

Manuscript received August 15, 2012; revised October 18, 2012; accepted October 19, 2012.

Correspondence to: Ahmedin Jemal, DVM, PhD, Surveillance Research Program, American Cancer Society, 250 Williams St NW, Atlanta, GA 30303 (e-mail: ajemal@cancer.org).

• Journal of the National Cancer Institute, ePUB January 7, 2013; print: February, 2013 (issue 3)
Disclosure

• I am an inventor of NIH vaccine technology that has been licensed to Merck and GlaxoSmithKline, the two companies that manufacture the vaccine.
Number of New HPV-Associated Cancers 2009

Data from SEER and National Program of Cancer Registries

**Men**

- **N=13,446**
- **Oropharynx**: 78%, >60%
- **Anus**: 14%, 90%
- **Penis**: 7%, 40%

**Women**

- **N=21,342**
- **Cervical**: 53%
- **Anus**: 16%, 90%
- **Vulva**: 15%, 40%
- **Oropharynx**: 12%, 60%
- **Vagina**: 3%, 40%
Public Health Interventions Against HPV-induced Disease

• Screening to identify pre-cancer (secondary prevention)
  – Approved for cervical cancer screening
  – Start at 21, stop at 65, can include HPV testing if over 30

• HPV vaccination (primary prevention)
  – Approved for prevention of cervical cancer, other anogenital cancers, and genital warts; plausible to be protective against cancer at other sites

Average annual percent change

*The AAPC is statistically significant from 0 (p<.05)
Age-Adjusted Incidence of HPV-Associated Cancers by SES 2005-2009

Data from SEER and National Program of Cancer Registries
The Commercial Vaccines Are Composed of Multiple Types of HPV L1 VLPs

Gardasil (Merck)

- HPV16: 70% of Cervix Cancer
- HPV18: >90% of Non-cervix Cancer
- HPV6: 90% of Genital Warts

Cervarix (GlaxoSmithKline)

- Approved for females (both) and males (Merck)
- Target group: 11-12 year olds, catch-up to 26
- Three intramuscular injections over 6 months
Prospective post-licensure assessment of 600,558 doses (Gardasil) from 7 managed care organizations

No vaccine-related increased risk to prespecified outcomes: Guillan-Barré syndrome, stroke, venous thromboembolism, appendicitis, seizure, allergic reactions

- Prespecified outcomes were derived from CDC analysis from VAERS [Vaccine Adverse Events Reporting System]: Slade et al, JAMA 2009

Rate of anaphylaxis (1 case, 26 y.o.) similar to other vaccines

Rate of fainting similar to that of other adolescent vaccines
**Durability of Antibody Response to Cervarix**

From The GSK Vaccine HPV-007 Study Group. Lancet 374:301-14, 2009

8.4 years sustained immunogenicity and efficacy: Roteli-Martins et al., Hum Vaccin Immunother 8: 390-7, 2012
Australia: Fall in HPV Prevalence After Initiating National Vaccine Program

Figure 1. Differences in human papillomavirus (HPV) genoprevalence between prevaccine and postvaccine populations. *P<.05 for difference in percentages between groups. Abbreviations: CI, confidence interval; excl, excluding; HR-HPV, high-risk HPV.

Tabrizi et al, J Infect Dis 206: 1645-51, 2012
NCI-Costa Rica Trial of GSK vaccine in 18-25 year old women: Vaccine Efficacy Against Oral Infection (End-point: HPV16/18 infection)

• 5840 oral swabs at 4-year visit; balanced between control and vaccine group

• 93% vaccine efficacy (1/16 infections in vaccine group)
  – 12 HPV16 infections; 4 HPV18 infections

• Suggestive evidence that HPV vaccination may protect against oropharyngeal cancer attributable to HPV infection

• Rolando Herrero, Allan Hildesheim, Aimee Kreimer and their colleagues, submitted
Abbreviations: Tdap = tetanus, diphtheria, acellular pertussis vaccine; MenACWY = meningococcal conjugate vaccine; HPV-1 = human papillomavirus vaccine, ≥1 dose; HPV-3 = human papillomavirus, ≥3 doses.

* Tdap and MenACWY vaccination recommendations were published in March and October 2006, respectively.
† HPV vaccination recommendations were published in March 2007.
## USA: 2011 HPV and Meningococcal Vaccination Rates for 13-17 year olds

<table>
<thead>
<tr>
<th></th>
<th>HPV vaccine 1 dose or more</th>
<th>Meningococcal vaccine 1 dose or more</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>United States</strong></td>
<td>53%</td>
<td>70%</td>
</tr>
<tr>
<td><strong>Below poverty</strong></td>
<td>62% (boys: 14%)</td>
<td>69%</td>
</tr>
<tr>
<td><strong>Above poverty</strong></td>
<td>50% (boys: 7%)</td>
<td>71%</td>
</tr>
<tr>
<td><strong>Hispanics</strong></td>
<td>65%</td>
<td>75%</td>
</tr>
<tr>
<td><strong>Blacks</strong></td>
<td>56%</td>
<td>72%</td>
</tr>
<tr>
<td><strong>Whites</strong></td>
<td>48%</td>
<td>68%</td>
</tr>
</tbody>
</table>

*From MMWR August 31, 2012*
HPV vaccine uptake: 2011

- Vaccination uptake rates vary widely among states: from 32% to 76% for 1 dose, from 16% to 57% for 3 doses
USA: Wide Regional Differences in Cervical Cancer Incidence and Mortality Rates

Suggested Reading

Thank you!