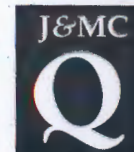


# MEDICINE, MEDIA, AND CELEBRITIES: NEWS COVERAGE OF BREAST CANCER, 1960-1995

By Julia B. Corbett and Motomi Mori

This research investigated the relationship between medical activities, public events, and media coverage of breast cancer during a thirty-six-year period.<sup>1</sup> There was substantial support for medical attention preceding media attention to breast cancer, and some evidence of medical attention following media coverage. There were extremely high, significant correlations between numbers of medical journal articles and newspaper, magazine, and TV coverage. Time-series analysis revealed a two-way, concurrent relationship between breast cancer funding and media coverage. Public events (prominent women acknowledging their breast cancer) significantly affected media coverage. There was a two-way concurrent relationship between breast cancer incidence and TV coverage.



The diffusion of medical information to health practitioners and the public has been a long-standing, fundamental U.S. governmental and social priority.<sup>2</sup> Health communicators, government agencies, and related non-profit organizations have long relied on mass media to aid in this dissemination. If the media are a major conduit for medical news, what kind of role can health communicators expect mass media to play regarding specific health problems?

Take for example "the Big C," as John Wayne called it. Although the mortality rate for some types of cancer has improved dramatically, the overall mortality rate for breast cancer in the United States is virtually the same now as it was sixty years ago.<sup>3</sup> Meanwhile, print coverage of breast cancer has mushroomed: the *New York Times* and all U.S. magazines published a total of three stories in 1960 and 149 stories in 1995. What does this suggest about the influence of societal institutions (such as the medical community) on the reporting of medical problems? Are there additional factors that influence the role that media play regarding public health issues? This research investigates these questions for one particular health problem, breast cancer.

According to a macro framework, the mass media are an integrated part of the overall social system, dependent on the cooperation of other institutions within it for news. Within this framework, scholars seek to understand the interaction of media with other social units, such as medicine. As a social institution, medicine has numerous system controls, exercised inside and outside the health care delivery system. There are barriers to entering the field, including a lengthy and expensive education, apprentice-

**Literature:  
Medicine  
and  
Media**

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J&MC Quarterly  
Vol. 76, No. 2  
Summer 1999  
229-249  
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ship, and stiff competition. Licensing and medical journal publication constitute additional controls, but practitioners are afforded a great deal of status and authority once licensed. Gandy<sup>4</sup> noted that those in the health care industry to a large extent control the formulation of health policy through their ability to define problems, specify alternatives, and choose between benefits and costs. A reliance on technological devices and physician-driven care<sup>5</sup> constitute system controls that are part of the accepted public image of health care.

The interdependencies between medicine, government, insurance companies, and private businesses reinforce this dominant ideology and the role of physicians as primary providers of medical information. Government-sponsored research, primarily funneled through the National Institutes of Health (NIH), helps drive the demand for technology and directly supports medical schools. Stevens<sup>6</sup> reported that nearly half of the faculty at U.S. medical schools got part of their salaries from NIH-sponsored research. The U.S. government is the world's largest single drug buyer through its purchases for the military and public health services.<sup>7</sup> Gandy<sup>8</sup> has noted parallels between the defense and health care industries, such as defense-electronics firms that develop new medical devices.

Because of its technical, specialized nature, medical information is channeled and controlled by numerous gatekeepers,<sup>9</sup> constituting a one-way information flow from medical journals, physicians, and researchers.<sup>10</sup> As a result, "the news comes to the science writers" more so than for other media beats,<sup>11</sup> a practice reinforced by the requirement that scientists present their results first in professional journals. This one-way flow can directly influence media coverage of medical topics. For example, Rogers, Dearing, and Chang<sup>12</sup> found that medical journal publication about AIDS affected media coverage of it. The medical community, by deciding what to translate and release to media, what to disseminate through nonmedia channels, and what to withhold, is the media's primary source for medical news. Media coverage of medicine implies "support for the scientific and political agenda of the nation's health care delivery system"<sup>13</sup> and reinforces the media's role of popularizing health news to lay audiences to improve public health.<sup>14</sup>

Nelkin said that although scientists have publicized their work since the nineteenth century, public relations activities have grown and become more sophisticated because the medical industry, professional groups, and aspiring individuals "all want to manage the messages that enter the cultural sphere."<sup>15</sup> She concluded that although PR people save reporters time in tracing and translating news, they also "sell" science by promoting some discoveries and withholding others. The effectiveness of public relations in obtaining media coverage has been well-documented.<sup>16</sup> PR practitioners act as mediators between scientists and journalists,<sup>17</sup> a relationship that is most effective when the publicizing institution has a track record of productivity, and as Stocking<sup>18</sup> discovered for medical schools, a high level of prestige.

Schwitzer<sup>19</sup> noted a growing number of medical reporters and physician-broadcasters, a phenomenon he attributed to expanding PR efforts by physicians, hospitals, and medical and drug manufacturers. He cited evidence of their influence: health reporters' favorite stories concern new drugs and treatments, and 90 percent of medical news originates from PR. The tendency of medical journalists to rely on packaged information has been criticized,<sup>20</sup> including use of a relatively new package in which to wrap medical news, the video news release (VNR). *The Nation* reported that the pharmaceutical industry frequently sends VNRs starring "white-coated,

confidence-inspiring physicians" to TV stations nationwide.<sup>21</sup> Most TV stations exercise editorial control over VNRs and often do not identify on-screen the source of video footage.<sup>22</sup>

Because science reporters depend on their scientific sources, they may tend to avoid controversy that might alienate sources. Cole<sup>23</sup> found that although coverage of scientific conflict increased during a twenty-year period, science reporters were still less likely than general assignment reporters to report conflict. Pfund and Hofstadter<sup>24</sup> reached a similar conclusion; reporters of biomedical research were much more likely to pick supportive mainstream scientific sources over the opinions of those adversely affected by the science.

Studies have found that health coverage strongly resembles the priorities of the medical community. Winkler, Kanouse, Brodsley, and Brook<sup>25</sup> reported that press coverage of certain medical topics peaked after NIH Consensus Conferences<sup>26</sup> were devoted to them. Findings from these conferences were widely cited in the media up to six months later. Dutch researchers found agreement between medicines discussed in medical literature and those discussed in newspapers during a four-month period.<sup>27</sup> Fisher, Gandy, and Janus<sup>28</sup> noted similarities during a fifteen-year period in peaks of news coverage about heart disease and peaks in the budget of what was then the National Heart and Lung Institute, a part of NIH.

To suggest that media are dependent on the medical community is only part of the story; there is ample evidence that the medical community is "watching" news coverage. Just as journalistic attention to a disease varies—according to the perceived health threat, public interest, or sensational news value—so may attention by the medical community. Federal appropriations from Congress for the National Cancer Institute (NCI) are essentially political, and it is logical to assume that agency officials and researchers pay attention to "what's hot" politically and publicly. For example, once AIDS was legitimized in the media, research funding skyrocketed: the estimated 1991 research dollars spent per case of AIDS was \$2,841.42, versus \$1.55 per cancer case.<sup>29</sup>

O'Keefe<sup>30</sup> found that almost 90 percent of physicians surveyed admitted that they got professional news from the media now and then. Phillips, Kanter, Bednarczyk, and Tastad<sup>31</sup> concluded that popular press coverage of medical research amplified the transmission of medical information from scientific literature to the research community. They discovered that articles in the *New England Journal of Medicine* covered by the *New York Times* received a disproportionate number of scientific citations in each of the ten years after the *NEJM* articles appeared. An *Annals of Internal Medicine* article recommended that physicians make the media a "useful tool of medicine" because media content significantly affects public attitudes.<sup>32</sup>

Media coverage is viewed by some medical researchers as a way to help with their careers. In a survey of authors who recently published in *NEJM* and *JAMA*, 44 percent felt that media coverage would help them achieve their professional goals.<sup>33</sup> The authors also said media coverage improved the profession's image, informed the professional community of their research, and allowed the public to better understand the topic.

This review of literature has illustrated medical community control of specialized information in a way that reinforces the media's dependence. The literature also points out the political nature of medicine, apparent in the interdependencies with other industries and government, as well as the

## Hypotheses and Rationale



infusion of government appropriations for medical research, education, and government-sponsored health care programs. Finally, the literature documents medical community reliance on the media for professional information and for cues regarding public interest and political reaction to particular health topics.

What this suggests is that the media's relationship with medicine is different from the journalistically popular notion of "watchdog" and the academically popular theory of "agenda setting."<sup>34</sup> If the media had played the role of watchdog, representing and protecting public interest, news coverage would have been representative of incidence over the past thirty-six years. Instead, mortality remained at a constant high level while media attention skyrocketed. Researchers have found that media attention often does not correspond with actual disease incidence or mortality.<sup>35</sup>

Agenda-setting theory posits that media tell us what to think about by virtue of what they print or air. But much of the agenda-setting research portrays media as equal co-actors in the power structure,<sup>36</sup> able to directly oppose other powers or team up with them to attain certain ends. Mass media, however, are not autonomous generators of information nor capable of independent gatekeeping news choices, particularly for scientific material. Media are structurally dependent on institutions such as medicine for information and for cues as to its importance. If the media had played an agenda-setting role regarding breast cancer, journalists would have made news decisions independently of the medical community and coverage might little resemble medical activities, a conclusion not supported by past research.

What type of role, then, can we say that media play regarding institutions such as the medical community? An apt metaphor for their role, coined by Donohue, Tichenor, and Olien,<sup>37</sup> is that of a "guard dog." This theorization holds that media act as sentries not for the entire community and the public interest (a watchdog) but for entities with sufficient power and influence. Guard dog media are not a separate nor equal power (that is, not agenda setters), but are dependent on the dominant powers, thereby providing a means by which the power oligarchy is maintained. Although media may criticize or attack individuals within the system, they do not attack the power structure itself nor the dominant relationships in it. Applying a guard dog role to media coverage of breast cancer suggests that media would defer to dominant medical institutions concerning breast cancer, following their changing emphases and priorities.

H1: Medical community attention to breast cancer will precede mass media attention to breast cancer.

However, given the competitive, political nature of medical research and funding, we also expect the medical community to pay close attention to where the restless media spotlight is shining.<sup>38</sup> Media can focus attention on a health concern in ways that even the powerful medical community cannot, and for that reason, health practitioners will note how an issue "plays" in the media. Examples include how media "convergence" over Rock Hudson's death and Ryan White's expulsion from school sparked attention to the AIDS crisis,<sup>39</sup> and how the deaths of athletes Len Bias and Don Rogers peaked coverage of the "crack epidemic."<sup>40</sup> Some health communicators have concluded that revelations by several public figures about their breast cancer

in the 1970s worked in a similar way.<sup>41</sup> It may be that the powerful medical community can rely on a dependent and deferent guard dog press, and can therefore trust—and follow—media attention to breast cancer.

H2: The medical community will often note and follow increases in media attention.

But media serve as sentries for powerful entities throughout the social system and may be just as willing to follow leads outside the medical community. Just as researchers noted the influence of "famous faces" on media attention to AIDS and cocaine, prominent women publicly announcing their breast cancer may have served to peak media as well as medical attention.

H3: Important public events regarding breast cancer will legitimize and amplify both media coverage and medical community attention.

Further, we expect to find what previous researchers have discovered regarding the media's representative coverage of incidence and mortality.

H4: There will be no relationship between breast cancer mortality and media attention, but there will be a positive relationship between breast cancer incidence and media attention.

Finally, media can be expected to follow one another's lead at times, termed inter-media influences by communication researchers. Prestigious media with specialized medical reporters may lead the way for other media regarding breast cancer.

H5: Intermedia influences will be significant, particularly from prestigious media like the *New York Times*.

To accurately trace the relationship between medical activities and media content, it was important to begin this study when both media and medical attention were relatively low yet breast cancer mortality was significant, qualifying it as an issue worthy of both medical and media attention. Because low-dose mammography was developed in 1960, this year was chosen as a starting point.

Although thirty-six years gives strength to data analysis, it presented special considerations for data collection. Most media indexes did not begin until the 1970s, and when many media later switched to electronic indexes, indexing procedures often changed dramatically. To avoid these problems, this study selected all print media available in printed indexes from January 1960 through December 1995: the *New York Times* and magazines in the *Reader's Guide to Periodical Literature*. Abstracts of network TV newscasts (ABC, CBS, and NBC) from *Vanderbilt Television Archives* were available beginning in 1972. All time series comparisons were limited to years for which complete data were available.

A census of media abstracts was collected, using the key words "breast," "cancer—breast," "mammary cancer," "mastectomy," "mammogram," and "breast exam." Entries under "breast implants" and "breast

## Methods



disease" were included only if the abstract mentioned cancer.

A graduate research assistant and the first author coded the media data. Test coding was done on 25 independent stories (from the *Washington Post* and CNN); all coding disagreements were discussed and the code book revised. A second test coding with 25 more stories (also outside the study sample) resulted in more examples in the code book but no substantive revisions. Inter-coder reliability was established on a third independent sample of 108 stories from the studied media (print and broadcast) but from years before and after the study period. Reliability corrected for chance agreement (Scott's  $\pi^{42}$ ) ranged from 84% to 99%; overall agreement was 96% for six categories.<sup>43</sup> Final sample size of media stories was 1,999: 704 in the *New York Times*, 985 in magazines, 310 in TV network newscasts.

Three indicators of medical community attention were chosen: published journal articles and two measures of research funding. Journal data was collected from *Index Medicus*, a comprehensive index of journal articles and available on-line through *Medline* from 1966-1995. Because this index did not change protocol when it began its on-line service, print versions of *Index Medicus* from 1960-1965 completed the data set. The search term "breast neoplasms" (the medical term for breast cancer) was used to locate articles in five of the most prominent U.S. medical journals for cancer research that had been in existence since 1960:<sup>44</sup> *Cancer*, *Cancer Research*, *JAMA*, *Journal of the National Cancer Institute*, and *NEJM*.

Record-keeping at NCI changed dramatically in thirty-six years; records on research funds spent on specific cancer sites were not kept until 1981. So, in addition to breast cancer funds from 1981-1995, the annual total appropriation for NCI since 1960 also was used; both were adjusted for inflation with the Implicit Price Deflator.<sup>45</sup> Nationwide estimates for incidence and mortality became available in 1973.<sup>46</sup>

A data set also was compiled of important events. These events, which occurred outside the controls of journal publication or funding, were discussed in the literature as potentially affecting media coverage, medical attention, or both: the public announcements of prominent women with breast cancer and public consensus conferences on breast cancer.

The principal statistical technique was time-series analysis (using SAS/ETS procedures).<sup>47</sup> Time series analysis is a stringent method for analyzing longitudinal data because it removes any naturally occurring trends over time before comparing one data set with another. In order not to violate data limitations, data available only as annual figures were not extrapolated into monthly increments to compare with data available by month. All medical community indicators were analyzed as annual data because funding levels and incidence and mortality rates were annual figures, and medical journals did not publish with the same frequency. When medical data were compared with media data, both data sets were analyzed as annual. However, when analyzing solely media data and events (all available as monthly data), time series comparisons were made by month.

Initially we checked for non-stationarity by plotting each time series against year (or month) and examining its autocorrelation function. Of the seven time series using annual data, six showed nonstationarity trends, or a systematic increase or decrease in distribution over time. Because all time series must be stationary, these series were first-order differenced (subtracting the first observation from the second) to remove the linear trend from the series. Once stationarity was achieved for each series by applying appropriate transformation and differencing, we found the best fitting Autoregressive

TABLE 1  
ARIMA Models Used in Times Series Analysis

Data Type	Time-Series	Diff. <sup>a</sup>	AR <sup>b</sup>	MA <sup>c</sup>	Parameter Estimates
Annual	New York Times & Magazines	1	0	0	$(1-B)y_t = 4.171 + a_t$
	TV	1	1	0	$(1-B)y_t = 1.418 + (1 + 0.564B)^{-1}a_t$
	Journal	1	0	1	$(1-B)y_t = 10.021 + (1 - 0.667B)a_t$
	NCI Funding	1	0	(1)(8)	$(1-B)\log(y_t) = 0.051 + (1 + 0.906B)(1 - 0.630B^8)a_t$
	Breast Cancer Funding	1	0	1	$(1-B)\log(y_t) = 0.120 + (1 + 0.507B)a_t$
	Incidence	1	0	0	$(1-B)\log(y_t) = 0.015 + a_{t+1}$
	Mortality	0	0	0	$\log(y_t) = 3.299 + a_t$
Monthly	New York Times	1	1	(1)(5)(9)(21)	$(1 - 0.265B)(1 - B)y_t = 0.012 + (1 - 0.935B)(1 + 0.138B^5)(1 - 0.117B^9)(1 - 0.146B^{21})a_t$
	TV	1	0	1	$(1-B)y_t = 0.009 + (1 - 0.952B)a_t$
	Science Magazines	1	(1, 3)	(1)(3)	$(1 + 0.088B - 0.713B^3)(1 - B)y_t = 0.006 + (1 - 0.942B)(1 - 0.570B^3)a_t$
	News/Business Magazines	1	(1)(10)	(1, 2)(23)	$(1 - 0.122B^{10})(1 + 0.383B)(1 - B)y_t = 0.003 + (1 - 0.438B - 0.522B^2)(1 + 0.101B^{23})a_t$
	Women's Magazines	1	(2, 7)	(1)(24)	$(1 + 0.141B^2 - 0.116B^7)(1 - B)y_t = 0.005 + (1 - 0.983B)(1 + 0.239B^{24})a_t$
	General Magazines	1	0	(1)(7)	$(1-B)y_t = 0.002 + (1 - 0.976B)(1 + 0.138B^7)a_t$
	Health Magazines	1	15	1	$(1 + 0.170B^{15})(1 - B)y_t = 0.0024 + (1 - 0.961B)a_t$

<sup>a</sup> Order of differencing

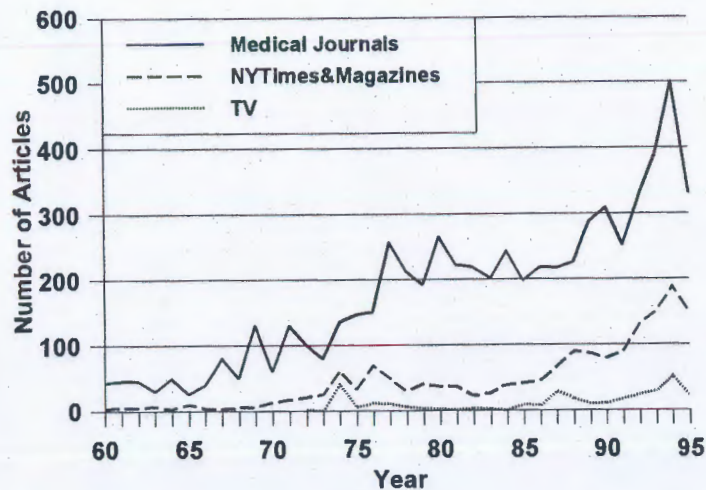
<sup>b</sup> Order of autoregressive process

<sup>c</sup> Order of moving-average process



FIGURE 1

Medical Journal Articles and Media Coverage of Breast Cancer



Integrated Moving-Average (ARIMA) model for each series by examining its sample autocorrelation, inverse autocorrelation, and partial autocorrelation functions. An ARIMA model predicts a value in a response time series as a linear combination of its own past values and past errors (also called shocks or innovations).

An ARIMA model is expressed as  $ARIMA(p,d,q)$  where  $p$  is the order of the autoregressive process,  $d$  is the degree of differencing applied to make the model stationary, and  $q$  is the order of the moving average process. For example, an  $AR(1)$  model [ $ARIMA(1,0,0)$ ] implies that the current observation ( $y_t$ ) is a linear function of the mean, immediate past observation ( $y_{t-1}$ ) and current random error. An  $MA(1)$  model [ $ARIMA(0,0,1)$ ] implies that the current observation ( $y_t$ ) is a linear function of the mean, the current random error, and exponentially weighted past observations. Table 1 shows the ARIMA model for each annual and monthly time series as well as the estimated coefficients.<sup>48</sup>

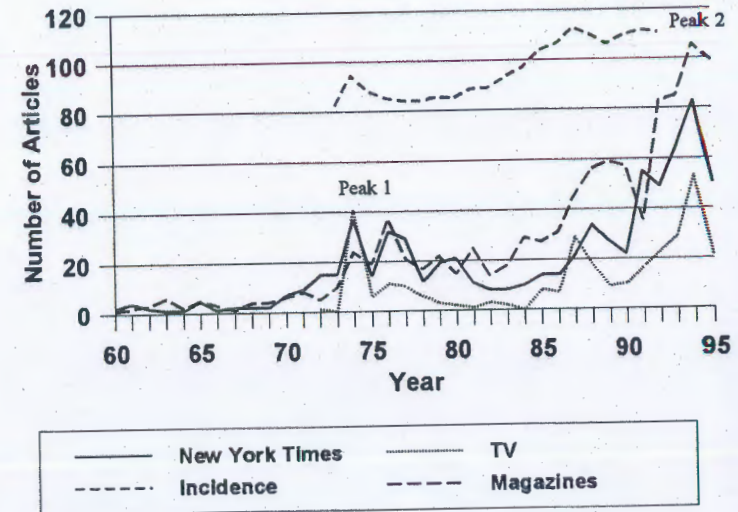
Residuals from the ARIMA models were then used to examine the dynamic interactions between series. Specifically, cross correlation functions were used to postulate possible transfer function models (sometimes called dynamic regression models). Finally, the transfer function models were fitted to assess the strength of the association.

## Results

**Descriptive Results.** Medical journal articles about breast cancer (see Figure 1) increased fairly steadily, particularly after 1976.<sup>49</sup> Breast cancer funding experienced a steady increase since 1981, although the degree is dwarfed by the overall NCI funding level, which experienced far more fluctuation. The population rate of breast cancer incidence across age categories has increased since 1973; the mortality rate has remained constant.

FIGURE 2

Media Coverage and Breast Cancer Incidence



As Figure 2 illustrates, media stories showed two distinctive peaks: 1974 and 1994. In September 1974, Betty Ford, wife of President Ford, had a mastectomy and announced it to the media. Several weeks later Happy Rockefeller (wife of Sen. Nelson Rockefeller) announced she had a mastectomy, followed by a mastectomy of the other breast in November. Calls to cancer hotlines and to schedule mammograms quickly mushroomed. Much of the media attention in 1974 came from TV, which eclipsed that of all other media. They were not, however, the first prominent women to make public acknowledgments. In October 1971, Sen. Birch Bayh's wife Marvella was diagnosed with breast cancer; she died from the disease in 1978. In November 1972, Shirley Temple Black, child actress and later political figure, told the public she had breast cancer. Public revelations did not end with Ford and Rockefeller; if anything, they encouraged others to broach the subject. In the twenty years following, more than a dozen prominent women talked about their breast cancer, including humorist Erma Bombeck, Supreme Court Justice Sandra Day O'Connor, former First Lady Nancy Reagan, and a host of entertainment figures, such as Jill Eikenberry, Ann Jillian, Olivia Newton John, and Linda Ellerbee.

In 1994, media coverage included two prominent events: discovery of the "breast cancer gene" BRCA-1, and the admission by a Canadian researcher (working on a prominent, federally funded breast cancer study centered at the University of Pittsburgh) that data had been falsified. Coverage by the *New York Times* in 1994 surpassed that of TV and magazines.

Table 2 illustrates the shifts in media story focus by decade. In the 1960s, the predominant story focus in print media was on breast cancer treatment (mastectomy and lumpectomy, radiation, chemotherapy, and later, drugs like taxol and tamoxifen), a focus that shifted over the decades to include screening and diagnosis. (This is understandable given the call for



TABLE 2  
Focus of Breast Cancer Stories by Decades

DECADE Frequency Row % Column % NY Times & Magazines	FOCUS	Causes & Links	Screening & Diagnosis	Basic Research	Therapy & Treatment	Personal Stories	Famous People	General	Fraud	Other	Total
1960s	5	9.43 1.26	16.98 2.44	10 18.87 15.63	17 32.08 5.18	1 1.89 0.44	0 0.00 0.00	8 15.09 6.15	0 0.00 0.00	3 5.66 10.00	53 3.14
1970s	38	10.61 9.60	107 29.89 29.00	29 8.10 45.31	77 21.51 23.48	44 12.29 19.38	24 6.70 36.92	16 4.47 12.31	13 3.36 16.25	10 2.79 33.33	358 21.20
1980s	127	25.97 32.07	118 24.13 31.98	21 4.29 32.81	113 34.45	42 8.59 18.50	21 4.29 32.31	33 6.75 25.38	5 1.02 6.25	9 1.84 30.00	489 28.95
1990s	226	28.64 57.07	135 17.11 36.59	4 0.51 6.25	121 15.34 36.89	140 17.74 61.67	20 2.53 30.77	73 9.25 56.15	62 7.86 77.50	8 1.01 26.67	789 46.71
Total	396	23.45	369 21.85	64 3.79	328 19.42	227 13.44	65 3.85	130 7.70	80 4.75	30 1.78	1,689 100.00
(Chi-square = 241.16, $p < .001$ )											
Network TV Newscasts	4										
1970s	5.13 5.80	11 14.10 22.00	0 0.00 0.00	13 16.67 24.07	0 0.00 0.00	0 0.00 0.00	48 61.54 62.34	2 2.56 8.00	0 0.00 0.00	0 0.00 0.00	78 25.16
1980s	22 27.85 31.88	8 10.13 16.00	0 0.00 0.00	12 15.19 22.22	2 2.53 20.00	27 34.18 35.06	2 1.31 2.60	7 8.86 28.00	0 0.00 0.00	1 1.27 50.00	79 25.48
1990s	43 28.10 62.32	31 20.26 62.00	1 0.65 100.00	29 18.95 53.70	8 5.23 80.00	2 1.31 2.60	16 10.46 64.00	16 10.46 64.00	22 14.38 100.00	1 0.65 50.00	153 49.35
Total	69 22.26	50 16.13	1 0.32	54 17.42	10 3.23	77 24.84	25 8.06	22 7.10	2 0.65	2 0.65	310 100.00

TABLE 3  
Correlations between Medical Journal Articles and Media Articles about Breast Cancer

	medical journals	New York Times	TV	science mags.	news/busin. mags.	women's mags.	general mags.	health mags.
medical jnl		.847	.697	.820	.777	.823	.850	.760
NY Times	.847		.842	.862	.873	.807	.837	.825
TV	.697	.842		.706	.926	.669	.732	.618
science mag.	.862	.862	.706		.843	.798	.854	.845
news mag.	.777	.873	.926	.843		.799	.826	.683
women mag.	.823	.807	.669	.798	.799		.812	.778
gen. mag.	.850	.837	.732	.854	.826	.812		.788
health mag.	.760	.825	.618	.845	.683	.778	.786	

Pearson product-moment correlation coefficients,  $p = .0001$  for all correlations

screening by Ford, Rockefeller, and others, and perhaps due to the federal Breast Cancer Detection Demonstration Project, which began in 1972.) In the 1980s and 1990s, possible causes of breast cancer became a common focus of media stories. Prominent among these were research on breast cancer links to a high-fat diet, family history, alcohol use, a woman's hormonal history, and the breast cancer gene.

TV news stories (see Table 2) about famous people with cancer accounted for almost 62% of TV coverage in the 1970s, and 34% of the 1980s coverage as well. Causes of cancer were common TV stories in the 1980s and 1990s.

As shown in Table 3, Pearson correlation coefficient analysis found strong relationships between different media genre<sup>50</sup> as well as between medical articles and media articles; all were significant at the  $p < .0001$  level.

**ARIMA Analysis.** The results of the time-series analysis are shown in Tables 4 and 5, and graphic summaries are presented in Figures 3, 4, and 5. Interpreting the results in terms of the hypotheses provides the following.

H1: There is support for medical community attention leading media attention based on a strong, positive association between breast cancer funding and both print and TV coverage in the current year. The number of journal articles did not affect mass media attention. Breast cancer funding also was significantly related to medical journal publication in the concurrent year, and funding two years ago affected current year journal publication. NCI funding level bears little relationship to other variables, most likely because NCI funds support all types of cancer, and because fluctuations in appropriations may represent shifts in the political landscape. As noted in Table 1, the parameter estimate of the ARIMA model for NCI funding has evidence of an eight-year cycle.

H2: There is some support for the medical community following media attention. Breast cancer funding was significantly associated in the concurrent year for all media types. There was a relationship (possibly spurious) between print media coverage a year ago and current year journal article publication.

H3: Public events did not have a significant impact on the annual medical indicators, nor on TV in the annual time series (Figure 3). However,



**TABLE 4**  
Cross Correlation Functions of Annual Data

Residual Series	lag <sup>a</sup>	NYT & Magazines	TV	Medical Journals	NCI Funding	Breast Ca. Funding	Incidence	Mortality	Event
New York Times & Magazines	t			0.24	0.09	0.73**	0.38	-0.25	0.41*
	t-1			-0.32	-0.09	0.05	-0.20	-0.22	-0.23
	t-2			-0.03	0.23	0.04	0.52*	-0.08	0.48*
	t-3			-0.08	-0.31	-0.67*	-0.11	0.14	-0.18
TV	t			0.30	0.35	0.56*	0.79**	0.28	0.35
	t-1			-0.26	-0.40	0.07	0.14	-0.43*	-0.22
	t-2			-0.07	0.04	0.05	-0.08	-0.12	0.34
	t-3			-0.04	0.02	-0.41	0.04	-0.01	-0.09
Medical Journals	t	0.24	0.30		0.04	0.56*	-0.33	-0.00	0.24
	t-1	0.31*	-0.13		-0.33	0.29	-0.33	0.04	0.21
	t-2	0.12	0.06		0.21	0.54*	-0.33	0.11	0.27
	t-3	-0.03	0.29		-0.11	-0.26	0.36	0.34	0.10
NCI Funding	t	0.09	0.35	0.14		0.39	-0.03	0.10	0.20
	t-1	0.04	0.13	-0.23		-0.38	0.50*	-0.23	-0.10
	t-2	-0.26	-0.26	0.06		-0.02	-0.30	0.09	-0.16
	t-3	0.05	0.03	0.14		-0.38	0.08	0.11	0.05
Breast Cancer Funding	t	0.73**	0.56*	0.56*	0.39		-0.30	-0.65*	0.21
	t-1	-0.03	0.05	-0.19	-0.20		-0.02	0.00	0.13
	t-2	-0.06	-0.14	0.15	-0.02		-0.04	-0.38	0.44
	t-3	-0.14	-0.36	0.16	-0.37		-0.40	0.02	-0.01
Incidence	t	0.38	0.79**	-0.33	-0.03	-0.30		0.10	0.22
	t-1	-0.26	-0.35	-0.02	-0.13	-0.11		-0.30*	-0.24
	t-2	-0.07	-0.19	-0.21	-0.16	-0.20		-0.07	0.05
	t-3	-0.07	-0.11	0.02	-0.04	0.30		-0.14	-0.27
Mortality	t	-0.25	0.28	0.00	0.10	-0.65*	0.10		0.00
	t-1	0.39	0.21	-0.01	0.00	0.10	0.22		-0.04
	t-2	0.05	-0.01	-0.39*	0.14	-0.11	0.02		-0.11
	t-3	-0.05	0.32	-0.20	0.33*	-0.05	0.35		0.08

\*t represents year.

\* .01 &lt; p value &lt; .05

\*\* p value &lt; .01

**TABLE 5**  
Cross Correlation Functions of Monthly Data

Residual Series	lag <sup>a</sup>	NY Times	TV	Science	News/Bus.	Women	General	Health	Event
New York Times	t		0.46**	0.08	0.29**	0.13**	0.06	0.13**	0.24**
	t-1		0.08	-0.08	0.01	0.03	0.00	0.03	0.14**
	t-2		-0.07	-0.07	-0.04	0.01	0.07	-0.00	0.06
	t-3		-0.05	-0.01	-0.02	-0.02	-0.11*	0.03	0.07
TV	t	0.46**		0.17**	0.45**	0.05	0.05	0.17**	0.33**
	t-1	0.18**		-0.02	0.18**	0.05	0.04	0.02	0.14*
	t-2	-0.03		-0.04	-0.04	0.03	0.04	-0.11	0.08
	t-3	0.01		-0.03	0.04	-0.01	-0.03	0.05	-0.01
Science Magazines	t	0.08	0.17**		0.17**	0.01	0.04	0.05	0.12*
	t-1	0.04	0.01		0.02	0.00	0.13*	-0.06	0.05
	t-2	-0.04	-0.01		0.02	-0.02	-0.03	-0.03	-0.02
	t-3	-0.02	0.07		0.04	0.20**	0.05	0.04	-0.07
News/Business Magazines	t	0.29**	0.45**	0.17**		0.01	-0.03	0.01	0.12*
	t-1	0.05	0.11	0.00		-0.01	0.08	-0.01	0.12*
	t-2	0.11*	0.07	0.04		0.06	0.07	0.00	0.07
	t-3	-0.03	0.00	-0.10*		-0.00	0.06	0.08	0.03
Women's Magazines	t	0.14**	0.05	0.01	0.01		0.11*	0.00	0.09
	t-1	0.00	0.09	-0.01	0.07		0.05	0.10*	0.03
	t-2	-0.05	-0.11	-0.06	0.00		0.03	-0.06	0.10*
	t-3	0.02	0.07	0.02	0.10*		-0.01	-0.02	0.09
General Magazines	t	0.06	0.05	0.04	-0.03	0.11*		0.07	0.03
	t-1	0.06	0.11	0.10*	-0.05	-0.02		0.07	0.03
	t-2	0.13**	0.03	-0.09	-0.01	0.06		0.00	0.07
	t-3	-0.06	-0.00	0.06	0.00	0.05		-0.08	-0.02
Health Magazines	t	0.13**	0.17**	0.05	0.01	0.00	0.07		0.13**
	t-1	-0.02	-0.02	-0.06	-0.00	-0.05	0.06		0.07
	t-2	-0.02	-0.01	-0.01	-0.07	0.03	0.13**		-0.01
	t-3	0.04	0.04	0.09	0.02	0.04	-0.06		0.04

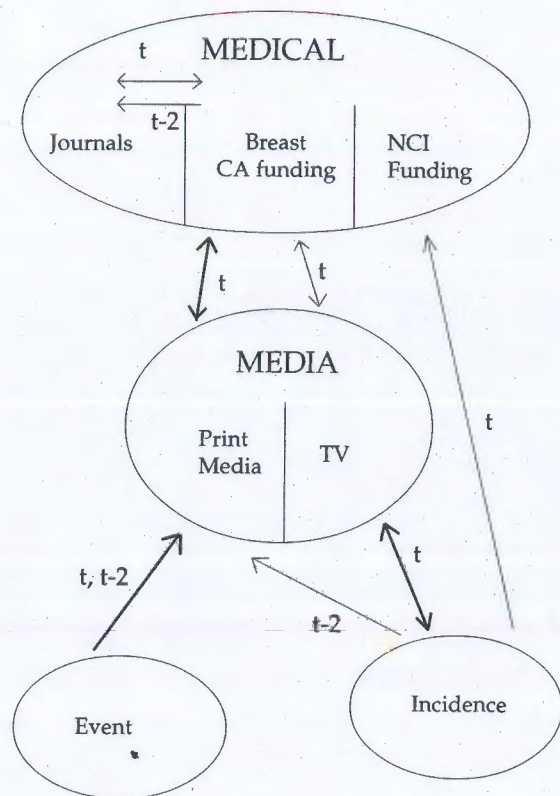
\*t represents month.

\* .01 &lt; p value &lt; .05

\*\* p value &lt; .01

**FIGURE 3**

*Relationships between Medical Community Indicators, Media, Coverage, Events, and Incidence*



t = concurrent year; t-1 = one-year lag; t-2 = two-year lag  
Bold arrows indicate strongest relationships.

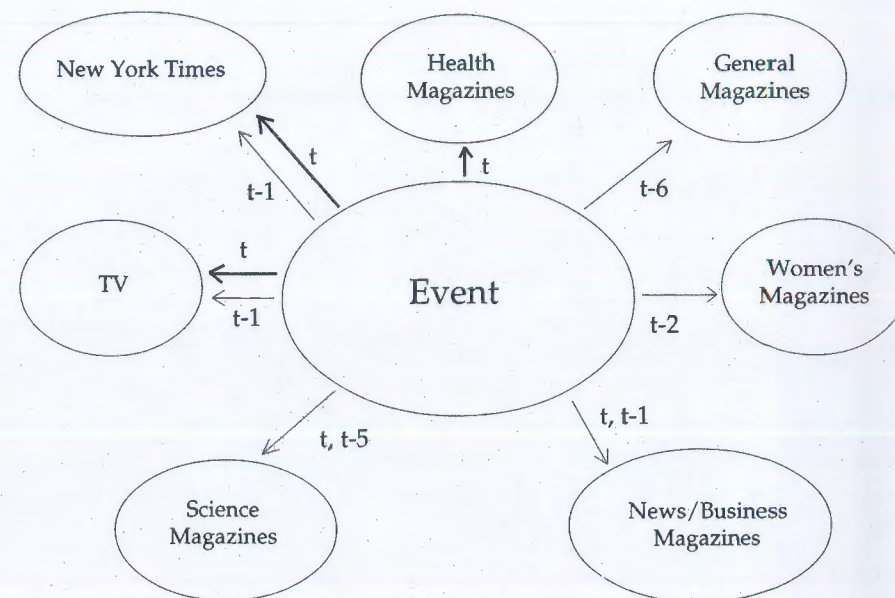
monthly time series revealed that important events significantly affected all types of media coverage (Table 5 and Figure 4).

H4: As predicted, there was not a significant relationship between breast cancer mortality and media stories. Also as predicted, there was a very strong two-way association between breast cancer incidence and the number of TV stories, and a positive association between incidence two years ago and the number of newspaper and magazine stories (Figure 3).

H5: As expected, the prestigious *New York Times* showed the strongest intermedia influence, with significant effects on all media except science magazines (Table 5 and Figure 5).

**FIGURE 4**

*Relationships between Event and Media Coverage of Breast Cancer*



t = concurrent year; t-1 = one-year lag; t-2 = two-year lag  
Bold arrows indicate strongest relationships.

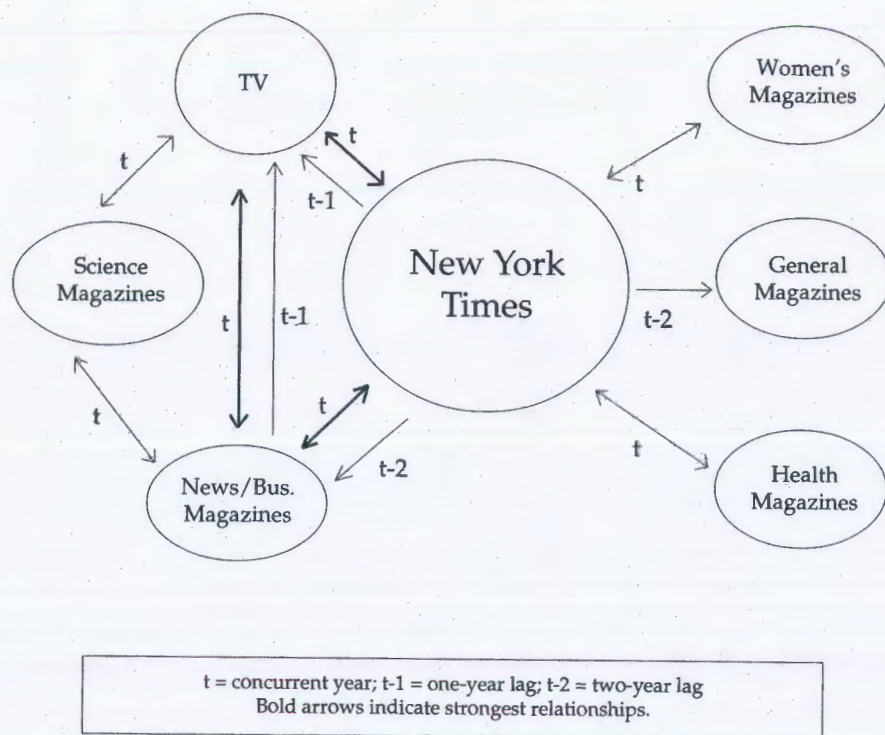
Although health communicators recognize the importance of mass media as a channel for health messages, they also recognize its limited utility. As Logan noted, "the accuracy, impartiality, and comprehensiveness of news is not directly tied to what one knows about medicine or a person's health care behavior."<sup>51</sup> At the same time, health professionals know that media publicity can help them reach both their professional and medical goals. It is of the utmost importance, therefore, for health professionals and media scholars to understand the relationship between medical activities, the media's reporting of health, and public events that affect them both.

One example of this media-health link is the relationship between media coverage and breast cancer incidence found here. Although this study does not address the impact of coverage on media consumers, we can assume that media attention to breast cancer helped spur women to visit doctors or seek mammograms. There was an extremely strong concurrent correlation between TV coverage and incidence ( $r = .79, p < .01$ ) and a moderate correlation between incidence two years ago and current print coverage ( $r = .52, p < .05$ ). Breast cancer campaigns also may have served to increase incidence levels, no doubt aided by media publicity.

## Discussion



**FIGURE 5**  
Inter-media Relationships Regarding Breast Cancer Coverage



Methodologically, this study attempted to refine the implementation of time-series analysis by addressing past applications that violated limitations of available data<sup>52</sup> and time lags<sup>53</sup> and failed to adjust dollar amounts of real-world indicators for inflation.<sup>54</sup> This study also considered TV coverage separately from print, utilized six real-world indicators that fairly represented emphases of the field, and chose a long time period and a long-standing health issue not prone to news coverage simply for its new-ness. Public issues undergo a complex life cycle<sup>55</sup> and ebbs and flows in media and public attention should be considered natural, not indicative. However, the primary limit methodologically of this study may very well be the length of its time series. Although the span of thirty-six years would remove fleeting associations, it might have suppressed relationships as well.

Although the time series analysis does not provide clear-cut confirmation of the guard dog model, there is substantial evidence (as Figure 3 illustrates) of a circular relationship between the medical community and mass media, as well as the influence of "famous faces" upon both. The strong connections between media and breast cancer funding—which ultimately drives much of the research funded and published—are noteworthy.

More clear-cut evidence of a guard dog role of the media is provided by the descriptive results, which document the media's deference to the medical community and medicine's reliance on the media for cues. First, there were extremely strong correlations between medical journal articles and media stories by year, and among media themselves (Table 3). This supports the dependencies documented in the literature of medical reporters upon the medical community, as well as the attention that medical professionals pay to "what's hot" in the media.

Second, as shown in Figure 1, trend lines and peaks for medical journal articles, print stories, and TV coverage are remarkably similar. All media lines show a marked peak in 1974 (the year of the Ford and Rockefeller announcements), while journal articles began a steady up-turn shortly after. The publicity likely provided a needed boost for a medical community that had been unable to change mortality rates, markedly improve treatment, or pinpoint the causes of breast cancer over several decades.<sup>56</sup>

Third, the shift in focus in print stories closely parallels shifting medical community emphases toward breast cancer (Table 2). Medicine focused on treatment in the 1960s, screening and diagnosis in the 1970s, and the search for causes in the 1980s and 1990s. This is evidence of the ability of the media to transmit news in accordance with institutional agendas.

Fourth, it is remarkable—though not unique—that celebrities helped provide the boost for both sustained media and medical attention. In American society, celebrities come from all sectors—political to entertainment—and exert tremendous power within the social system. Media may grant a celebrity news status equal to that of a governor or corporate CEO; for example, Christopher Reeve has done more than any politician or businessperson to champion and raise money for head-injury victims. Indeed, the power of a political or business figure may be further enhanced with celebrity status, such as a General Norman Schwarzkopf or a Bill Gates.

In other data from this study,<sup>57</sup> we noted a similar "coming out" by prominent men about their prostate cancer in the late 1980s and early 1990s.<sup>58</sup> This phenomenon of increased media attention to a disease after the direct involvement of famous faces deserves further study. We suggest, only somewhat facetiously, that finding a celebrity suffering from a disease may provide health professionals a boost in research funding, media publicity, and public awareness. Celebrities may provide a crucial element in what Reese and Danielian called media convergence, that once established can build exponentially: "After a story has reached a 'critical mass' it may continue in this way, floating loose from any moorings to actual newsworthy events."<sup>59</sup> Regarding prostate cancer, the development of the prostate-specific antigen (PSA) test occurred about the same time as the announcements by prominent men, providing simultaneous cues to the media from several powerful institutions.

Future research also could examine the amplification of attention in related industries and institutions as a result of celebrity involvement in an issue. For example, NBC reporter Betty Rollin's book about her breast cancer experience, *First You Cry*, was made into a CBS prime-time movie. Actress Ann Jillian starred in a TV movie about her breast cancer, and actress Jill Eikenberry was interviewed on a Barbara Walters' special about her breast cancer. Supreme Court Justice Sandra Day O'Connor and humorist Erma Bombeck each received media coverage about their experiences. These prominent women (as well as Ford and Reagan) represent a wide cross-section of the country's power and influence structures. The faces of these



famous breast cancer survivors continue to receive media attention; the Sunday newspaper *Parade Magazine* pictured fifteen of these celebrities on its 31 January 1999 cover.

Finally, further research is needed into alternative conceptualizations of the media's role in relation to the power structure. It is important to know, for example, that media cannot be expected to be public health watchdogs because coverage does not represent the severity or incidence of any particular disease or health issue. At the same time, media are not submissive "lapdogs" to the medical community and will occasionally sound the alarm, such as over the 1994 data falsification scandal. Nor are media a separate, equal power in the medical-governmental power oligarchy, for media did not significantly drive medical journal publication. Although this study presented evidence of a dependent, deferent guard dog press toward the coverage of breast cancer, additional testing is greatly needed.

## NOTES

1. This research was supported by grants from the American Cancer Society and by the Biostatistics Shared Resources of the Huntsman Cancer Institute (grant 5P30 CA42014), University of Utah, Salt Lake City. Special thanks to Heike Hoffmann for data collection and coding and to Renlu Gao, M.S., for statistical programming.
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in journal articles about other gender-specific cancers, including prostate, testicular, cervical, ovarian, and uterine. These breast cancer data are part of a much larger study concerning media coverage of all gender-specific cancers. See Julia B. Corbett and Motomi Mori, "Gender-Specific Cancers, Gender-Specific Reporters? Twenty-four Years of Network Television Coverage," *Science Communication* 20 (June 1999): 395-408; Julia B. Corbett and Motomi Mori, "Media as 'Guard Dogs' of Medical News: Newspaper Coverage of Breast Cancer, 1960-1995 in the U.S. and Great Britain" (paper presented at the annual meeting of the International Communication Association, San Francisco, May 1999).

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