

## Appendix 1. List of Histologic Subtype Codes

Squamous: 8051-3, 8052-3, 8070-3, 8071-3, 8072-3, 8073-3, 8075-3, 8076-3, 8078-3, 8082-3, 8083-3.
Adenocarcinoma: 8140-3, 8144-3, 8210-3, 8260-3, 8261-3, 8262-3, 8263-3, 8310-3, 8380-3, 8382-3, 8384-3, 8441-3, 8460-3, 8461-3, 8480-3, 8481-3, 8482-3, 8574-3.
Adenosquamous cell: 8015-3, 8560-3.
Neuroendocrine: 8012-3, 8013-3, 8041-3, 8044-3, 8045-3, 8046-3, 8246-3.
Others: 8000-3, 8001-3, 8002-3, 8004-3, 8010-3, 8020-3, 8021-3, 8022-3, 8030-3, 8031-3, 8032-3, 8033-3, 8042-3, 8050-3, 8074-3, 8084-3, 8090-3, 8092-3, 8094-3, 8098-3, 8120-3, 8123-3, 8130-3, 8145-3, 8147-3, 8200-3, 8201-3, 8240-3, 8241-3, 8244-3, 8245-3, 8255-3, 8313-3, 8320-3, 8323-3, 8410-3, 8430-3, 8440-3, 8510-3, 8570-3, 8575-3, 8950-3, 8951-3, 8960-3, 8980-3.
Sarcoma: 8800-3, 8801-3, 8802-3, 8803-3, 8804-3, 8805-3, 8806-3, 8810-3, 8890-3, 8891-3, 8896-3, 8900-3, 8902-3, 8910-3, 8930-3, 8931-3, 8933-3, 8935-3, 8963-3, 9120-3, 9581-3.
Metastatic tumor: 8490-3, 8500-3, 8503-3, 8542-3, 8720-3, 8770-3, 8772-3, 9064-3, 9100-3, 9105-3, 9110-3, 9364-3, 9473-3, 9540-3.

Sarcoma and metastatic tumor were excluded from the study.

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**Appendix 2. Comparison of patient demographics between stage IA and IB among women aged <50 years with cervical cancer who received hysterectomy and no radiotherapy**

Characteristic	Stage IA	Stage IB	<i>P</i> -value
No.	5,526 (58.7%)	3,893 (41.3%)	
Age	38.0 (±6.5)	37.7 (±6.6)	.30
40-49	2,414 (43.7%)	1,640 (42.1%)	
30-39	2,485 (45.0%)	1,789 (46.0%)	
< 30	627 (11.3%)	464 (11.9%)	
Ethnicity			<b>.001</b>
White	3,470 (62.8%)	2,389 (61.4%)	
Black	525 (9.5%)	316 (8.1%)	
Hispanic	1,061 (19.2%)	797 (20.5%)	
Asian	321 (5.8%)	299 (7.7%)	
Others	113 (2.0%)	66 (1.7%)	
Unknown	36 (0.7%)	26 (0.7%)	
Marital status			<b>.02</b>
Single	1,290 (23.3%)	918 (23.6%)	
Others	3,977 (72.0%)	2,838 (72.9%)	
Unknown	259 (4.7%)	137 (3.5%)	
Registry Area			<b>.01</b>
West	3,157 (57.1%)	2,344 (60.2%)	
Central	1,207 (21.8%)	778 (20.0%)	
East	1,162 (21.0%)	771 (19.8%)	
Year at diagnosis			<b>&lt;.001</b>
1983-1989	776 (14.0%)	888 (22.8%)	
1990-1999	1,781 (32.2%)	1,472 (37.8%)	
2000-2009	2,396 (43.4%)	1,141 (29.3%)	
2010-2012	573 (10.4%)	392 (10.1%)	
Histology			<b>&lt;.001</b>
Squamous cell	4,150 (75.1%)	2,305 (59.2%)	
Adenocarcinoma	876 (15.9%)	1,256 (32.3%)	
Adenosquamous cell	122 (2.2%)	227 (5.8%)	
Others	378 (6.8%)	105 (2.7%)	
Grade			<b>&lt;.001</b>
1	670 (12.1%)	594 (15.3%)	
2	797 (14.4%)	1,311 (33.7%)	
3 (including high grade)	361 (6.5%)	1,060 (27.2%)	
Unknown	3,698 (66.9%)	928 (23.8%)	
Surgery type			<b>&lt;.001</b>
Total/pan/simple hyst.	4,526 (81.9%)	1,699 (43.6%)	
mRH/RH	653 (11.8%)	1,832 (47.1%)	
Others	347 (6.3%)	362 (9.3%)	
Ovarian conservation			<b>&lt;.001</b>
No	2,590 (46.9%)	2,921 (75.0%)	
Yes	2,936 (53.1%)	972 (25.0%)	

Number (%) or mean (±SD) is shown. Student *t* test and chi-square test for *P* values. Significant *P*-values are emboldened. Abbreviations: hyst, hysterectomy; mRH, modified hysterectomy; and RH, radical hysterectomy.

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**Appendix 3. Median age at cervical cancer diagnosis in women aged <50 years with stage IA disease (n=5,526)**

<b>Follow-up time (years)</b>	<b>Ovarian conservation</b>	<b>Oophorectomy</b>
15 years or longer	35	40
20 years or longer	34	39
25 years or longer	34	37

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**Appendix 4. Cause of death for women aged <50 years with stage IA cervical cancer who received hysterectomy and no radiotherapy (n=5,526)**

Characteristic	Event No.	Cumulative risk			P-value
		10-yr (%)	15-yr (%)	20-yr (%)	
Cervical cancer					.12
Oophorectomy	36	1.3%	2.0%	2.2%	
Ovarian conservation	25	1.0%	1.0%	1.2%	
Cardiovascular disease					<b>&lt;.001</b>
Oophorectomy	46	0.8%	1.7%	3.3%	
Ovarian conservation	18	0.4%	0.5%	1.2%	
Other chronic disease					<b>.005</b>
Oophorectomy	20	0.4%	1.0%	1.4%	
Ovarian conservation	6	0.1%	0.3%	0.5%	
Other causes					.051
Oophorectomy	57	1.3%	2.6%	4.0%	
Ovarian conservation	40	1.2%	1.4%	2.0%	
Other malignancies					.12
Oophorectomy	56	1.0%	2.7%	3.9%	
Ovarian conservation	42	1.0%	1.7%	2.5%	

Number (%) is shown. Log-rank test for P-values. Significant P-values are emboldened. Abbreviations: 10-yr (%), 15-yr (%), and 20-yr (%), 10-, 15-, and 20-year cumulative risk of death.

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**Appendix 5. Characteristics of ovarian conservation in women age <50 years with stage IB cervical cancer who received hysterectomy and no radiotherapy (n=3,893).**

Characteristic	Ovarian conservation	Oophorectomy	P-value
No.	972 (25.0%)	2,921 (75.0%)	
Age	35.2 (±6.1)	38.6 (±6.6)	<b>&lt;.001</b>
40-49	244 (14.9%)	1,396 (85.1%)	
30-39	556 (31.1%)	1,233 (68.9%)	
< 30	172 (37.1%)	292 (62.9%)	
Ethnicity			<b>&lt;.001</b>
White	553 (23.1%)	1,836 (76.9%)	
Black	73 (23.1%)	243 (76.9%)	
Hispanic	259 (32.5%)	538 (67.5%)	
Asian	68 (22.7%)	231 (77.3%)	
Others	11 (16.7%)	55 (83.3%)	
Unknown	8 (30.8%)	18 (69.2%)	
Marital status			<b>&lt;.001</b>
Single	294 (32.0%)	624 (68.0%)	
Others	641 (22.6%)	2,197 (77.4%)	
Unknown	37 (27.0%)	100 (73.0%)	
Registry Area			<b>.003</b>
West	630 (26.9%)	1,714 (73.1%)	
Central	166 (21.3%)	612 (78.7%)	
East	176 (22.8%)	595 (77.2%)	
Year at diagnosis			<b>&lt;.001</b>
1983-1989	48 (5.4%)	840 (94.6%)	
1990-1999	319 (21.7%)	1,153 (78.3%)	
2000-2009	431 (37.8%)	710 (62.2%)	
2010-2012	174 (44.4%)	218 (55.6%)	
Stage			<b>&lt;.001</b>
IB1	645 (28.9%)	1,585 (71.1%)	
IB2	58 (25.0%)	174 (75.0%)	
IB NOS	269 (18.8%)	1,162 (81.2%)	
Histology			<b>.46</b>
Squamous cell	574 (24.9%)	1,731 (75.1%)	
Adenocarcinoma	326 (26.0%)	930 (74.0%)	
Adenosquamous cell	49 (21.6%)	178 (78.4%)	
Others	23 (25.0%)	82 (75.0%)	
Grade			<b>.035</b>
1	172 (29.0%)	422 (71.0%)	
2	325 (24.8%)	986 (75.2%)	
3*	268 (25.3%)	792 (74.7%)	
Unknown	207 (22.3%)	721 (77.7%)	
Surgery type			<b>&lt;.001</b>
Total/pan/simple hyst.	777 (45.7%)	922 (54.3%)	
mRH/RH	0	1,832 (100%)	
Others	195 (53.9%)	167 (46.1%)	

Number (%) or mean (±SD) is shown. Student *t* test for Chi-square test for *P* values. Significant *P*-values are emboldened. \*including high grade. Abbreviations: NOS, not otherwise specified; hyst, hysterectomy; mRH, modified hysterectomy; and RH, radical hysterectomy.

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**Appendix 6. Comparison of adenocarcinoma and squamous histology in women aged <50 years with stage I cervical cancer who received ovarian conservation (n=3,715)**

No.	Adenocarcinoma n=765	Squamous n=2,950	<i>P</i> -value
Age	35.6 (±6.0)	35.8 (±6.0)	.41
40-49	221 (28.9%)	856 (29.0%)	
30-39	444 (58.0%)	1,607 (54.5%)	
< 30	100 (13.1%)	487 (16.5%)	
Ethnicity			<b>&lt; .001</b>
White	504 (65.9%)	1,760 (59.7%)	
Black	20 (2.6%)	275 (9.3%)	
Hispanic	180 (23.5%)	671 (22.7%)	
Asian	46 (6.0%)	159 (5.4%)	
Others	9 (1.2%)	66 (2.2%)	
Unknown	6 (0.8%)	19 (0.6%)	
Marital status			.08
Single	194 (25.4%)	802 (27.2%)	
Others	547 (71.5%)	2,010 (68.1%)	
Unknown	24 (3.1%)	138 (4.7%)	
Registry Area			<b>.008</b>
West	484 (63.3%)	1,787 (60.6%)	
Central	122 (15.9%)	616 (20.9%)	
East	159 (20.8%)	547 (18.5%)	
Year at diagnosis			<b>&lt;.001</b>
1983-1989	31 (4.1%)	350 (11.9%)	
1990-1999	180 (23.5%)	956 (32.4%)	
2000-2009	387 (50.6%)	1,330 (45.1%)	
2010-2012	167 (21.8%)	314 (10.6%)	
Stage			<b>&lt;.001</b>
IA	369 (48.2%)	2,283 (77.4%)	
IB	326 (42.6%)	574 (19.5%)	
I NOS	70 (9.2%)	93 (3.2%)	
Grade			<b>&lt;.001</b>
1	238 (31.1%)	262 (8.9%)	
2	194 (25.4%)	518 (17.6%)	
3*	69 (9.0%)	324 (11.0%)	
Unknown	264 (34.5%)	1,846 (62.6%)	
Surgery type			<b>&lt;.001</b>
Total/pan/simple hyst.	607 (79.3%)	2,704 (91.7%)	
Others	158 (20.7%)	246 (8.3%)	

Number (%) or mean (±SD) is shown. Student *t* test and chi-square test for *P* values. Significant *P*-values are emboldened. \*including high-grade tumors. Abbreviations: hyst, hysterectomy; mRH, modified hysterectomy; and RH, radical hysterectomy.

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**Appendix 7. Multivariable analysis for cause-specific survival among women aged <50 years with stage I cervical cancer who had ovarian conservation and no radiotherapy (n=3,715)**

	No.	5-yr (%)	10-yr (%)	Adjusted-HR (95%CI)	P-value
<b>Age</b>					
40-49	1,077	98.8%	97.7%	1	
30-39	2,051	98.8%	98.3%	0.60 (0.35-1.02)	.06
< 30	587	97.7%	97.5%	0.69 (0.34-1.40)	.31
<b>Ethnicity</b>					
Caucasian	2,264	99.0%	98.3%	1	
African American	295	98.9%	98.3%	0.81 (0.31-2.11)	.66
Hispanic	851	97.8%	97.0%	1.80 (0.99-3.24)	.05
Asian	205	96.2%	96.2%	1.89 (0.76-4.66)	.17
Others	75	100.0%	100.0%	n.a.	.98
Unknown	25	100.0%	100.0%	n.a.	.99
<b>Marital status</b>					
Single	996	98.6%	97.6%	1	
Others	2,557	98.6%	98.0%	1.01 (0.61-1.67)	.84
Unknown	162	100.0%	100.0%	n.a.	.96
<b>Registry Area</b>					
West	2,271	98.4%	97.9%	1	
Central	738	99.2%	98.4%	0.97 (0.46-2.05)	.97
East	706	98.7%	97.9%	1.43 (0.73-2.79)	.29
<b>Year at diagnosis</b>					
1983-1989	381	99.7%	99.2%	1	
1990-1999	1,136	98.0%	97.3%	1.17 (0.46-3.01)	.74
2000-2009	1,717	98.6%	98.2%	0.95 (0.35-2.54)	.92
2010-2012	481	100.0%	n.a.	n.a.	.97
<b>Cancer stage</b>					
IA	2,652	99.6%	99.0%	1	
IB	900	95.7%	94.8%	5.03 (2.68-9.43)	<b>&lt;.001</b>
I NOS	163	97.3%	97.3%	4.08 (1.57-10.6)	<b>.004</b>
<b>Histology</b>					
Squamous cell	2,950	98.7%	98.1%	1	
Adenocarcinoma	765	98.3%	97.5%	0.82 (0.43-1.56)	.55
<b>Grade</b>					
1	500	99.2%	98.1%	1	
2	712	97.8%	97.0%	1.50 (0.57-4.01)	.41
3*	393	94.3%	93.0%	3.19 (1.23-8.30)	<b>.02</b>
Unknown	2,110	99.5%	99.1%	1.10 (0.42-2.92)	.84

A Cox proportional hazard regression model for multivariable analysis. Significant P-values are emboldened. \*including high-grade tumors. Abbreviations: NOS, not otherwise specified; 5-yr (%) and 10-yr (%), 5-year and 10-year proportion, respectively.

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**Appendix 8. Characteristics of women aged <50 with stage IA cervical cancer based on performance of oophorectomy after propensity score matching (n=3,072).**

Characteristic	Ovarian conservation	Oophorectomy	P-value
No.	n=1,536	n=1,536	
Age			.92
40-49	858 (55.9%)	858 (55.9%)	
30-39	591 (38.5%)	586 (38.2%)	
< 30	87 (5.7%)	92 (6.0%)	
Ethnicity			.99
White	955 (62.2%)	955 (62.2%)	
Black	168 (10.9%)	160 (10.4%)	
Hispanic	293 (19.1%)	293 (19.1%)	
Asian	89 (5.8%)	95 (6.2%)	
Others	22 (1.4%)	25 (1.6%)	
Unknown	9 (0.6%)	8 (0.5%)	
Marital status			.81
Single	357 (23.2%)	342 (22.3%)	
Others	1,107 (72.1%)	1,121 (73.0%)	
Unknown	72 (4.7%)	73 (4.8%)	
Registry area			.69
West	847 (55.1%)	845 (55.0%)	
Central	358 (23.3%)	343 (22.3%)	
East	331 (21.5%)	348 (22.7%)	
Year at diagnosis			.80
1983-1989	193 (12.6%)	177 (11.5%)	
1990-1999	364 (23.7%)	374 (24.3%)	
2000-2009	791 (51.5%)	803 (52.3%)	
2010-2012	188 (12.2%)	182 (11.8%)	
Stage			.32
IA1	872 (56.8%)	852 (55.5%)	
IA2	499 (32.5%)	535 (34.8%)	
IA NOS	165 (10.7%)	149 (9.7%)	
Histology			.99
Squamous	1,175 (76.5%)	1,170 (76.2%)	
Adenocarcinoma	223 (14.5%)	227 (14.8%)	
Adenosquamous	27 (1.8%)	28 (1.8%)	
Others	111 (7.2%)	111 (7.2%)	
Grade			.84
1	190 (12.4%)	196 (12.8%)	
2	200 (13.0%)	212 (13.8%)	
3*	79 (5.1%)	84 (5.5%)	
Unknown	1,067 (69.5%)	1,044 (68.0%)	
Surgery type			.67
Total/pan/simple hyst	1,434 (93.4%)	1,427 (92.9%)	
Others	102 (6.6%)	109 (7.1%)	

Number (%) is shown. Univariable analysis with Fisher's exact test or chi-square test for *P*-values. \*included high-grade tumors. Abbreviations: hyst, hysterectomy; mRH, modified hysterectomy; RH, radical hysterectomy; and NOS, not otherwise specified.

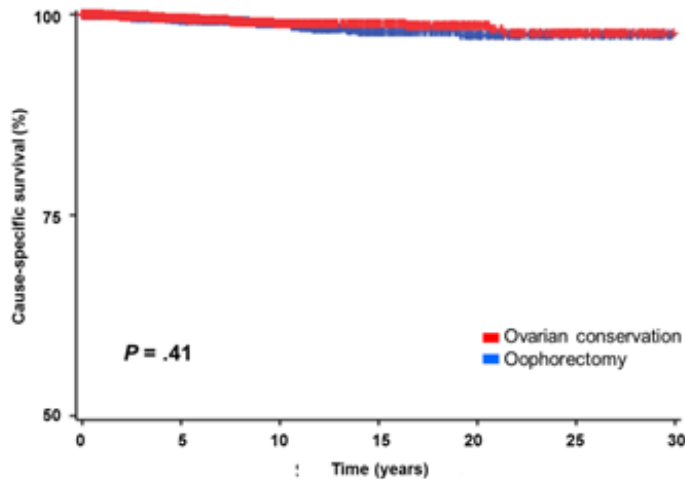
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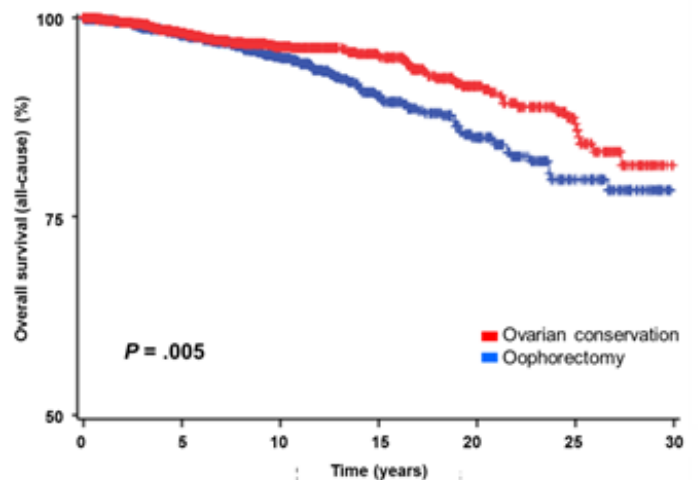


**Appendix 9. Kaplan-Meier curves for women younger than 50 years of age with stage IA cervical cancer after propensity score matching.** Log-rank test for *P* values. Y-axis was truncated to 50–100% for panels A–D and 0–50% for panels E–F. Survival curves were constructed for cause-specific survival (A), overall survival (B), and cumulative mortality risk from cardiovascular disease (C) and other chronic disease (D) for women younger than 50 years of age with stage IA cervical cancer with no radiotherapy.

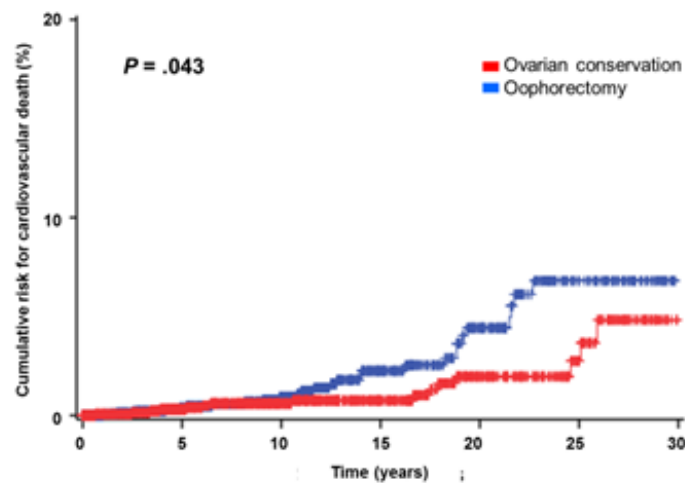
A. Stage IA (age < 50)



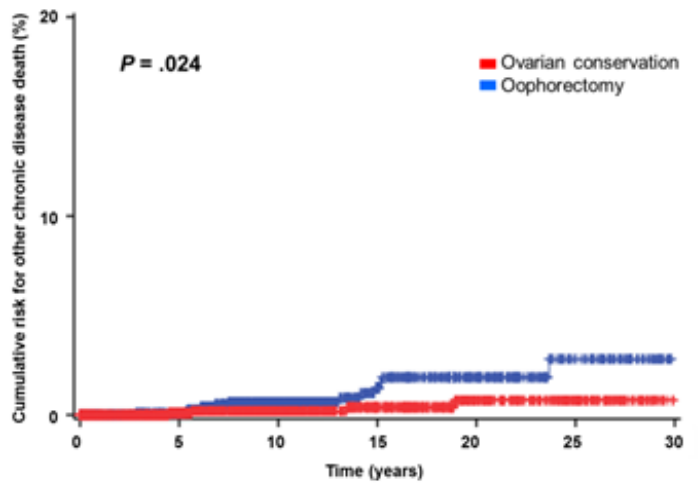
B. Stage IA (age < 50)



C. Stage IA (age < 50)



D. Stage IA (age < 50)



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