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Background—Over the past decade, calcium channel blockers (CCBs) and ACE inhibitors have been used increasingly in the treatment of hypertension. In contrast, β-blocker and diuretic use has decreased. It has been suggested that pharmaceutical marketing has influenced these prescribing patterns. No objective analysis of advertising for antihypertensive therapies exists, however.

Methods and Results—We reviewed the January, April, July, and October issues of the New England Journal of Medicine from 1985 to 1996 (210 issues). The intensity of drug promotion was measured as the proportion of advertising pages used to promote a given medication. Statistical analyses used the χ² test for trend. Advertising for CCBs increased from 4.6% of advertising pages in 1985 to 26.9% in 1996, while advertising for β-blockers (12.4% in 1985 to 0% in 1996) and diuretics (4.2% to 0%) decreased (all P<0.0001). A nonsignificant increase was observed in advertising for ACE inhibitors (3.5% to 4.3%, P=0.17). Although the total number of drug advertising pages per issue decreased from 60 pages in 1985 to 42 pages in 1996 (P<0.001), the number of pages devoted to calcium channel blocker advertisements nearly quadrupled.

Conclusions—Increasing promotion of CCBs has mirrored trends in physician prescribing. An association between advertising and prescribing patterns could explain why CCBs have supplanted better-substantiated therapies for hypertension. (Circulation. 1999;99:2055-2057.)

Key Words: hypertension ■ practice patterns ■ drug therapy ■ advertising

β-Blockers and thiazide diuretics are the only antihypertensive medications that have been shown to reduce cardiovascular mortality.1–3 Despite this evidence, the use of newer, more expensive medications, such as calcium channel blockers (CCBs) and ACE inhibitors (ACEIs), has increased dramatically over the past decade. In 1995, calcium channel antagonists accounted for an estimated 38% of antihypertensive prescriptions, slightly ahead of ACEIs (33%), whereas β-blockers and diuretics combined accounted for only 19%.4

The forces behind these trends are not immediately apparent. None of the clinical trials published during this period can account for the shift away from β-blockers and diuretics. In fact, the Fifth Report of the Joint National Committee on Detection, Evaluation, and Treatment of High Blood Pressure (JNC V) in 1993 recommended β-blockers and diuretics as first-line agents for the management of hypertension.5 This guideline, however, appears to have had little influence on prescribing patterns.4 What, then, has stimulated the use of newer medications, particularly CCBs?

It has been suggested that pharmaceutical promotion, particularly advertising, has been a major factor behind the adoption of newer antihypertensives.4,6,7 However, although prescribing patterns have been described, no previous analysis of antihypertensive drug advertising exists.4,7,8 We undertook this study to describe trends in advertising for antihypertensive drugs.

Methods

We analyzed advertising trends over an 11-year period in the New England Journal of Medicine (NEJM). We recognize that pharmaceutical companies promote their products in many ways besides advertising in medical journals, but we conceive of the journal advertisements as a proxy for wider drug promotion efforts. The NEJM was selected as a representative journal, given its large circulation and the likelihood that it is read by physicians treating hypertension.

Specifically, we investigated advertising trends by reviewing 210 issues of NEJM from 1985 through 1996, for the months of January, April, July, and October. One of the authors (J.C.A.) collected data by recording the drug name and number of pages (or fraction of a page) for each advertisement in the 210 selected issues. Selected review of this coding was performed by the other authors. The journals came from the institutional subscriptions housed at the Harvard Medical School Countway Library. Use of a standard source is vital because the volume of advertising per issue varies according to subscriber characteristics (personal communication, Eileen Welch, May 13, 1998). Institutional subscriptions have fewer advertising pages than subscriptions sent to doctors’ offices. In 1995, the average numbers of advertising pages in the library and physician office versions of NEJM were 36 and 44 pages per issue, respectively. The proportions of advertising pages devoted to antihypertensive medications, however, were similar for the library (29.4%) and office versions (29.1%). The institutional subscriptions were chosen to maximize the consistency and reproducibility of the data. From 1985 to 1996, a total of 9644.5 pages of drug advertising were evaluated from this source.

We calculated the number of pages used to advertise each class of antihypertensive medication. We gauged advertising intensity by...
From 1985 to 1996, the total number of pages devoted to advertising fell from a mean of 60 to 42 pages per issue ($P<0.0001$). However, given the large increase in the proportion of advertisements devoted to CCBs, the number of CCB advertising pages increased from 2.8 pages per issue in 1985 to 11.4 in 1996. The estimated annual pages of CCB advertisements increased from 143 pages in 1985 to 590 in 1996.

**Discussion**

Between 1985 and 1996, physician-directed advertising for CCBs rose dramatically. By 1996, no other class of medication, cardiac or noncardiac, was as heavily advertised. Previously described trends in CCB prescribing parallel this growth of CCB advertising. Manolio and colleagues$^7$ estimate a 90-fold increase in the proportionate use of CCBs between 1982 and 1993. ACEI use increased by 30-fold over this period. Concurrently, use of $\beta$-blockers and diuretics declined substantially (by 52% and 34%, respectively). These trends suggest that advertising may be important, particularly because trends in CCB use cannot be explained by practice guidelines or clinical trial results.$^2,^4$

Although it is widely supposed that pharmaceutical advertising accounts for rising CCB use, this is the first study to substantiate that advertising patterns are consistent with this claim. Pharmaceutical companies devote substantial resources to drug advertising, despite assertions by physicians that they pay little attention to advertisements. Only 3% of physicians surveyed by Avorn et al$^{10}$ described drug advertising as a “very important” influence on their prescribing practices. Beliefs regarding 2 index medications, cerebral vasodilators and propranolol, however, corresponded more closely with advertising claims than with published scientific evidence.$^{11}$

What determines the choice of antihypertensive therapies is a question of vital commercial, medical, and public health importance. The market for these medications is immense, with an estimated 50 million hypertensive patients in the United States.$^2$ Growing use of newer, more expensive medications has increased the national cost of hypertensive treatment by several billion dollars,$^7$ despite a lack of improvement in the proportion of Americans whose hypertension is adequately controlled.$^2$ It is still not known whether all antihypertensive medications have equivalent clinical outcomes. Several retrospective studies, however, have raised questions concerning the relative benefits of CCBs, particularly for patients with coronary artery disease.$^{11,^12}$ While awaiting the results of several large clinical trials, recent national guidelines recommend already proven therapies: $\beta$-blockers and diuretics.$^3$ Pharmaceutical promotions, however, may have contributed to the adoption of alternative therapies. Concerns about the susceptibility of physicians to advertising are heightened by the unsubstantiated claims of some drug advertisements.$^{13}$

Several limitations of this study should be noted. The purpose of this study was to characterize promotional patterns. These data do not prove that a causal relationship exists between advertising and antihypertensive prescribing. A fully developed model of prescribing practices would account for
the impact of clinical trials, marketing, physician knowledge, patient knowledge, and product features.\textsuperscript{14}

A specific factor that may have contributed to rising use of CCBs is the perception that these medications have fewer side effects than older medications. Fixed attitudes, however, cannot account for the continuous rise in CCB use observed during the study period. Furthermore, advertising may work to reinforce negative perceptions about older medications. The rising use of ACEIs, despite limited physician advertising, remains unexplained. Well-publicized trials suggesting their substantial benefits in congestive heart failure and diabetic nephropathy\textsuperscript{15–18} may have prompted physicians to select ACEIs for the treatment of uncomplicated hypertension.

Further investigation is needed to elucidate the relative importance of commercial and scientific influences on the choice of antihypertensive therapies. In the meantime, a focus on modifying barriers to appropriate hypertensive treatment should be a priority.

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**References**


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