

Cancer Screening and Prevention Saving Women's Lives

Chinese translation: 1978

Lifetime probability of developing cancer for females, US, 2018-2019, 2021

Site	Risk
All sites ^a	1 in 3 (35.0%)
Breast	1 in 8 (12.5%)
Lung & bronchus	1 in 10 (5.9%)
Colon & rectum	1 in 26 (3.9%)
Uterine corpus	1 in 32 (3.1%)
Melanoma of the skin ^b	1 in 40 (2.5%)

© 2002 Blackwell Science Ltd, *Journal of Internal Medicine* 252: 459–464

Important News from the Data

- Cancer incidence is Increasing in Women
- Dramatically increasing in women under 50 yr
- Endometrial cancer is the only cancer increasing in incidence and mortality
- Endometrial cancer deaths > ovary
- Cancer prevention is feasible
 - cervix, endometrial, colon, ovary, HPV related CA
 - Disparities exist in mortality-Blacks and Native/AI

Cancer Statistics 2025

Estimated number of new cancer cases in the US in 2025

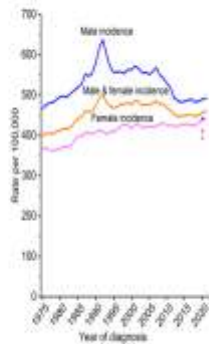
American Cancer Society



Excludes basaloid and squamous cell carcinoma of the skin and melanoma of the skin.
 Source: Cancer Facts & Figures 2025.
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Trends in cancer incidence rates, US, 1975-2021

American Cancer Society

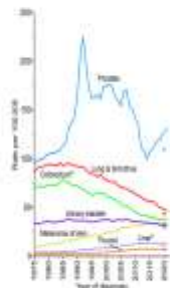


Rate per 100,000 is based on the 2021 census population and adjusted for age by reporting. Incidence rates in 2021 are shown as the most recent data.
 Source: Cancer Facts & Figures 2025.
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Cancer Statistics 2025

Trends in cancer incidence rates among males, US, 1975-2021

American Cancer Society



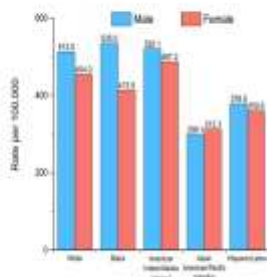
Rate per 100,000 is based on the 2021 census population and adjusted for age by reporting. Incidence rates in 2021 are shown as the most recent data.
 Source: Cancer Facts & Figures 2025.
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Publicacion de la Universidad de Chile, Santiago, Chile. Publicado en el *Boletín de la Asociación de Sociólogos de Chile*, Vol. 1, No. 1, 1966, pp. 1-10.

 American Cancer Society

Cancer Statistics 2025

Cancer incidence rates by race and ethnicity, US, 2017-2020

American
Cancer
Society

Age-specific rates (00-19 standard population) are presented for each race and ethnicity. Rates for Hispanic populations from each of the three Hispanic ethnic groups (Mexican, Central American, and South American) are presented separately. Data are based on the Surveillance, Epidemiology, and End Results (SEER) Cancer Statistics Database, 2017-2020. Data are based on the Surveillance, Epidemiology, and End Results (SEER) Cancer Statistics Database, 2017-2020.

Cancer Statistics 2025

Trends in five-year relative survival (%), US, 1975-2020

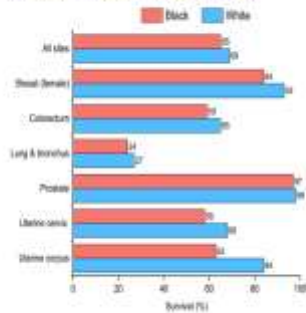
American
Cancer
Society

Site	1975-79	1985-89	2000-2020
All sites	47	63	69
Breast (female)	75	87	91
Colon & rectum	50	61	64
Leukemia	34	46	57
Liver & intrahepatic bile duct	3	7	22
Lung & bronchus	12	15	27
Melanoma of the skin	62	91	94
Non-Hodgkin lymphoma	47	56	74
Ovary	38	43	51
Pancreas	3	4	13
Prostate	68	97	97
Uterine cervix	89	73	67
Uterine corpus	67	84	81

Survival rates are age-adjusted to the 1975-79 standard population and are based on data reported to the Surveillance, Epidemiology, and End Results (SEER) Cancer Statistics Database, 1975-2020. Data are based on the Surveillance, Epidemiology, and End Results (SEER) Cancer Statistics Database, 1975-2020. Data are based on the Surveillance, Epidemiology, and End Results (SEER) Cancer Statistics Database, 1975-2020.

Cancer Statistics 2025

Five-year relative survival (%) by race, US, 2014-2020

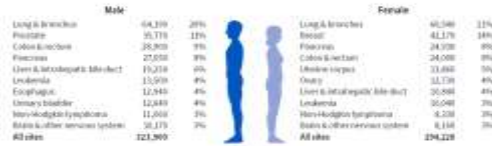
American
Cancer
Society

Survival rates are age-adjusted to the 1975-79 standard population and are based on data reported to the Surveillance, Epidemiology, and End Results (SEER) Cancer Statistics Database, 2014-2020. Data are based on the Surveillance, Epidemiology, and End Results (SEER) Cancer Statistics Database, 2014-2020. Data are based on the Surveillance, Epidemiology, and End Results (SEER) Cancer Statistics Database, 2014-2020.

Cancer Statistics 2025

Estimated number of new cancer deaths in the US in 2025

American Cancer Society

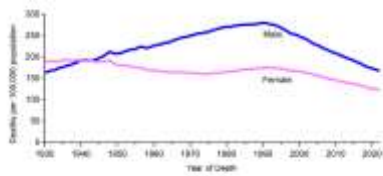


Source: American Cancer Society, Cancer Statistics 2025. Data are based on the most recent available data. All rates are age-adjusted to the 2019 US standard population. All rates are per 100,000 people.

Cancer Statistics 2025

Trends in cancer death rates, US, 1975-2022

American Cancer Society

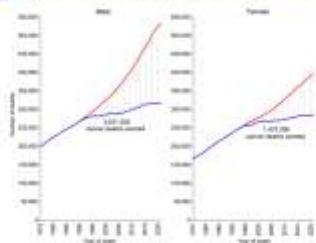


Source: American Cancer Society, Cancer Statistics 2025. Data are based on the most recent available data. All rates are age-adjusted to the 2019 US standard population. All rates are per 100,000 people.

Cancer Statistics 2025

Total number of cancer deaths averted in men (1991 onward) and women (1992 onward), US

American Cancer Society

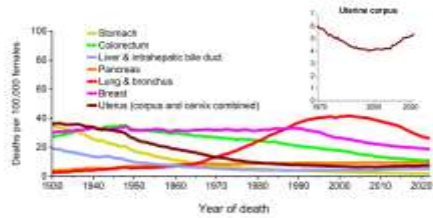


Source: American Cancer Society, Cancer Statistics 2025. Data are based on the most recent available data. All rates are age-adjusted to the 2019 US standard population. All rates are per 100,000 people.

Cancer Statistics 2025

Trends in cancer death rates among females, US, 1930-2022

American Cancer Society

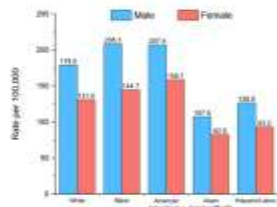


From our age-adjusted data and all reported population statistics, we calculated the age-adjusted rates for each cancer site. The age-adjusted rates are calculated by applying the age-specific rates to the age-specific population of the United States in 2000. The age-adjusted rates are then summed to give the overall age-adjusted rate. The age-adjusted rates are then multiplied by 100,000 to give the age-adjusted rates per 100,000 females.

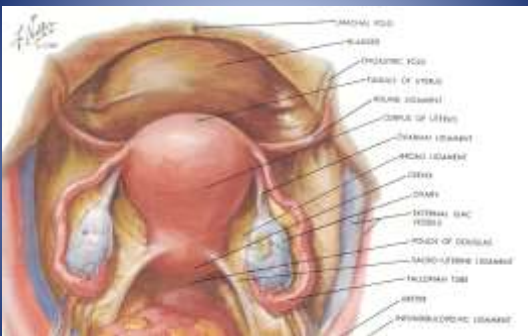
Cancer Statistics 2025

Cancer death rates by race and ethnicity, US, 2018-2022

American Cancer Society



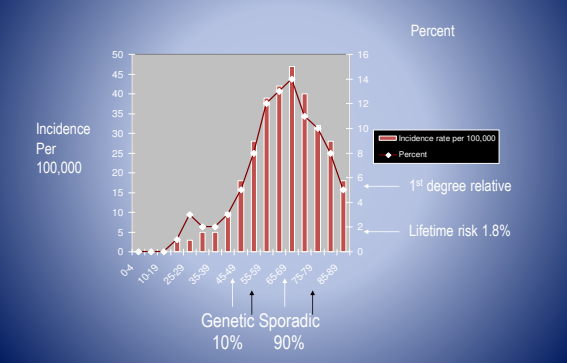
Rate is age-adjusted (2018-2022) standard population as presented by the American Cancer Society. The age-adjusted rates are calculated by applying the age-specific rates to the age-specific population of the United States in 2000. The age-adjusted rates are then summed to give the overall age-adjusted rate. The age-adjusted rates are then multiplied by 100,000 to give the age-adjusted rates per 100,000 females.



CANCER CASES AND DEATHS

	CASES	OK CASES	DEATHS	LIFETIME RISK	RISK OF DEATH
ENDOMETRIAL	69,120	690	13,250	1:38	1:190
OVARY	19680	250	12,740	1:70	1:100
CERVIX	13,820	200	4,360	1:147	1:441
VULVA	6,900	100	950	1:300	
VAGINA	2,680	50	840		
other	8650		1870		
ALL GYN	118,179		29,910		

Incidence of Ovarian Cancer by Age



Stromal cell cancers (7%):

- Granulosa
- Sertoli

Germ cell cancers (2-3%):

- Dysgerminoma
- Immature teratoma
- Embryonal carcinoma
- Choriocarcinoma
- Endodermal sinus tumor

Epithelial cell cancers (90%)

Papillary serous

Endometrioid

Clear cell

Nasora H Nat Rev Cancer 2005

Latest Theories

- Low grade ovarian epithelial cancer-
 - Estrogen and endometriosis associated
 - Prevented by oral contraceptives
 - 20% of deaths
- High grade serous ovarian epithelial cancer
 - Starts in fallopian tube
 - Rarely stage I
 - Prevented by salpingectomy-RRSO
 - 80% of deaths

Risk Factors Epithelial Ovarian Cancer

- Age
- Family History RR=2.8 1FDR, 4.6 2FDR
- BRCA1 60%
- BRCA2 30%
- Lynch II Syndrome (HNPCC) 13%
- Endometriosis 3%
- Infertility/Nulliparity
- PCOS

Protective Factors

- Prophylactic salpingectomy- OPPORTUNISTIC
- Oophorectomy
- Oral contraceptives
 - Risk reduction proportional to duration of use
 - Large cohort, n=103,551
 - Ever-users RR=0.6 (95% CI 0.5-0.7)
 - Long-term users (≥15 years) RR=0.1 (95% CI 0.01-0.6)
 - Lesser protection with progestin-only methods
- Tubal ligation
- Pregnancy

Kumle, Br J Cancer; 2004.

Occult RRSO malignancy is often tubal

Table 2. Frequency of tubal intra-epithelial carcinoma in women with BRCA mutations

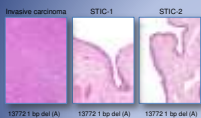
Authors	Number	Cancer (%)	Fallopian tube (%)	Comments
Fujita ²⁷	122	7.36	8.96	
Chapman ²⁸	152	2	0	All classified as stage I only
Good ²⁹	36	5	0	One classified as postmenopausal
Prasad ³⁰	21	7	8.33	Three additional cases classified as stage
Goodman ³¹	12	2.5	2.78	Two cases involved BRCA2
TAG ³²	402	28	15	

Table 3. Occurrence of Non PT in Patients With Invasive Tubal Carcinoma and in High-Risk Patients

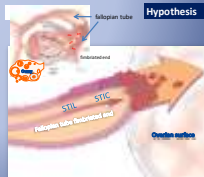
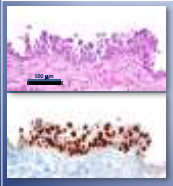
Study	No. of Patients	BRCA Mutation Status		Fallopian Tube Carcinoma		Incidence of PT	
		No.	%	No.	%	No.	%
Lynch et al ³³	112	BRCA1, 49	43	39/112	34.8	32	28.6
		BRCA2, 32	28				
		Not BRCA1/2, 30	26				
		Unknown, 1	1				
Prasad et al ³⁰	100	BRCA1, 24	20	20/100	20	20	
		BRCA2, 80	64				
Goldman et al ³¹	122	BRCA1, 88	73	73/122	59.8	73	59.8
		BRCA2, 32	26				
		Not reported, 2	2				



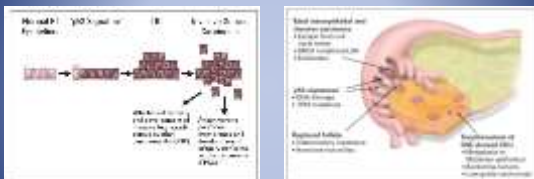
Serous Tubal Intra-epithelial Carcinoma (STIC) has same TP53 mutations as invasive tumors



- Not circumstantial
- Quite convincing
- Precursor lesion identified



Models of 'Ovarian' Tumorigenesis

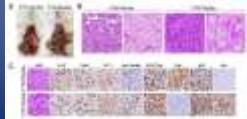
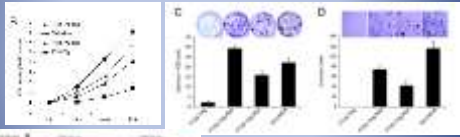


Levanon K et al JCO 2008

Modeling high-grade serous ovarian carcinogenesis from the fallopian tube

Allen M. Katz¹, Karen Lewtas^{1,2}, and Kevyn Dugan^{1,2,3}

- FTSEC can be dissociated from fresh tissue and grown in culture
- Viral oncogenic transformation leads to increase proliferation, colony formation, and growth on soft agar
- Phenotype mimics HGSOEC based on morphology and IHC



- FTSEC can be transformed to mimic HGSOEC
- Excellent and elegant model created

FTSEC | MV2A-2P1 | 10-100 | 10-12 | 10-12

New Prevention Strategy

- Oral contraceptives when not pregnant
- Salpingectomy after last child
- Salpingectomy during any abdominal surgery
- Genetic testing
- Salpingo-Oophorectomy for genetic high-risk individuals near menopause
- Early detection with symptoms
 - Abd distension, early satiety, fatigue, abd pelvic pain

Cancer Statistics 2025

Estimated number of new cancer cases in the US in 2025

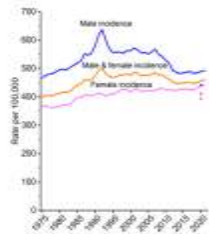


Male			Female		
Prostate	117,780	13%	Breast	136,350	12%
Lung & bronch	110,880	12%	Lung & bronch	115,830	12%
Colon & rectum	81,860	9%	Colon & rectum	71,830	7%
Urinary bladder	65,980	7%	Stomach/esophagus	69,220	7%
Melanoma of the skin	62,500	7%	Melanoma of the skin	44,410	4%
Kidney & renal pelvis	52,430	6%	Non-Hodgkin lymphoma	15,230	1%
Non-Hodgkin lymphoma	45,540	5%	Pancreas	12,490	1%
Oral cavity & pharynx	41,580	5%	Thyroid	11,700	1%
Leukemia	35,720	4%	Kidney & renal pelvis	10,530	1%
Pancreas	34,250	4%	Leukemia	28,130	3%
All sites	1,853,150		All sites	998,460	

Source: American Cancer Society, Cancer Statistics 2025
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Cancer Statistics 2025

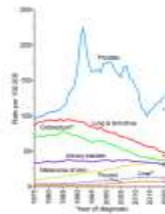
Trends in cancer incidence rates, US, 1975–2021

American
Cancer
Society

Rate per 100,000 is SEER cancer incidence rates, age-adjusted for males, females, and both sexes combined, based on 1975–2021 cancer incidence data. Data source: Surveillance Epidemiology and End Results program, National Cancer Institute, SEER. ©2024 American Cancer Society, Inc. For educational and public health purposes.

Cancer Statistics 2025

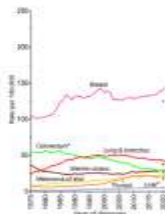
Trends in cancer incidence rates among males, US, 1975–2021

American
Cancer
Society

Rate is age-adjusted to 2000 US standard population and adjusted for delay in reporting. Incidence rates in 2021 are preliminary and may change. Data source: Surveillance Epidemiology and End Results program, National Cancer Institute, SEER. ©2024 American Cancer Society, Inc. For educational and public health purposes.

Cancer Statistics 2025

Trends in cancer incidence rates among females, US, 1975–2021

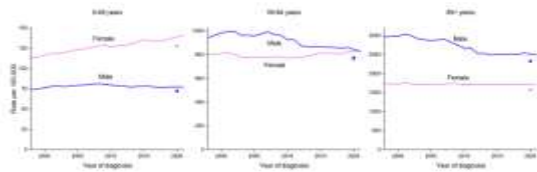
American
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Society

Rate is age-adjusted to 2000 US standard population and adjusted for delay in reporting. Incidence rates in 2021 are preliminary and may change. Data source: Surveillance Epidemiology and End Results program, National Cancer Institute, SEER. ©2024 American Cancer Society, Inc. For educational and public health purposes.

Cancer Statistics 2025

Trends in cancer incidence rates by sex and age, 1999-2021

American Cancer Society

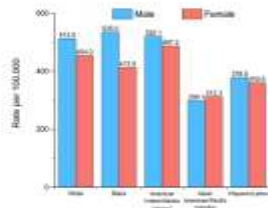


Based on age 15-49 in the 2017-21 age-standardized and age-standardized to non-Hispanic Whites. Data are shown as age-standardized rates.

Cancer Statistics 2025

Cancer incidence rates by race and ethnicity, US, 2017-2021

American Cancer Society



Rate is age-adjusted (2017-21 standard population) and age-standardized to non-Hispanic Whites. Data are shown as age-standardized rates.

Cancer Statistics 2025

Lifetime probability of developing cancer for males, US, 2010-2019, 2021

American Cancer Society

Site	Risk
All sites ^a	1 in 3 (33.9%)
Prostate	1 in 8 (12.8%)
Lung & bronchus	1 in 17 (5.9%)
Colon & rectum	1 in 24 (4.1%)
Melanoma of the skin ^b	1 in 29 (3.5%)
Kidney & renal pelvis	1 in 45 (2.2%)

Risk is based on all ages and sexes of the general population. Risk is based on the 2010-2019 period. Data are shown as age-standardized rates.

Source: American Cancer Society, Inc. (2021) and National Cancer Institute.

[Close this link](#)

Lifetime probability of developing cancer for females, US, 2018-2019, 2021



Site	Risk
All sites ^a	1 in 3 (38.8%)
Breast	1 in 8 (12.5%)
Lung & bronchus	1 in 10 (5.4%)
Colon & rectum	1 in 26 (3.9%)
Uterine corpus	1 in 32 (3.1%)
Melanoma of the skin ^b	1 in 40 (2.5%)

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Exercise 10.10 *Write a function that takes a list of numbers and returns the sum of the squares of the numbers.*

Trends in five-year relative survival (%), US, 1975-2020

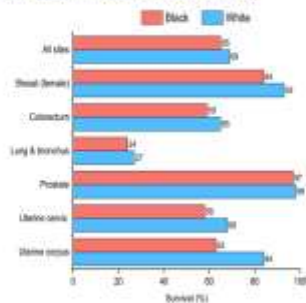


Site	1975-77	1995-97	2004-2007
All sites	49	93	95
Breast (female)	75	87	91
Colon & rectum	50	81	64
Leukemia	34	46	67
Liver & intrahepatic bile duct	1	7	22
Lung & bronchus	22	15	27
Melanoma of the skin	82	91	94
Non-Hodgkin lymphoma	47	56	74
Ovary	38	43	51
Pancreas	3	4	13
Prostate	68	97	97
Uterine cervix	69	73	67
Uterine corpus	67	84	81

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Summer 2024 Edition

Five-year relative survival (%) by race, US, 2014-2020



Journal of Management Information Systems, 2010, Vol. 27, No. 4, pp. 569-590
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Cancer Statistics 2025

Estimated number of new cancer deaths in the US in 2025

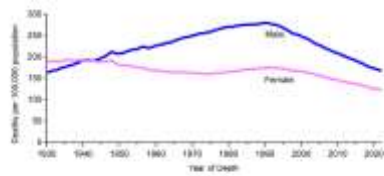


Male			Female		
Long & bronchus	64,319	28%	Long & bronchus	40,340	21%
Prostate	35,778	15%	Breast	41,179	21%
Colon & rectum	35,303	15%	Pancreas	24,328	12%
Pancreas	27,850	12%	Colon & rectum	24,000	12%
Liver & intrahepatic bile duct	19,218	8%	Uterine corpus	13,860	7%
Leukemia	15,509	7%	Ovary	11,738	6%
Esophagus	12,943	6%	Liver & intrahepatic bile duct	10,888	6%
Urinary bladder	12,883	6%	Leukemia	10,040	5%
Non-Hodgkin lymphoma	11,660	5%	Non-Hodgkin lymphoma	8,238	4%
Brain & other nervous system	10,175	4%	Brain & other nervous system	8,168	4%
All sites	223,360		All sites	214,128	

Includes thyroid, stomach, and esophageal cancer deaths for both sexes combined.
Source: Cancer Statistics 2025.
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Cancer Statistics 2025

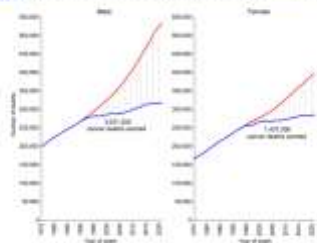
Trends in cancer death rates, US, 1975–2022



Relative age-adjusted death rate (95% confidence interval).
Source: Cancer Statistics 2025.
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Cancer Statistics 2025

Total number of cancer deaths averted in men (1991 onward) and women (1992 onward), US

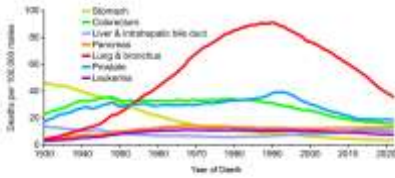


Modeling for population-based estimates of cancer deaths averted each year, and the number of people who would have died from cancer if no progress had been made in reducing cancer death rates since 1991.
Source: Cancer Statistics 2025.
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Cancer Statistics 2025

Trends in cancer death rates among males, US, 1930-2022

American Cancer Society



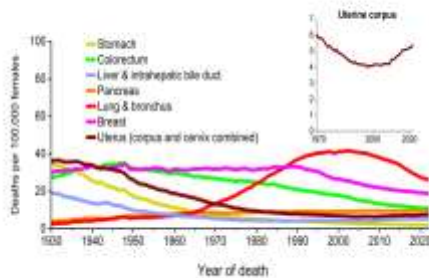
These are age-adjusted death rates for the United States population, excluding Puerto Rico and other territories. There are important considerations for specific information about cancer and mortality rates, including the impact of changes in the definition of cancer, changes in the way cancer is diagnosed, and changes in the way cancer is treated. Information on National Cancer Institute's Cancer Facts and Figures website.

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Cancer Statistics 2025

Trends in cancer death rates among females, US, 1930-2022

American Cancer Society



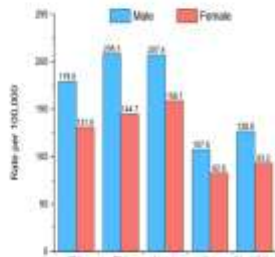
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Cancer Statistics 2025

Cancer death rates by race and ethnicity, US, 2018-2022

American Cancer Society

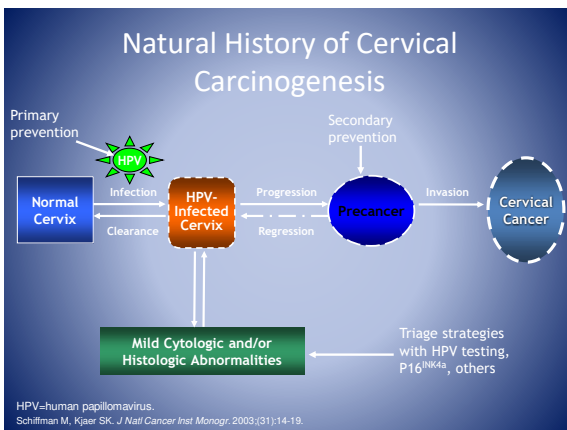


Rate is age-adjusted (2018-2022) population standardized for age by sex. Rates are presented by race and ethnicity. There are important considerations for specific information about cancer and mortality rates, including the impact of changes in the definition of cancer, changes in the way cancer is diagnosed, and changes in the way cancer is treated. Information on National Cancer Institute's Cancer Facts and Figures website.

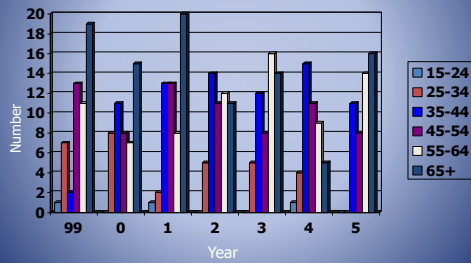
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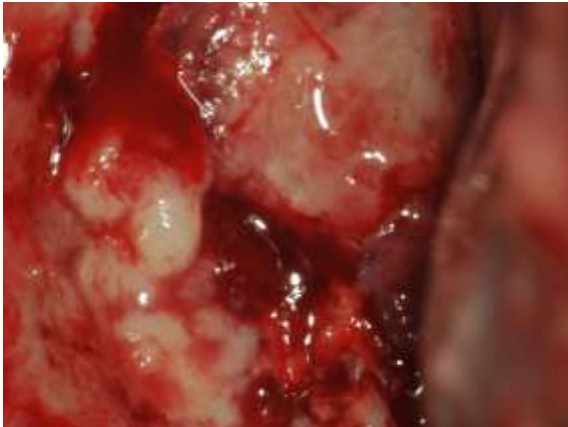




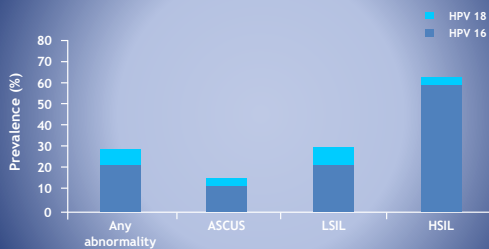


Cervical Cancer Deaths Oklahoma



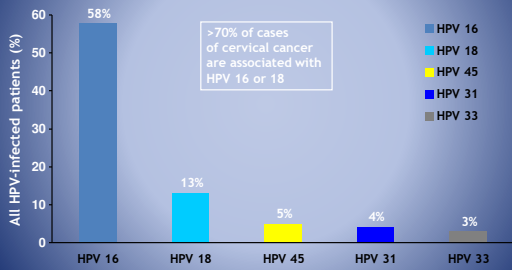


HPV 16 and 18 Prevalence by Cytology Sentinel Surveillance (2003-2004)



ACSUS=atypical squamous cells of undetermined significance; HSIL=high-grade squamous intraepithelial lesion; LSIL=low-grade squamous intraepithelial lesion.
Centers for Disease Control and Prevention, preliminary/unpublished data.
Modified from Advisory Committee on Immunization Practices, June 2006.
Available at <http://www.cdc.gov/nip/ACIP/slides/mtg-slides-jun06.htm#hpv>. Accessed on March 3, 2007.

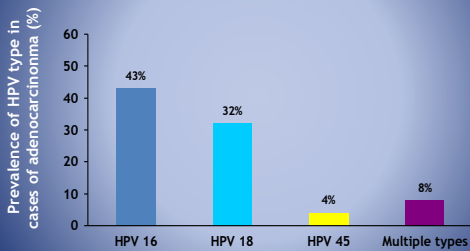
Most Prevalent HPV Types That Cause Cervical Squamous Cancer



N=1918 patients.

Munoz et al. *N Engl J Med*. 2003;348:518-527. Based on a worldwide survey.

Most Prevalent HPV Types That Cause Cervical Adenocarcinoma



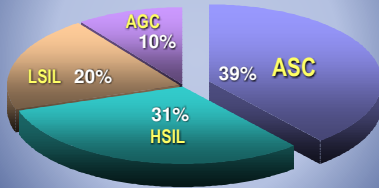
HPV DNA was detected in 93% of patients with cervical adenocarcinoma.

Castellsague X et al. *J Natl Cancer Inst*. 2006;98:303-315.

Absolute Risk of CIN 2+

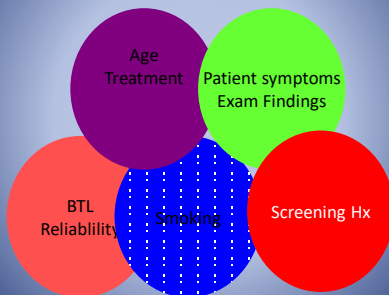
- CIN 1 post LSIL – 12%
- ASC/HPV+ = LSIL = 25%
- ASC-H- 25-40%
- AGC – 30-50%
- HSIL- 60-80%
- HSIL pap and Low Grade Colpo = 40%
- HSIL and High Grade colpo = 70-85%
- Post LEEP for CIN 3 = 5-15%
- Post Cone for AIS = 8%

Pap Diagnoses Preceding Histologic High-Grade Neoplasia



Modified from Kinney W, et al. *Obstet Gynecol*. 1998;91: 973-976.

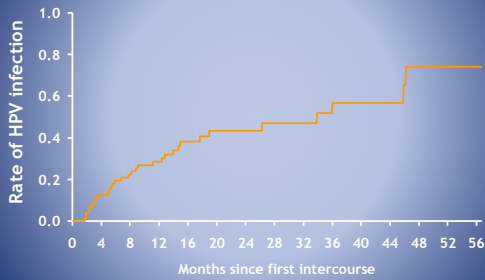
Risk of Cervical Cancer



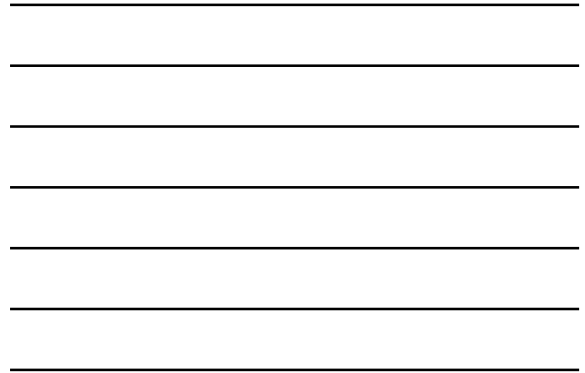
Limitations of Secondary Prevention

- Screening compliance
- Identifying true precursors from 3 million ASC and LSIL smears per year in the US
- Over treatment of patients with trivial lesions
- All of these problems are overcome if primary prevention with vaccines works

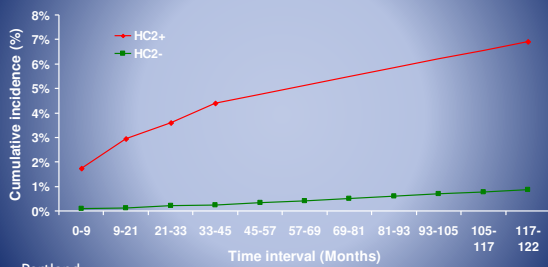
Risk of Genital HPV Infection From Time of First Sexual Intercourse



Winer RL et al. *Am J Epidemiol* 2003;157:218-226.



Cumulative Incidence of Cervical Precancer/Cancer After A Single HC2 Test

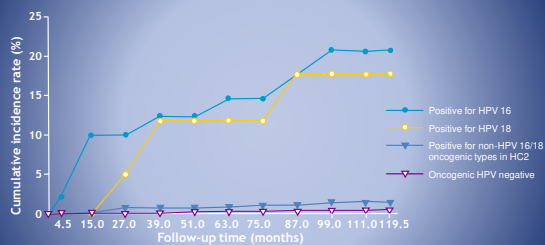


Portland

HC2=Hybrid Capture 2 HPV Test.
Sherman ME et al. *J Natl Cancer Inst*. 2003;95:46-52.



Cumulative Incidence of CIN 3+ in 12,976 Women Older Than 30 Years of Age



No. of women seen during follow-up interval												
HPV16	93	50	39	38	36	39	28	28	27	11	1	
HPV18	38	18	20	14	15	12	9	15	11	3	0	
HC2+	890	498	463	419	370	353	310	276	288	127	7	
HC2-	1224	626	525	477	423	423	461	428	414	205	13	

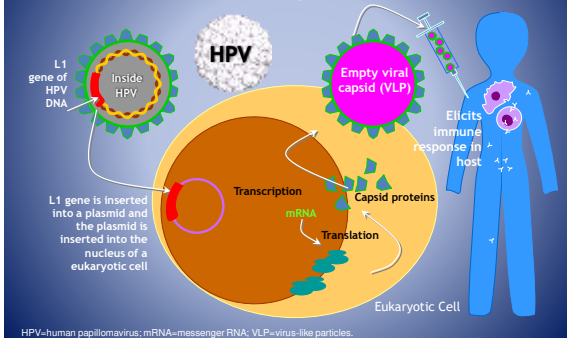
Khan MJ et al. *JAMA* 2005;293:174-181.



HPV Types in Cancer

- 16 54%
- 18 16%
- 33 4.4%
- 45 3.7%
- 31 3.5%
- 58 3.4%
- 35 1.8%
- 59 1.1%
- 56,51,39,73,68,82,

HPV L1 Virus-Like Particle (VLP) Vaccine Synthesis



Gardasil – Merck HPV 6, 11, 16, 18 vaccine SKB HPV 16-18

- FDA approved- females and males
- 9-45 yrs
- Target age 9
- Health Dept+CDC make it free
- AGE <18 VFC

Clinical Impact of HPV Infection

- Cervical cancer (CIN)
 - 60 million Pap tests
 - 3 million abnormal Paps
 - 300,000 cases of high-grade dysplasia (CIN 2/3)
 - 9710 cervical cancer cases (3700 deaths)
- Vulvar cancer (VIN) 3740 cases, 880 deaths
- Vaginal cancer (VaIN) 2420 cases, 820 deaths
- HEAD AND NECK IS FASTEST GROWING
- Anogenital warts & anal cancer in women and men
 - 1.4 million annual subject-visits for care
 - 4660 anal cancer cases

VaIN=vaginal intraepithelial neoplasia; VIN=vulvar intraepithelial neoplasia.
Source: National Cancer Institute and American Cancer Society.

Impact on Screening

- 75% reduction of cervical cancer in 25 years
 - HPV 16 – 50-60%
 - HPV 18 – 20-30%
- Decrease in CIN 3
- ASC/LSIL continue with less CIN 3
- Decrease in cost-effectiveness of cervical cytology and colpo

CA: A Cancer Journal for Clinicians. 53(1):27-43, 2003.

Endometrial Cancer

1/30 Lifetime Risk-
increasing

Cases: 69,129

Deaths: 13,250

White

- BMI 40- 10%
- MORE GRADE 1
- > 65 yrs – 80.8% 5 yr survival

Blacks

- MORE SEROUS
- ADVANCED STAGE
- >65 yrs -53.3% 5 yr survival

Etiology

- Type I- survival
 - Low Grade
 - Unopposed estrogen
 - Obesity
 - Diabetes
 - Anovulation
 - Colon cancer
- Type II- death
 - P53 – Serous carcinoma
 - Associated with breast cancer
 - Age
 - tamoxifen

Prevention

- Lean body weight
- Mirena IUD- progestin
- Aromatase inhibitors instead of tamoxifen
- Lynch syndrome screening- prophylaxis

Early Detection- OBESE POPULATION

- PROGESTIN CHALLENGE TEST
- PROVERA 10 MG X 10 DAYS PO
- Biopsy for bleeding
- LEVONORGESTREL IUD- PROGESTIN FOR LIFE
- BMI 40= 10% LESION- CANCER OR AEH
- BMI 30 – 4% (AGE)
- Endometrial hyperplasia
- ATYPICAL ENDOMETRIAL HYPERPLASIA -AEH
 - Hysterectomy
 - 40% of Atypical endometrial hyperplasia patients will have cancer
