UNITED EUROPEAN GASTROENTEROLOGY

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What communities gain from colorectal cancer screening

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Presentation by

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Interests of communities

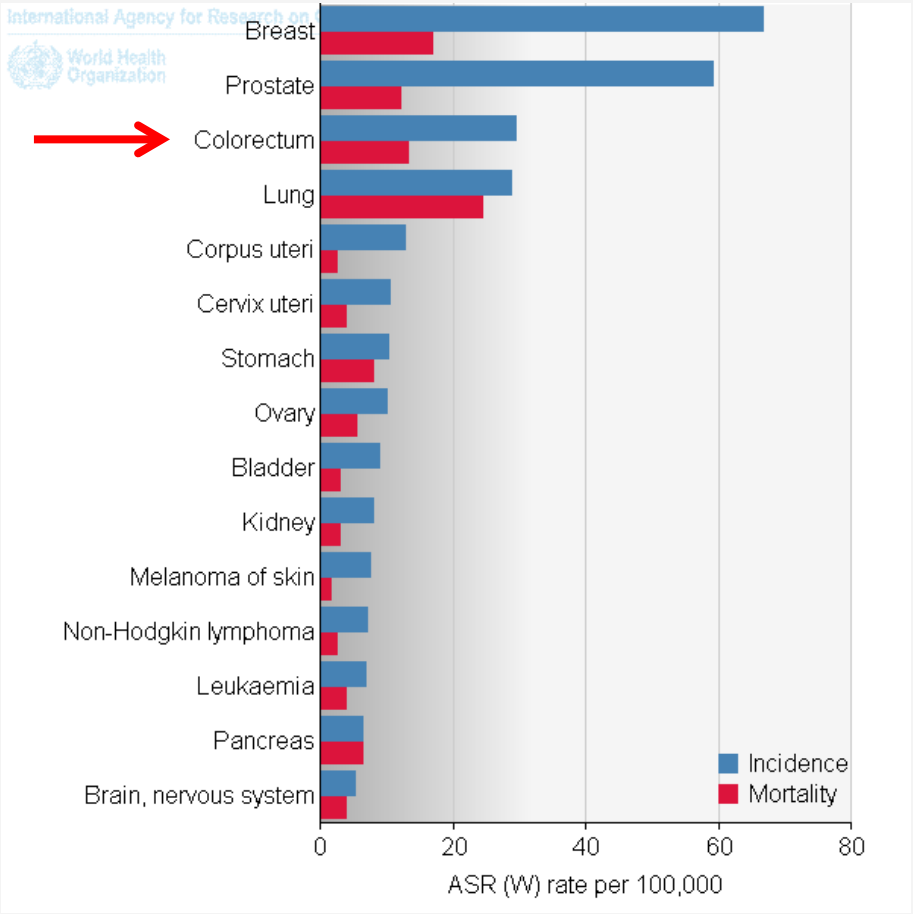
- **Good health of members of the community**
  - Low mortality
  - Low morbidity
  - Low loss of production because of illness

  ⇒ importance of colorectal cancer ?

- **Low costs due to health care**
  - Costs of colorectal cancer treatment
    - Surgery
    - radiotherapy
    - Chemotherapy
  - Screening costs

  ⇒ Screening of colorectal cancer cost-effective ?

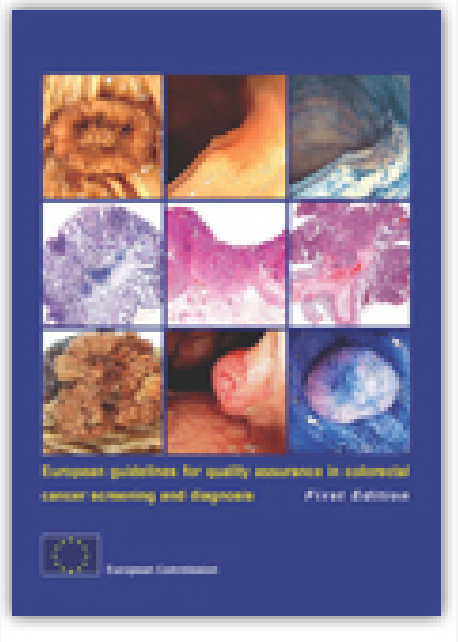
Colorectal Cancer in Europe: the current situation



Globocan 2008 (IARC)

=> Colorectal Cancer is the 3rd most common cancer in Europe

Colorectal Cancer Screening - facts



- Colorectal cancer screening is recommended by several societies and institutions including the European commission
- Nearly all colorectal cancers develop from adenomatous polyps
- It takes about 10 years for an adenoma to become a cancer
- Removal of adenomas prevents cancer formation

Colorectal Cancer Screening – CRC related mortality reduction by FOBT

	mortality reduction		
	biennial	annual	screened participants
Minnesota 47.000/18 years	21%	33%	45%
Funen 140.000/13 years	18%	–	30%
Nottingham 153.000/11 years	13%	–	27%
Burgundy 91.000/11 years	16%	–	33%

Winawer et al. Gastroenterology 1997, Jorgensen et al. Gut 2002, Scholefield et al. Gut 2002, Faivre et al. Gastroenterology 2004

Colorectal Cancer Screening – Stage shift by FOBT

Dukes stage	control-group (%)	screening-group (%)	screened participants (%)	5-year-survival (%)
A	11	22	30	94
B	37	34	33	84
C	23	19	20	57
D	24	20	13	2
unknown	5	5	4	

Kronborg et al. Lancet 1996

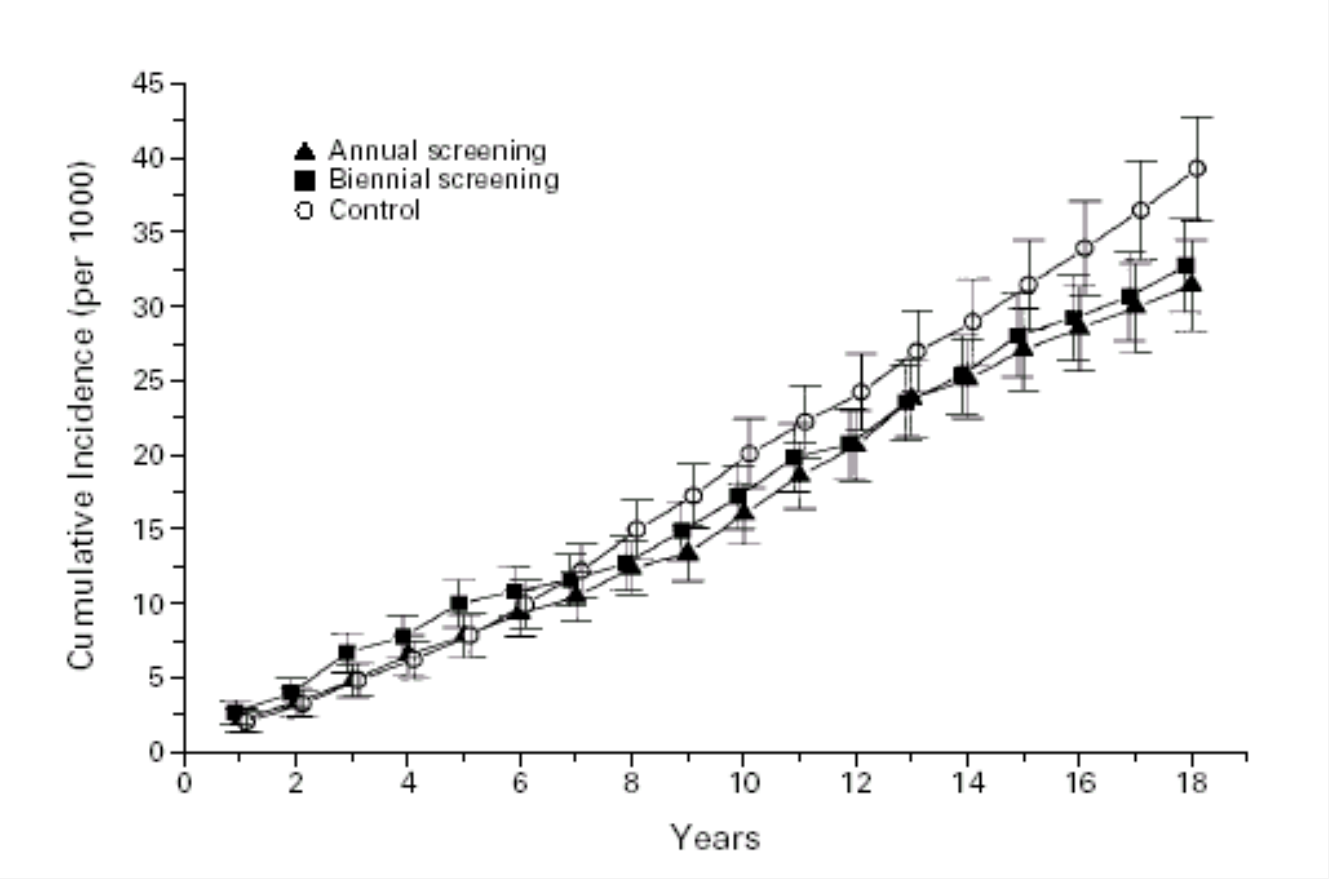
Colorectal Cancer Screening – effect of FOBT on CRC incidence ?

cumulative incidence ratio:

controls: 1.00

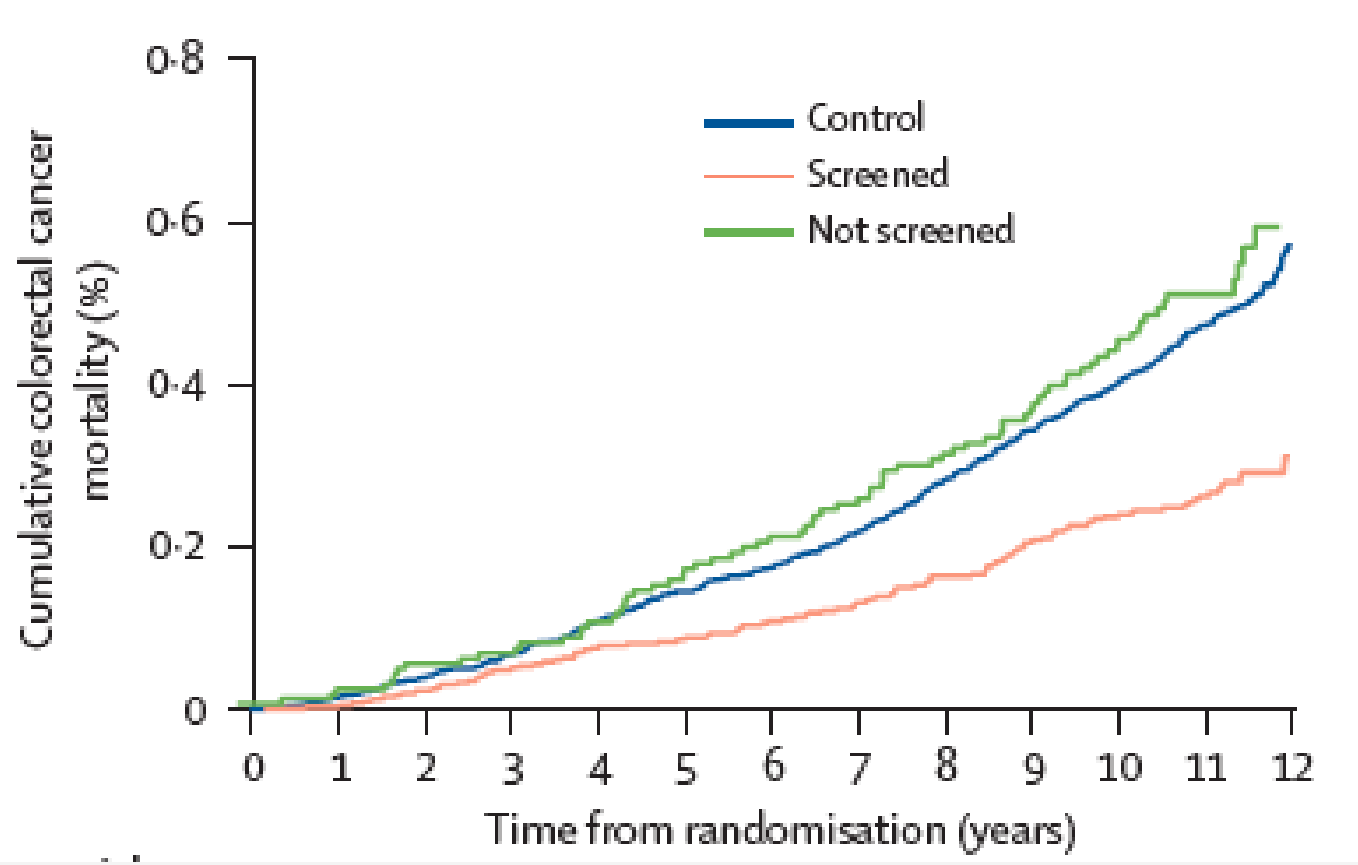
FOBT Annual 0.80

FOBT biennual 0.83



Mandel et al. N Engl J Med 2000

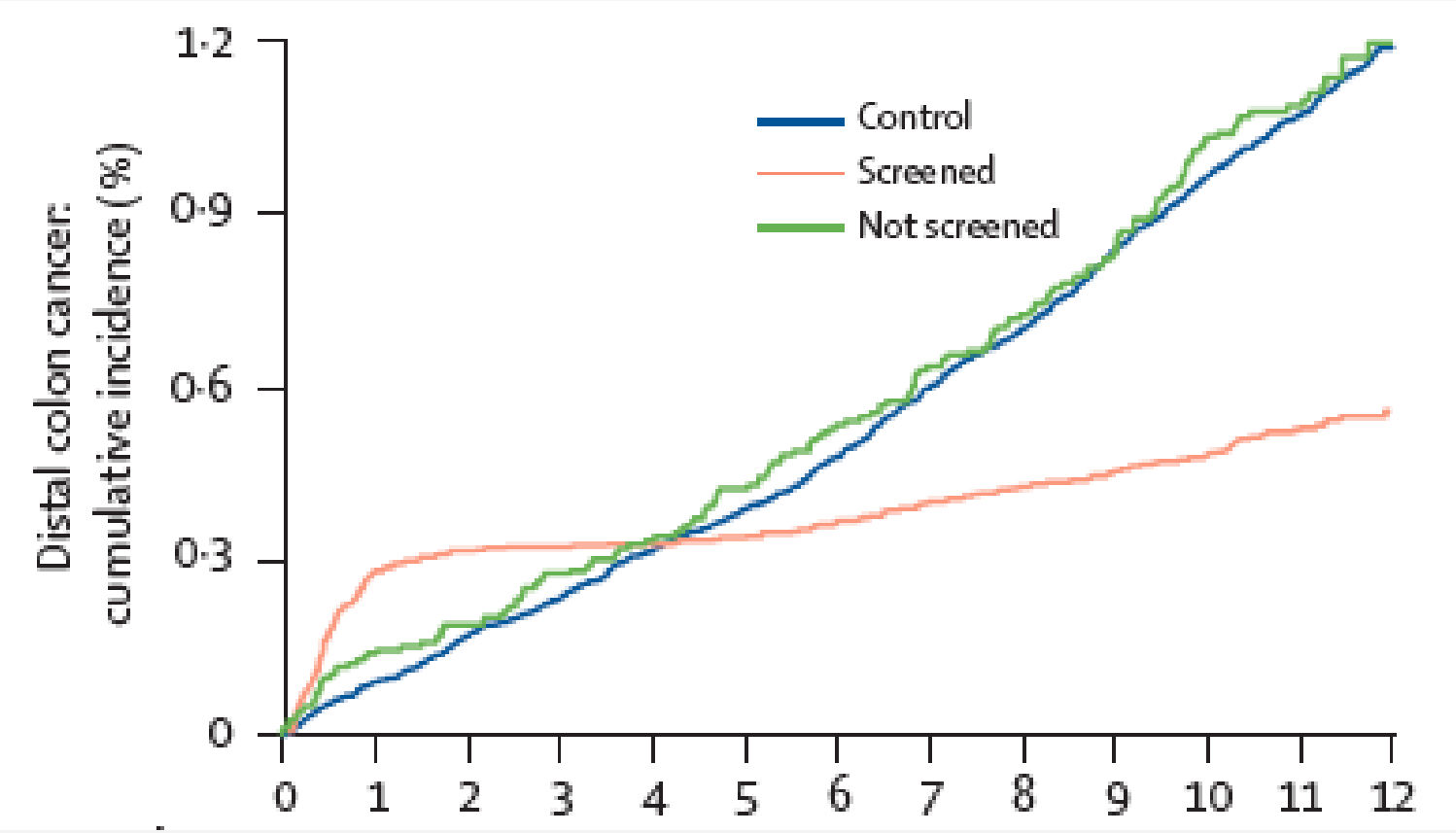
Colorectal Cancer Screening – Mortality reduction by endoscopy



=> CRC-related mortality reduction of 43%

Atkin et al. Lancet 2010;375:1624-33

Colorectal Cancer Screening – Incidence reduction by endoscopy



=> Reduction of distal CRC by 50%

Atkin et al. Lancet 2010;375:1624-33

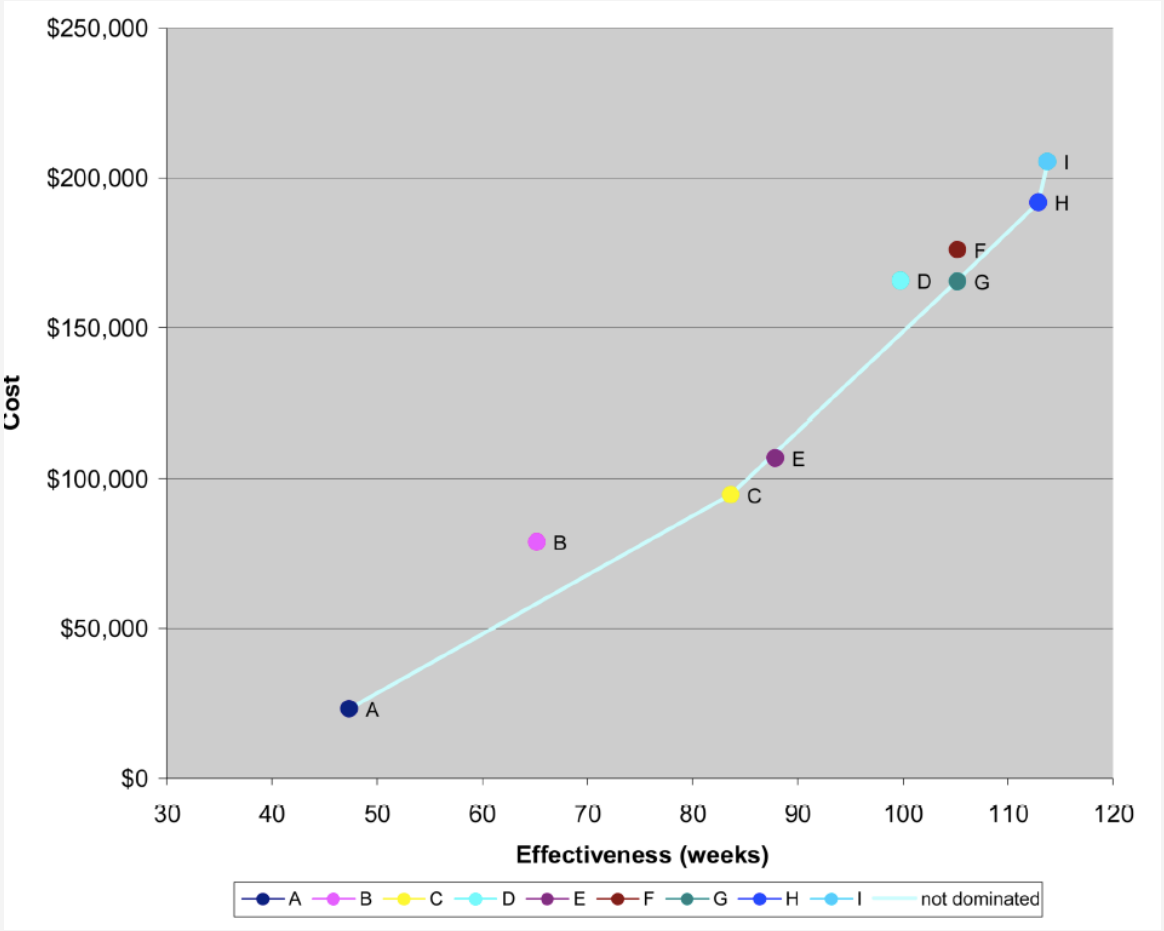
Colorectal Cancer – costs of screen vs. symptom detected cancers

Time from diagnosis (*mo*) by stage	n	Cost, screen-detected ($)	95% confidence interval ($)	n	Cost, symptom-detected ($)	95% confidence interval ($)
−3 to 0						
In situ	23	5872[a]	4035–7709	28	6419	2277–10,560
Dukes' A	83	6586[a]	5117–8054	174	7733	6456–9010
Dukes' B	46	7282[b]	5225–9338	225	11,682	10,364–13,000
Dukes' C	39	9532[a]	6945–12,120	142	9832	8413–11,250
Dukes' D	10	8819[a]	0–17,791	117	13,012	8240–17,784
0 to 12						
In situ	23	14,575[a]	6400–22,750	28	15,839	8597–23,082
Dukes' A	83	17,267[b]	14,378–20,156	174	23,310	20,717–25,903
Dukes' B	46	28,040[a]	21,776–34,304	225	33,800	27,718–39,882
Dukes' C	39	30,864[a]	24,726–37,002	142	34,048	30,608–37,488
Dukes' D	10	36,865[a]	10,276–63,455	117	29,749	24,052–35,447
Total (−3 to 12)						
In situ	23	16,009[a]	7783–24,235	28	17,338	9884–24,792
Dukes' A	83	18,357[b]	15,444–21,270	174	25,380	22,549–28,212
Dukes' B	46	29,367[a]	22,880–35,854	225	35,651	29,522–41,781
Dukes' C	39	32,274[a]	26,118–38,430	142	35,063	31,580–38,546
Dukes' D	10	38,221[a]	10,710–65,732	117	31,502	25,806–37,198
All stages	201	24,636[b]	21,614–27,657	686	31,128	28,715–33,540

P value for difference in costs for persons with screen- versus symptom-detected cancers. The number alive at month 6 was used to determine the number for statistical comparison for the 0–12-month and −3- to 12-month costs.
Difference between screen-detected and symptom-detected groups: [a]$P > 0.05$, [b]$P < 0.001$.

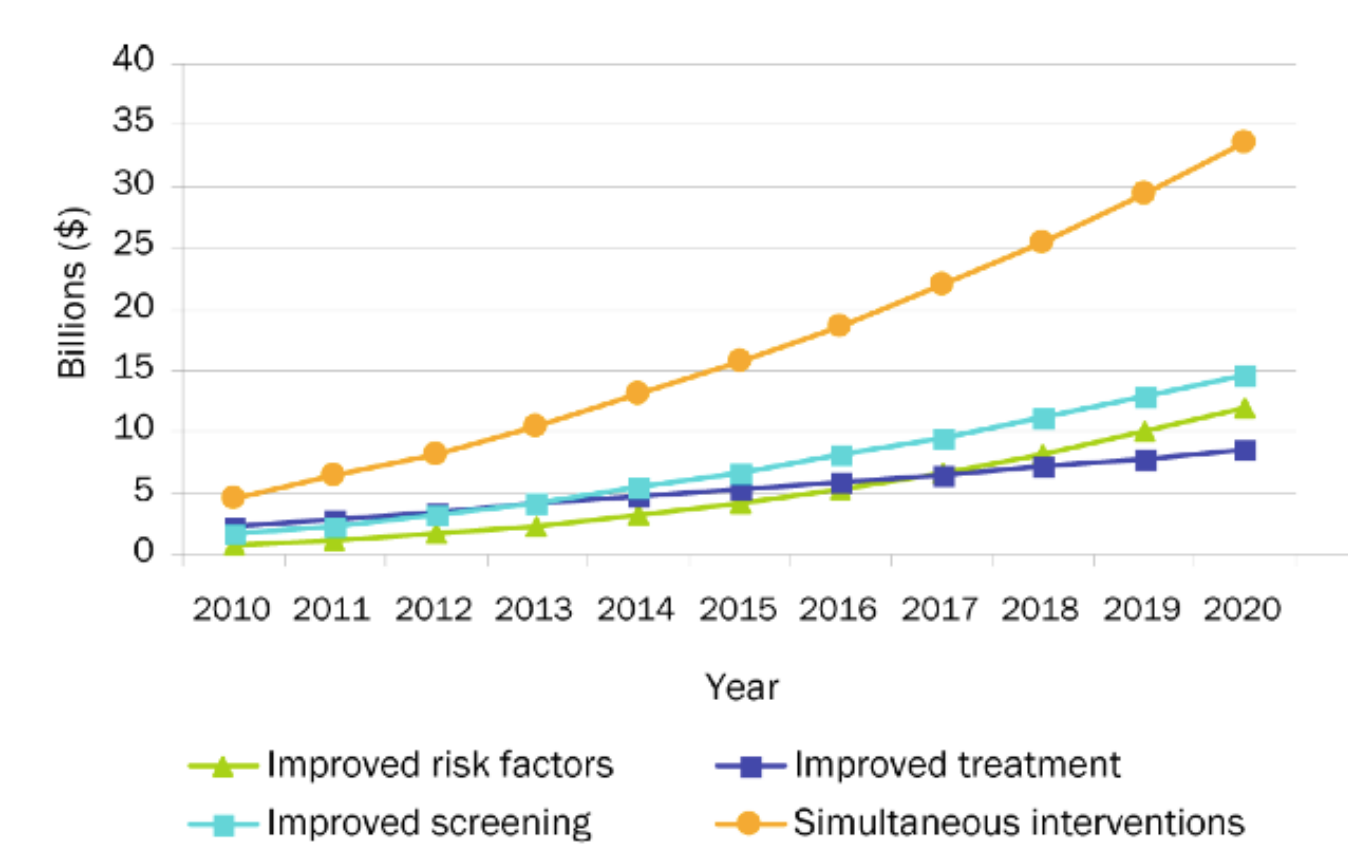
Ramsey et al., Gastroenterology 2003

Colorectal Cancer – Costs due to chemotherapy



Wong et al. Cancer 2009;115:2081-91

Colorectal Cancer – Cumulative projected total productivity loss savings from colorectal cancer prevention and control strategies



Bradley et al. Am J Prev Med. 2011;41(2): e5–e14

Colorectal Cancer Screening – cost-effectiveness of different strategies

Study: First Author, Year (Reference No.)[a]	Annual gFOBT			Biennial gFOBT			Flexible Sigmoidoscopy Every 5 Years			Flexible Sigmoidoscopy Every 5 Years + Annual gFOBT			Colonoscopy Every 10 Years		
	LYG	Cost	Cost/LYG	LYG	Cost	Cost/LYG	LYG	Cost	Cost/LYG	LYG	Cost	Cost/LYG	LYG	Cost	Cost/LYG
Flanagan, 2003 (34)	0.025	328	13,100	0.016	185	11,600									
Frazier, 2000 (35)	0.042	825	19,600				0.039	751	19,500	0.059	1,523	26,000	0.048	1,514	31,700
Gyrd-Hansen, 1998 (28)	0.006	36	6,400	0.004	20	5,300									
Hassan, 2007 (44)													0.036	−10	CS
Helm, 2000 (36)				0.014	72	4,000									
Khandker, 2000 (37)	0.100	2,519	25,600				0.090	1,904	22,500	0.110	3,553	32,400	0.110	3,487	31,500
Lejeune, 2004 (38)				0.029	126	4,400									
Leshno, 2003 (39)	0.160	−158	CS							0.182	−324	CS	0.180	−26	CS
Macafee, 2008 (45)				0.009	30	3,400									
O'Leary, 2004 (40)													0.021	2,883	9,800
Pickhardt, 2007 (19)													0.046	495	10,700
Shimbo, 1994 (32)	0.013	750	56,300												
Song, 2004 (20)	0.056	508	9,100				0.048	940	19,600	0.063	1,347	21,500	0.062	1,330	21,500
Sonnenberg, 2000 (41)	0.019	285	15,100				0.036	2,059	56,600				0.080	1,355	17,000
Steele, 2004 (42)	0.008	94	11,700				0.012	132	11,400				0.019	515	26,800
Stone, 2004 (27)				0.001	23	15,500									
Tappenden, 2007 (26)				0.026	147	5,700									
Tsoi, 2008 (46)	0.094	651	7,000				0.110	989	9,000				0.159	1,281	8,100
Vijan, 2007 (23)	0.029	202	6,800				0.031	948	30,100	0.050	1,138	22,800	0.053	544	10,200
Wagner, 1995 (18)	0.059	1,086	18,500				0.036	705	19,700	0.067	1,461	21,700	0.059	1,028	17,300
Whynes, 1998 (25)				0.017	76	4,600									
Wu, 2006 (47)	0.025	−27	CS				0.014	35	2,500				0.025	−2	CS
Zauber (MISCAN), 2009 (22)	0.066	−88	CS				0.077	102	1,300	0.085	133	1,600	0.087	205	2,400
Zauber (SimCRC), 2009 (22)	0.060	−305	CS				0.069	−231	CS	0.087	−315	CS	0.094	−207	CS
Zauber (CRC-SPIN), 2009 (22)	0.064	−471	CS				0.080	−375	CS	0.095	−413	CS	0.106	−403	CS

Lansdorp-Vogelaar et al. Epidemiol Rev 2011;33:88–100

Interests of communities

- **Good health of members of the community**
  - Low mortality
  - Low morbidity
  - Low loss of production because of illness

  ⇒ colorectal cancer is of great importance

- **Low costs due to health care**
  - Costs of colorectal cancer treatment
    - Surgery
    - radiotherapy
    - Chemotherapy
  - Screening costs

  ⇒ Screening of colorectal cancer is cost-effective and may be cost saving

Colorectal Cancer Screening – the German Program

- **Before October 2002**
- ≥ 45 years FOBT annually

- **After October 2002**
- 50 – 54 years FOBT annually
- 55 years colonoscopy (repeated once after 10 years)
  or
  FOBT every 2 years

=> opportunistic, free of charge

Colorectal Cancer Screening – Quality control

- Gastroenterologists, internists with colonoscopy board certification, colorectal surgeons
- proof of 200 colonoscopies and 50 polypectomies during last 2 years
- To maintain colonoscopy licence :
  200 colonoscopies + 10 polypectomies/year
- photo documentation of completeness of colonoscopy
- infection control:
  - external annual control of endoscopes
  - smear culture of endoscope
  - Cx of endoscope canal perfusate
  - Cx of optics rinsing water
- Central evaluation of results (Central Institute, Berlin)
- Feed back report about personal performance

Colorectal Cancer Screening – results

- 2.8 million screening colonoscopies performed until Dec. 2008
- 2100 sites perform screening colonoscopies (> 99% private practices)
- 45% gastroenterologists, 45% internists, 5% surgeons

- Examination and screenee characteristics:
  - females 55.6%
  - median age m. 64.4 y., f. 65.0 y.
  - 86.6% colonoscopies w. sedation

Pox et al. Gastroenterology 2012;142:1460-1467

Colorectal Cancer Screening – results

	2003	2004	2005	2006	2007	2008
colonoscopies	303,050	537,331	507,300	529,916	478,433	466,253
cancer	0.70%	0.75%	0.99%	0.99%	1.06%	1.07%
adenoma	17.7%	18.8%	20.1%	20.9%	22.7%	23.2%
advanced adenoma	5.8%	6.1%	6.6%	6.7%	7.0%	6.9%

=> 35.7% of cancers + 28.7% of adenomas located proximal to the sigmoid colon

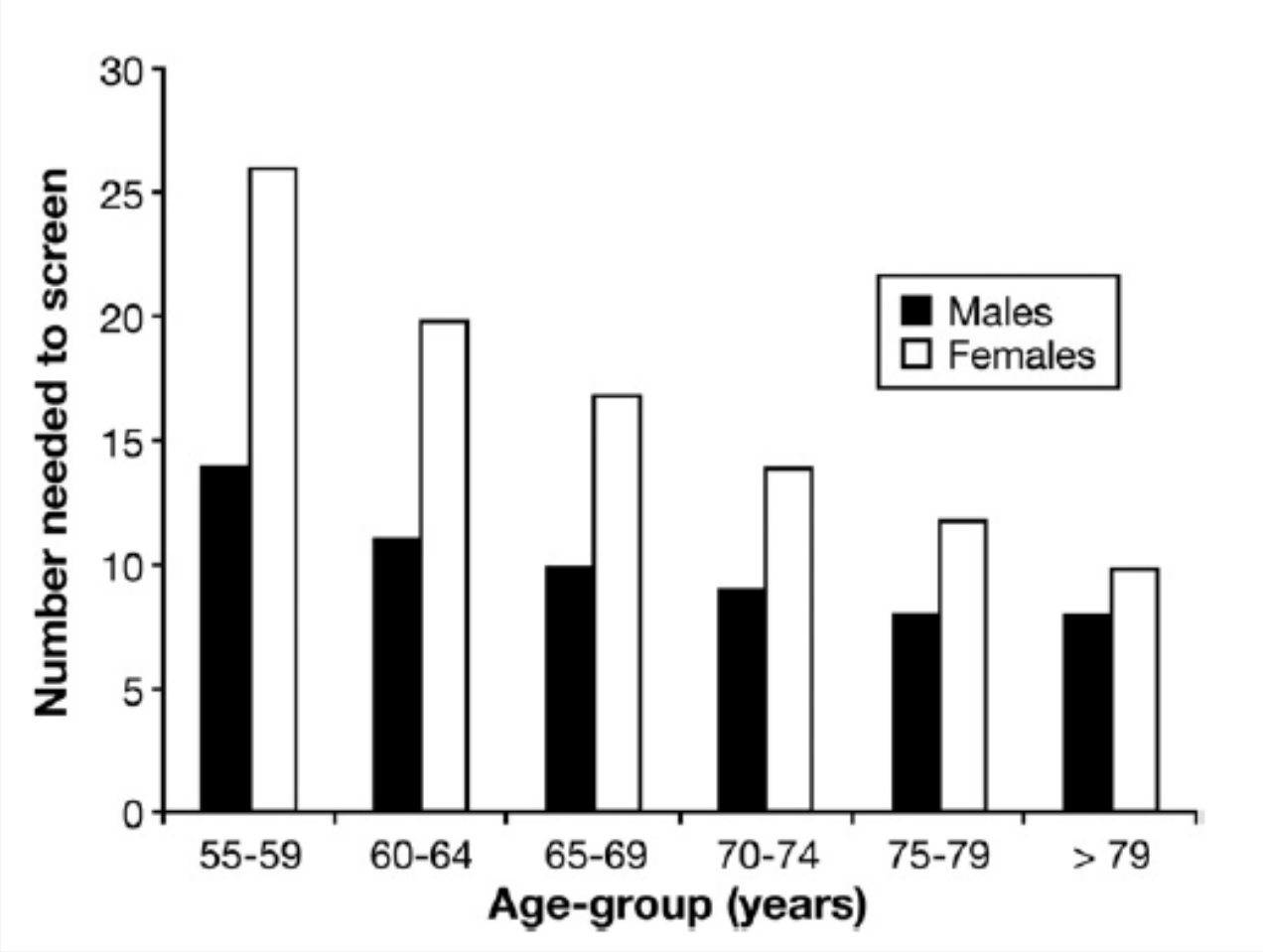
Pox et al. Gastroenterology 2012;142:1460-1467

Colorectal Cancer Screening – tumour stages

Age group (*y*)	n	Stage distribution (%)			
		I	II	III	IV
55–59	2033	50.7	19.5	20.0	9.7
60–64	3088	50.8	18.9	21.1	9.2
65–69	4230	47.5	22.4	20.7	9.4
70–74	3228	47.1	22.9	21.1	8.9
75–79	2042	42.0	26.8	19.4	11.7
80 or older	1054	40.5	27.1	22.1	10.2
Total	15,675	47.3	22.3	20.7	9.6

Pox et al. Gastroenterology 2012;142:1460-1467

Colorectal Cancer Screening – Number needed to screen to detect one advanced neoplasia



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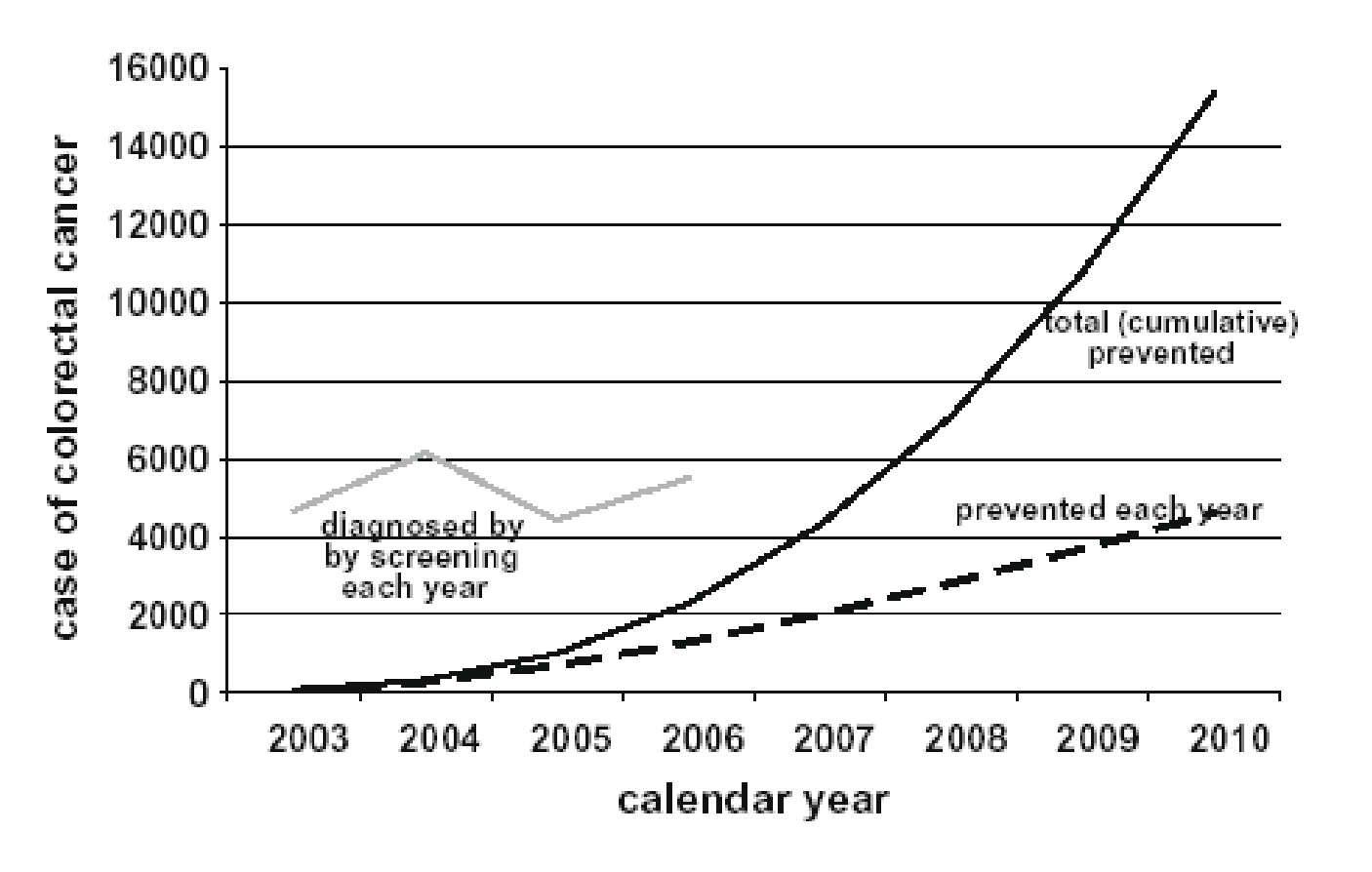
Colorectal Cancer Screening – complications

	n	bleeding	perforations	others
Lieberman	3.121	0,19%	0%	0,13%
Imperiale	2.686	0,11%	0,04%	
Atkin	2.377	0,38%	0,17%	
Regula	50.148	0,03%	0,01%	0,05%
Germany (2005-8)				
overall	1.977.000	0,15%	0,02%	0,07%
diagnostic	1.325.000	0,01%	0,01%	0,07%
therapeutic	652.000	0,47%	0,05%	0,07%

Colorectal Cancer Screening – cancer prevention



Brenner et al. European J Cancer 2009

Colorectal Cancer Screening – participation rates 2003-8