

# Excessive and Disproportionate Advertising in Peer-reviewed Journals

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The International Committee of Medical Journal Editors (ICMJE) has outlined ethical guidelines concerning the advertising practices of peer-reviewed journals that briefly discuss issues of excessive and disproportionate advertising. The authors evaluated these guidelines using quantitative data, assessing the types and frequencies of advertising in 2001 print issues of *NEJM* and *JAMA*, two principal members of ICMJE. Advertising ratios (ratio of advertisements to editorial content) were near unity in *NEJM* and 0.30 in *JAMA*, compared with reported ratios of 0.15 among low-circulation specialty science journals and 0.80 among high-circulation consumer magazines. In both journals, five corporations placed more than 50% of all display advertisements. The findings suggest a dissonance between the ethical guidelines and the de facto advertising practices of arguably the two most important member journals of the ICMJE. There is a need to define and apply standards for excessive and disproportionate advertising. *Key words:* advertising; readership; editors; ethics, peer review.

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The International Committee of Medical Journal Editors (ICMJE) has outlined a series of uniform requirements for manuscripts submitted to biomedical journals. The requirements discuss various ethical and practical issues of publication relating to manuscripts, authors, editors, and journals. Editors from both *New England Journal of Medicine (NEJM)* and *Journal of the American Medical Association (JAMA)* helped write the guidelines.<sup>1</sup>

The guidelines state:

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Journals should not be dominated by advertising, but editors should be careful about publishing advertisements from only one or two advertisers as readers may perceive that the editor has been influenced by these advertisers.<sup>1</sup>

There is uncertainty as to a measurable definition of “dominated by advertisements.” Furthermore, the ICMJE guidelines to not discuss whether the criterion for disproportionate advertising that is restricted to one or two companies adequately addresses the complexity of publisher-advertiser relationships and the potential influence of any large advertising account irrespective of how many other accounts may buy space in a journal.

Advertising in peer-reviewed journals introduces physicians to new treatments<sup>2,3</sup> and provides both journals and publishing companies revenue that helps ensure their survival in a very competitive and increasingly costly industry. But there may be discord between the financial motivations of the advertisers and the objectives of the peer-reviewed science journals to provide impartial and accurate information.<sup>4</sup>

*NEJM* and *JAMA* are frequently cited by the lay press and are a primary reference for physicians.<sup>5-7</sup> Therefore, there is a case for investigating whether *NEJM* and *JAMA* adhere to the ethical principles set forth by the ICMJE. But more important, by evaluating the advertising practices in these two flagship journals we can better assess the adequacy of the ICMJE advertising guidelines through the use of quantitative measures. In this study, we assessed the type and frequency of advertising in both journals in order to begin to better define what constitutes excessive and disproportionate advertising.

## METHODS

We selected *NEJM* and *JAMA* because they have the highest reported circulations among general medicine journals,<sup>8</sup> and are the most frequently cited general medicine journals both in peer-reviewed journals<sup>9</sup> and in the lay literature.<sup>5,6</sup> We reviewed all the advertisements placed in print 2001 issues of *NEJM* and

**TABLE 1** Circulations, Impact Factors, and Revenue Sources in 2001, *New England Journal of Medicine* and *Journal of the American Medical Association*

	<i>NEJM</i>	<i>JAMA</i>
Circulation (paid subscriptions only)	193,785	249,532
Impact factor	29.5	15.4
Ad rate (2002)*	\$5,515	\$10,152
Advertising revenue†	\$17,925,050	\$27,201,112
Subscription revenue†	\$24,000,000 (est.*)	\$17,000,000
Number of original manuscripts published in 2001	193	205

\*Ad rates: *JAMA*, cost for one full-page ad, one issue, full run, black-and-white advertisement; *NEJM*, cost for one full-page ad, one issue, full run, black-and-white only.

†Advertising revenue: Based on figures provided by PERQ/HCI Journal Ad Review, year 2001; these figures do not include revenues from classified advertisements, which appear to be considerable; For example, *NEJM* estimated revenue in 2001 from classified ads was \$8,640,000 (24,000 classified ads per inch/per column rate of \$360).

*JAMA*.<sup>10,11</sup> All monetary descriptions are in U.S. dollars. We cite the ICMJE guidelines for advertising from the 2004 revision, the wording of which has not changed since 2000.

We provide data on circulation, impact factor, and revenue from advertisements and subscriptions (Table 1).<sup>8,9,12-13</sup> We report advertising revenue for display advertising in 2001 based on figures provided by PERQ/HCI Journal Ad Review.<sup>14</sup> The PERQ/HCI data do not include revenues from classified advertisements. Display advertising includes graphics or other artwork and is typically distributed throughout a journal. Classified advertising is most commonly text-based and grouped under headings classifying the product or service being offered, usually in the back pages. *NEJM* subscription revenue estimates were based on reported circulation and reader characteristics.<sup>15</sup>

We reviewed all advertisements placed in the *NEJM* U.S. edition, (Regional—Midwest; university library issue). For *JAMA*, we reviewed all advertisements placed in the US edition (Regional—Midwest; university library issue) and used the “Index of Advertisers” to verify our manual counts. The “Index of Advertisers” lists all the display advertisements placed in the *JAMA* national issue, including those targeting specific demographics and mini inserts.

### Statistical Methods

We used SAS for Windows (Version 8) for the statistical analysis. In order to evaluate whether corporate advertising trends in both journals corresponded to national spending patterns, we calculated the correlation between reported national advertising spending<sup>11</sup> and number of advertisements placed in *NEJM* and *JAMA*

combined by company. Reported national advertising spending was used for the following 15 companies: Pfizer, Johnson & Johnson, Merck & Co., Bristol-Myers Squibb Co., GlaxoSmithKline, Wyeth, Pharmacia Corp., Bayer, Novartis, Schering-Plough Corp., Aventis, Abbott Laboratories, AstraZeneca, Eli Lilly & Co., and Roche Holdings.<sup>16</sup> Data for other companies were not available. We used Fisher’s Transformation to calculate 95% confidence intervals for the Pearson correlation coefficients. A two-sided *p* value less than 0.05 was considered statistically significant.

## RESULTS

The *NEJM* generated \$17,925,050 and *JAMA* generated \$27,201,112 in revenue from non-classified advertisements during 2001 (Table 1).

Approximately 24,000 classified ads are placed annually in the *NEJM*. We found a total of 1,080 non-classified ad placements in *NEJM*. Display ads averaged 21 per issue, constituting a mean of 45.1 printed pages of advertising per issue. There were 4,157 pages of advertisements during 2001, of which 2,348 pages were display ads. In *NEJM*, pharmaceutical companies placed 90% of display advertisement pages (*n* = 2,121) (Table 2). On average, display ads accounted for 38.3% of each printed issue and classified ads accounted for 14%, for a total of 52.3% for the two combined.

In *JAMA*, we counted 562 display advertisements totaling 943 printed pages. In the university library issues, the average numbers of pages of display and classified ads per issue were 19.7 and 11.4, respectively. Display ads accounted for an average of 15.7% of the entire printed issue, and classified ads for 7%, for a total of 22.8% of total advertising pages. The *JAMA* media kit states that there is an average of 70 pages of advertisements per issue (39.9% of a printed issue), since demographic oriented advertisements and mini inserts vary by region. Pharmaceutical companies placed 73.5% of display advertisement pages (*n* = 693) (Table 2). When we exclude non-for-profit and “other” (e.g., conference and AMA self-promotion) advertisements, pharmaceutical advertisements accounted for 90.2% of all advertising pages in *JAMA* and 92.3% in *NEJM*.

In *NEJM*, 57.4% of pages of all non-classified advertisements (1,348 of 2,348) were placed by five companies: Pfizer (*n* = 350, 14.9%), Astra Zeneca (*n* = 326, 13.9%), Aventis (*n* = 301, 12.8%), Eli Lilly (*n* = 200, 8.5%), and GlaxoSmithKline (*n* = 171, 7.3%). Advertisements from these five companies comprised 58.7% of all the advertising pages when excluding the not-for-profit, conference, and internal self-promotion advertisements.

In *JAMA*, 52.7% of pages of all non-classified advertisements (497 of 943) were placed by five companies: Pfizer (*n* = 249, 26.4%), GlaxoSmithKline (*n* = 90, 9.5%), Pharmacia (*n* = 56, 5.9%), Roche Holdings (*n* = 52, 5.5%), and Eli Lilly (*n* = 50, 5.3%). Advertisements from

**TABLE 2 Type of Companies Advertising in the *New England Journal of Medicine* and *Journal of the American Medical Association***

Company Advertising	NEJM Advertisements		JAMA Advertisements	
	Number	Pages*	Number	Pages*
Pharmaceutical	906 (83.9%)	2,121 (90.3%)	369 (65.7%)	693 (73.5%)
Health Industry (non-pharmaceutical)	54 (5.0%)	78 (3.3%)	5 (0.9%)	5 (0.5%)
Non-medical commercial†	7 (0.6%)	7 (0.3%)	24 (4.3%)	23 (2.4%)
Reference‡	63 (5.8%)	76 (3.2%)	20 (3.6%)	24 (2.5%)
Government§	14 (1.3%)	16 (0.7%)	23 (4.1%)	23 (2.4%)
Not-for-profit companies	31 (2.9%)	44 (1.9%)	51 (9.1%)	50 (5.3%)
Other (including internal)¶	5 (0.5%)	6 (0.3%)	70 (12.5%)	125 (13.3%)
TOTAL	1,080	2,348	562	943

\*Pages of advertisements includes half-page advertisements; therefore, there may be fewer pages than the actual number of advertisements.

†Non-medical commercial companies include electronics, information technology services, financial services, and retirement plans.

‡Reference includes books, publishers, and online information services.

§Government includes U.S. Army, Department of Health and Human Services, CDC, EPA.

¶Other includes ads in *JAMA* for the American Medical Assoc. and in *NEJM* five conference ads.

these five companies comprised of 64.7% of all the advertising pages when excluding the not-for-profit, conference, and internal self-promotion advertisements.

The total amounts spent on advertising in the United States in 2001 by the above-named companies are shown in Table 3. Total corporate advertising spending for the 15 major U.S. pharmaceutical companies in 2001 (Table 3) was weakly correlated with the distribution of total ad pages placed by these companies in *NEJM* ( $r = 0.103$ ;  $CI_{95\%} = -0.433, 0.584$ ;  $p > 0.05$ ) and moderately correlated with the ads placed in *JAMA* ( $r = 0.572$ ;  $CI_{95\%} = 0.084, 0.839$ ;  $p < 0.05$ ). In other words, the distribution of advertisements in *JAMA* more closely corresponded to the advertising spending patterns of the 15 major pharmaceutical companies in the United States, while the distribution of advertisements in *NEJM* did not.

In both journals combined, there were five cases (four in *JAMA*) in which there was an advertisement in the same issue as an article reviewing a respective treatment; in all cases it occurred as part of a larger ad campaign (mean of 20 ads/year; range = 8-48). Furthermore, none of these advertisements was juxtaposed on a page adjacent to such an article. Both journals have a strict policy to not place advertisements within the "original research" sections.

## DISCUSSION

*NEJM* generated approximately \$18 million in revenue from display advertising in 2001. In 2001, the American Medical Association generated \$41.6 million from all forms of advertisements in *JAMA*, including classifieds.<sup>12</sup> The latter sum represents a ratio of 2.5 advertising dollars to every \$1 dollar from subscriptions and 23.5% of the AMA's total gross revenue.<sup>12,17</sup> No data are readily available regarding the annual revenues of the

*NEJM* parent organization—the Massachusetts Medical Society (MMS).

In *NEJM*, display advertising accounted for 38% of each printed issue, compared with 16% in the *JAMA* issues we analyzed. If classified advertisements are included, the totals were 52% compared with 23% of each printed issue, respectively. The numbers of advertisements in *JAMA* may vary widely. The *JAMA* media kit states that an average issue may contain up to 40% display advertisements—nearly identical to the ratio in *NEJM*. In a survey by Hall's Magazine Reports, which monitors more than 130 consumer magazines (e.g., *Cosmopolitan*, *People Weekly*, *Time*), advertisements represent 45.1% of the entire content among all consumer magazines combined.<sup>18</sup> For example, advertisements represent 42% of all content in *Time* magazine—the top selling news-magazine in the United States.<sup>19</sup> *NEJM* and reportedly some issues of *JAMA* have nearly the same ratio of ads to editorial content as many "throw-away" periodicals.

Compared with specialty journals, general medicine journals have a higher ratio of advertisements to scientific material,<sup>20</sup> because of their broader audience and appeal (i.e., circulation). Nelson and Bloom<sup>21</sup> found in three specialty journals relating to urology that the ratio of ad pages to science pages in 2000 was 0.151, compared with the near unity found in *NEJM* and an observed ratio of 0.30 in *JAMA* when including all forms of advertising.

The ICMJE states in its ethical guidelines that "journals should not be dominated by advertising." Christine Laine, from the ICMJE Secretariat Office and Senior Deputy Editor of *Annals of Internal Medicine*, reports that the committee has not discussed what constitutes "excessive advertising" (personal communication). A starting point would be to look at commercial journals and compare them with specialty journals in order to define a range of real-world scenarios. A ratio

**TABLE 3 Advertisements by Pharmaceutical Company, *New England Journal of Medicine* and *Journal of the American Medical Association***

Advertiser	2001 Advertising Budget* (\$1,000s)	% of Group (Proportion)	NEJM Advertisements			JAMA Advertisements		
			Number	Pages	% of Pages of Ads	Number	Pages	% of Pages of Ads
Pfizer	2,189	20.1%	160	350	21.1%	127	249	42.6%
Johnson & Johnson	1,618	14.8%	0	0	0.0%	0	0	0.0%
Merck & Co.	1,137	10.4%	12	24	1.4%	0	0	0.0%
Bristol-Myers Squibb Co.	974	8.9%	4	4	0.2%	3	3	0.5%
GlaxoSmithKline	881	8.1%	67	171	10.3%	36	90	15.4%
Wyeth	771	7.1%	29	65	3.9%	22	48	8.2%
Pharmacia Corp.	590	5.4%	0	0	0.0%	28	56	9.6%
Bayer	567	5.2%	39	70	4.2%	1	1	0.2%
Novartis	552	5.1%	24	77	4.6%	4	4	0.7%
Schering-Plough Corp.	498	4.6%	0	0	0.0%	0	0	0.0%
Aventis	421	3.9%	131	301	18.2%	11	11	1.9%
Abbott Laboratories	265	2.4%	40	43	2.6%	12	18	3.1%
AstraZeneca	191	1.8%	106	326	19.7%	3	3	0.5%
Eli Lilly & Co.	134	1.2%	84	200	12.1%	25	50	8.5%
Roche Holdings	116	1.1%	13	27	1.6%	25	52	8.9%

\*Source: <www.adage.com>.

of 0.4 to 0.5, which constitutes one page of advertisements for every two pages of editorial content, appears to be the middle ground between high-circulation consumer magazines (0.8) and low-circulation specialty science journals (0.15).

Stakeholders in the peer-review process—including publishers, editors, reviewers, researchers, marketing professionals, advertisers, and the general public—need to define what constitutes excessive advertising, and whether there should be a ceiling that matches the average advertising ratio in consumer journals. In either case, *NEJM* and *JAMA* advertising policies appear to contradict the ethical standards they themselves helped define.

The second major issue raised by the ICMJE concerns disproportionate advertising by a single company or a small group of companies, which we observed in both *NEJM* and *JAMA*. Advertisers have the potential to influence the editorial staff, either directly or indirectly, by withdrawing advertisements or increasing ad buys.<sup>22</sup> In the words of the ICMJE,<sup>1</sup> readers “may perceive that the editor has been influenced by these advertisers,” especially when a large proportion of revenue is based on the ad buys of so few companies. For example, Pfizer placed 42.6% of all pharmaceutical-related advertising pages in *JAMA*. Loss of the Pfizer account could translate into a loss of an estimated 2.5 million dollars in revenue. Any large account, not only a single dominant advertiser, in theory could have disproportionate influence on content.

To address the ethical and public-relations concerns of stakeholders in the peer-review process, a system of transparency would greatly benefit everyone. We recommend that medical journals define the criteria

implied by the ICMJE guidelines. Since journal staff and the organizations themselves are susceptible to conflicts of interest (COI), journals and their publishers should provide clear declarations of COI, as researchers are required to do. Journal staff and publishers should provide annual public statements that clearly outline the journal’s advertising guidelines, provide details about the companies advertising in the journal and the revenue generated from each, the financial affiliations of the editorial staff with for-profit companies, donations to the journal or parent organization from all donors of \$5,000 dollars or more, and the business relationships between the journal’s parent organization and advertisers.

Currently, the only recommendation by the ICMJE is that members of the editorial staff provide their editors with a COI statement and excuse themselves from editorial decisions that involve conflicts of interest. But other stakeholders in the peer-review process are blinded to this process.

We must emphasize, however, that despite the large amount of advertising in both journals, and what appears to be a disproportionate amount of advertising from a small group of pharmaceutical companies, evidence was not available of any association in either journal between advertisements and publication of original manuscripts investigating the same advertised drugs. The absence of such associations suggests the effectiveness of policies in both journals in which the advertising department is “blinded” to the activities of the editorial staff. Juxtaposition of advertisements with a corresponding article does not occur in either journal, since no display ads are placed in the section of the research articles.

## EFFECTS OF ADVERTISING ON PHYSICIANS AND EDITORIAL STAFF

Prescriptions increase directly in proportion to the number of pharmaceutical advertisements.<sup>23</sup> In a 2003 survey by PERQ/HCI of office-based medical professionals, including general practitioners, who are classified as “high prescribers,” 71% reported that medical journals are an important source of medical information, and 87% reported that they were exposed to information or advertising about products from medical journals. This association provides important information for advertisers, who seek mediums that maximize their audiences. But problems arise when the advertisements do not accurately and objectively describe the risks and proper use of the medical products.<sup>24</sup> Wilkes et al.<sup>24</sup> reviewed the accuracy of advertisements in peer-reviewed journals and found that 32% of the advertisements misled readers regarding efficacy, 40% did not provide balanced descriptions of the side effects, and 44% could lead to improper prescribing if the physician did not use other sources of information regarding the drug.

Both *NEJM* and *JAMA* are owned by diversified business organizations that derive large proportions of their total revenue through their journals. As advertising revenue begins to represent a larger share of the overall corporate revenue and create a greater dependency on revenue from advertisements,<sup>25</sup> the lines between the duties of the editor and the business may become blurred.<sup>22,26,27</sup> A recent study by Davis and Mullner<sup>28</sup> noted that 60% of the editors of medical journals they surveyed reported having little control over the profits their periodicals generated, which can increase their susceptibility to external influence.<sup>28</sup> Their study included editors from ten journals with membership in the ICMJE. In 2004, an editorial questioning the benefits of increased doses of Epogen in patients with renal disease was rejected because it “went beyond what [the] marketing department [was] willing to accommodate.” In fact, the executive editor initially accepted the manuscript but was “overruled” by the marketing department, providing a clear example of an internal conflict of interest between editorial integrity and business needs.<sup>29</sup> Dr Richard Smith, who edited the *British Medical Journal* for 13 years, acknowledges that the demands of producing a profit are real for editors.<sup>30</sup>

## CONCLUSION

Despite the potential negative effects of advertising in scientific journals, advertising is a major source of revenue for these larger journals and helps introduce novel treatments to medical professionals. However, the current ICMJE guidelines regarding ethical advertising practices in medical journals are non-descriptive

and poorly quantified. There is a need to define what constitutes “excessive advertising” in order to initiate examination of the role of advertising in peer-reviewed journals. Scientists, physicians and editors need to facilitate greater discourse concerning the ethical dilemmas of an increasingly commercialized scientific community.<sup>31</sup> Furthermore, publishers and editors need to be more transparent regarding their business relationships with for-profit companies by providing readers annual public statements that clearly outline their journals’ advertising guidelines and organizational conflicts of interest.

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*Cover note*

Texaco began to extract oil from the Ecuadoran Amazon in 1964 and continued to do so for 30 years, leaving in its wake 18.5 billion gallons of oily wastewater dumped in 600 unlined pits and streams. Residents have sued the company in Ecuador's courts, saying that the pollution has caused cancers and other illnesses, spoiled the environment, and destabilized communities. They argue that the oil company, which in 2001 merged with Chevron, should pay \$6 billion to remediate the environmental disaster left behind. Chevron denies human rights and environmental violations in Ecuador. Such abuses are increasing as the global scarcity of petroleum drives oil companies into countries with rich oil reserves but poor protections for human rights and the environment. On our cover, Dolores Morales, resident of one of the affected communities, holds a photo of her 19-year-old son Pedro, who died of a cancerous tumor at her home in Sacha Central, Ecuador. Her 14-year-old son, José (not shown) suffers from leukemia. (Photo by Lou Dematteis, <[lou\\_dematteis@hotmail.com](mailto:lou_dematteis@hotmail.com)>. © Lou Dematteis. From the exhibit "Crude Reflections: ChevronTexaco's Rainforest Legacy.")