

# Breast Cancer Screening Prior to Cosmetic Breast Surgery: ASPS Members' Adherence to American Cancer Society Guidelines

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**Background:** The goal of this study was to determine the self-reported breast cancer screening practices of American plastic surgeons and the degree to which those practices adhere to the American Cancer Society guidelines. An independent analysis of subgroups divided by gender, years in practice, and practice setting was performed and the implications of the results are discussed.

**Methods:** The authors conducted an online survey of the members of the American Society of Plastic Surgeons. Questions assessed practice composition, American Cancer Society guideline familiarity, and preoperative breast cancer screening in patients seeking aesthetic breast surgery. Responses were summarized, subgroup comparisons were made, and logistic regression was used to determine predictors of physician practices.

**Results:** The 1066 respondents were predominantly male (82 percent) and consisted largely of private practitioners (73 percent). In total, 47 percent appeared to follow the American Cancer Society guidelines, while 64 percent claimed familiarity. Being male predicted more accurate guideline knowledge, but being female resulted in more aggressive screening and possibly more diagnoses. Number of years in practice and familiarity with the American Cancer Society guidelines also resulted in more perioperative diagnoses.

**Conclusions:** Knowledge of the American Cancer Society guidelines is an essential component of effective cancer screening, but only two-thirds of plastic surgeons claim familiarity with them, and fewer than half report concordant practices. As plastic surgeons who often perform surgical procedures on the breast in women with no history of breast disease, we have an obligation to understand and apply consistent, reliable breast cancer screening practices to ensure the well-being of our patients. (*Plast. Reconstr. Surg.* 124: 1375, 2009.)

Despite an emphasis on early detection and treatment, breast cancer remains a significant public health problem. It continues to be the most frequently diagnosed non-skin cancer malignancy and the second leading cause of cancer-related death in women. In 2007, an estimated 180,000 women were diagnosed with invasive breast cancer.<sup>1</sup> During this same period, the rate of aesthetic breast surgery increased nearly 60 percent,<sup>2</sup> with more than 550,000 women undergoing cosmetic breast procedures in the past year alone.<sup>2</sup> This places plastic surgeons in a position to improve rates of preoperative breast cancer

screening, as most women presenting for aesthetic breast surgery are also in the demographic group that is at risk for breast cancer. Further, aesthetic breast surgery is associated with irreversible changes to the architecture of the breast parenchyma, increasing the importance of presurgical screening in this population.

Much discussion and investigation have surrounded which breast cancer screening should be performed in postoperative aesthetic surgery patients.<sup>3-11</sup> Breast implants used in augmenta-

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tion mammoplasty can obscure portions of breast tissue during subsequent mammography screening<sup>12-14</sup> and, therefore, have the potential to reduce the sensitivity and specificity of the test.<sup>7,15,16</sup> Implants may compress glandular tissue and cause capsule formation with microcalcification, events that can mask or mimic architectural change associated with malignancy. Even with displacement mammography techniques, studies have shown that mammography results may remain difficult to interpret in these patients,<sup>17</sup> as implants may still reduce the amount of tissue visualized by up to 25 percent.<sup>4</sup> Interestingly, although detection by mammography is decreased, most available evidence implies that women with implants who later develop cancer tend to present at similar stages compared with those without implants.<sup>6,8,18-20</sup> In addition, these women more often present with palpable masses.<sup>6,15,19</sup> The implant itself may facilitate the clinical breast examination<sup>6</sup> and therefore may offset the difficulties with the interpretation of mammograms. These factors may account for the fact that implants have not been shown to affect survival.<sup>8</sup> Patients who undergo reduction mammoplasty have routine cancer screening through the procedure itself, as the surgical specimens are commonly sent to pathology for histologic examination.<sup>4</sup> If the specimens are not oriented and contain a suspicious finding, subsequent completion mastectomy is frequently required due to the repositioning of the breast parenchyma during the reconstruction.<sup>21</sup> In addition, postreduction mammograms have shown consistent architectural changes within the reconstruction.<sup>10,11,22</sup> In general, breast reductions decrease the risk for cancer as breast tissue is removed, but resulting changes in the mammogram can mimic malignancy and have the potential to make future screening studies difficult to interpret.<sup>4</sup>

While studies exist on postoperative cancer screening in the aesthetic surgery population, few articles specifically address recommendations for preoperative screening in this population. In the limited body of literature that addresses screening before cosmetic breast surgery, approaches most commonly echo the American Cancer Society Guidelines for Breast Cancer Screening.<sup>23</sup> These guidelines include yearly mammography for average-risk women age 40 and above, with clinical breast examinations for asymptomatic women beginning at age 20 and occurring at least every 3 years until age 40 and yearly after age 40. The guidelines also suggest that patients be educated on breast self-exams beginning at age 20.<sup>23</sup> In ad-

dition, for certain high-risk individuals, including those with *BRCA* mutations, those who are first-degree relatives of *BRCA* mutation carriers, and those with a calculated high risk for cancer, yearly magnetic resonance screening is now recommended.<sup>24</sup> It is not known how closely these guidelines are followed by plastic surgeons before aesthetic breast surgery or if plastic surgeons routinely follow other screening practices not supported by data or recommended by mainstream medical organizations.

Approximately 60 percent of aesthetic breast procedures were performed in patients 40 years old or younger.<sup>2</sup> Unless they possess risk factors for early breast cancer, these patients are not recommended for screening mammography under current American Cancer Society guidelines. Whether there is an opportunity or obligation for the plastic surgery community to perform such screening in patients under 40 is an open question. There are currently no data to suggest that such screening results in identification of early breast cancer or lowers breast cancer mortality rates in this patient subpopulation.

The goal of this study was to determine the self-reported breast cancer screening practices of American plastic surgeons and determine the degree to which those practices adhere to guidelines set forth by the American Cancer Society. Subgroup analyses of plastic surgeons divided by gender, length of time in practice, and practice setting also were performed.

## METHODS AND STUDY DESIGN

The authors conducted an online survey of the members of the American Society of Plastic Surgeons. The 20 multiple-choice questions (Tables 1 and 2) were designed to assess physician practice composition and familiarity with American Cancer Society guidelines, and to ascertain specific practices for preoperative evaluation and breast cancer screening in patients seeking aesthetic breast surgery. The survey comprised four components: general practice information, breast cancer screening practice, criteria for obtaining breast cancer screening, and criteria for further evaluation of breast cancer risk. The survey was administered through the online survey application Survey Monkey over a 5-month period (January of 2008 to May of 2008). E-mails were sent to the 4520 society members, with an initial distribution followed by two additional distributions to nonresponders.

Survey responses were tallied and summarized using descriptive statistics (frequencies and percentages). Pearson's chi-square test or Fisher's ex-

**Table 1. Characteristics of the Study Sample**

	No.	%*
What procedures do you perform in your practice? ( <i>n</i> = 1066)		
Breast augmentation	5	0.5
Breast reduction	7	0.7
Breast lift	1	0.1
All of the above	1026	96.2
Breast augmentation and breast reduction	2	0.2
Breast augmentation and breast lift	14	1.3
Breast reduction and breast lift	11	1.0
How long have you been in practice? ( <i>n</i> = 1066)		
<5 years	215	20.2
5–10 years	212	19.9
11–15 years	200	18.8
16–20 years	148	13.9
>20 years	291	27.3
What is your gender? ( <i>n</i> = 1066)		
Male	878	82.4
Female	188	17.6
In what type of setting is your medical practice? ( <i>n</i> = 1066)		
Academic	152	14.3
Private	780	73.2
Combination	134	12.6
For what percentage of your patients scheduled to undergo a cosmetic breast procedure do you perform a review of risk factors? ( <i>n</i> = 1047)		
100 percent	950	89.1
76–99 percent	41	3.8
26–75 percent	22	2.1
1–25 percent	13	1.2
0 percent	21	2.0
For what percentage of your patients scheduled to undergo a cosmetic breast procedure do you perform a clinical breast examination? ( <i>n</i> = 1038)		
100 percent	917	86.0
76–99 percent	56	5.3
26–75 percent	20	1.9
1–25 percent	22	2.1
0 percent	23	2.2
Do you obtain a mammogram based on age? ( <i>n</i> = 1031)		
Yes	950	89.1
No	81	7.6
Do you obtain a mammogram based on a positive family history regardless of age? ( <i>n</i> = 1031)		
Yes	609	57.1
No	422	39.6
Do you obtain a mammogram based on American Cancer Society breast screening guidelines? ( <i>n</i> = 1031)		
Yes	653	61.3
No	118	11.1
Don't know them	260	24.4

(Continued)

**Table 1. (Continued)**

	No.	%*
In approximately what percentage of patients do you obtain a mammogram? ( <i>n</i> = 1031)		
100 percent	78	7.3
76–99 percent	254	23.8
26–75 percent	531	49.8
1–25 percent	158	14.8
0 percent	10	0.9
At what age do you start to routinely order mammograms on patients scheduled to undergo a cosmetic breast procedure? ( <i>n</i> = 1025)		
≤30 years	230	21.6
35 years	158	14.8
40 years	498	46.7
>40 years	23	2.2
Other	53	5.0
Almost all to all	63	5.9
Within how many years of surgery do you consider a prior mammogram valid screening? ( <i>n</i> = 1031)		
1 year	799	75.0
2 years	53	5.0
3 years	9	0.8
4 years	2	0.2
5 years	2	0.2
Age dependent	166	15.6
For what percent of preoperative breast patients do you obtain an oncology consult? ( <i>n</i> = 1007)		
100 percent	11	1.0
76–99 percent	7	0.7
26–75 percent	26	2.4
1–25 percent	432	40.5
0 percent	531	49.8
For patients scheduled to undergo a cosmetic breast procedure, do you obtain an oncology consult when you have a positive finding? ( <i>n</i> = 989)		
Medical consult	76	7.1
Surgical consult	792	74.3
Neither	48	4.5
Both	73	6.8
For patients scheduled to undergo a cosmetic breast procedure, do you obtain an oncology consult when you have a positive family history? ( <i>n</i> = 939)		
Medical consult	181	17.0
Surgical consult	53	5.0
Neither	693	65.0
Both	12	1.1
For patients scheduled to undergo a cosmetic breast procedure, do you obtain an oncology consult when you have an abnormal mammogram? ( <i>n</i> = 990)		
Medical consult	68	6.4
Surgical consult	799	75.0
Neither	27	2.5
Both	96	9.0

(Continued)

**Table 1. (Continued)**

	No.	%*
Do you obtain any study to screen for breast cancer other than a mammogram? ( <i>n</i> = 979)		
None	557	52.3
Ultrasound	146	13.7
Magnetic resonance imaging	49	4.6
Other	70	6.6
Ultrasound and magnetic resonance imaging	157	14.7
Are you familiar with the recommendations in the American Cancer Society breast cancer screening guidelines? ( <i>n</i> = 1007)		
Yes	680	63.8
No	327	30.7
How many patients in your practice were diagnosed with ductal carcinoma in situ or breast cancer during, or within a year, of their cosmetic breast procedure? ( <i>n</i> = 1007)		
None	598	56.1
1–2 patients	260	24.4
3–6 patients	49	4.6
7–10 patients	2	0.2
>10 patients	6	0.6
Don't know	92	8.6
At what age do you start to routinely order mammograms on patients scheduled to undergo a cosmetic breast procedure? ( <i>n</i> = 1017)		
Does not follow American Cancer Society guidelines	515	48.3
Follows American Cancer Society guidelines	502	47.1

\*Percentages may not sum to 100% due to rounding and missing data.

act test, where appropriate, was used to compare categorical variables by physician characteristics (years in practice, gender, practice setting, and familiarity with American Cancer Society guidelines). Multivariate logistic regression analysis was then used to determine predictors of physician practices. Statistical analysis was performed using SPSS 13.0 (SPSS Inc., Chicago, Ill.). A *p* value less than 0.05 was considered statistically significant. Adjustments were not made for multiple comparisons; *p* values should be interpreted conservatively.

## RESULTS

### Response Rate and Demographics

A total of 1094 plastic surgeons participated in the survey (24 percent response rate). Twenty-eight responses were excluded because these surgeons responded that they “do not do breast surgery,” “do not operate,” “are pediatric surgeons,” “are retired,” or “work with cancer patients only”

on an initial screening question. The 1066 included respondents were predominantly male (82 percent) and consisted largely of private practitioners (73 percent). The participants were roughly evenly distributed with respect to total years in practice, and a majority of surgeons performed augmentation mammoplasty, reduction mammoplasty, and mastopexy (96 percent). We attempted, but were unable, to obtain data regarding the mentioned variables for the total American Cancer Society member population.

### Overall Results

Most respondents attested to always reviewing risk factors preoperatively in their aesthetic breast surgery patients (89 percent), and only slightly fewer always perform a clinical breast examination preoperatively (86 percent). Eighty-nine percent of respondents claimed that they obtain mammographic screening based on age, and 57 percent do so based on positive family history, regardless of age. When prompted on the practice of obtaining a mammogram based on American Cancer Society breast screening guidelines, 61 percent stated that they did follow the guidelines, whereas 24 percent stated that they did not know the guidelines. The overall use of mammography varied greatly, with 7 percent (*n* = 78) of respondents screening 100 percent of patients, 24 percent (*n* = 254) screening 76 to 99 percent of patients, 50 percent (*n* = 531) screening 26 to 75 percent of patients, 15 percent (*n* = 159) screening 1 to 25 percent of patients, and 0.1 percent (*n* = 10) never screening. The age at which routine preoperative mammography was initiated varied as well, but the largest percentage of surgeons stated that they screen beginning at age 40; most of the remainder stated that they screened beginning at a younger age (Table 2). Seventy-five percent (*n* = 799) of plastic surgeons considered a mammogram within 1 year to be valid, whereas 15 percent (*n* = 166) stated that this was age dependent. In total, 47 percent (*n* = 502) of the physicians surveyed appeared to follow the American Cancer Society guidelines, while 64 percent (*n* = 680) claimed familiarity with the recommendations.

Over 90 percent (*n* = 963) of survey respondents reported obtaining an oncology consult in less than 25 percent of patients. These surgeons were much more likely to obtain a consult, usually surgical, if screening revealed a positive finding. Even in patients with a positive family history, most respondents stated that they would not obtain a consult. A minority utilized other screening mo-

**Table 2. Overall Survey Response Frequencies and Subgroup Analysis**

	Overall		Years in Practice		Gender		Practice Type		Guideline Familiarity		p
	n = 1066	Subgroup	≤15 Years	>15 Years	Male	Female	Academic	Private	Yes	No	
		n = 1047	p	p	p	p	p	p	p	p	
For what percentage of your patients scheduled to undergo a cosmetic breast procedure do you perform a review of risk factors?											
100 percent	950 (89%)	557 (91%)	393 (91%)	0.82	777 (90%)	173 (94%)	136 (90%)	694 (91%)	640 (94%)	277 (85%)	<0.001
0-99 percent	97 (9%)	58 (9%)	39 (9%)		86 (10%)	11 (6%)	15 (10%)	69 (9%)	40 (6%)	50 (15%)	
For what percentage of your patients scheduled to undergo a cosmetic breast procedure do you perform a clinical breast examination?											
100 percent	917 (86%)	525 (86%)	391 (92%)	0.007	763 (89%)	154 (85%)	133 (89%)	667 (88%)	607 (90%)	280 (86%)	0.04
0-99 percent	121 (12%)	85 (14%)	36 (8%)		94 (11%)	27 (15%)	17 (11%)	91 (12%)	65 (10%)	46 (14%)	
Do you obtain a mammogram based on age?											
Yes	950 (89%)	570 (94%)	380 (90%)	0.02	776 (91%)	174 (96%)	142 (95%)	686 (91%)	642 (94%)	288 (88%)	<0.001
No	81 (8%)	38 (6%)	43 (10%)		74 (9%)	7 (4%)	8 (5%)	64 (9%)	38 (6%)	39 (12%)	
Do you obtain a mammogram based on a positive family history regardless of age?											
Yes	609 (57%)	360 (59%)	249 (59%)	0.91	499 (59%)	110 (61%)	91 (61%)	430 (57%)	412 (61%)	179 (55%)	0.08
No	422 (40%)	248 (41%)	174 (41%)		351 (41%)	71 (39%)	59 (39%)	320 (43%)	268 (39%)	148 (45%)	
Do you obtain a mammogram based on American Cancer Society breast screening guidelines?											
Yes	653 (61%)	384 (63%)	269 (64%)	0.89	538 (63%)	115 (63%)	96 (64%)	468 (62%)	593 (87%)	48 (15%)	<0.001
No	118 (11%)	72 (12%)	46 (11%)		93 (11%)	25 (14%)	15 (10%)	95 (13%)	71 (10%)	42 (13%)	
Don't know them	260 (24%)	152 (25%)	108 (26%)		219 (26%)	41 (23%)	39 (26%)	187 (25%)	16 (2%)	237 (73%)	
In approximately what percentage of patients do you obtain a mammogram?											
76-100 percent	332 (31%)	205 (34%)	127 (30%)	0.21	253 (30%)	79 (44%)	57 (38%)	227 (30%)	219 (32%)	101 (31%)	0.67
0-75 percent	699 (66%)	403 (66%)	296 (70%)		597 (70%)	102 (56%)	93 (62%)	523 (70%)	461 (68%)	226 (69%)	
At what age do you start to routinely order mammograms on patients scheduled to undergo a cosmetic breast procedure?											
≤30 years	230 (22%)	143 (24%)	87 (21%)	<0.001	173 (21%)	57 (32%)	41 (28%)	155 (21%)	163 (24%)	61 (19%)	0.29
35 years	158 (15%)	106 (17%)	52 (12%)		125 (15%)	33 (18%)	15 (10%)	124 (17%)	100 (15%)	56 (17%)	
40 years	498 (47%)	290 (48%)	208 (50%)		426 (50%)	72 (40%)	75 (50%)	363 (49%)	325 (48%)	163 (50%)	
>40 years	23 (2%)	6 (1%)	17 (4%)		20 (2%)	3 (2%)	3 (2%)	15 (2%)	13 (2%)	9 (3%)	
Other	53 (5%)	21 (4%)	32 (8%)		47 (6%)	6 (3%)	5 (3%)	42 (5%)	30 (4%)	19 (6%)	
Almost all to all	63 (6%)	40 (7%)	23 (6%)		54 (6%)	9 (5%)	10 (7%)	47 (6%)	45 (7%)	17 (5%)	
Within how many years of surgery do you consider a prior mammogram valid screening?											
1 year	799 (75%)	498 (82%)	301 (71%)	<0.001	648 (76%)	151 (83%)	120 (80%)	587 (78%)	517 (76%)	268 (82%)	0.03
2-5 years, or age dependent	232 (22%)	110 (18%)	122 (29%)		202 (24%)	30 (17%)	30 (20%)	163 (22%)	163 (24%)	59 (18%)	
For what percentage of preoperative breast patients do you obtain an oncology consult?											
1-100 percent	476 (45%)	301 (50%)	175 (43%)	0.02	380 (46%)	96 (55%)	86 (59%)	323 (44%)	351 (52%)	125 (38%)	<0.001
0 percent	531 (50%)	296 (50%)	235 (57%)		452 (54%)	79 (45%)	59 (41%)	409 (56%)	329 (48%)	202 (62%)	

(Continued)

**Table 2. (Continued)**

	Overall		Years in Practice		Gender		Practice Type		Guideline Familiarity		p			
	n = 1066	Subgroup	≤15 Years	>15 Years	p	Male	Female	p	Academic	Private		p	Yes	No
For patients scheduled to undergo a cosmetic breast procedure, do you obtain an oncology consult when you have a positive physical finding?		n = 989												
Medical consult	76 (7%)		43 (7%)	33 (8%)	0.84	63 (8%)	13 (8%)	0.99	7 (5%)	60 (8%)	0.48	42 (6%)	33 (10%)	
Surgical consult	792 (74%)		471 (80%)	321 (80%)		656 (80%)	136 (80%)		119 (83%)	565 (79%)		541 (81%)	251 (78%)	
Neither	48 (4%)		27 (5%)	21 (5%)		39 (5%)	9 (5%)		6 (4%)	39 (5%)		32 (5%)	16 (5%)	
Both	73 (7%)		46 (8%)	27 (7%)		61 (7%)	12 (7%)		11 (8%)	54 (8%)		52 (8%)	21 (7%)	
For patients scheduled to undergo a cosmetic breast procedure, do you obtain an oncology consult when you have a positive family history?		n = 990												
Yes	246 (23%)		158 (28%)	88 (23%)	0.11	197 (25%)	49 (31%)	0.15	51 (37%)	147 (22%)	<0.001	174 (27%)	72 (24%)	
No	693 (65%)		405 (72%)	288 (77%)		583 (75%)	110 (69%)		86 (63%)	536 (78%)		461 (73%)	232 (76%)	
For patients scheduled to undergo a cosmetic breast procedure, do you obtain an oncology consult when you have an abnormal mammogram?		n = 979												
Medical consult	68 (6%)		38 (7%)	30 (7%)	0.55	57 (7%)	11 (6%)	0.99	7 (5%)	54 (8%)	0.27	36 (5%)	32 (10%)	
Surgical consult	799 (75%)		474 (81%)	325 (80%)		660 (81%)	139 (81%)		125 (87%)	574 (80%)		551 (82%)	248 (78%)	
Neither	27 (3%)		13 (2%)	14 (4%)		22 (3%)	5 (3%)		2 (1%)	22 (3%)		20 (3%)	7 (2%)	
Both	96 (9%)		60 (10%)	36 (9%)		80 (10%)	16 (9%)		10 (7%)	68 (9%)		63 (9%)	33 (10%)	
Do you obtain any study to screen for breast cancer other than a mammogram?		n = 1007												
Yes (including ultrasound, magnetic resonance imaging, both, other)	422 (40%)		227 (39%)	195 (49%)	0.004	334 (41%)	88 (52%)	0.01	45 (32%)	309 (43%)	0.015	307 (47%)	115 (35%)	
No	557 (52%)		351 (61%)	206 (51%)		475 (59%)	82 (48%)		94 (68%)	402 (57%)		347 (53%)	210 (65%)	
Are you familiar with the recommendations in the American Cancer Society breast cancer screening guidelines?		n = 1007												
Yes	680 (64%)		412 (69%)	268 (65%)	0.23	558 (67%)	122 (70%)	0.5	104 (72%)	488 (67%)	0.24	235 (38%)	82 (28%)	
No	327 (31%)		185 (31%)	142 (35%)		274 (33%)	53 (30%)		41 (28%)	244 (33%)		385 (62%)	213 (72%)	
How many patients in your practice were diagnosed with ductal carcinoma in situ or breast cancer during or within a year of their cosmetic breast procedure?		n = 1007												
Any	409 (38%)		176 (32%)	141 (39%)	0.035	244 (33%)	73 (44%)	0.004	47 (37%)	228 (34%)	0.54	235 (38%)	82 (28%)	
None	598 (56%)		375 (68%)	223 (61%)		506 (67%)	92 (56%)		81 (63%)	444 (66%)		385 (62%)	213 (72%)	
At what age do you start to routinely order mammograms on patients scheduled to undergo a cosmetic breast procedure?		n = 1017												
Does not follow American Cancer Society guidelines	515 (48%)		307 (51%)	208 (50%)	0.73	411 (49%)	104 (59%)	0.01	69 (47%)	376 (51%)	0.44	343 (51%)	159 (49%)	
Follows American Cancer Society guidelines	502 (47%)		294 (49%)	208 (50%)		430 (51%)	72 (41%)		77 (53%)	365 (49%)		328 (49%)	163 (51%)	

dalities in addition to mammography, including magnetic resonance imaging and ultrasound. Fifty-six percent of respondents ( $n = 598$ ) had never had a patient diagnosed with ductal carcinoma in situ during or within a year of an aesthetic procedure, whereas 24 percent ( $n = 260$ ) had up to two patients diagnosed during that period.

**Subgroup Results**

**Years in Practice**

Physicians who had been in practice for more than 15 years were more likely than less experienced physicians to report that they perform clinical examinations in all patients (92 versus 86 percent,  $p = 0.007$ ); however, the physicians with fewer than 15 years in practice more often obtained a mammogram based on age (94 versus 90 percent,  $p = 0.02$ ). These less-experienced physicians also reported initiating mammography screening at younger ages ( $p < 0.001$ ; Table 2). A higher percentage of physicians in practice fewer than 15 years stated that mammography was valid within 1 year (82 versus 71 percent,  $p \leq 0.001$ ). Physicians with more than 15 years of experience less commonly ordered oncology consults in their patients, with 57 versus 50 percent stating that they never do ( $p = 0.02$ ), but these physicians were more likely to use additional studies to screen for breast cancer (49 versus 39 percent,  $p = 0.004$ ). With respect to utilization of other screening modalities, multivariate logistic regression comparing greater than 15 years in practice to less than 15 years in practice also predicted a similar result, with an odds ratio of 1.65 ( $p = 0.001$ , Tables 3 through 5). A higher percentage of more experienced physicians reported having had any patient diagnosed with breast cancer during or within a year of their cosmetic procedure (39 versus 32 percent,  $p = 0.035$ ), and the multivariate logistic regression also predicted an increased odds of having a patient diagnosed with breast cancer during or within a year of the procedure in this group (odds ratio 1.48,  $p = 0.007$ ).

**Physician Gender**

Female respondents to this survey stated that they were more likely to obtain a mammogram based on age (96 versus 91 percent,  $p = 0.03$ ). A higher percentage of women surgeons reported that they obtained mammograms in more than 75 percent of their patients (44 versus 30 percent,  $p \leq 0.001$ ), initiated screening at younger ages ( $p = 0.01$ , Table 2), and screened with other modalities, compared with their male counterparts (52 versus 41 percent,  $p = 0.01$ ). Multivariate logistic

**Table 3. Multivariate Analyses**

	For What Percentage of Preoperative Breast Patients Do You Obtain an Oncology Consult? = Any†		
	OR	95% CI	<i>p</i>
Years in practice >15 years versus ≤15 years†	0.79	0.60, 1.05	0.11
Gender Female versus male†	1.37	0.96, 1.94	0.08
Practice setting Private versus academic†	0.56	0.39, 0.81	0.002
Familiar with American Cancer Society screening guidelines Yes versus no†	1.72	1.29, 2.31	<0.001

OR, odds ratio; CI, confidence interval.

†Reference group.

‡Reference group = none.

For each variable, odds ratios indicate the likelihood, relative to the reference group, of the outcome occurring (while controlling for the other variables in the model). Odds ratios greater than 1.00 indicate an increased likelihood of occurrence, while odds ratios less than 1.00 indicate a decreased likelihood of occurrence.

**Table 4. Multivariate Analyses**

	Do You Obtain Any Study to Screen for Breast Cancer Other than a Mammogram? = Yes‡		
	OR	95% CI	<i>p</i>
Years in practice >15 years versus ≤15 years†	1.65	1.23, 2.20	0.001
Gender Female versus male†	1.75	1.22, 2.51	0.002
Practice setting Private versus academic†	1.55	1.05, 2.29	0.03
Familiar with American Cancer Society screening guidelines Yes versus no†	1.56	1.16, 2.11	0.004

OR, odds ratio; CI, confidence interval.

†Reference group.

‡Reference group = none; Yes = ultrasound, magnetic resonance imaging, ultrasound and magnetic resonance imaging, or "other" screening.

For each variable, odds ratios indicate the likelihood, relative to the reference group, of the outcome occurring (while controlling for the other variables in the model). Odds ratios greater than 1.00 indicate an increased likelihood of occurrence, while odds ratios less than 1.00 indicate a decreased likelihood of occurrence.

regression further confirms this last relationship (odds ratio 1.75,  $p = 0.002$ ). Although mammography was utilized to a greater extent by female than by male physicians, 59 percent of female plastic surgeons did not follow American Cancer

**Table 5. Multivariate Analyses**

	How Many Patients in Your Practice Were Diagnosed with Ductal Carcinoma In Situ or Breast Cancer during or within a Year of Their Cosmetic Breast Procedure? = Any†‡		
	OR	95% CI	<i>p</i>
Years in practice >15 versus ≤15 years†	1.48	1.11, 1.96	0.007
Gender Female versus male†	1.76	1.24, 2.50	0.002
Familiar with American Cancer Society screening guidelines Yes versus no†	1.61	1.19, 2.19	0.002

†Reference group.

‡Reference group = none.

For each variable, odds ratios indicate the likelihood, relative to the reference group, of the outcome occurring (while controlling for the other variables in the model). Odds ratios greater than 1.00 indicate an increased likelihood of occurrence, while odds ratios less than 1.00 indicate a decreased likelihood of occurrence.

Society guidelines, while the same was true in 49 percent of male plastic surgeons ( $p = 0.01$ ). Women surgeons also reported that they were more likely to obtain preoperative oncology consultations (55 versus 46 percent,  $p = 0.03$ ). Finally, a higher percentage of women indicated having had one or more patients diagnosed with breast cancer during or within a year of the procedure (44 versus 33 percent,  $p = 0.004$ ), and a multivariate logistic regression model demonstrated that being a female surgeon was predictive of having had one or more patients diagnosed during or within a year of a cosmetic breast procedure (odds ratio 1.76,  $p = 0.002$ ).

### Practice Setting

Academic physicians tended to report obtaining mammograms in more of their patients compared with physicians in private practice, although this difference did not reach statistical significance (38 versus 30 percent,  $p = 0.06$ ). Academic plastic surgeons did report being significantly more likely to obtain preoperative oncology consultations for patients (59 versus 44 percent,  $p = 0.001$ ). A multivariate linear regression further confirms this association, utilizing the academic physicians as a reference group (odds ratio 0.56,  $p < 0.01$ ). In addition, academic physicians were significantly more likely to report obtaining mammography based on a positive family history (37 versus 22 percent,  $p < 0.001$ ). Finally, private practice

physicians were more likely to report utilizing other screening methods in addition to mammography (43 versus 32 percent,  $p = 0.015$ ), and a multivariate logistic regression also predicted these findings (odds ratio 1.55,  $p = 0.03$ ).

### Familiarity with American Cancer Society Guidelines

Surgeons who answered that they were familiar with the American Cancer Society screening guidelines were more likely to review risk factors preoperatively in all patients (94 versus 85 percent,  $p \leq 0.001$ ) and were more likely to perform a clinical breast examination in 100 percent of their patients (90 versus 86 percent,  $p = 0.04$ ). A higher percentage of respondents familiar with American Cancer Society guidelines obtained a mammogram based on age (94 versus 88 percent,  $p \leq 0.001$ ), obtained a mammogram based on the American Cancer Society guidelines (87 versus 15 percent  $p \leq 0.001$ ), and obtained a preoperative oncology consult for any of their patients (52 versus 38 percent,  $p \leq 0.001$ ). The association with preoperative oncology consultation was further confirmed by multivariate linear regression (odds ratio 1.72,  $p < 0.001$ ). Fewer of these surgeons considered mammography to be valid within 1 year (76 versus 82 percent,  $p = 0.03$ ), and surgical consultation was utilized to a greater extent and medical consultation to a lesser extent when abnormal findings were noted, compared with surgeons not familiar with American Cancer Society (Table 2;  $p = 0.045$ ). Surgeons familiar with the guidelines more often obtained additional screening tests (47 versus 35 percent,  $p = 0.001$ ), and a higher percentage had patients diagnosed with ductal carcinoma in situ during or within a year after surgery (38 versus 28 percent,  $p = 0.003$ ). The multivariate logistic regression predicted similar associations for these outcomes when comparing those familiar with the guidelines to those unfamiliar, with an odds ratio of 1.56 ( $p = 0.004$ ) for obtaining additional screening studies and 1.61 for having a patient diagnosed during or within a year of the procedure ( $p = 0.002$ ).

## DISCUSSION

Plastic surgeons are in a unique position to intervene in the lives of women who may not otherwise be receiving appropriate screening for breast cancer. Effective intervention requires knowledge and application of evidence-based guidelines. Screening recommendations have changed over the last decade. In 1997, the American Cancer Society updated its guidelines for breast cancer screening.<sup>25</sup> The most promi-

ment modification to previous guidelines was the recommendation that women should begin annual screening mammography at age 40, as opposed to every 1 to 2 years, beginning at age 40 and annually after age 50.<sup>26</sup> Recommendations for clinical breast examination were changed to advise women beginning at age 40 to schedule a clinical breast examination annually around the time of mammography.

In 2002, the American Cancer Society convened a panel of experts to review existing guidelines and relevant literature to more closely align recommendations with available evidence. The results of these deliberations were published in 2003, with recommendations for women at average risk and women at increased risk (Table 6).<sup>23</sup> Women at average risk should begin mammogra-

phy at age 40 and should receive a clinical breast examination at least every 3 years beginning in their 20s and 30s. Beginning in their 20s, these women should also receive education on the benefits and limitations of breast self-examination. At that time, it was stated that women at increased risk of breast cancer might benefit from additional screening strategies, such as ultrasound or magnetic resonance imaging; however, available evidence was insufficient to justify recommendations for any specific screening approach. In 2007, the American Cancer Society amended the guideline recommendations for magnetic resonance imaging screening following the release of several studies demonstrating the efficacy of this as a screening tool in such high-risk groups.<sup>27-31</sup> The updated guidelines recommend yearly magnetic resonance imaging screening as an adjunct to mammography in groups of women at high risk (a >20 to 25 percent lifetime risk) of developing cancer, a group that includes *BRCA* mutation carriers and first-degree family members.<sup>24</sup> Evidence was insufficient to recommend magnetic resonance imaging in moderate-risk patients.

Over the years, a number of risk factors have been identified for breast cancer. These include two or more relatives with breast or ovarian cancer, breast cancer occurring before age 50 in an affected relative, relatives with both breast and ovarian cancer, one or more relatives with two cancers, male relatives with breast cancer, or a family history of breast or ovarian cancer and Ashkenazi Jewish heritage.

Although there is insufficient evidence to recommend specific screening guidelines for all women at increased risk, four additional screening options may still be considered: the initiation of mammography screening at age 30, shorter mammography screening intervals, the addition of ultrasound screening, and the addition of magnetic resonance imaging screening for moderate-risk patients.

This study was undertaken to determine the extent to which plastic surgeons are screening patients who present for cosmetic breast surgery using these established guidelines and to investigate the role of practice setting, gender, and years in practice in American Society of Plastic Surgeons member screening practices. Several findings deserve discussion.

### Years in Practice

Physicians in practice greater than 15 years were more likely to perform a clinical breast ex-

**Table 6. American Cancer Society Breast Cancer Screening Guidelines\***

Risk Group	Guideline
Women at average risk	<ol style="list-style-type: none"> <li>1. Begin mammography at age 40</li> <li>2. Clinical breast examinations should be part of periodic health examinations, at least every 3 years for women in their 20s and 30s, and yearly for women over 40</li> <li>3. Beginning in their 20s, women should be given instructions, and information on the benefits and limitations of breast self-examination</li> </ol>
Older women	Should be individualized, considering benefits and risks of mammography in context of current health status and estimated life expectancy
Women at increased risk	<p>These women may benefit from additional screening strategies such as earlier initiation, shorter intervals, or additional modalities such as magnetic resonance imaging. Annual magnetic resonance imaging screening is recommended for:</p> <ul style="list-style-type: none"> <li>• <i>BRCA</i> mutation carriers</li> <li>• First-degree relative of <i>BRCA</i> carrier, but untested</li> <li>• Lifetime risk 20–25% or greater</li> <li>• Radiation to chest between age 10 and 30 years</li> <li>• Li-Fraumeni syndrome and first-degree relatives</li> <li>• Cowden and Bannayan-Riley-Ruvalcaba syndromes and first-degree relatives.</li> </ul> <p>Women who have a moderately increased (15–20%) lifetime risk should speak with their physician about benefits and limitations of magnetic resonance imaging screening</p>

\*From Smith RA, Cokkinides V, Eyre HJ. American Cancer Society guidelines for the early detection of cancer, 2003. *CA Cancer J Clin.* 2003;53:27–43; and Leitch AM, Dodd GD, Costanza M, et al. American Cancer Society guidelines for the early detection of breast cancer: Update 1997. *CA Cancer J Clin.* 1997;47:150–153.

amination than those in practice less than 15 years, but were less likely to begin screening mammograms in patients under 40. Mammography has become a much more widely applied screening tool over the last 15 years, and it is understandable that physicians having trained during the height of emphasis on screening mammography are more likely to obtain a mammogram, whereas physicians who trained before that era would rely more strongly on physical examination. Being in practice for longer than 15 years was an independent predictor of having had patients diagnosed with breast cancer either during or within a year of having a cosmetic breast procedure. This finding is probably due to a greater number of years in practice, resulting in a greater cumulative number of established patients, making any positive finding, including breast cancer, more likely.

### Physician Gender

Female physicians were more likely to obtain a preoperative mammogram, more likely to begin screening in younger patients, more likely to screen with multiple modalities, and more likely to obtain an oncology consult. In light of these more aggressive screening practices, it is not surprising that being a female surgeon is an independent predictor of having a patient diagnosed with breast cancer during or within a year of a cosmetic breast procedure. It should be noted, however, that male surgeons were more likely to follow American Cancer Society screening guidelines than their female counterparts, even though these practices seem to result in fewer true-positive breast cancer cases. The reason for the difference in screening practices is not known, although one might speculate that being at risk for breast cancer herself, a female surgeon could possess a degree of countertransference, and thus conduct more aggressive “empathic screening,” rather than screening based on American Cancer Society guidelines. This type of conclusion cannot be drawn from the data and is, at best, highly speculative.

### Practice Setting

Being an academic practitioner is associated with obtaining an oncology consult as well as obtaining additional screening modalities beyond mammography. This is somewhat expected, as both consult services and imaging modalities are more readily available in academic settings and academic practitioners are more used to relying on them than private practitioners. It is important

to note that there was not a difference in adherence to American Cancer Society guidelines, nor was there a difference in the number of patients diagnosed during or within a year of cosmetic breast surgery.

### Familiarity with American Cancer Society Guidelines

Surgeons who claimed to be familiar with American Cancer Society guidelines also claimed to screen more aggressively in almost every measured parameter: they were more likely to review risk factors, perform a clinical breast examination, obtain an oncology consult, and order additional screening studies. Importantly, claiming knowledge of American Cancer Society guidelines was an independent predictor of having patients diagnosed with ductal carcinoma in situ or breast cancer during or within a year of a cosmetic breast procedure, suggesting that these more aggressive screening practices result in a greater number of true-positive breast cancer diagnoses.

### Limitations

Survey data can suffer from significant recall bias and sample bias. Because the distribution of respondents was fairly even in subgroups compared, sample bias was less likely a serious confounder. Recall bias, however, could have significantly affected the data. For instance, it is very possible that surgeons who think they are familiar with American Cancer Society guidelines also think that they order mammograms more often than they actually do. It is also possible that female surgeons are aware of patients in their practice having been diagnosed with breast cancer within a year of a cosmetic procedure because they are following patients longer or more closely, rather than screening more effectively. It is very difficult to determine the contribution of such effects, but conclusions must be interpreted with this caveat. In addition, the response rate to the online survey was relatively low at 24 percent. As we were unable to make a comparison of our respondents with the overall American Society of Plastic Surgeons membership, it is possible that the respondents represent a subset of the American Society of Plastic Surgeons membership whose practices are not reflective of the whole group. For this reason, conclusions should be interpreted with the appropriate level of caution.

## CONCLUSIONS

Breast cancer is a major public health problem, for which screening is at least part of the

solution. Plastic surgeons are in a unique position to screen women who may not otherwise receive screening. Knowledge of the American Cancer Society guidelines is an essential component of effective cancer screening, but unfortunately only somewhat more than half of plastic surgeon respondents who perform breast surgery have knowledge of these guidelines. Being male predicted more accurate knowledge of the guidelines, but being female resulted in more aggressive screening, and possibly more diagnoses. Familiarity with the American Cancer Society screening guidelines also resulted in a greater number of perioperative diagnoses. As plastic surgeons, we have an obligation to actively participate in the health and well-being of our patients, and this involves understanding and applying good breast cancer screening practices.

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## REFERENCES

- Jemal A, Siegel R, Ward E, et al. Cancer statistics, 2007. *CA Cancer J Clin.* 2007;57:43–66.
- American Society of Plastic Surgeons. National Clearinghouse of Plastic Surgery Statistics. *Procedural Statistics Trends 2000–2007*. Vol. 2008. 2008.
- Uematsu T. Screening and diagnosis of breast cancer in augmented women. *Breast Cancer* 2008;15:159–164.
- Bleicher RJ, Topham NS, Morrow M. Beauty and the beast: Management of breast cancer after plastic surgery. *Ann Surg.* 2008;247:680–686.
- Deapen D. Breast implants and breast cancer: A review of incidence, detection, mortality, and survival. *Plast Reconstr Surg.* 2007;120:70S–80S.
- Handel N, Silverstein MJ. Breast cancer diagnosis and prognosis in augmented women. *Plast Reconstr Surg.* 2006;118:587–593; discussion 594–586.
- Miglioretti DL, Rutter CM, Geller BM, et al. Effect of breast augmentation on the accuracy of mammography and cancer characteristics. *JAMA.* 2004;291:442–450.
- Birdsell DC, Jenkins H, Berkel H. Breast cancer diagnosis and survival in women with and without breast implants. *Plast Reconstr Surg.* 1993;92:795–800.
- Mendelson EB. Evaluation of the postoperative breast. *Radiol Clin North Am.* 1992;30:107–138.
- Miller CL, Feig SA, Fox JWt. Mammographic changes after reduction mammoplasty. *AJR Am J Roentgenol.* 1987;149:35–38.
- Danikas D, Theodorou SJ, Kokkalis G, et al. Mammographic findings following reduction mammoplasty. *Aesthet Plast Surg.* 2001;25:283–285.
- Wolfe JN. On mammography in the presence of breast implants. *Plast Reconstr Surg.* 1978;62:286–288.
- Hayes HJr, Vandergrift J, Diner WC. Mammography and breast implants. *Plast Reconstr Surg.* 1988;82:1–8.
- Handel N, Silverstein MJ, Gamagami P, et al. Factors affecting mammographic visualization of the breast after augmentation mammoplasty. *JAMA.* 1992;268:1913–1917.
- Skinner KA, Silberman H, Dougherty W, et al. Breast cancer after augmentation mammoplasty. *Ann Surg Oncol.* 2001;8:138–144.
- Silverstein MJ, Handel N, Gamagami P, et al. Breast cancer diagnosis and prognosis in women following augmentation with silicone gel-filled prostheses. *Eur J Cancer* 1992;28:635–640.
- Silverstein MJ, Handel N, Gamagami P, et al. Mammographic measurements before and after augmentation mammoplasty. *Plast Reconstr Surg.* 1990;86:1126–1130.
- Deapen D, Hamilton A, Bernstein L, et al. Breast cancer stage at diagnosis and survival among patients with prior breast implants. *Plast Reconstr Surg.* 2000;105:535–540.
- Jakub JW, Ebert MD, Cantor A, et al. Breast cancer in patients with prior augmentation: Presentation, stage, and lymphatic mapping. *Plast Reconstr Surg.* 2004;114:1737–1742.
- Clark CP3rd, Peters GN, O'Brien KM. Cancer in the augmented breast: Diagnosis and prognosis. *Cancer* 1993;72:2170–2174.
- Keleher AJ, Langstein HN, Ames FC, et al. Breast cancer in reduction mammoplasty specimens: Case reports and guidelines. *Breast J.* 2003;9:120–125.
- Brown FE, Sargent SK, Cohen SR, et al. Mammographic changes following reduction mammoplasty. *Plast Reconstr Surg.* 1987;80:691–698.
- Smith RA, Cokkinides V, Eyre HJ. American Cancer Society guidelines for the early detection of cancer, 2003. *CA Cancer J Clin.* 2003;53:27–43.
- Saslow D, Boetes C, Burke W, et al. American Cancer Society guidelines for breast screening with MRI as an adjunct to mammography. *CA Cancer J Clin.* 2007;57:75–89.
- Leitch AM, Dodd GD, Costanza M, et al. American Cancer Society guidelines for the early detection of breast cancer: Update 1997. *CA Cancer J Clin.* 1997;47:150–153.
- Dodd GD. American Cancer Society guidelines on screening for breast cancer: An overview. *Cancer* 1992;69:1885–1887.
- Kriege M, Brekelmans CT, Boetes C, et al. Efficacy of MRI and mammography for breast-cancer screening in women with a familial or genetic predisposition. *N Engl J Med.* 2004;351:427–437.
- Kuhl CK, Schrading S, Leutner CC, et al. Mammography, breast ultrasound, and magnetic resonance imaging for surveillance of women at high familial risk for breast cancer. *J Clin Oncol.* 2005;23:8469–8476.
- Leach MO, Boggis CR, Dixon AK, et al. Screening with magnetic resonance imaging and mammography of a UK population at high familial risk of breast cancer: A prospective multicentre cohort study (MARIBS). *Lancet* 2005;365:1769–1778.
- Lehman CD, Blume JD, Weatherall P, et al. Screening women at high risk for breast cancer with mammography and magnetic resonance imaging. *Cancer* 2005;103:1898–1905.
- Warner E, Plewes DB, Hill KA, et al. Surveillance of BRCA1 and BRCA2 mutation carriers with magnetic resonance imaging, ultrasound, mammography, and clinical breast examination. *JAMA.* 2004;292:1317–1325.