Supplementary Online Content

Geuzinge HA, Obdeijn I-M, Rutgers EJT, et al; for the Familial MRI Screening (FaMRIsc) Study group. Cost-effectiveness of breast cancer screening with magnetic resonance imaging for women at familial risk. *JAMA Oncol.* Published online July 30, 2020. doi:10.1001/jamaoncol.2020.2922

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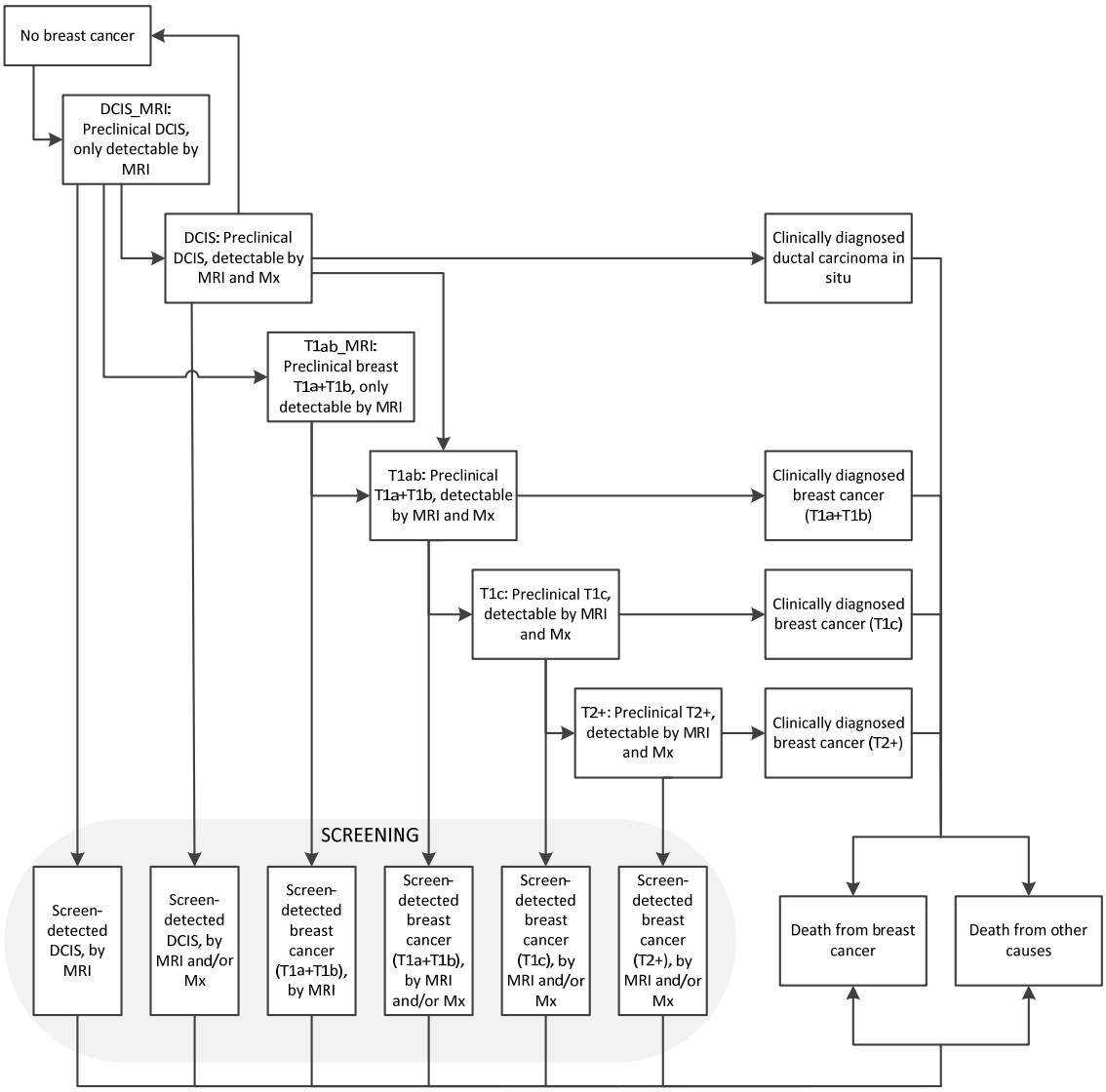
This supplementary material has been provided by the authors to give readers additional information about their work.

eFigure 1. Model Structure



eTable 1. Unit Prices per Procedure Associated With Breast Cancer Screening, Diagnosis and Treatment

Procedure	Unit price (€)
Screening and diagnosis	
Mammography	91.97 [a]/69.10[b]
MRI	272.00
Consultation (with CBE)	72.57
Ultrasound	115.23
Fine needle aspiration	288.62
Biopsy	288.62
Surgery	
Breast conserving surgery	1452.49
Breast conserving surgery incl. sentinel node biopsy	1512.14
Mastectomy	1623.35
Mastectomy incl. sentinel node biopsy	1682.99
Lymph node dissection	884.98
Adjuvant therapy	
Radiotherapy	6885.05
Chemotherapy	3573.21
Chemotherapy followed by one year of Trastuzumab	25832.18
Hormonal therapy	2574.81

Prices derived from the study by Saadatmand et al (1) and the costing manual (2) were converted to Euro 2018 prices using consumer price indices (3).

a Mammography at a hospital (screening and diagnostic)

b Mammography within the national breast cancer screening programme

eTable 2. Utility Values and Durations

Health state	Utility value	Duration
No breast cancer	0.858	n.a.
After a (false) positive screening result	0.105 (disutility)	5 weeks
DCIS/localized breast cancer	0.772	5 years
Regional breast cancer	0.644	5 years
Metastasis	0.515	Until death
Death	0	

eTable 3. Alternative Utility Values and Durations Used in a Scenario Analysis

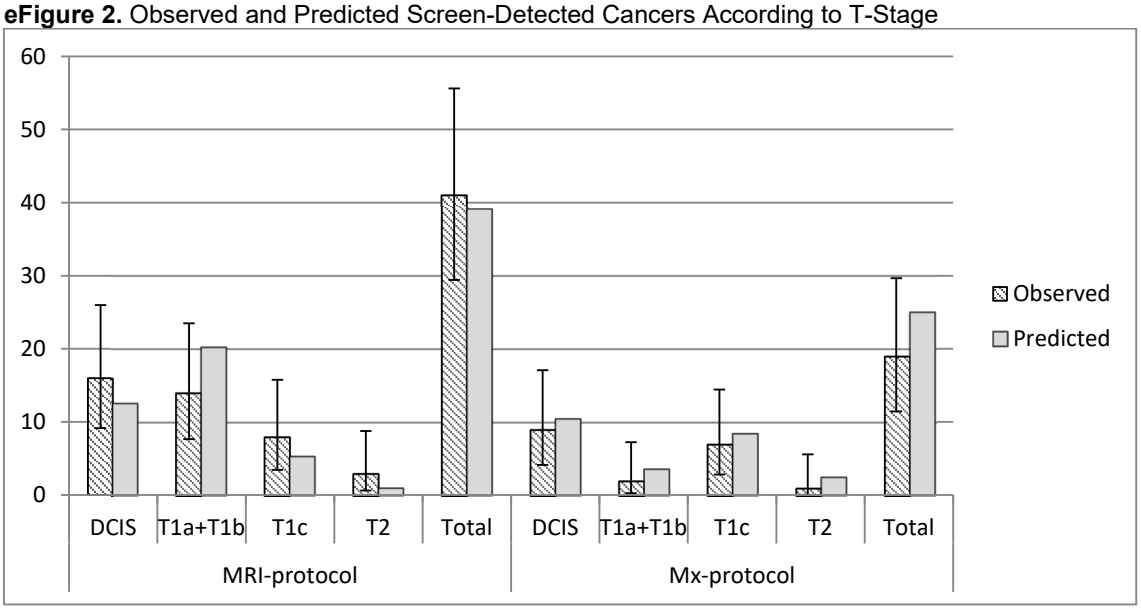
Health state	Utility value	Duration
No breast cancer	0.858	n.a.
After a (false) positive screening result	0.105 (disutility)	5 weeks
DCIS/localized breast cancer, first year	0.696	1 year
DCIS/localized breast cancer, after the first year	0.779	10 years
Regional breast cancer	0.685	11 years
Metastasis	0.515	Until death
Death	0	

eTable 4. Mean Costs per Tumor Stage

	No. of tumors	Mean additional investigation costs, €	Mean surgery costs, €	Mean radiotherapy costs, €	Mean systemic therapy costs, €	Mean total costs, €
DCIS	25	433	1,554	3,305	0	5,292
T1a, N-	7	624	1,601	984	0	3,209
T1b, N-	8	627	1,604	2,582	0	4,813
T1c, N-	12	560	1,540	4,590	7,511	14,200
T2+, N-	1	669	1,512	6,885	6,148	15,214
T1a, N+	0	n.a.	n.a.	n.a.	n.a.	n.a.
T1b, N+	2	433	1,512	6,885	3,074	11,904
T1c, N+	5	571	1,854	5,508	4,403	12,336
T2+, N+	6	890	2,372	6,885	6,148	16,296

In this paper, one additional cancer was added, which was excluded in the previous paper (4). This was an interval cancer between a mammogram and MRI in the first screening round in the MRI-arm. €1 = $1.13 on July 1, 2020.

eFigure 2. Observed and Predicted Screen-Detected Cancers According to T-Stage



eTable 5. Modelled Effects and Costs per 1000 Women of Dominated Screening Protocols and of Protocols With an ICER >100,000 Euro per QALY Gained

	I	**J**	**K**	**L**	**N**	**O**	**P**	**Q**	**R**
Screening rounds	16,256	17,595	17,520	21,152	18,706	20,011	19,901	22,784	21,137
Breast cancers	372	371	380	376	370	368	381	349	377
Screen detected	325	323	334	337	332	327	343	301	338
Clinically diagnosed	47	48	46	40	38	41	38	48	38
Breast cancer deaths	42	43	42	37	38	40	38	46	36
Reduction breast cancer deaths, compared to no screening	-69%	-68%	-69%	-73%	-72%	-71%	-72%	-66%	-74%
False-positives	1623	1,762	1,781	2,131	1759	2,020	2,010	2,240	2,715
Overdiagnosis (% of screen-detected cancers)	66 (20%)	65 (20%)	74 (22%)	70 (21%)	64 (19%)	62 (19%)	75 (22%)	43 (14%)	71 (21%)
LYs	57,492	57,490	57,500	57,594	57,635	57,609	57,627	57,527	57,607
QALYs	48,977	48,972	48,979	49,079	49,117	49,086	49,099	49,002	49,088
Costs (€)									
Screening tests	3,498,785	3,855,876	4,225,106	4,839,223	4,725,348	4,625,117	4,866,252	4,388,062	5,600,707
Diagnosis	866,028	966,838	979,856	1,148,518	1,111,498	1,132,147	1,138,247	1,251,846	1,472,032
Treatment	2,604,847	2,639,056	2,574,523	2,408,956	2,509,938	2,589,918	2,489,337	2,980,128	2,381,939
Breast cancer death	826,524	843,959	823,942	719,972	742,591	785,312	752,129	904,354	705,282
Death other causes	14,205,372	14,192,464	14,207,268	14,285,271	14,268,542	14,236,904	14,261,547	14,147,949	14,296,118
Total	22,001,557	22,498,193	22,810,695	23,401,940	23,357,918	23,369,399	23,507,512	23,672,340	24,456,077
QALYs gained[#*]	325	325	326	347	367	361	363	347	348
Total costs (€)*	6,271,826	6,610,610	6,722,959	6,998,746	7,241,465	7,316,046	7,375,201	7,438,477	7,526,288
ACER (€/QALY)*	3,853	4,894	5,228	5,701	6,057	6,359	6,496	6,969	7,209
ICER (€/QALY)*	Dominated	Dominated	Dominated	Dominated	Dominated	Dominated	Dominated	Dominated	Dominated

	S	T	G	H	U
Screening rounds	22,690	26,202	27,061	25,928	25,924
Breast cancers	358	370	385	377	377
Screen detected	315	335	360	349	349
Clinically diagnosed	42	34	25	28	28
Breast cancer deaths	40	36	29	31	30
Reduction breast cancer deaths, compared to no screening	-71%	-74%	-79%	-77%	-78%
False-positives	2,266	2,466	2,771	2,444	3,380
Overdiagnosis (% of screen-detected cancers)	52 (17%)	64 (19%)	79 (22%)	71 (20%)	71 (20%)
LYs	57,622	57,668	57,777	57,769	57,774
QALYs	49,100	49,145	49,252	49,250	49,246
Total costs					
Screening tests	4,884,424	5,243,477	6,819,899	6,796,109	7,123,245
Diagnosis	1,269,612	1,574,109	1,524,262	1,593,060	1,876,975
Treatment	2,678,728	2,493,810	2,176,410	2,249,955	2,242,559
Breast cancer death	792,564	707,330	580,499	604,132	598,822
Death other causes	14,231,504	14,294,899	14,389,857	14,372,210	14,376,257
Total	23,856,832	24,313,625	25,490,928	25,615,466	26,217,858
QALYs gained[#]*	367	372	395	397	393
Total costs (€)*	7,567,680	7,762,521	8,237,080	8,514,625	8,761,895
ACER (€/QALY)*	6,945	7,372	8,149	8,813	9,525
ICER (€/QALY)*	Dominated	Dominated	101,489	161,008	Dominated

Breast cancers include invasive breast cancers and DCIS

Outcomes contain the effects of both the described strategy and the subsequent National breast cancer screening programme

LYs: life-years; QALYs: quality-adjusted life-years; ACER: average cost-effectiveness ratio (comparison of a strategy to a situation without screening); ICER: incremental cost-effectiveness ratio (comparison of a strategy to the previous non-dominated strategy in the ranking)

[#] Relative to a situation without screening

*Discounted by 3.0%

G. annual (MRI 35-65)

H. annual (MRI and triennial Mx 35-60)

I. MRI every 18 months between age 40 and 60

J. annual MRI between age 40 and 50, biennial MRI between age 50 and 60

K. annual MRI between age 40 and 50, biennial MRI between age 50 and 65

L. annual MRI between age 40 and 60

N. MRI every 18 months and triennial mammography between age 35 and 60

O. annual MRI between age 35 and 45, biennial MRI between age 45-60

P. annual MRI between age 35 and 45, biennial MRI between age 45-65

Q. annual MRI between age 35 and 50

R. annual MRI and triennial mammography between age 40 and 60

S. annual MRI between age 35 and 55

T. annual mammography and biennial MRI between age 35 and 60

G. annual MRI between age 35 and 60

H. annual MRI, and triennial mammography between age 35 and 60

U. annual MRI and biennial mammography between age

eReferences

1. Saadatmand S, Tilanus-Linthorst MMA, Rutgers EJT, Hoogerbrugge N, Oosterwijk JC, Tollenaar REAM, et al. Cost-Effectiveness of Screening Women With Familial Risk for Breast Cancer With Magnetic Resonance Imaging. J Natl Cancer Inst. 2013;105(17):1314-21.
2. Hakkaart-van Roijen L, van der Linden N, Bouwmans C, Kanters T, Tan S**.** Kostenhandleiding: Methodologie van Kostenonderzoek En Referentieprijzen Voor Economische Evaluaties in de Gezondheidszorg. Diemen; 2015.
3. Statistics Netherlands. Annual rate of change CPI, since 1963. 2018. Accessed at http://statline.cbs.nl/Statweb/publication/?DM=SLEN&PA=70936ENG&D1=0&D2=623,636,649,662,675,688,701,714&LA=EN&VW=T on October 7, 2018.
4. Saadatmand S, Geuzinge HA, Rutgers EJT, Mann RM, de Roy van Zuidewijn DBW, Zonderland HM, et al. MRI versus mammography for breast cancer screening in women with familial risk (FaMRIsc): a multicentre, randomised, controlled trial. Lancet Oncol. 2019;20(8):1136-47.