COME LO SCREENING HA MODIFICATO L'EPIDEMIOLOGIA DEL TUMORE DEL COLON-RETTO

Lauro Bucchi, Silvia Mancini
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How a faecal immunochemical test screening programme changes annual colorectal cancer incidence rates: an Italian intention-to-screen study

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British Journal of Cancer

Published online: 20 April 2022

incidenza di cancro colo-rettale nella popolazione-bersaglio: osservata vs. attesa

Effects of Attendance to an Organized Fecal Immunochemical Test Screening Program on the Risk of Colorectal Cancer: An Observational Cohort Study

Flavia Baldacchini,* Lauro Bucchi,* Orietta Giuliani,* Silvia Mancini,* Alessandra Ravaioli,* Rosa Vattiato,* Federica Zamagni,* Paolo Giorgi Rossi,‡ Lucia Mangone,‡ Cinzia Campari,§ Romano Sassatelli,|| Paolo Trande,¶ Pasqualina Esposito,# Federica Rossi,# Giuliano Carrozzi,** Omero Triossi,‡‡,a Carlo Fabbri,§§ Enrico Strocchi,|||| Mauro Giovanardi,¶¶ Debora Canuti,## Priscilla Sassoli de Bianchi,## Stefano Ferretti,*** and Fabio Falcini,*,‡‡‡ on behalf of the Emilia-Romagna Region Workgroup for Colorectal Screening Evaluation

Clinical Gastroenterology and Hepatology 2022;■:■–■

incidenza di, e mortalità da, cancro colo-rettale nelle persone aderenti vs. le persone non aderenti

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Table 1. Age-period-cohort modelling analysis of colorectal cancer incidence rates, by sex.

Sex and submodel[a]	Goodness of fit		Model comparison				
	Residual df	Residual deviance	Comparison	Interpretation	Change in df	Change in deviance	*P*-value[b]
Men							
1. Age	90	663.69					
2. Age-drift	89	460.86	2 versus 1	Trend (drift)	1	202.82	<0.001
3. Age-cohort	72	383.25	3 versus 2	Non-linear cohort effect	17	77.62	<0.001
4. Age-period	81	115.47	4 versus 2	Non-linear period effect	8	345.40	<0.001
5. Age-period-cohort	64	86.56	5 versus 3	Period effect adjusted for cohort	8	296.69	<0.001
			5 versus 4	Cohort effect adjusted for period	17	28.91	0.035
Women							
1. Age	90	317.11					
2. Age-drift	89	261.27	2 versus 1	Trend (drift)	1	55.83	<0.001
3. Age-cohort	72	217.84	3 versus 2	Non-linear cohort effect	17	43.43	<0.001
4. Age-period	81	91.27	4 versus 2	Non-linear period effect	8	170.00	<0.001
5. Age-period-cohort	64	73.71	5 versus 3	Period effect adjusted for cohort	8	144.13	<0.001
			5 versus 4	Cohort effect adjusted for period	17	17.56	0.417

Emilia-Romagna Region, Italy, 1997–2016.

Df degrees of freedom.

[a]For both sexes, five submodels (age, age-drift, age-cohort, age-period and the full age-period-cohort model) were derived. The model goodness-of-fit was evaluated based on residual deviance statistics. The age, period and birth cohort effects were derived from pairwise comparisons of the appropriate submodels. The significance of the pairwise comparisons was examined by comparing the difference in residual deviance and in degrees of freedom using the likelihood ratio test. The models 3 and 4 could not be directly compared in this way because it was not possible to construct a formal test of whether the age-cohort model was significantly better than the age-period model.

[b]Likelihood ratio test.

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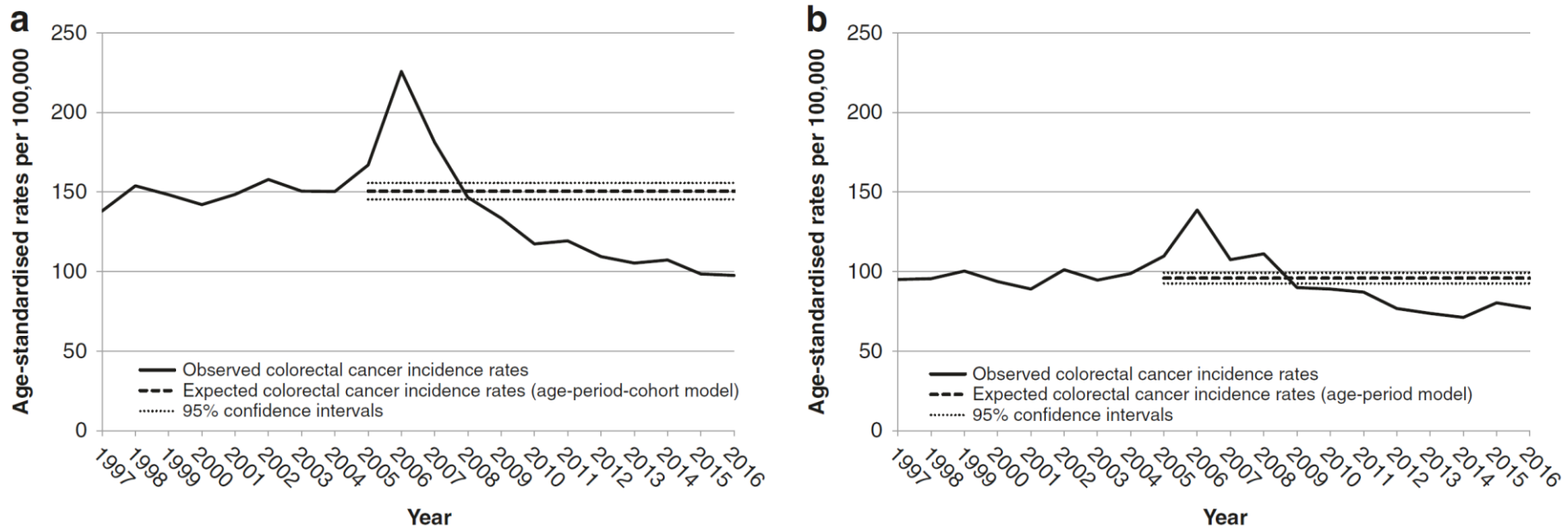

Fig. 1 Curves of observed and expected annual colorectal cancer incidence rates. The graphs show the curve of observed annual colorectal cancer incidence rates per 100,000 persons aged 50–69 years in 1997–2016 (bold line) and the curve of rates that would be expected in 2005–2016 in the absence of the organised faecal immunochemical test screening programme (dashed line) by sex (**a** men; **b** women). The dotted lines represent the 95% confidence bands around the expected annual rates. The expected annual rates were estimated by analysing the observed annual rates in 1997–2016 with an age-period-cohort model (men) and an age-period model (women). 2005 was the year of introduction of the screening programme. 2006 was the first full year of screening. All rates were age-standardised using the European standard population. Emilia-Romagna Region, Italy, 1997–2016.

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Table 2. Ratio between the observed annual colorectal cancer incidence rates per 100,000 persons aged 50–69 years in 2005–2016 and the rates that would be expected in the absence of the organised FIT screening programme, and annual and cumulative number of prevented colorectal cancer cases, by sex.

Year[a]	Men			Women		
	Incidence rate ratio [95% CI]	Annual number prevented	Cumulative number prevented	Incidence rate ratio [95% CI]	Annual number prevented	Cumulative number prevented
2005	1.11 [1.06, 1.16]	−91	−91	1.18 [1.13, 1.22]	−97	−97
2006	1.52 [1.46, 1.59]	−427	−518	1.45 [1.40, 1.51]	−249	−346
2007	1.20 [1.15, 1.25]	−163	−681	1.11 [1.07, 1.15]	−62	−408
2008	0.97 [0.93, 1.01]	21	−660	1.16 [1.12, 1.20]	−70	−478
2009	0.88 [0.85, 0.92]	77	−583	0.93 [0.89, 0.96]	32	−446
2010	0.78 [0.75, 0.81]	146	−437	0.94 [0.90, 0.97]	28	−418
2011	0.80 [0.76, 0.83]	137	−300	0.91 [0.88, 0.94]	41	−377
2012	0.73 [0.70, 0.76]	185	−115	0.80 [0.77, 0.83]	90	−287
2013	0.70 [0.67, 0.73]	204	89	0.77 [0.74, 0.80]	108	−179
2014	0.71 [0.68, 0.74]	179	268	0.74 [0.71, 0.77]	108	−71
2015	0.65 [0.62, 0.68]	220	488	0.84 [0.81, 0.87]	69	−2
2016	0.65 [0.62, 0.67]	229	717	0.81 [0.78, 0.84]	85	83

Emilia-Romagna Region, Italy, 2005–2016.

FIT faecal immunochemical test, *CI* (bootstrap-estimated) confidence interval.

[a]2005 was the year of introduction of the screening programme. 2006 was the first full year of screening. The annual incidence rates that would be expected in 2005–2016 in the absence of screening were estimated by analysing the observed annual rates in 1997–2016 with an age-period-cohort model for men and an age-period model for women, i.e. the models providing the best fit to the observed rates. In both models, the values of parameters of the non-linear period effect were set to zero. All rates were age-standardised using the European standard population.

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