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Post-colonoscopy Colorectal Cancer in Sweden 2003–2012: Survival, Tumor Characteristics, and Risk Factors

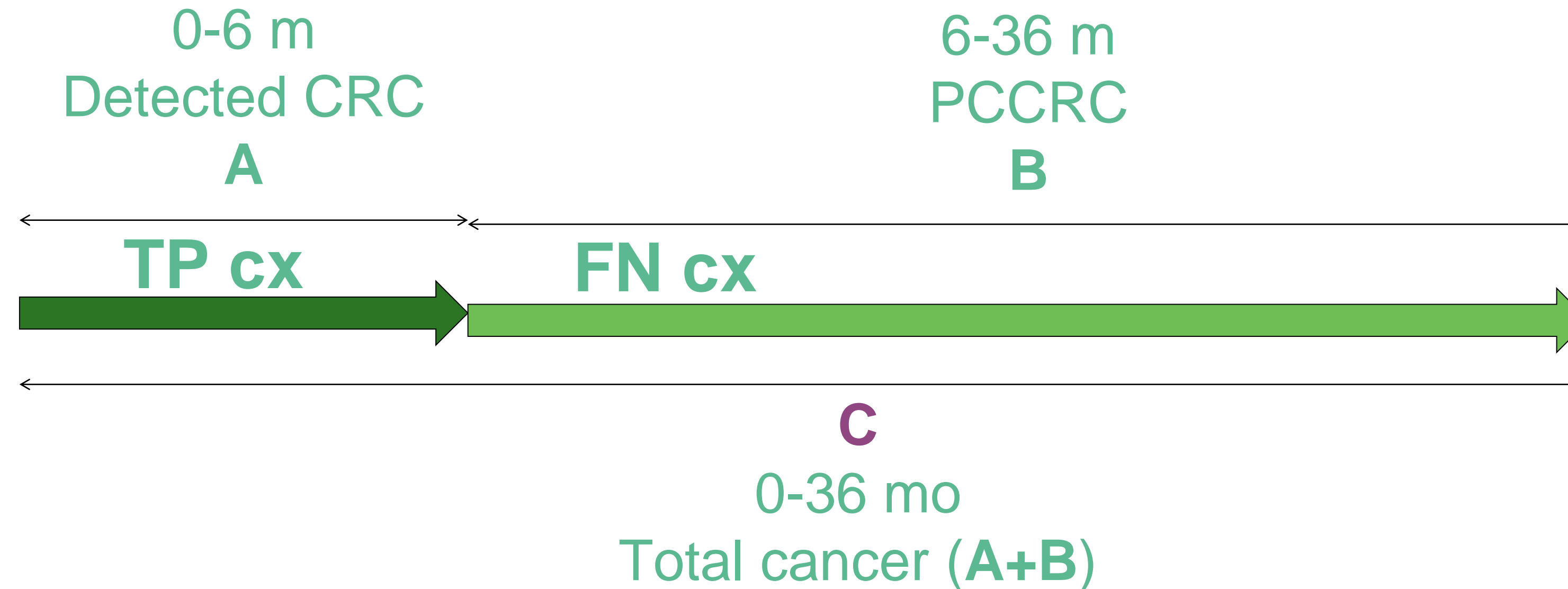
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Rate PCCRC WEO

- Colonoscopies (cx) denominator. First false negative (FN=PCCRC) and first true positive (TP) included.
- Rate PCCRC : $[\{FN/(FN + TP)\} \times 100]\%$.



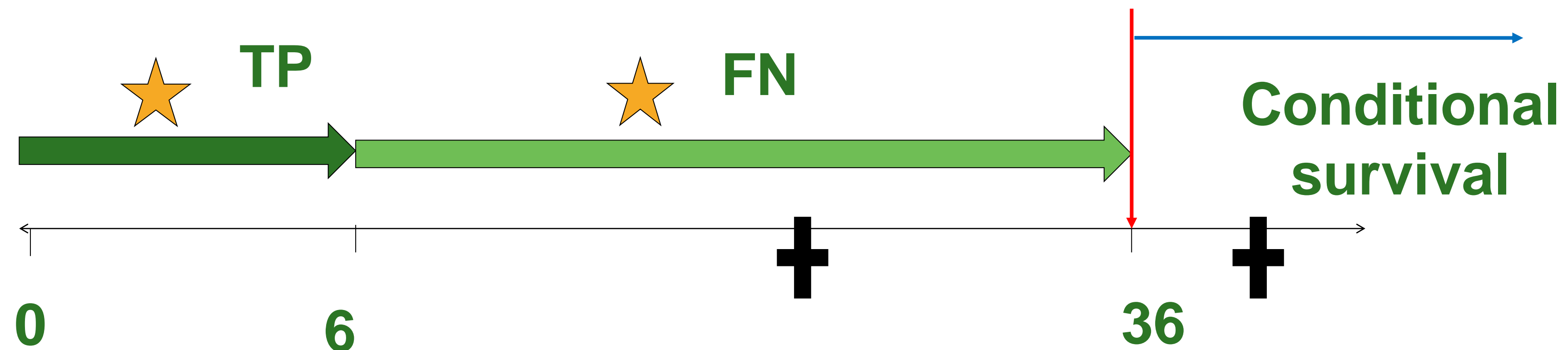
Basic data

- 1/1 2003 to 31/12 2012 Swedish registers
- 352,176 individuals (55.3% women) with at least one colonoscopy
- 458,937 colonoscopies (54.0% women) were evaluated
- N FN colonoscopies: 1,384 and N TP colonoscopies: 19,849
- Overall PCCRC-3yr rate of 7.2% for the 10-year period
- Most important risk factors for PCCRC: **prior CRC diagnosis** (RR: 3.3; 95% CI: 2.7–4.0), **UC** (RR: 5.4; 95% CI: 4.8–6.2), **Crohn's disease** (RR: 3.8; 95% CI: 3.0–4.9), and **prior polypectomy** (RR: 2.3; 95% CI: 2.0–2.7).



Survival PCCRC – avoid bias

- **Lead time bias:** the survival is measured from the date of the FN or TP colonoscopy, not from the date of cancer diagnosis
- **Immortal time bias:** conditional survival - an individual with a PCCRC must survive at least until the time of the CRC diagnosis = up to 3 years after the index colonoscopy

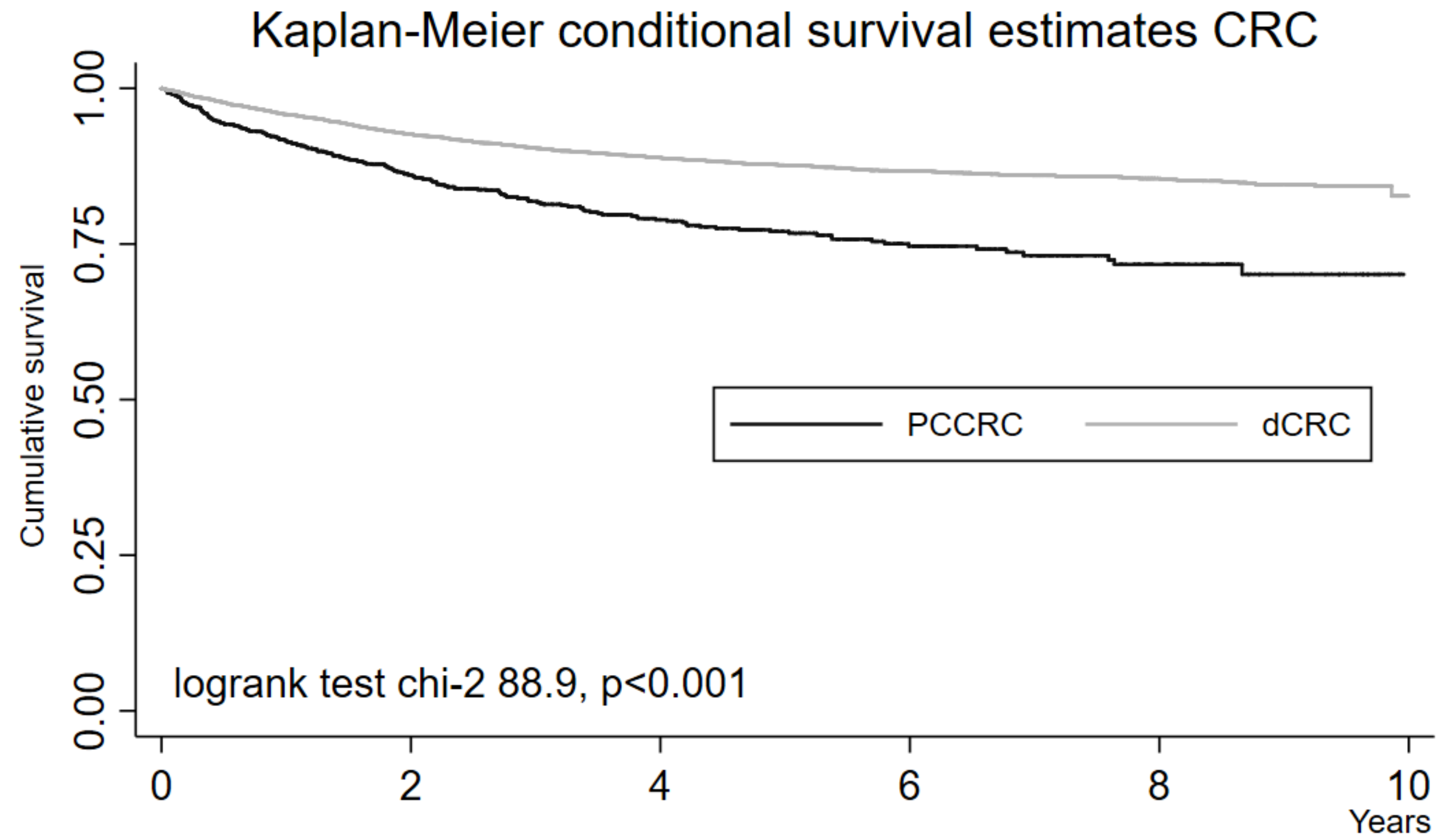


Conditional survival all stages PCCRC vs dCRC

At-risk (alive) 36 month after index colonoscopy included

5992 died **before the time of entry:**

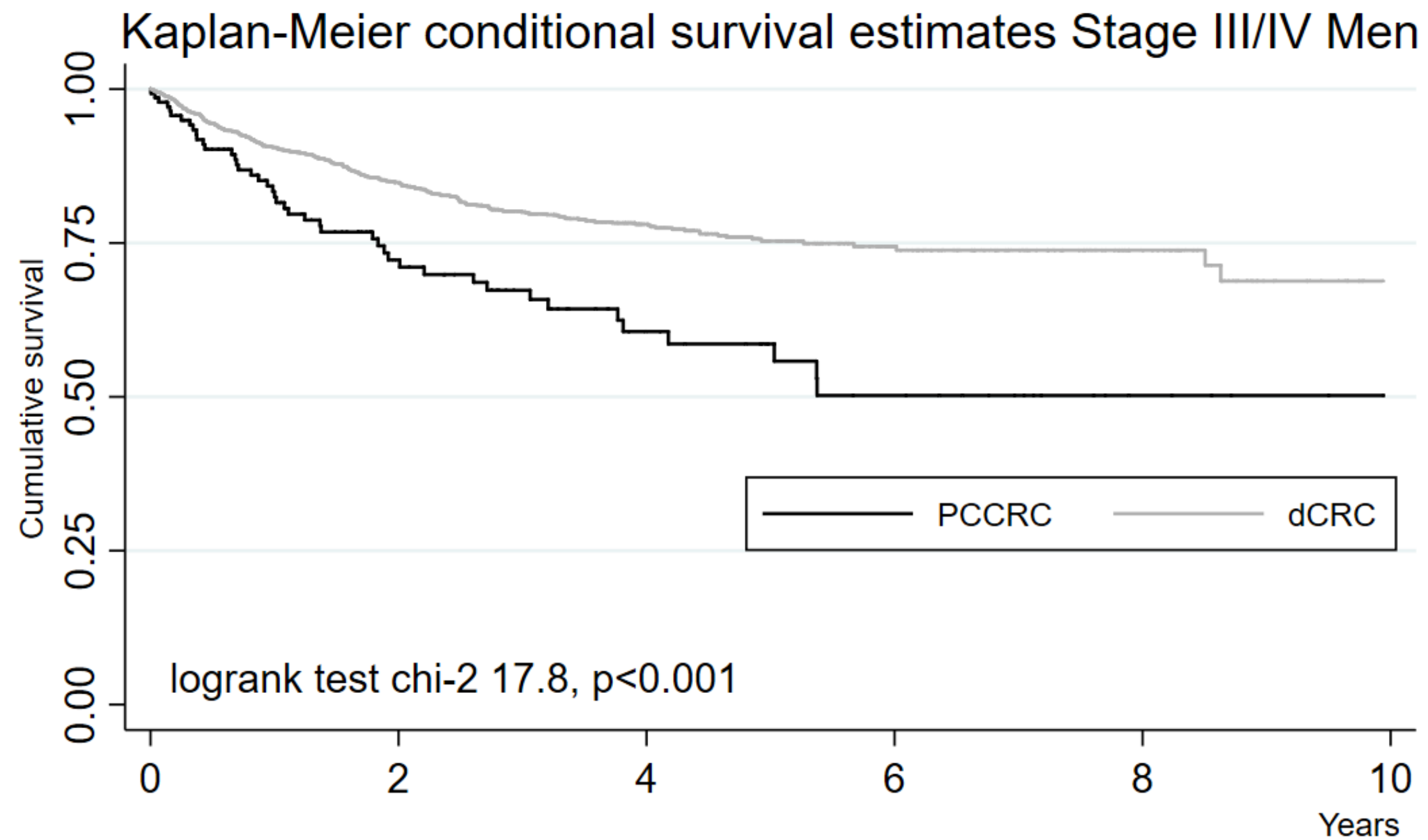
- Of men 33%, of women 29.3%
- Of PCCRC 20.2%, dCRC 32.1%
- Of T1/T2, 13.3%; T3/T4, 30.4%; undefined T stage, 65.1%



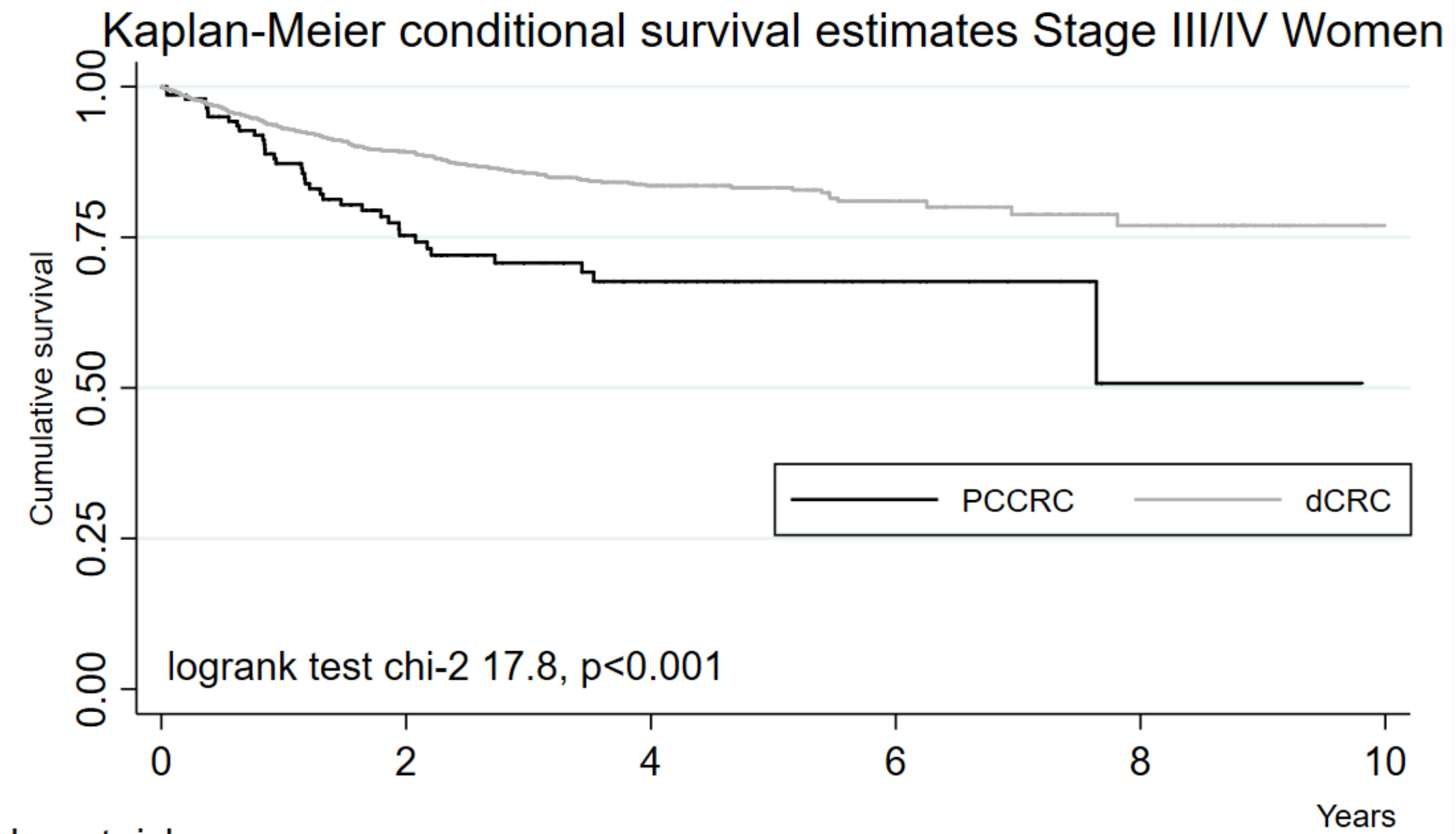
Number at risk		0	2	4	6	8	10
PCCRC	1105	650	369	191	81	0	0
dCRC	12088	7625	4645	2395	961	0	0



Conditional survival stage III/IV PCCRC vs dCRC, stratified by sex



Number at risk		0	2	4	6	8	10
PCCRC	141	62	31	17	5	0	0
dCRC	1517	790	380	122	43	0	0



Number at risk		0	2	4	6	8	10
PCCRC	147	70	36	12	1	0	0
dCRC	1396	756	389	96	41	0	0



Comparing tumour characteristics between dCRCs and PCCRCs multivariate by logistic regression, controlling for age and sex (n.s. omitted)

Covariate	Number		Multivariate		
	N dCRC	N PCCRC (%)	OR	<i>p-value</i>	95% CI
Stage I	2,222	260 (10.5%)	Ref		
II	3,757	268 (6.7%)	0.62	<0.001	0.52-0.74
III	3,304	280 (7.8%)	0.72	<0.001	0.60-0.85
IV	1,032	76 (6.9%)	0.61	<0.001	0.46-0.79
Location right	5,453	610 (10.1%)	Ref		
left	3,510	225 (6.0%)	0.55	<0.001	0.47-0.65
rectum	4,157	273 (6.2%)	0.56	<0.001	0.48-0.66
Differentiation grade high	8,485	697 (7.6%)	Ref		
low	2,145	226 (9.5%)	1.27	0.003	1.09-1.49



Cox proportional hazard model for conditional colorectal cancer specific survival for patients with detected CRC and with PCCRC, stratified by sex (n.s. omitted)

Covariate	Women			Men		
	HR	p-value	95% CI	HR	p-value	95% CI
PCCRC						
no (dCRC)	ref			ref		
yes	2.75	<0.001	2.21-3.42	2.00	<0.001	1.59-2.52
Age (continuous, per year)	1.01	<0.001	1.00-1.02	1.01	0.013	1.00-1.02
Location						
right	ref			ref		
left	1.56	<0.001	1.30-1.90	1.60	<0.001	1.36-1.88
not defined	2.23	<0.001	1.70-2.92	1.75	<0.001	1.34-2.30
T-stage						
T1/T2	ref			ref		
T3/T4	3.09	<0.001	2.43-3.92	2.57	<0.001	2.12-3.11
undefined	3.59	<0.001	2.61-4.92	2.79	<0.001	2.12-3.67



Comparing tumor characteristics between dCRCs and PCCRCs in individuals with conditional survival 36 months, univariate by Chi-2 analysis and multivariate by logistic regression (n.s omitted)

Covariate	Right-sided (n=4,107)			Left-sided (n=2,763)			Rectal (n=3,093)		
	Univariate	Multivariate		Univariate	Multivariate		Univariate	Multivariate	
	N PCCRC (%)	OR	95% CI	N PCCRC (%)	OR	95% CI	N PCCRC (%)	OR	95% CI
Stage I	112 (15.2%)***	Ref		55 (9.0%)	Ref		80 (9.3%)***	Ref	
II	150 (8.4%)	0.51***	0.39–0.66	51 (6.0%)	0.64*	0.43–0.95	39 (5.0%)	0.52**	0.35–0.77
III	147 (12.4%)	0.76*	0.58–0.99	47 (6.9%)	0.72	0.48–1.09	37 (4.6%)	0.46***	0.31–0.69
IV	26 (22.0%)	1.42	0.87–2.31	10 (9.0%)	0.94	0.46–1.90	4 (4.3%)	0.41	0.15–1.17
Free resection margin no	36 (20.9%)***	Ref		13 (10.2%)	Ref		26 (13.8%)***	Ref	
yes	425 (11.0%)	0.49***	0.33–0.71	171 (6.8%)	0.64	0.35–1.16	170 (6.3%)	0.42***	0.27–0.65
Mucinous tumor no	322 (12.2%)	Ref		137 (7.1%)	Ref		107 (6.5%)*	Ref	
yes	102 (10.0%)	0.79*	0.62–1.00	30 (9.1%)	1.30	0.86–1.97	27 (11.4%)	1.85**	1.18–2.90
Diff grade high	330 (11.1%)	Ref		143 (6.4%)**	Ref		136 (6.5%)	Ref	
low	114 (12.1%)	1.09	0.87–1.36	29 (11.2%)	1.82**	1.20–2.78	25 (8.7%)	1.37	0.88–2.14

* $P < 0.05$ ** $P < 0.01$ *** $P < 0.001$



Summary

- PCCRC worse conditional survival compared to detected CRC
- Seen across the CRC stages
- Women with PCCRC worse survival compared to men
- Different histology part of the explanation?





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World Endoscopy Organization

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