

# Human Papilloma Virus (HPV) and Vaccine-Preventable Cancers

## FACT SHEET

### Human Papilloma Virus (HPV) causes several types of cancer

Current research shows that some HPV types are high risk and can cause certain cancers. Most of these cancers are caused by two high-risk types, HPV 16 and 18. The parts of the body most susceptible to high-risk HPV infections are squamous cell tissue of the cervix, genital areas (vagina, vulva, and penis), and oropharynx (back of the throat, base of the tongue, and tonsils). These specific cancers are referred to as HPV-associated cancers.

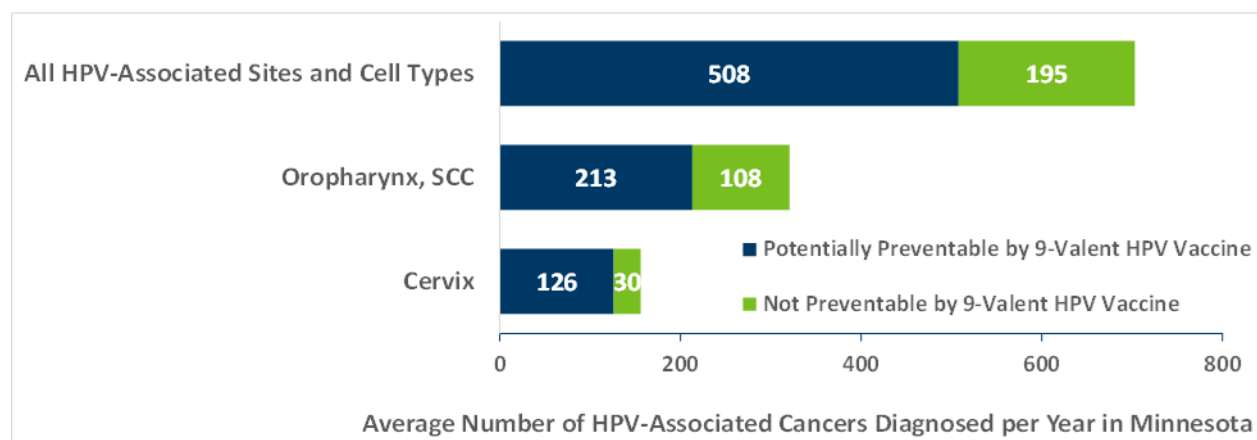
### An effective vaccine against HPV is available

Gardasil 9 is a Food and Drug Administration (FDA) approved HPV vaccine for use in the United States. Gardasil 9 is effective in developing immunity to the nine high-risk HPV types known to cause cancer: 6, 11, 16, 18, 31, 33, 45, 52, and 58.

### HPV vaccination can prevent certain cancers

Researchers have estimated that 72% of all HPV-associated cancers are attributable to infections with the cancer-causing HPV types (Saraiya, 2015; Viens 2016). Vaccination with Gardasil 9 against HPV promises to prevent many of these cancers from developing. In Minnesota, an estimated 703 HPV-associated cancers were reported each year during 2015-2019. Of these, an estimated 508 might be prevented with Gardasil 9, with the greatest potential for preventing oropharynx and cervix cancers.

### Estimated annual number of HPV-associated cancers of the oropharynx and cervix prevented by Gardasil 9 vaccination, Minnesota 2015-2019



## HPV AND VACCINE-PREVENTABLE CANCERS

Below is a detailed list of the number of cancers that could be prevented in Minnesota with HPV vaccinations (column 4).

### Estimated annual number of HPV-associated cancers prevented in Minnesota <sup>A</sup>

(1) Invasive Cancer Anatomic Site and Tissue Type <sup>B</sup>	(2) Average Number New Cases per Year <sup>D</sup>	(3) Percent of Cancers Preventable by 9-Valent Vaccine <sup>E</sup>	(4) Number of Cancers Preventable by 9-Valent Vaccine <sup>F</sup>
Cervix	156	80.9%	126
Vagina, SCC	11	73.4%	8
Vulva, SCC	85	62.8%	53
Penis, SCC	27	56.9%	15
Anus, SCC - Total	95	88.3-%	84
Anus, SCC - Female	70	90.3%	63
Anus, SCC - Male	25	82.9%	21
Rectum, SCC - Total	9	87.6%	8
Rectum, SCC - Female	7	90.3%	6
Rectum, SCC - Male	2	82.9%	2
Oropharynx, SCC <sup>C</sup> - Total	321	66.4%	213
Oropharynx, SCC <sup>C</sup> - Female	58	60.3%	35
Oropharynx, SCC <sup>C</sup> - Male	263	67.8%	178
All Sites - Total	703	–	508
All Sites - Female	386	–	292
All Sites - Male	317	–	216

- A. Estimates are based on the CDC approach for estimating attributable fraction (Saraiya 2015, Table 4 and Viens 2016, Table 3). Source: Minnesota Cancer Reporting System, invasive cancers diagnosed from 2015 to 2019.
- B. Specific anatomic sites and cell types in which HPV DNA is frequently found (HPV-associated sites and histology). Cell types for all sites but the cervix are restricted to squamous cell carcinomas (SCC). SCC make up the majority of cancers diagnosed in the cervix (97%), vagina (64%), vulva (78%), penis (93%), anus (84%), and oropharyngeal sites (90%), but only a very small proportion (2%) of rectal cancer diagnoses.
- C. Oropharynx includes the back base of the tongue, soft palate, side and back walls of the throat, and the tonsils (ICD-O-3 primary site 1.9, 2.4, 2.8, 5.1, 5.2, 9.0, 9.1, 9.8, 9.9, 10.0, 10.1, 10.2, 10.3, 10.4, 10.8, 10.9 having ICD-O-3 histology codes 8050–8084, 8120–8131).
- D. Average number of new cancers per year in Minnesota meeting defined site and histology criteria for HPV-associated cancers.
- E. Percentage of HPV-associated cancers detected by HPV 9-valent vaccine in previous genome sequencing studies (as described in Saraiya et al., 2015). The site and histology-specific percentages are taken from Viens 2016, where they are referred to as the percentage of cancers attributable to HPV 16/18/31/33/45/52/58).
- F. Estimated number of cancers preventable by 9-valent HPV vaccine if the entire at-risk population was vaccinated and the vaccine was completely effective.

## Information on HPV-vaccination and cervical cancer screening

For more information on HPV screening and immunization go to the MDH HPV Basics website:  
<https://www.health.state.mn.us/diseases/hpv/basics.html>.

For information about the MDH Sage Screening Program which offers free cervical cancer screening to women who meet age, insurance and income criteria, go to:  
<https://www.health.state.mn.us/diseases/cancer/sage/screening/index.html>.

## References

Saraiya M, Unger ER, Thompson TD, ... HPV Typing of Cancers Workgroup. US assessment of HPV types in cancers: implications for current and 9-valent HPV vaccines. J Natl Cancer Inst 2015;107:djv086. <https://doi.org/10.1093/inci/djv086>

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