

Colorectal Cancer Screening in Finland in 2004-2010

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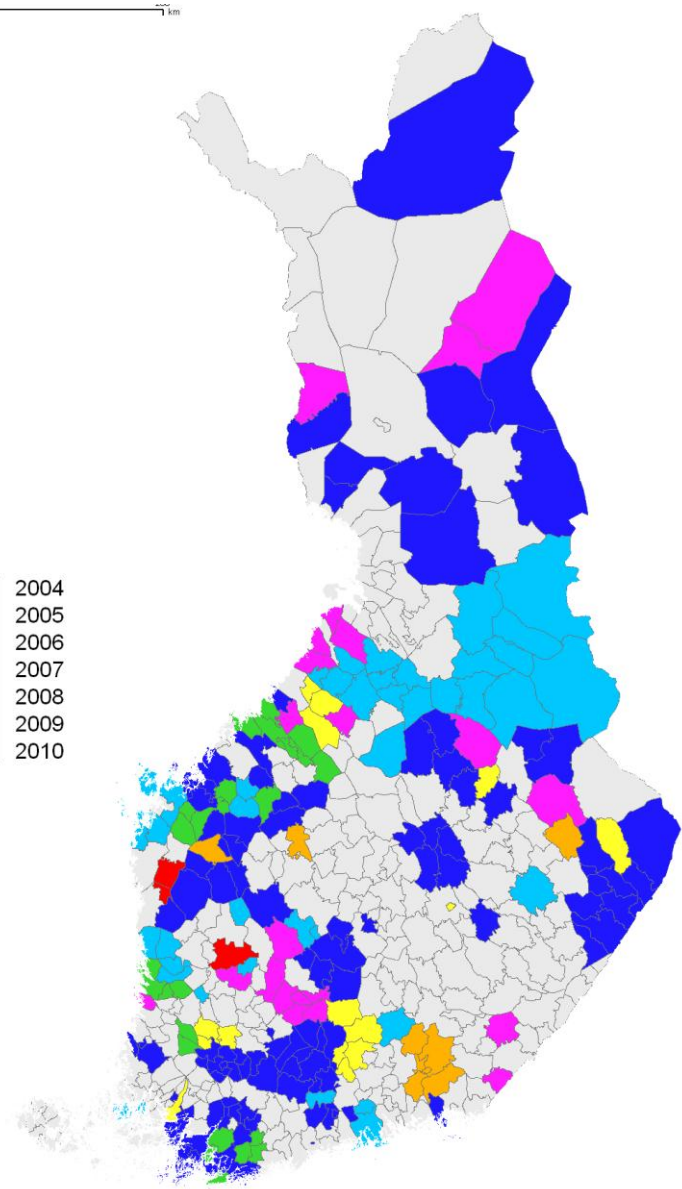
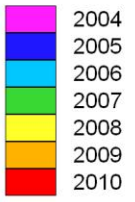


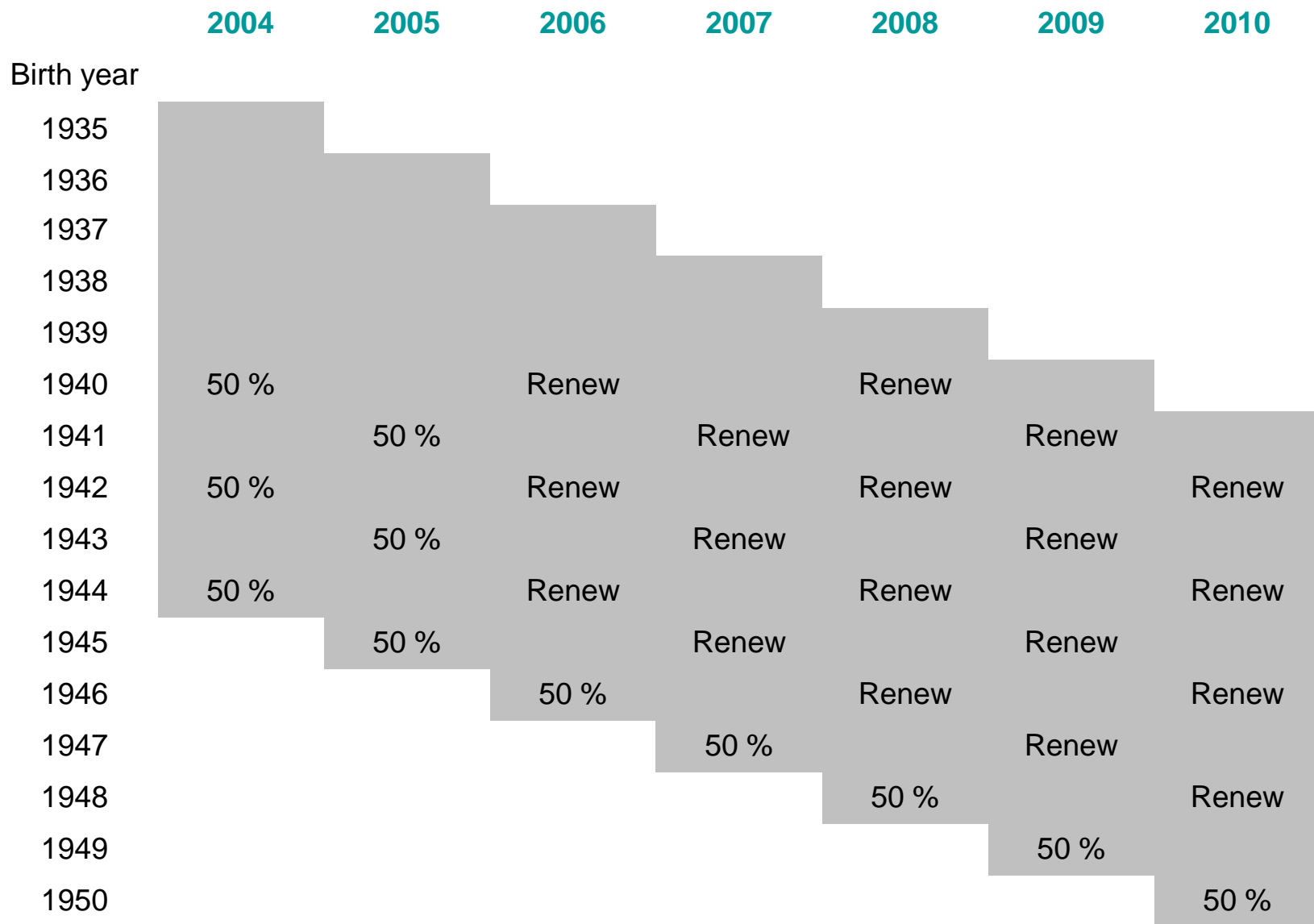
CRC screening in Finland

- Public health policy implemented since 2004
- Gradual increase over regions and over age groups
- Individual level randomisation into screening and control groups
- Not compulsory for the municipalities to organise
- Around 40% of the target population is covered and 20% invited
- Evaluation of effectiveness as a public health policy needed
- Main outcome colorectal cancer mortality



1 km





Randomised population

Year	Controls	Screened	Total randomised
2004	4539	4539	9078
2005	23565	23562	47127
2006	24898	24897	49795
2007	21375	21594	42969
2008	24229	24231	48460
2009	24324	24326	48650
2010	19912	19907	39819
Total	142 842	143 056	285 898



Why gradual and randomised implementation

- **Effectiveness evaluation**
 - Randomisation gives unbiased estimates
 - Expected effect modest, around 16% reduction in crc mortality
- Gradual increase in need of resources – colonoscopy mainly
- Programme costs can be controlled and studied
- Resource allocation over several years - surveillance
- Random selection is considered fair by the population

Screening process

- Personal invitation letter (only)
- Free of charge for the invitee, public health care takes care of payment (tax money)
- Test kits * 3 (Hemoccult) included
- Test results mailed
- Colonoscopy referral for all test-positives
- Colonoscopy at regional level by public sector
- Repeated screening every second year, **no exclusions**
- Follow-up of colonoscopy findings centrally
- Linkage with cancers and deaths during follow-up (nation wide registers)



Screening rounds 1 to 3

- FOBT screening is repeated in the target population every second year
- In Finland, screening data from 2004 on includes three rounds up to 2010
- First round (2004-2010) – 143 000 invited, second round (2006-2010) 94 000 invited, and third round (2008-2010) 48 000 invited
- All in the target group are re-invited, no exclusions (except for death or emigration)
- This procedure is similar to organised breast and cervical cancer screening
- Results for previous non-attendees, negatives and positives at the subsequent round available for first and second round

Results by round in 2004-2010

	Invited	NEG	POS	Attendance	Pos.prop.
First round					
Females	72059	52669	1199	74.8 %	2.2 %
Males	70997	40104	1727	58.9 %	4.1 %
Total	143056	92773	2926	66.9 %	3.1 %
Second round					
Females	47895	35820	1062	77.0 %	2.9 %
Males	46269	27820	1457	63.3 %	5.0 %
Total	94164	63640	2519	70.3 %	3.8 %
Third round					
Females	24644	19075	693	80.2 %	3.5 %
Males	23394	15071	915	68.3 %	5.7 %
Total	48038	34146	1608	74.4 %	4.5 %

Colonoscopy findings

Colonoscopy findings	1st round		2nd round		3rd round	
	Females	Males	Females	Males	Females	Males
	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)
Adenomas	266 (22)	610 (36)	232 (22)	461 (32)	121 (18)	258 (30)
CRC	50 (4)	88 (5)	28 (3)	50 (3)	21 (3)	25 (3)
Normal	271 (23)	310 (18)	195 (19)	199 (14)	147 (22)	117 (13)
No colonoscopy	173 (15)	195 (11)	177 (17)	226 (16)	108 (16)	156 (18)

Reason for no colonoscopy

	1st round				2nd round				3rd round			
	Females		Males		Females		Males		Females		Males	
No contact	2	1.1 %	12	6.0 %	3	1.7 %	15	6.6 %	5	4.6 %	6	3.8 %
Declined	56	32.0 %	59	29.4 %	50	27.6 %	54	23.6 %	32	29.4 %	47	29.9 %
In follow-up	7	4.0 %	13	6.5 %	11	6.1 %	23	10.0 %	10	9.2 %	21	13.4 %
Done recently	49	28.0 %	42	20.9 %	50	27.6 %	44	19.2 %	27	24.8 %	38	24.2 %
Other	59	33.7 %	75	37.3 %	67	37.0 %	93	40.6 %	35	32.1 %	45	28.7 %
Total	173		201		181		229		109		157	

Positive predictive values (PPV)

	Positive	Cancers	Adenomas	PPV (cancer)	PPV (adenoma)
1st round					
Females	1199	50	266	4.2 %	22.2 %
Males	1727	88	610	5.1 %	35.3 %
Both	2926	138	876	4.7 %	29.9 %
2nd round					
Females	1062	28	232	2.6 %	21.8 %
Males	1457	50	461	3.4 %	31.6 %
Both	2519	78	693	3.1 %	27.5 %
3rd round					
Females	693	21	121	3.0 %	17.5 %
Males	915	25	258	2.7 %	28.2 %
Both	1608	46	379	2.9 %	23.6 %



Low vs. high grade adenomas

- Histology (villous features or tubular only)
- Dysplasia (grades 1-3, 3 = high grade)
- Size in three categories: small (less than 1 cm in diameter, big >2 cm in diameter, medium 1-2 cm)
- Number of adenomas: 1 or 2, 3 or more
- Any of the above "high grade" features result in high grade adenoma
- Close to 45% of the first round adenomas and 40% at the second round are of high grade based on this
- High grade dysplasia is found in 10% of adenomas
- Villous features in around 40% at the first round and 30% at the second round

Adenomas of high grade at 1st and 2nd round

1st round	Low gr	High gr	Prop.	2nd round	Low gr	High gr	Prop.
2004	9	11	55.0 %	2006	19	4	17.4 %
2005	55	54	49.5 %	2007	87	61	41.2 %
2006	73	56	43.4 %	2008	128	78	37.9 %
2007	64	46	41.8 %	2009	80	53	39.8 %
2008	78	75	49.0 %	Total	314	196	38.4 %
2009	79	55	41.0 %				
Total	358	297	45.3 %				

Results for 1st (2004-08) and 2nd (2006-10) round

2nd ROUND						
1st ROUND	MIS	NEG	POS	TOTAL	PROP. ATTEND	PROP. POS
MIS	22970	5846	341	29157	21.2 %	1.2 %
NEG	4572	56730	2025	63327	92.8 %	3.2 %
POS	463	1064	153	1680	72.4 %	9.1 %
TOTAL	28005	63640	2519	94164	70.3 %	2.7 %

What next?

- In Finland, the randomised programme is followed for an additional 2-3 years
- In the meantime, costs, resource use, and outcomes are followed from national registers for the screening group and the control group
- Evaluation on colonoscopic needs and availability is studied
- Cancer incidence in the screening and control group is monitored
- Cancer deaths are followed by linkage of screening data and control population to statistics Finland (time and cause of death)



Conclusions

- The FOBT based screening programme is running smoothly, still randomised
- The design allows comparison between the screening and control arms
- Cancers and deaths are followed by national registries
- Both screened and controls can be followed equally well
- Evaluation up to mortality will need long follow-up; 10 years for incidence of colorectal cancer and further 5 years for mortality in the population (incidence based mortality)
- The decision whether to include colorectal cancer screening in the compulsory (for municipalities) public health policy (like cervix and breast) is expected in 2014

