

SPECIAL ARTICLE

A Decade of Direct-to-Consumer Advertising of Prescription Drugs

Julie M. Donohue, Ph.D., Marisa Cevasco, B.A., and Meredith B. Rosenthal, Ph.D.

ABSTRACT

BACKGROUND

Evidence suggests that direct-to-consumer advertising of prescription drugs increases pharmaceutical sales and both helps to avert underuse of medicines and leads to potential overuse. Concern about such advertising has increased recently owing to the withdrawal from the market of heavily advertised drugs found to carry serious risks. Moreover, the Food and Drug Administration (FDA) has been criticized for its weak enforcement of laws regulating such advertising.

METHODS

We examined industry-wide trends in spending by pharmaceutical companies on direct-to-consumer advertising and promotion to physicians during the past decade. We characterized the drugs for which such advertising is used and assessed the timing of advertising after a drug is introduced. Finally, we examined trends in the FDA's regulation of drug advertising.

RESULTS

Total spending on pharmaceutical promotion grew from \$11.4 billion in 1996 to \$29.9 billion in 2005. Although during that time spending on direct-to-consumer advertising increased by 330%, it made up only 14% of total promotional expenditures in 2005. Direct-to-consumer campaigns generally begin within a year after the approval of a product by the FDA. In the context of regulatory changes requiring legal review before issuing letters, the number of letters sent by the FDA to pharmaceutical manufacturers regarding violations of drug-advertising regulations fell from 142 in 1997 to only 21 in 2006.

CONCLUSIONS

Spending on direct-to-consumer advertising has continued to increase in recent years in spite of the criticisms leveled against it. Our findings suggest that calls for a moratorium on such advertising for new drugs would represent a dramatic departure from current practices.

From the Department of Health Policy and Management, University of Pittsburgh Graduate School of Public Health, Pittsburgh (J.M.D.); the Department of Health Policy and Management, Harvard School of Public Health, Boston (M.C., M.B.R.); and Vanderbilt School of Medicine, Nashville (M.C.). Address reprint requests to Dr. Donohue at the Department of Health Policy and Management, University of Pittsburgh Graduate School of Public Health, Crabtree Hall A613, 130 DeSoto St., Pittsburgh, PA 15261, or at jdonohue@pitt.edu.

N Engl J Med 2007;357:673-81.

Copyright © 2007 Massachusetts Medical Society.

IT HAS BEEN 10 YEARS SINCE A CHANGE IN A policy of the Food and Drug Administration (FDA) allowed direct-to-consumer advertising of prescription drugs on television. Such advertising has been criticized for encouraging inappropriate use of medications and driving up drug spending.^{1,2} Concern that such advertising may lead to increased use of expensive medications was amplified by the introduction of a prescription-drug benefit in Medicare in 2006 (Part D). Studies of the effect of advertising on prescribing practices have shown that such advertising increases classwide sales, helps to avert underuse of medicines to treat chronic conditions, and leads to some overuse of prescription drugs.³⁻⁵

Direct-to-consumer advertising has also been controversial in light of postmarketing revelations regarding problems with drug safety. Specifically, clinical trials that are required for drug approval are typically not designed to detect rare but significant adverse effects, and contemporary methods of postmarketing surveillance often fail to connect adverse events that have a high rate of background prevalence with the use of particular drugs. After the market withdrawal of Vioxx (rofecoxib), a drug heavily promoted to consumers,⁶ critics called for the FDA to place limits on direct-to-consumer advertising, particularly for new drugs,⁷ a view that was reiterated in a recent report by the Institute of Medicine on the safety of medicines.⁸

Finally, the Government Accountability Office (GAO)⁹ and others¹⁰ have criticized the FDA's enforcement of regulations governing direct-to-consumer advertising. Criticism has focused specifically on the adequacy of the FDA's review of pharmaceutical advertisements, as well as the level and speed of enforcement actions taken subsequent to review.

Since direct-to-consumer advertising has a significant effect on demand for prescription drugs, it is important to understand the evolution of such advertising and its regulation. Although one study reported that spending for such advertising increased by a factor of 3 from 1996 to 2000,¹¹ little is known about trends in spending and other forms of pharmaceutical promotion in recent years. In our study, we examined recent trends in the industry's use of direct-to-consumer advertising (as opposed to other forms of promotion), assessed the timing of advertising campaigns relative to the introduction of drugs in order to shed

light on safety issues, and examined trends in the FDA's regulation of drug advertising during the past decade.

METHODS

DATA COLLECTION

We obtained data on industry-wide and product-specific promotional expenditures from three market-research firms that track advertising spending and specialize in forms of promotion for the pharmaceutical industry; we also obtained information from researchers and staff members at the FDA and other government agencies. These data have been widely used in studies of trends in and the effects of direct-to-consumer advertising.^{3,5,11-14}

Data on expenditures for such advertising were collected by TNS Media, which tracks local and national advertising campaigns at 44 television networks (including cable), 658 magazines, 202 newspapers, the Internet, and several network and local radio stations. Data are representative of major media markets.

We obtained publicly available data on promotion to health professionals from 1996 to 2005 from IMS Health, an independent medical-information company. For the industry as a whole, we report on three major components of spending on promotion to professionals: visits of pharmaceutical sales representatives to physicians in office-based and hospital practices ("detailing"), free samples dispensed to physicians, and advertising in professional journals. IMS Health derives spending estimates on detailing from a nationally representative panel of office-based physicians and hospital pharmacy directors who track their contacts with sales representatives. IMS Health obtains data on spending on free samples from a panel of approximately 1200 office staff members in medical practices, sampled from the practices of the office-based physicians who are on the detailing panel. To estimate spending on advertising in professional journals, IMS Health tracks advertisements placed in approximately 400 medical journals and adds estimates of printing costs to the publisher's charge for the advertisements.

We obtained data on industry-wide sales from published reports on the basis of an annual survey conducted by the Pharmaceutical Research and Manufacturers of America (PhRMA). We purchased data on promotional expenditures in 2005 for products in specific classes from Verispan,

another independent medical-information company, and from TNS Media. For the 10 therapeutic drug classes that had the highest U.S. sales in 2004, we obtained data on the five forms of pharmaceutical promotion that are tracked by Verispan: direct-to-consumer advertising, detailing, advertising in professional journals, meetings and educational events for physicians, and online pharmaceutical promotion to physicians. Data regarding spending on advertising are collected by TNS Media, as described previously. To track detailing, Verispan surveys approximately 13,000 office-based and hospital-based physicians and residents, nurse practitioners, and physician assistants who track their encounters with pharmaceutical sales representatives. The panel is geographically representative and includes members of 31 clinical specialties.

Verispan produces estimates of industry expenditures on professional meetings and events through a survey of more than 3500 office-based physicians representing 19 specialties who report on the events sponsored by pharmaceutical companies that they attend. This panel of physicians is also asked to report on online pharmaceutical-promotion activity, which includes digital (Internet and video) promotion and continuing medical education modules. Verispan audits approximately 600 medical journals and tabloids and calculates spending on the basis of each journal's rate-card information and premium-factor costs.

Finally, we obtained data on the number of FDA enforcement actions related to pharmaceutical promotion from 1997 to 2006 from the FDA, which posts the regulatory letters sent to pharmaceutical companies on its Web site (www.fda.gov/cder/ddmac/lawsregs.htm). FDA approval dates for specific products were obtained from the *Orange Book* of approved drug products with therapeutic equivalence evaluations.¹⁵ We obtained data on start dates for advertising campaigns through a series of Internet searches (with specific sources available from the authors).

DATA ANALYSES

We conducted descriptive analyses. Data on promotional spending were adjusted to 2005 dollars with the use of the Consumer Price Index. We examined spending on all forms of promotion relative to sales to determine whether the intensity of pharmaceutical promotional spending has changed during the past decade. We examined the distri-

bution of promotional spending by type for the 10 leading classes of drugs in terms of dollar sales in the United States. In addition, we examined the level and timing (relative to a drug's FDA approval) of spending on advertising for the 20 drugs with the highest spending for direct-to-consumer advertising in 2005.

To characterize the nature of FDA enforcement related to advertising spending over time, we examined the numbers of enforcement letters related to promotion in each year and further calculated the percentage of promotion-related enforcement actions that were for advertising campaigns (as opposed to promotional materials aimed at health professionals). Finally, we examined the content of the notices of violation to determine the type of violation (e.g., false or misleading claims about the effectiveness or risks of drugs) and calculated the proportion related to each type.

RESULTS

INDUSTRY-WIDE TRENDS IN PROMOTION

Total real spending on promotion grew from \$11.4 billion to \$29.9 billion from 1996 to 2005, at an average annual rate of 10.6% (Table 1). The percentage of sales spent on promotion for the industry as a whole increased from 14.2% in 1996 to 18.2% in 2005. In the past 9 years, spending on direct-to-consumer advertising and free samples has risen as a share of total promotion, whereas investments in detailing and advertising in professional journals have fallen as a share of the total.

Real spending on direct-to-consumer advertising increased by 330% from 1996 to 2005 (Table 1). After a brief slowdown in spending on advertising in 2000 and 2001, spending grew at an average annual rate of 14.3% from 2002 to 2005. Yet, promotion to professionals still outweighs spending on direct-to-consumer advertising. In 2005, only 14% of total industry expenditures on pharmaceutical promotion were devoted to such advertising.

ROLE OF ADVERTISING FOR TOP-SELLING DRUGS

In 2005, 8 of the 10 top drug classes in terms of dollar sales had at least one product with advertising spending (Table 2). The importance of direct-to-consumer advertising varied substantially across the top classes. Manufacturers of proton-pump inhibitors, 3-hydroxy-3-methylglutaryl coenzyme A (HMG-CoA) reductase inhibitors (statins), and

Table 1. Annual Spending on Direct-to-Consumer Advertising and Promotion to Health Professionals, 1996–2005.*

Variable	Annual Spending									
	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Direct-to-consumer advertising										
Total spending (millions of \$)	985	1,301	1,578	2,166	2,798	2,954	2,864	3,478	4,160	4,237
Percentage of sales	1.2	1.5	1.6	1.8	2.1	2.0	1.9	2.2	2.5	2.6
Professional promotion										
Total spending (millions of \$)										
Detailing	3,747	4,093	4,861	5,064	5,447	6,055	6,731	7,364	7,585	6,777
Journal advertising	571	621	597	551	549	469	474	476	516	429
Percentage of sales	5.4	5.4	5.6	4.7	4.6	4.5	4.8	5.0	4.9	4.4
Free samples										
Total retail value (millions of \$)	6,104	7,358	7,910	8,476	9,021	11,539	12,928	14,362	16,404	18,438
Percentage of sales	7.6	8.4	8.1	7.1	6.9	8.0	8.6	9.1	9.9	11.2
Total promotion										
Total spending (millions of \$)	11,407	13,373	14,946	16,257	17,815	21,018	22,997	25,680	28,664	29,881
Percentage of sales	14.2	15.3	15.3	13.7	13.6	14.6	15.2	16.3	17.2	18.2

* Data on promotional spending are from IMS Health (www.imshealth.com); data on sales are from PhRMA's annual report. All data were adjusted to 2005 dollars, according to the Consumer Price Index. Spending on free samples for 2005 was estimated on the basis of growth and spending rates from the previous 3 years.

erythropoietin medications spent 34%, 34%, and 31% of their total marketing budget, respectively, on direct-to-consumer advertising in 2005. The manufacturers of several drugs in these classes invested in advertising campaigns (Table 2). Spending for the advertising of antidepressant agents, seizure-disorder medications, and antipsychotic agents was lower than that for proton-pump inhibitors, statins, and erythropoietin medications as a proportion of the total marketing budget. The remaining 4 of the top 10 drug classes placed little emphasis on consumers in their promotional strategies. None of the angiotensin II antagonists used direct-to-consumer advertising in 2005. Among manufacturers of calcium-channel blockers, only non-product-specific or "disease awareness" ads were purchased. In 2005, manufacturers used direct-to-consumer advertising for only one of the cyclooxygenase-2 inhibitors (of which celecoxib was the only remaining product) and one of the angiotensin-converting-enzyme inhibitors. Since data on the retail value of free samples that are dispensed for these drug classes were not available, the overall promotion-to-sales ratios probably provide a conservative estimate.

LEVEL AND TIMING OF EXPENDITURES

Spending on direct-to-consumer advertising continued to be concentrated among a relatively small number of brands. The 20 drugs with the highest spending made up 54.4% of total industry spending on advertising in 2005 (Table 3). Drugs that are advertised to consumers are predominantly new drugs used to treat chronic conditions. Ten of the top 20 drugs, as ranked by advertising spending, were introduced in 2000 or later. Notably, nearly all (17 of 20) advertising campaigns for the most heavily advertised drugs began within a year after FDA approval of the drug.

FDA ENFORCEMENT OF REGULATIONS

The number of letters sent by the FDA to pharmaceutical manufacturers notifying them that they had violated regulations for prescription-drug advertising fell from 142 in 1997 to only 21 in 2006 (Fig. 1). During the same period, the proportion of promotion-related regulatory letters citing problems with direct-to-consumer advertisements (as opposed to promotional material aimed at health professionals) increased from 15.5% of all letters in 1997 to 33.3% in 2006. And during the years

Table 2. U.S. Sales Revenues and Promotional Spending for Leading Therapeutic Classes of Drugs, According to Dollar Sales in 2005.*

Variable	U.S. Sales Revenues	Total Promotional Spending	Percentage of Sales	Type of Promotion					No. of Drugs in Class with Direct-to-Consumer Advertising
				Direct-to-Consumer Advertising	Detailing	Professional Meetings and Events	Journal Advertising	Online Promotion to Physicians	
	<i>millions of dollars</i>			<i>percent</i>					
HMG-CoA reductase inhibitors	16,000	859	5	34	52	11	2	1	4
Proton-pump inhibitors	12,900	884	7	34	57	7	1	1	4
SSRIs or SNRIs	12,500	1018	8	12	68	15	4	1	6
Antipsychotic agents	10,500	513	5	10	64	21	3	2	4
Erythropoietin	8,700	100	1	31	45	12	7	5	2
Seizure-disorder agents	8,000	348	4	12	65	16	5	2	3
Angiotensin II antagonists	5,000	598	12	0	78	19	2	1	0
Calcium-channel blockers	4,600	94	2	1	79	18	1	1	0
ACE inhibitors	3,800	251	7	2	71	24	2	1	1
COX-2 inhibitors	1,800	299	17	4	78	16	1	1	1

* Data on direct-to-consumer advertising are from TNS Media; data on detailing, professional meetings and events, journal advertising, and online promotions to physicians are from Verispan; and data on sales revenues are from IMS Health. Leading therapeutic classes of drugs were identified on the basis of publicly available IMS Health rankings of therapeutic classes according to spending for 2004. Values for selective serotonin-reuptake inhibitors (SSRIs) and selective norepinephrine-reuptake inhibitors (SNRIs) match the classification scheme used by Verispan, which was the source of our data on promotions. Values in the far right-hand column refer to product-specific advertising only. HMG-CoA denotes 3-hydroxy-3-methylglutaryl coenzyme A, ACE angiotensin-converting enzyme, and COX-2 cyclooxygenase-2.

2003–2004, nearly half of the FDA's promotion-related regulatory letters were focused on direct-to-consumer advertisements. From 1997 to 2006, nearly 84% of regulatory letters regarding direct-to-consumer advertising cited advertisements for either minimizing risks (e.g., minimizing or omitting information on side effects), exaggerating effectiveness (e.g., portraying the indication too broadly or making unsubstantiated claims of superiority over other drugs), or both.

For example, the FDA found that Eli Lilly's television broadcast advertisement for Strattera (atomoxetine) was false or misleading because it inadequately communicated the indication for the drug (attention-deficit-hyperactivity disorder) by means of competing visuals, graphics, and music presented concurrently. Similarly, serious risk disclosures were minimized for Strattera, the FDA said, by the distracting visuals and graphics (e.g.,

erratic camera movement, quick scene changes, and visual changes in point of view). In another case, the FDA said Pfizer's print advertisement for Zoloft (sertraline) was false or misleading because it omitted important information relating to the risk of suicidality in patients, a risk stated on the product's label at the time the advertisement ran.

DISCUSSION

Spending on direct-to-consumer advertising has continued to increase recently in absolute terms and as a percentage of pharmaceutical sales in spite of pressure on manufacturers to curtail such advertising.⁸ Promotion to physicians continues to be the dominant marketing strategy, but there are some drugs in a majority of the top-selling classes that are promoted by such advertising. Driven by increases in direct-to-consumer advertising, total

Table 3. Top 20 Pharmaceutical Products in Terms of Spending on Direct-to-Consumer Advertising in 2005.*

Drug	Company	Therapeutic Category	Spending† millions of dollars	FDA Approval Date‡	Year That Campaign Started§
Nexium (esomeprazole)	AstraZeneca	Proton-pump inhibitor	224	Feb. 2000	2001
Lunesta (eszopiclone)	Sepracor	Hypnotic–sedative	214	Dec. 2004	2005
Vytorin (ezetimibe–simvastatin)	Merck/Schering-Plough	Cholesterol absorption blocker–HMG-CoA reductase inhibitor	155	July 2004	2004
Crestor (rosuvastatin)	AstraZeneca	HMG-CoA reductase inhibitor	144	Aug. 2003	2004
Advair (fluticasone and salmeterol)	GlaxoSmithKline	Corticosteroid– β -adrenergic–receptor agonist	137	Aug. 2000	2001
Nasonex (mometasone)	Schering-Plough	Corticosteroid	124	Dec. 1997	1998
Flonase (fluticasone)	GlaxoSmithKline	Corticosteroid	111	Oct. 1994	1995
Lamisil (terbinafine)	Novartis	Allylamine antifungal	110	May 1996	1997
Plavix (clopidogrel)	Bristol-Myers Squibb/Sanofi	Platelet-aggregation antagonist	110	Nov. 1997	2001
Cialis (tadalafil)	Lilly ICOS	PDE5 inhibitor	110	Nov. 2003	2004
Wellbutrin XL (bupropion)	GlaxoSmithKline	Dopamine reuptake inhibitor–SNRI	108	Aug. 2003	2004
Singulair (montelukast)	Merck	Leukotriene D ₄ –receptor antagonist	105	Feb. 1998	1998
Lipitor (atorvastatin)	Pfizer	HMG-CoA reductase inhibitor	93	Dec. 1996	1998
Ambien (zolpidem)	Sanofi-Aventis	Hypnotic–sedative	88	Sept. 2005	2005
Humira (adalimumab)	Abbott	Monoclonal antibody	88	Dec. 2002	2003
Imitrex (sumatriptan)	GlaxoSmithKline	Vascular 5-HT ₁ –receptor agonist	82	Aug. 1997	1998
Viagra (sildenafil)	Pfizer	PDE5 inhibitor	80	March 1998	1998
Neulasta (pegfilgrastim)	Amgen	G-CSF analogue	74	Jan. 2002	2002
Valtrex (valacyclovir)	GlaxoSmithKline	DNA polymerase inhibitor	72	June 1995	1996
Prevacid (lansoprazole)	TAP	Proton-pump inhibitor	71	May 1995	2000

* HMG-CoA denotes 3-hydroxy-3-methylglutaryl coenzyme A, SNRI selective norepinephrine-reuptake inhibitor, 5-HT₁ 5-hydroxytryptamine 1, PDE5 phosphodiesterase type 5, and G-CSF granulocyte colony-stimulating factor.

† Data are from Arnold.¹⁶

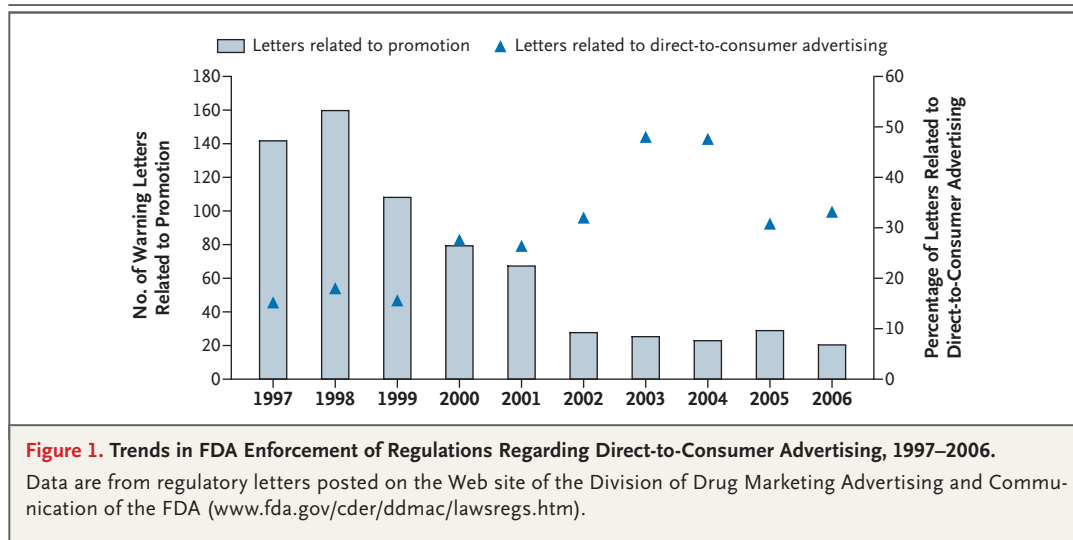
‡ Approval dates are from the *Electronic Orange Book*.¹⁵

§ Starting dates for direct-to-consumer campaigns were obtained through Internet searches. A detailed source list is available from the authors.

promotion as a percentage of sales has increased substantially during the past 5 years, leading some observers to worry that consumers must bear these increased costs in the form of higher prices. Economic theory and evidence suggest that changes in marketing costs are unlikely to have a direct effect on pharmaceutical prices, which largely reflect perceptions of product value held by con-

sumers, physicians, and payers.¹⁷ Of course, it is possible that advertising reduces the price responsiveness of demand and thus leads manufacturers to increase prices, but the empirical evidence on this point is mixed.^{18,19}

Advertising campaigns generally begin within a year after the introduction of a pharmaceutical product, which raises questions about the extent



to which advertising increases the use of drugs with unknown safety profiles. At least one pharmaceutical manufacturer (Bristol-Myers Squibb) recently announced a voluntary moratorium on direct-to-consumer advertising for drugs in the first year after FDA approval. And PhRMA, the industry trade group, has recommended that manufacturers delay such campaigns for new drugs until after health professionals have been sufficiently educated, although no details have been provided on how long a period was deemed necessary.²⁰ Finally, in a recent study of drug safety, the Institute of Medicine recommended that the FDA restrict advertising for newer prescription drugs.⁸ Our data show that a mandatory waiting period on advertising for new drugs would represent a dramatic departure from current industry practices.

The number of regulatory actions taken by the FDA against companies marketing prescription drugs to consumers has fallen dramatically in recent years. This decline may reflect either better industry compliance with advertising regulations or a worsening of FDA oversight.²¹ Although a systematic assessment of the compliance of pharmaceutical advertisers with advertising regulations is beyond the scope of this article, some insights into this issue can be gained from examination of policy changes and staffing levels within the FDA over the period of our study. Three observations from such an examination suggest that the FDA's capacity to enforce advertising regulations has weakened in recent years.

First, in 2002 the Secretary of Health and Human Services began requiring that all draft FDA regulatory letters, including letters related to advertising violations, be reviewed and approved by the FDA's Office of Chief Counsel before they are issued. A GAO report found that this legal review has led to a reduction in the number of letters issued, as well as to delays such that FDA warning letters are frequently sent out long after the false or misleading advertising campaign has run its course.²² Notably, the number of regulatory letters sent by the FDA in 2002 was less than half that in 2001 (28 vs. 68) (Fig. 1).

A second indication of weakening FDA oversight of direct-to-consumer advertising in recent years is that the number of staff members who are dedicated to reviewing advertisements has remained relatively stable, whereas the use of such advertising has grown substantially. In 2002, three FDA staff members were dedicated to reviewing direct-to-consumer advertisements.²² In 2004, four staffers were reviewing such advertisements, even though spending on this form of advertising (and probably the volume of ads to review) had increased by 45%, from \$2.9 billion to \$4.2 billion (Table 1).²³

Finally, consistent with the hypothesis that staffing has not kept pace with the number of prescription-drug advertisements, the proportion of broadcast advertisements that underwent FDA review before airing declined from 64% in 1999 to only 32% in 2004.²³ Thus, even if manufacturers were to increase submission of advertisements

to the FDA, the agency has said that “current FDA resourcing for this work would probably result in delayed reviews . . . and discourage [manufacturers] from submitting the materials for prior FDA review.”²³

Our study has some key limitations. We obtained data on industry sales from PhRMA, which includes in its annual reports sales data only for its members. Ideally, we would include sales of all branded drugs sold by prescription, including pharmaceutical and biologic agents, and exclude sales of generic drugs (because generic drugs typically are not promoted). PhRMA sales data may include some generic sales (if a member reports both branded and generic sales) and typically exclude sales of biologic agents, which are manufactured by companies that belong to another trade group (Biotechnology Industry Organization). As a result, the sales figures may underestimate total dollar sales for the industry. We provide data on spending on free samples valued at their approximate retail price, which is how they typically are valued in industry promotional audits. Thus, the value of free samples we present probably overstates the opportunity cost to manufacturers, which would lie somewhere between the marginal cost of production and the retail value.

Since 2000, direct-to-consumer advertising of prescription drugs has continued to grow both in absolute dollars and relative to other forms of promotion. Although the evidence base is growing, there are few data to support an assessment of the balance of the costs and benefits of such advertising.²⁴ The debate over whether and how direct-to-consumer advertising should be more tightly regulated takes place against a backdrop of growing concern about the growth of health care spending, particularly in the Medicare program. Gaining a better understanding of the effects of direct-to-consumer advertising for prescription drugs has important public health implications not only for the United States and New Zealand, where such advertising is also permitted, but also for Canada and the European Union, where such advertising is banned but has been subject to recent challenge.^{25,26}

Supported by a grant (KL2-RR024154-01, to Dr. Donohue) from the National Center for Research Resources, a component of the National Institutes of Health (NIH); NIH Roadmap for Medical Research; and the Alfred P. Sloan Foundation (to Dr. Rosenthal).

Dr. Donohue reports receiving consulting fees from GlaxoSmithKline and CanWest Global Communications. No other potential conflict of interest relevant to this article was reported.

We thank Joseph Hanlon and Judith Lave for their helpful comments on earlier drafts of this article.

REFERENCES

1. Wolfe SM. Direct-to-consumer advertising — education or emotion promotion? *N Engl J Med* 2002;346:524-6. [Erratum, *N Engl J Med* 2002;346:1424.]
2. Hollon MF. Direct-to-consumer advertising: a haphazard approach to health promotion. *JAMA* 2005;293:2030-3.
3. Donohue JM, Berndt ER, Rosenthal M, Epstein AM, Frank RG. Effects of pharmaceutical promotion on adherence to the treatment guidelines for depression. *Med Care* 2004;42:1176-85.
4. Kravitz RL, Epstein RM, Feldman MD, et al. Influence of patients' requests for direct-to-consumer advertised antidepressants: a randomized controlled trial. *JAMA* 2005;293:1995-2002. [Erratum, *JAMA* 2005;294:2436.]
5. Rosenthal MB, Berndt ER, Donohue JM, Epstein AM, Frank RG. Demand effects of recent changes in prescription drug promotion. *Frontiers Health Policy Res* 2003;6:1-26.
6. Bradford WD, Kleit AN, Nietert PJ, Steyer T, McIlwain T, Ornstein S. How direct-to-consumer television advertising for osteoarthritis drugs affects physicians' prescribing behavior. *Health Aff (Millwood)* 2006;25:1371-7.
7. Saul S. Senate leader calls for limits on drug ads. *New York Times*. July 2, 2005: C13.
8. Committee on the Assessment of the US Drug Safety System, Baciu A, Stratton K, Burke SP, eds. *The future of drug safety: promoting and protecting the health of the public*. Washington, DC: National Academies Press, 2006.
9. Prescription drugs: improvements needed in FDA's oversight of direct-to-consumer advertising. Washington, DC: Government Accountability Office, November 2006.
10. Angell M. *The truth about drug companies*. New York: Random House, 2004.
11. Rosenthal MB, Berndt ER, Donohue JM, Frank RG, Epstein AM. Promotion of prescription drugs to consumers. *N Engl J Med* 2002;346:498-505.
12. Donohue JM, Berndt ER. Direct-to-consumer advertising and the choice of antidepressant. *J Public Policy Marketing* 2004;23:115-27.
13. Iizuka T. What explains the use of direct-to-consumer advertising of prescription drugs? *J Ind Econ* 2004;52:349-79.
14. Iizuka T, Jin GZ. The effect of prescription drug advertising on doctor visits. *J Econ Manage Strategy* 2005;14:701-27.
15. Electronic orange book — approved drug products with therapeutic equivalence evaluations. (Accessed July 20, 2007, at <http://www.fda.gov/cder/ob/default.htm>.)
16. Arnold M. The science of DTC. *Medical Marketing Media* 2006;April:38-40, 42, 45.
17. Berndt ER. Pharmaceuticals in U.S. health care: determinants of quantity and price. *J Econ Perspect* 2002;16:45-66.
18. Rizzo JA. Advertising and competition in the ethical pharmaceutical industry: the case of antihypertensive drugs. *J Law Econ* 1999;42:89-116.
19. Gonul FF, Carter F, Petrova E, Srinivasan K. Promotion of prescription drugs and its impact on physicians' choice behavior. *J Marketing* 2001;65:79-90.
20. Pharmaceutical Research and Manufacturers of America. PhRMA guiding principles: direct-to-consumer advertising about

- prescription medicines. Washington, DC: PhRMA, November 2005.
- 21.** Pines WL. A history and perspective on direct-to-consumer promotion. *Food Drug Law J* 1999;54:489-518.
- 22.** FDA oversight of direct-to-consumer advertising has limitations. Washington, DC: General Accounting Office, 2002.
- 23.** Prescription Drug User Fee Act (PDU-FA): adding resources and improving performance in FDA review of new drug applications. Washington, DC: Food and Drug Administration, 2005.
- 24.** Donohue JM. Direct-to-consumer advertising of prescription drugs: does it add to the overuse and inappropriate use of prescription drugs or alleviate underuse? *Int J Pharm Med* 2006;20:17-24.
- 25.** Watson R. EU health ministers reject proposal for limited direct to consumer advertising. *BMJ* 2003;326:1284.
- 26.** Cassels A. Canada may be forced to allow direct to consumer advertising. *BMJ* 2006;332:1469.

Copyright © 2007 Massachusetts Medical Society.