American College of Radiology ACR Appropriateness Criteria®

Supplemental Breast Cancer Screening Based on Breast Density

Variant 1: Supplemental breast cancer screening. Average-risk females with nondense breasts.

	Appropri	iateness	207		_						F	inal	Tabu	latio	ns		
Procedure	Categ	gory	SOE	Adults RR	aL .	Peds RRL	Rating	Median	1	2	3	4	5	6	7	8	9
Digital breast tomosynthesis screening	Usua approp	ılly oriate	Strong	�� 0.1-1m	ıSv		9	9	0	0	0	1	0	1	0	4	11
			References			Study	Quality										
			16 (25058084)				3										
			19 (29429017)				2										
			20 (28516226)			C	Good										
			23 (27919540)				3										
			17 (26893205)				4										
			18 (26458206)				3										
			22 (26176654)				2										
			21 (25599513)				2				1						
US breast	Usuall approp		Limited	O 0 mSv	′	O 0 mSv [ped]	2	2	7	4	4	2	0	0	0	0	0
			References			Study	Quality										
			24 (27389655)				4										
			25 (24951614)				3										
			5 (12355001)				4										
MRI breast without IV contrast	Usuall approp		Expert Consensus	O 0 mSv	′	O 0 mSv [ped]	1	1	16	0	1	0	0	0	0	0	0

MRI breast without and with IV contrast	Usuall approp		Limited	O 0 mSv		0 mSv [ped]	1	1	9	3	3	1	0	1	0	0	0
	•		References			Study	Quality										
			33 (28221097)				1										
FDG-PET breast dedicated	Usuall approp	y not oriate	Expert Consensus	���� 10- mSv	30		1	1	15	1	0	0	1	0	0	0	0
Sestamibi MBI	Usuall approp		Expert Consensus	��� 1-10 mSv	0		1	1	16	1	0	0	0	0	0	0	0
Mammography with IV contrast	Usuall approp	y not oriate	Strong	�� 0.1-1m	ıSv		1	1	10	3	4	0	1	0	0	0	0
			References			Study	Quality										
			28 (24928280)				3										
			29 (24986697)				3										
			26 (30240292)				2										
			30 (27097789)				3										
			31 (24696228)				2										
			27 (31453765)				2										
MRI breast without and with IV contrast abbreviated	Usuall approp		Limited	O 0 mSv		0 mSv [ped]	1	1	9	4	1	1	2	0	0	0	0
			References		·	Study	Quality										
			32 (28138893)				3										
MRI breast without IV contrast abbreviated	Usuall approp		Expert Consensus	O 0 mSv		0 mSv [ped]	1	1	16	0	0	1	0	0	0	0	0

Variant 2: Supplemental breast cancer screening. Intermediate-risk females with nondense breasts.

D 1	Appropriateness	SOF	A L L DDI	n i nni	D 4	3.6 11			F	inal '	Гаbu	latio	ns		
Procedure	Category	SOE	Adults RRL	Peds RRL	Rating	Median	1	2	3	4	5	6	7	8	9
Digital breast tomosynthesis screening	Usually appropriate	Strong	�� 0.1-1mSv		9	9	0	0	0	1	0	1	0	3	12

		References		Study	Quality										
		16 (25058084)			3										
		19 (29429017)			2										
		20 (28516226)		G	Good										
		23 (27919540)			3										
		17 (26893205)			4										
		18 (26458206)			3										
		22 (26176654)			2										
		21 (25599513)			2										
MRI breast without and with IV contrast	May be appropriate	Limited	O 0 mSv	O 0 mSv [ped]	5	5	0	1	4	2	5	4	0	1	0
		References		Study	Quality	•	•							•	
		40 (20651211)			3										
		42 (21900617)			4										
		41 (26744477)			3										
		15 (17392385)			4										
		43 (29371086)			4										
MRI breast without and with IV contrast abbreviated	May be appropriate	Strong	O 0 mSv	O 0 mSv [ped]	5	5	0	0	3	1	11	2	0	0	0
		References		Study	Quality										
		36 (26971429)			2										
		38 (29030785)			4										
		37 (25454099)			2										
		39 (24958821)			2										
US breast	Usually not appropriate	Limited	O 0 mSv	O 0 mSv [ped]	2	2	2	8	6	0	1	0	0	0	0
		References		Study	Quality		•		•						
		35 (30098212)			3										
		34 (28786298)			4										
		24 (27389655)			4										
		24 (21303033)			4										

MRI breast without IV contrast	Usually appropri	Expert Consensus	O 0 mSv		O 0 mSv [ped]	1	1	15	1	1	0	0	0	0	0	0
FDG-PET breast dedicated	Usually appropri	Expert Consensus	���� 10-3 mSv	30		1	1	15	1	0	0	1	0	0	0	0
Sestamibi MBI	Usually appropri	Expert Consensus	≎≎≎ 1-10 mSv)		1	1	15	1	1	0	0	0	0	0	0
Mammography with IV contrast	Usually appropri	Strong	�� 0.1-1m\$	Sv		1	1	10	2	2	0	2	2	0	0	0
		References			Study	y Quality										
		28 (24928280)				3										
		29 (24986697)				3										
		30 (27097789)				3										
		31 (24696228)				2										
MRI breast without IV contrast abbreviated	Usually appropri	Expert Consensus	O 0 mSv		O 0 mSv [ped]	1	1	15	1	1	0	0	0	0	0	0

Variant 3: Supplemental breast cancer screening. High-risk females with nondense breasts.

ъ.	Appropriateness	COF	A L L DDI	D I DDI	D 4	3.6.11			F	inal '	Гаbu	latio	ns		
Procedure	Category	SOE	Adults RRL	Peds RRL	Rating	Median	1	2	3	4	5	6	7	8	9
MRI breast without and with IV contrast	Usually appropriate	Strong	O 0 mSv	O 0 mSv [ped]	9	9	0	0	0	1	1	1	1	2	11

References	Study Quality
53 (17244718)	2
51 (15910949)	2
45 (22474203)	1
46 (20177029)	1
54 (19884532)	1
15 (17392385)	4
43 (29371086)	4

	_															
			55 (28586291)			3										
			56 (27097237)			4										
			52 (25534390)			Good										
			50 (15282350)			2										
Digital breast tomosynthesis screening	Usual appropr		Strong	�� 0.1-1mS	Sv	9	9	0	0	0	1	0	0	1	4	11
			References		Stud	dy Quality										
			16 (25058084)			3										
			19 (29429017)			2										
			20 (28516226)			Good										
			23 (27919540)			3										
			17 (26893205)			4										
			18 (26458206)			3										
			22 (26176654)			2										
			21 (25599513)			2		_								
MRI breast without and with IV contrast abbreviated	May t appropr	be riate	Limited	O 0 mSv	O 0 mSv [ped]	6	6	0	0	0	1	4	7	3	1	1
			References		Stud	dy Quality										
			49 (28506511)			4										
			48 (26521970)			4										
US breast	May l appropr	be riate	Strong	O 0 mSv	O 0 mSv [ped]	5	5	0	2	4	2	8	1	0	0	0
			References		Stu	dy Quality										
			44 (16293877)			2										
			45 (22474203)			1										
			46 (20177029)			1										
			35 (30098212)			3										
			24 (27389655)			4										
			5 (12355001)			4										
Mammography with IV contrast	May l appropr	be riate	Strong	�� 0.1-1mS	Sv	5	5	0	0	2	1	13	1	0	0	0

References	Study Quality
28 (24928280)	3
29 (24986697)	3
47 (29153365)	2
30 (27097789)	3
31 (24696228)	2

MRI breast without IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	1	15	1	1	0	0	0	0	0	0
FDG-PET breast dedicated	Usually not appropriate	Expert Consensus	���� 10-30 mSv		1	1	15	0	1	0	1	0	0	0	0
Sestamibi MBI	Usually not appropriate	Expert Consensus	≎≎≎ 1-10 mSv		1	1	15	1	0	1	0	0	0	0	0
MRI breast without IV contrast abbreviated	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	1	15	1	0	1	0	0	0	0	0

Variant 4: Supplemental breast cancer screening. Average-risk females with dense breasts.

	Appropriateness	COF	A L L DDY	D I DDI	D (1	3.6.11			F	'inal '	Tabu	llatio	ns		
Procedure	Category	SOE	Adults RRL	Peds RRL	Rating	Median	1	2	3	4	5	6	7	8	9
Digital breast tomosynthesis screening	Usually appropriate	Strong	�� 0.1-1mSv		9	9	0	0	0	0	0	1	0	4	12

References	Study Quality
16 (25058084)	3
19 (29429017)	2
20 (28516226)	Good
58 (29615072)	Good
23 (27919540)	3
57 (27721194)	4
17 (26893205)	4
18 (26458206)	3

		22 (26176654)		2											
		21 (25599513)			2										
MRI breast without and with IV contrast	May be appropriate	Limited	O 0 mSv	O 0 mSv [ped]	5	5	0	1	1	5	7	2	0	0	1
		References		Study	Quality				•			•			
		33 (28221097)			1										
US breast	May be appropriate (Disagreement)	Expert Opinion	O 0 mSv	O 0 mSv [ped]	5	5	0	0	0	3	7	4	1	2	0
		References		Study Quality											
		60 (29571797)													
		59 (27501888)			1										
		24 (27389655) 4													
		61 (26547101)		2											
		64 (25984843) 4													
		63 (25486550)			4										
		25 (24951614)			3										
		5 (12355001)			4										
		62 (30882843)			4										
Mammography with IV contrast	May be appropriate	Strong	�� 0.1-1mS	v	5	5	0	1	2	4	7	2	1	0	0
		References		Study	Quality										
		28 (24928280)			3										
		29 (24986697)			3										
		30 (27097789)			3										
		31 (24696228)			2										
MRI breast without and with IV contrast abbreviated	May be appropriate	Limited	O 0 mSv	O 0 mSv [ped]	5	5	0	0	0	3	10	3	0	1	0
		References		Study Quality											
		32 (28138893)			3										
		65 (27916594)			3										

MRI breast without IV contrast	Usuall approp	y not oriate	Expert Consensus	O 0 mSv	/	O 0 mSv [ped]	1	1	15	1	1	0	0	0	0	0	0
FDG-PET breast dedicated	Usuall approp	y not oriate	Limited	Limited			1	1	14	0	1	1	1	0	0	0	0
			References		Study Quality												
			67 (25454690)		4												
Sestamibi MBI	Usuall approp	y not oriate	Limited	��� 1-1 mSv	0		1	1	10	1	4	0	1	1	0	0	0
			References		Study Quality												
			69 (25615744)		1												
			68 (25615745)				4										
			70 (27186635)	70 (27186635)		3											
MRI breast without IV contrast abbreviated	Usuall approp	y not oriate	Expert Consensus	O 0 mSv	/	O 0 mSv [ped]	1	1	14	1	0	2	0	0	0	0	0

Variant 5: Supplemental breast cancer screening. Intermediate-risk females with dense breasts.

	Appropriateness	COF	A L L DDI	n i nni	D (1	3.5 31			F	inal T	Tabu	latio	ns		
Procedure	Category	SOE	Adults RRL	Peds RRL	Rating	Median	1	2	3	4	5	6	7	8	9
Digital breast tomosynthesis screening	Usually appropriate	Strong	�� 0.1-1mSv		9	9	0	0	0	0	0	0	1	3	13

References	Study Quality
16 (25058084)	3
19 (29429017)	2
20 (28516226)	Good
58 (29615072)	Good
23 (27919540)	3
57 (27721194)	4
17 (26893205)	4
18 (26458206)	3

		22 (26176654)		2											
		21 (25599513)			2										
MRI breast without and with IV contrast	May be appropriate	Limited	O 0 mSv	O 0 mSv [ped]	6	6	0	0	1	1	3	9	1	1	1
		References		Study	Quality										
		40 (20651211)			3										
		42 (21900617)			4										
		41 (26744477)			3										
		15 (17392385)			4										
		43 (29371086)			4										
US breast	May be appropriate	Limited	O 0 mSv	O 0 mSv [ped]	6	6	0	0	0	1	4	4	4	2	2
		References		Study	Quality										
		35 (30098212)			3										
		34 (28786298)			4										
		24 (27389655)			4										
		64 (25984843)													
		5 (12355001)													
MRI breast without and with IV contrast abbreviated	May be appropriate	Strong	O 0 mSv	O 0 mSv [ped]	6	6	0	0	0	0	6	9	1	1	0
		References		Study	Quality										
		36 (26971429)			2										
		38 (29030785)			4										
		37 (25454099)			2										
		39 (24958821)			2										
Mammography with IV contrast	May be appropriate	Strong	�� 0.1-1mSv		5	5	0	0	1	2	10	3	1	0	0
		References		Study	Quality										
		28 (24928280)		3											
		29 (24986697)		3											
	ı	30 (27097789)			3		ı								

31 (24696228) MRI breast without IV contrast Usually not appropriate Expert Consensus O 0 mSv O 0 mSv [ped] FDG-PET breast dedicated ���� 10-30 mSv Usually not appropriate Expert Consensus Sestamibi MBI ��� 1-10 mSv Usually not Expert appropriate Consensus MRI breast without IV contrast Usually not appropriate O 0 mSv Expert O 0 mSv abbreviated Consensus [ped]

Variant 6: Supplemental breast cancer screening. High-risk females with dense breasts.

	Appropriateness	207					Final Tabulations				ns				
Procedure	Category	SOE	Adults RRL	Peds RRL	Rating	Median	1	2	3	4	5	6	7	8	9
MRI breast without and with IV contrast	Usually appropriate	Strong	O 0 mSv	O 0 mSv [ped]	9	9	0	0	0	0	0	2	1	2	12
		References	Study		-										
		53 (17244718)	1		2										
		51 (15910949)	1		2										
		45 (22474203)	ı		1										
		46 (20177029)			1										
		54 (19884532)	1		1										
		15 (17392385)	ı		4										
		55 (28586291)			3										
		56 (27097237)			4										
		52 (25534390)	ı	(Good										
		50 (15282350)			2										
Digital breast tomosynthesis screening	Usually appropriate	Strong	�� 0.1-1mS	SV	9	9	0	0	0	0	0	0	1	3	13
		References		Study	Quality										

		16 (25058084))		3										
		19 (29429017))		2										
		20 (28516226))	(Good										
		58 (29615072))	(Good										
		23 (27919540))		3										
		57 (27721194))		4										
		17 (26893205))		4										
		18 (26458206))		3										
		22 (26176654))		2										
		21 (25599513))	2				1							
US breast	Usually appropriate	Strong	O 0 mSv	O 0 mSv [ped]	7	7	0	1	0	0	2	5	5	1	3
	,	References		Study	·										
		44 (16293877))		2										
		45 (22474203))		1										
		46 (20177029))		1										
		35 (30098212))		3										
		24 (27389655))	4											
		5 (12355001)		4											
MRI breast without and with IV contrast abbreviated	Usually appropriate	Limited	O 0 mSv	O 0 mSv [ped]	7	7	0	0	0	0	1	6	7	1	2
		References		Study	y Quality										
		49 (28506511))		4										
		48 (26521970)			4										
Mammography with IV contrast	May be appropriate	Strong	�� 0.1-1mSv	,	5	5	0	0	1	2	8	3	3	0	0
		References		Study	y Quality										
		28 (24928280))		3										
		29 (24986697))	3											
		47 (29153365))		2										
		30 (27097789))		3										

31 (24696228) 2

MRI breast without IV contrast	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	1	15	1	0	1	0	0	0	0	0
FDG-PET breast dedicated	Usually not appropriate	Expert Consensus	≎≎≎≎ 10-30 mSv		1	1	15	0	1	0	1	0	0	0	0
Sestamibi MBI	Usually not appropriate	Expert Consensus	��� 1-10 mSv		1	1	15	0	1	1	0	0	0	0	0
MRI breast without IV contrast abbreviated	Usually not appropriate	Expert Consensus	O 0 mSv	O 0 mSv [ped]	1	1	15	1	0	0	1	0	0	0	0

Appendix Key

A more complete discussion of the items presented below can be found by accessing the supporting documents at the designated hyperlinks.

Appropriateness Category: The panel's recommendation for a procedure based on the assessment of the risks and benefits of performing the procedure for the specified clinical scenario.

SOE: Strength of Evidence. The assessment of the amount and quality of evidence found in the peer reviewed medical literature for an appropriateness recommendation.

- **References:** The citation number and PMID for the reference(s) associated with the recommendation.
- Study Quality: The assessment of the quality of an individual reference based on the number of study quality elements described in the reference.

RRL: Relative Radiation Level. A population based assessment of the amount of radiation a typical patient may be exposed to during the specified procedure.

Rating: The final rating (1-9 scale) for the procedure as determined by the panel during rating rounds.

Median: The median rating (1-9 scale) for the procedure as determined by the panel during rating rounds.

Final tabulations: A histogram showing the number of panel members who rated the procedure as noted in the column heading (ie, 1, 2, 3, etc.).

Additional supporting documents about the AC methodology and processes can be found at www.acr.org/ac.