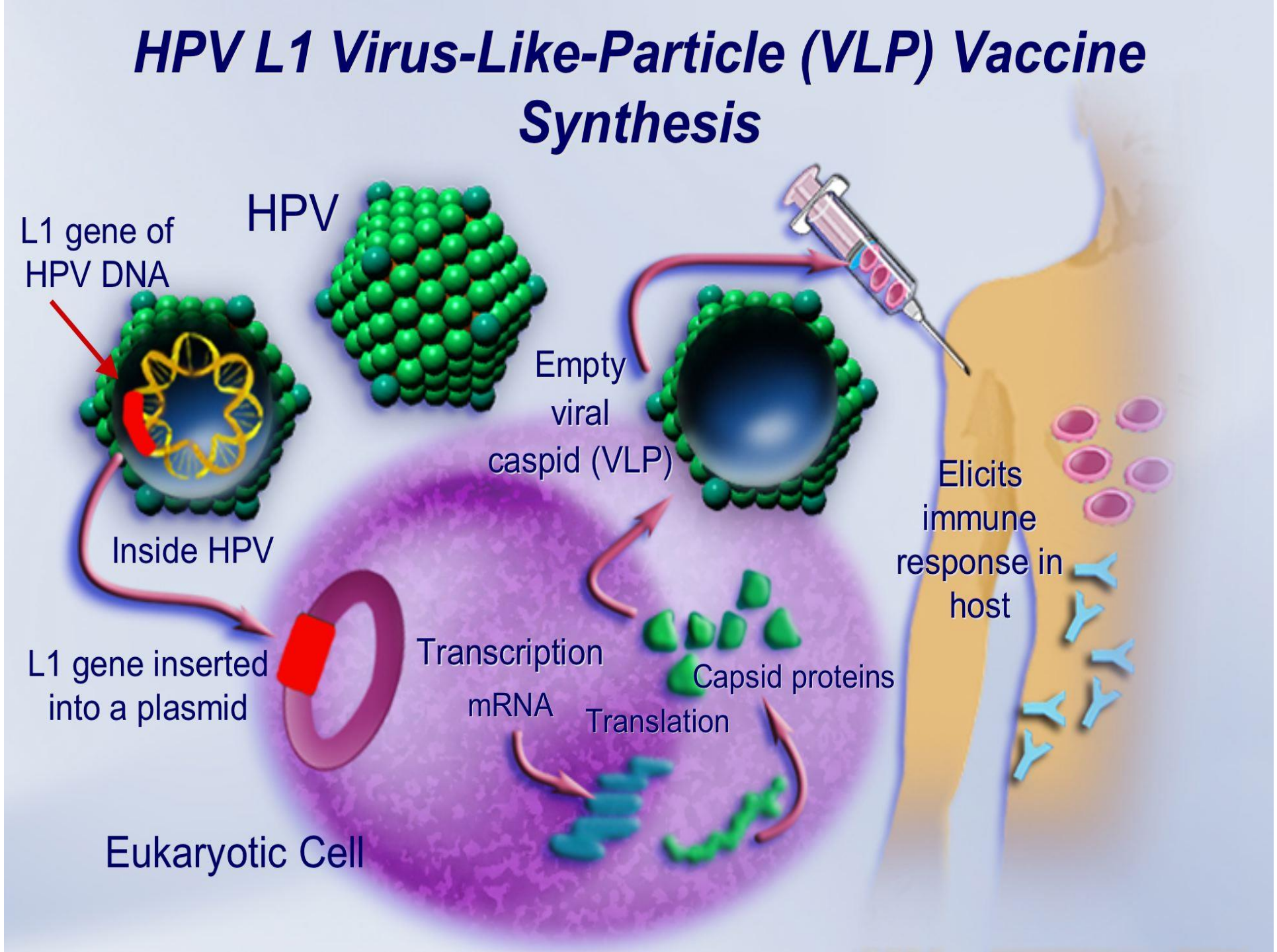


Woodman *et al*. *Nature Reviews Cancer* **7**, 11–22 (January 2007) | doi:10.1038/nrc2050

Prevention

HPV Vaccine

HPV L1 Virus-Like-Particle (VLP) Vaccine Synthesis



HPV Vaccine

- Gardasil: Quadrivalent Vaccine (6,11,16,18)
  - FDA approved for females and males aged 9-26
- Cervarix: Bivalent Vaccine (16, 18)
  - FDA approved for females aged 10-25
- Gardasil 9
  - Approved by FDA 2014
  - Covers HPV 6,11,16 and 18 plus 31,33,45,52 & 58
  - Approved for females aged 9-26
  - Approved for males aged 9-15

HPV Vaccine Recommendations

Morbidity and Mortality Weekly Report (*MMWR*)

MMWR

Human Papillomavirus Vaccination: Recommendations of the Advisory Committee on Immunization Practices (ACIP)

Please note: *An erratum has been published for this article. To view the erratum, please click here.*

Recommendations and Reports
August 29, 2014 / 63(RR05);1-30

Lauri E. Markowitz[1]

Eileen F. Dunne[1]

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ACIP recommends routine vaccination with HPV4 or HPV2 for females aged 11 or 12 years and with HPV4 for males aged 11 or 12 years. Vaccination also is recommended for females aged 13 through 26 years and for males aged 13 through 21 years who were not vaccinated previously. Males aged 22 through 26 years may be vaccinated. ACIP recommends vaccination of men who have sex with men and immunocompromised persons (including those with HIV infection) through age 26 years if not previously vaccinated.

HPV Vaccine Effectiveness

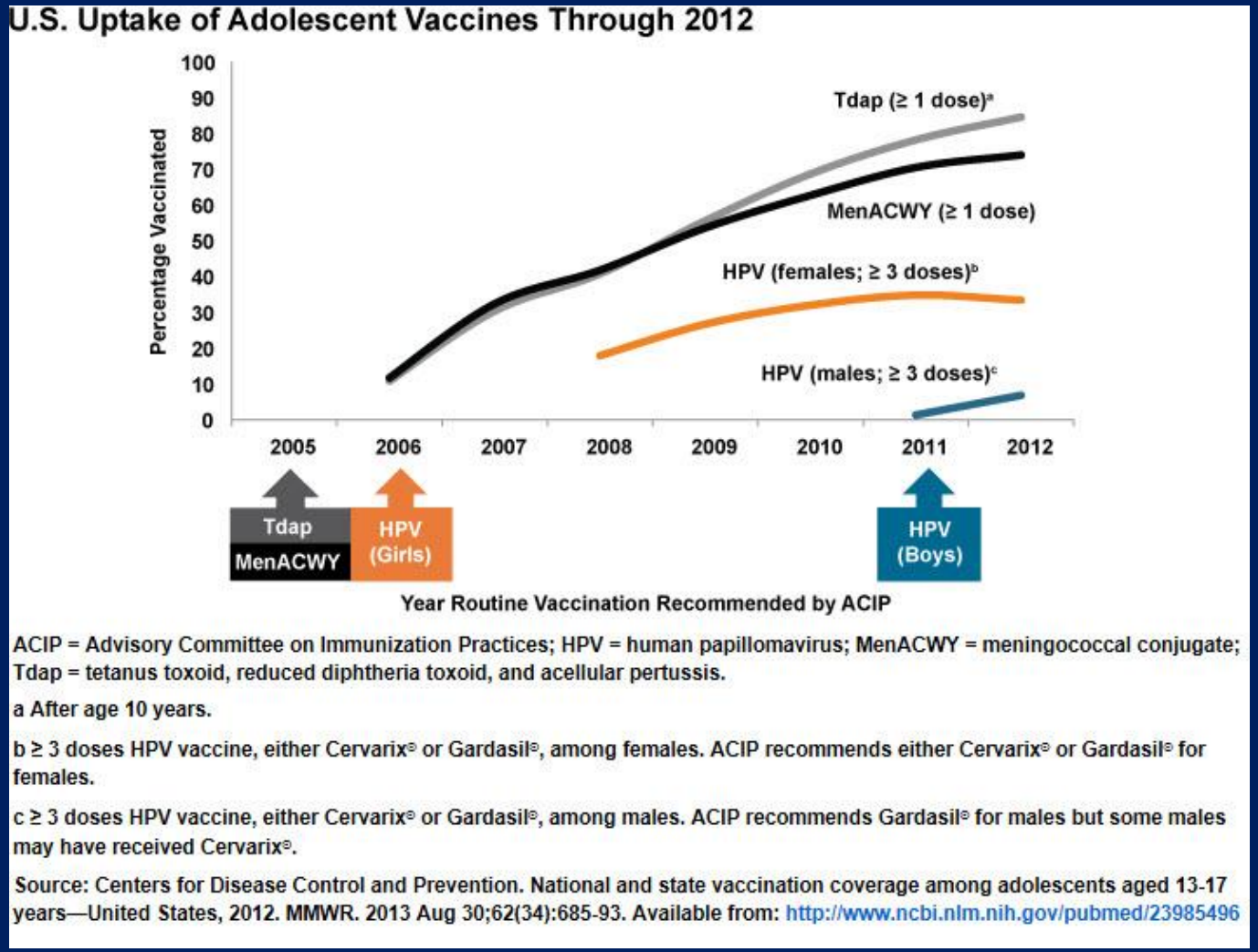
TABLE 4. Per-protocol efficacy for prevention of human papillomavirus vaccine-type disease outcomes among females in trials of the bivalent and quadrivalent human papillomavirus vaccines, end-of-study analyses

Vaccine/Endpoint related type	Vaccine		Control		Vaccine efficacy	
	No.	Cases	No.	Cases	%	(95% CI)
Quadrivalent vaccine*						
CIN2/3 or AIS†						
HPV 6, 11, 16, 18	7,864	2	7,865	110	98.2	(93.3–99.8)
HPV 16	6,647	2	6,455	81	97.6	(91.1–99.7)
HPV 18	7,382	0	7,316	29	100.0	(86.6–100.0)
VIN/VaIN2/3†						
HPV 6, 11, 16, 18	7,900	0	7,902	23	100.0	(82.6–100.0)
HPV 16	6,654	0	6,467	17	100.0	(76.5–100.0)
HPV 18	7,414	0	7,343	2	100.0	(<0–100.0)
Genital warts§						
HPV 6 and/or 11	6,718	2	6,647	186	98.9	(96.1–99.9)
Bivalent vaccine¶						
CIN2/3 or AIS						
HPV 16 and/or 18	7,338	5	7,305	97	94.9	(87.7–98.4)
HPV 16	6,296	2	6,160	81	97.6	(91.0–99.7)
HPV 18	6,789	3	6,739	23	87.1	(57.2–97.5)

HPV Vaccine

Uptake

HPV Vaccine Uptake



ACIP = Advisory Committee on Immunization Practices; HPV = human papillomavirus; MenACWY = meningococcal conjugate; Tdap = tetanus toxoid, reduced diphtheria toxoid, and acellular pertussis.

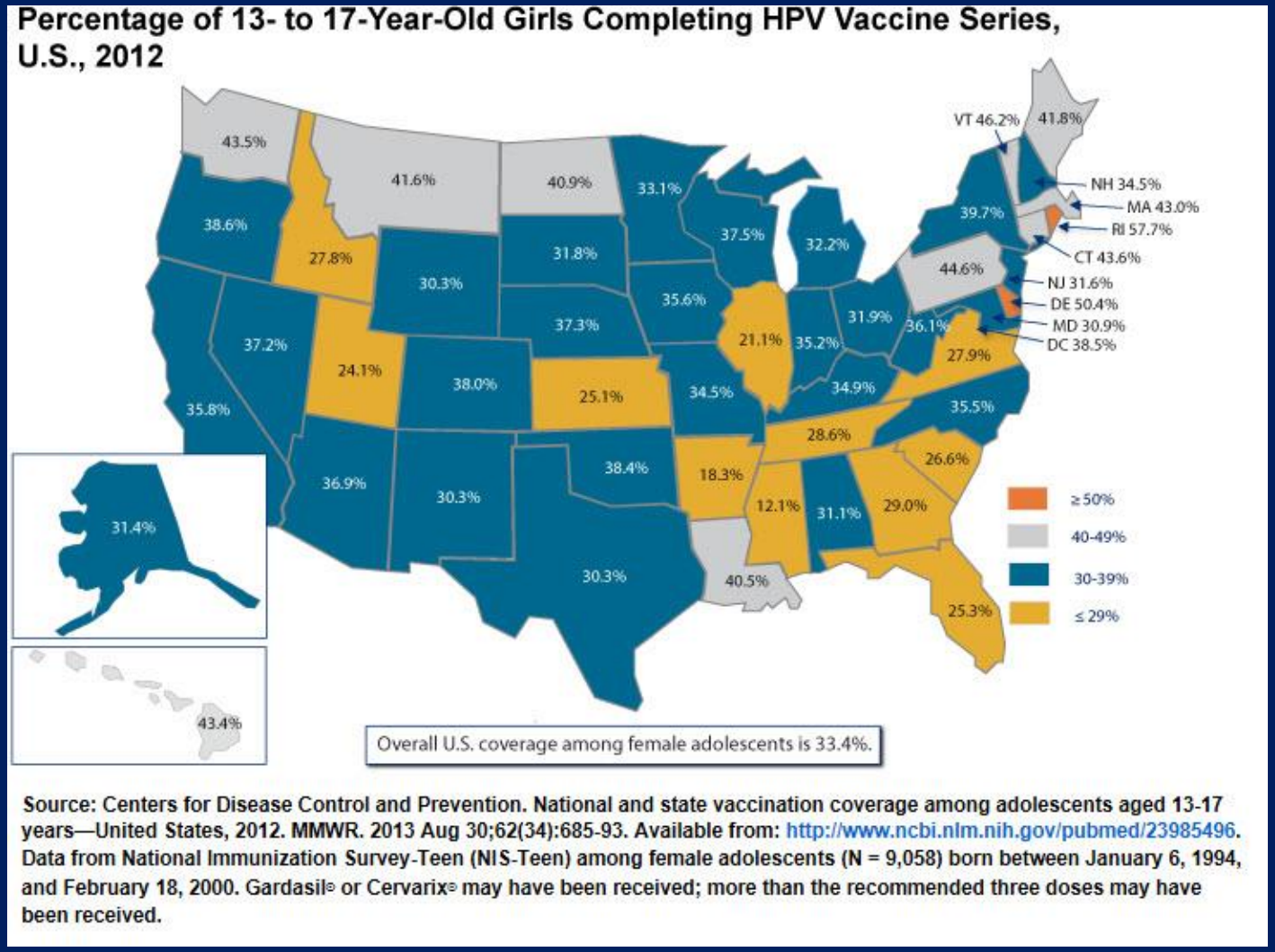
a After age 10 years.

b ≥ 3 doses HPV vaccine, either Cervarix® or Gardasil®, among females. ACIP recommends either Cervarix® or Gardasil® for females.

c ≥ 3 doses HPV vaccine, either Cervarix® or Gardasil®, among males. ACIP recommends Gardasil® for males but some males may have received Cervarix®.

Source: Centers for Disease Control and Prevention. National and state vaccination coverage among adolescents aged 13-17 years—United States, 2012. MMWR. 2013 Aug 30;62(34):685-93. Available from: http://www.ncbi.nlm.nih.gov/pubmed/23985496

HPV Vaccine Uptake



Source: Centers for Disease Control and Prevention. National and state vaccination coverage among adolescents aged 13-17 years—United States, 2012. MMWR. 2013 Aug 30;62(34):685-93. Available from: http://www.ncbi.nlm.nih.gov/pubmed/23985496. Data from National Immunization Survey-Teen (NIS-Teen) among female adolescents (N = 9,058) born between January 6, 1994, and February 18, 2000. Gardasil® or Cervarix® may have been received; more than the recommended three doses may have been received.


Silence is deadly.
Did you know that two thirds of all cervical cancers are caused by HPV and 2 out of 3 women will contract HPV at some point in their lives?
The HPV infection occurs mainly in young women and is less common in women over 30. HPV can be present for years with no symptoms, so you can be infected with HPV and pass it on with out knowing it.
Protect yourself
Get a HPV test today
www.nccc-online.org