

# Risk of second primary cancer among survivors of gynecologic cancers in the United States: A population-based study

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## Background

- In 2020 there will be an estimated 113,520 new cases of gynecological cancers (cervical, endometrial, ovarian, vaginal, and vulva) in the United States.
- Fortunately, the number of cancer survivors has been increasing due to advances in treatment, technology, and better surveillance.
- There were 16.9 million cancer survivors in the United States as of 2019, and that this number is projected to reach 22.1 million by 2030.
- Survivors of gynecologic cancers have an increased risk of developing secondary malignancies; however it is unclear which sites have higher risks.
- Objective:** We investigated the incidence and risk of secondary malignancies among survivors of gynecological cancers, stratified by cancer site, and characterized risk by latency interval.

## Methods

**Data Source:** Surveillance, Epidemiology, and End Results (SEER) 18 database (2000-2016)

**Study Population:** Survivors (n=301,210) aged 20 years or older of index gynecological (cervix uteri [cervical], corpus and uterus [endometrial], ovarian, vaginal, and vulva) cancers per the third edition of the International Classification of Diseases for Oncology

**Study Design:** Retrospective cohort

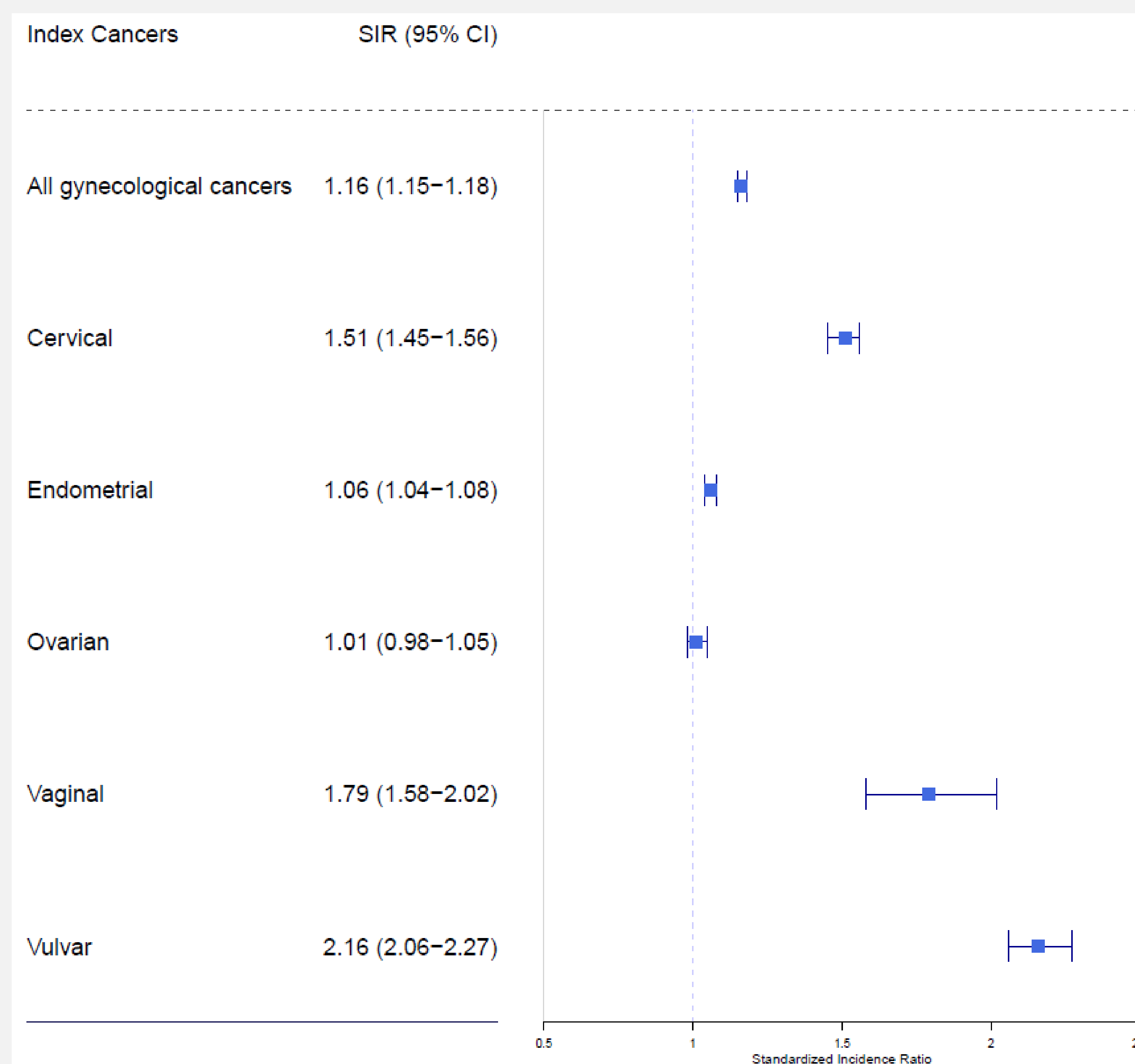
**Measures:** The primary outcome was risk of secondary malignancies (defined as the first subsequent primary cancer occurring at least 2 months after index diagnosis).

### Statistical Analysis

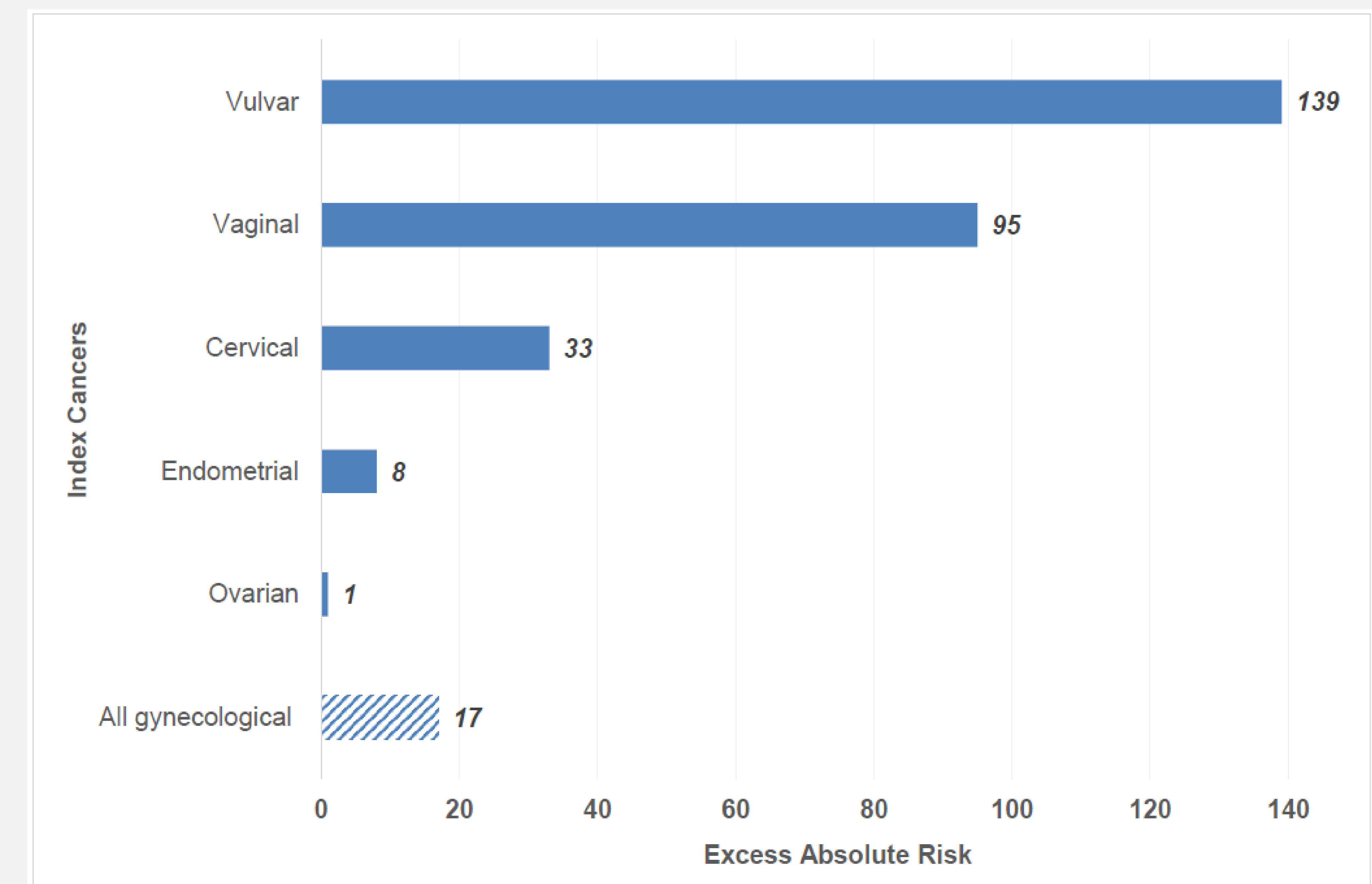
- Secondary malignancy risks were quantified using standardized incidence ratios (SIRs) and excess absolute risks (EARs) per 10,000 person-years at risk (PYR) stratify by latency period (<1 year, 1-5 years, 5-10 years, 10+ years).
- SEER\*Stat version 8.3.4 and R version 3.3.2

## Results

**Figure 1.** Risk of secondary malignancy among gynecological cancer survivors, by anatomic site of each index cancer



**Figure 2.** Burden of secondary malignancy among gynecological cancer survivors, by anatomic site of each index cancer



**Table 1.** Risk of secondary malignancies at all sites according to latency interval, SEER 2000-2016

Index Cancer site	<1year		1-4year		5-10year		10+year	
	SIR 95% CI	EAR	SIR 95% CI	EAR	SIR 95% CI	EAR	SIR 95% CI	EAR
All gynecologic	1.62 (1.57, 1.67)	61.51	1.16 (1.13, 1.18)	16.1	1.05 (1.02, 1.08)	5.15	0.96 (0.92, 1.01)	-4.35
Cervical	2.23 (2.05, 2.43)	74.45	1.56 (1.47, 1.65)	34.19	1.31 (1.22, 1.40)	21.27	1.19 (1.07, 1.32)	15.46
Endometrial	1.60 (1.54, 1.67)	65.37	1.06 (1.04, 1.09)	7.31	0.93 (0.90, 0.97)	-8.53	0.86 (0.81, 0.91)	-18.98
Ovarian	1.27 (1.18, 1.37)	27.97	0.94 (0.89, 0.99)	-6.17	1.01 (0.94, 1.09)	1.39	0.89 (0.79, 1.01)	-12.04
Vaginal	2.02 (1.51, 2.63)	121.4	1.87 (1.55, 2.22)	101.82	1.42 (1.07, 1.85)	51.41	2.04 (1.38, 2.92)	133.37
Vulvar	2.00 (1.75, 2.28)	121.13	2.27 (2.11, 2.44)	150.57	2.15 (1.95, 2.36)	138.47	1.96 (1.66, 2.29)	119.21

SEER = Surveillance, Epidemiology, and End Results; SIR = Standardized incidence ratio; EAR = Excess absolute risk per 10000 person-year at risk

## Conclusions

### Main Findings:

- 1-in-15 survivors of gynecological cancers developed a secondary malignancy.
- All index anatomic sites (except ovarian) were associated with significant risks of secondary malignancies compared with the general population
- Risk of secondary malignancies was highest within the first 5 years post-diagnosis for survivors of cervical, vulvar and vaginal cancers.

### Limitations of Study:

- Lack of information on smoking status, HPV infection, treatment type.
- Misclassification of secondary malignancy.

### Implications:

- A better understanding of secondary malignancy risk is needed to inform surveillance and prevention guidelines for survivors of gynecological cancers.