The Internet has become a favorite source of medical information for a growing number of patients. At the same time, content on the Internet represents an amalgamation of viewpoints, commercial interests, and various biases. A common way to access Internet information is through commercial portals with proprietary search engines. Often these search engines prioritize their rank list based on commercial interests. We evaluated whether Internet searches of ophthalmic issues are slanted toward commercial sites and whether any differences exist among the various search engines. We used age-related macular degeneration as an example. In this study, we found that some search engines are heavily tilted toward commercial partnerships, whereas others emphasize sites run by nonprofit and educational organizations. Our findings may guide physicians in recommending to their patients some internet portals rather than others. This type of evaluation can be conducted intermittently by physicians and other health care professionals to assess the type of information that reaches their patients and what biases may be influencing patient knowledge and decision making.

The popularization of the Internet has made enormous amounts of information available and easily obtainable by our patients. It is now common to see a patient in the clinic who brings printouts of Internet information on diseases, therapies, and clinical trials. Patients may also use the Internet as a second opinion to our clinical judgments and diagnoses. Such activities can empower patients to participate in their own care and assist in the patient-physician therapeutic partnership. The quality of medical information on the Internet is variable. However, a recent study of Internet medical information failed to find strong evidence of harm associated with its use.

Medical information on the Internet is neither monitored for accuracy nor standardized. Rather, it contains a mixture of opinions, controversies, and financial opportunities that reflect societal diversity. Internet users must be aware of potential misinformation mixed within the wealth of valuable information. A recent article in the New York Times documented that merchants with poor track records for customer support can, by paying higher fees, place their names and Web pages at the top of a search list ahead of well-known and highly regarded merchants. Although the Internet industry is aware of such situations, the profit motive causes some search engine companies to selectively ignore the poor track records of well-paying customers.

A letter published in JAMA examined the information available on the Internet regarding cancer treatments and found that patients commonly encounter sites with information on unproven but financially profitable therapies, often cleverly packaged with attractive Web page designs. Similarly, an article that examined ophthalmic information on the Internet found that when using macular degeneration as the search term, 21% of search results featured unconventional treatments that were inconsistent with the peer-reviewed standard of care for age-related macular degeneration.

As specialists in the medical care of the eye, ophthalmologists must provide opinions on diagnosis and therapy as well as sup-
porting information. Patients may, with or without the guidance of their ophthalmologist, turn to the Internet for additional information. Some familiarity with the information available on the Internet may prove useful for providing the best possible care to our patients.

To evaluate the type of information on the Internet that may be encountered by the curious patient and to assess the manner in which this information is presented, we conducted a limited study in which we used 7 common search engines to look for information with *macular degeneration* as the search term. Using go.com, aol.com, lycos.com, askjeeves.com, msn.com, yahoo.com, and google.com, we evaluated the top 10 search results (accessed October 20, 2002) from each search engine and placed them in 1 of 3 broad categories: strictly commercial (eg, vitamin supplements or illumination and vision aids), primarily or exclusively informational (organizations such as the American Macular Degeneration Foundation) with occasional links to commercial entities, or governmental or educational (eg, National Eye Institute, National Institutes of Health, and hospital or educational information associated with universities). We developed a scoring technique in which each entity was first categorized and then ranked according to its position on the search list (1-10). We used a weighted score technique that combined the category of each site with its position in the top 10 search results list to give a weighted impact score. We then calculated the relative exposure of each category with the assumption that Internet users pay more attention to the top search results than to the bottom results.

Our investigation revealed 2 striking findings. First, whereas commercial sites composed only 25% of the total search results, their relatively high position at the top of the results lists from some search engines increased their weighted impact percentage by 20% (*Table 1*). In contrast, vision-related organizations, foundations, and educational and other noncommercial sites (ie, informational and governmental/educational) composed 75% of the total number of search results, but their weighted impact percentage was nearly unchanged at 70%, indicating no benefit from list positioning.

Second, we found remarkable variability among the search engines. For example, in results from go.com, 80% of the list had a substantial commercial slant (*Table 2*). Results from yahoo.com, on the other hand, had only 3 commercial sites in the top 10. Nevertheless, commercial sites occupied the 3 top spots on the list. In contrast, results from msn.com, google.com, and aol.com had minimal commercial information. Instead, these lists were composed mostly of informational sites of organizations and research facilities. However, commercial sites did occupy the top spots on the google list.

The high position of commercial sites in the search results obtained by some search engines is not coincidental. Some of these search engines have business relationships with companies such as Overture (Pasadena, Calif), which places commercial information at the top of search lists for a fee. Overture was featured in the *New York Times* article as one of the leading fee-for-placement search engine services. Other search sites, such as google.com, have their own fee-for-position service. Some search engines identify these sites as “spon-

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**Table 1. Percentage of Items and Weighted Impact of Search Engine Results**

<table>
<thead>
<tr>
<th>Category</th>
<th>Result Items, %</th>
<th>Weighted Impact, %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commercial</td>
<td>25</td>
<td>30</td>
</tr>
<tr>
<td>Informational</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>Governmental/educational</td>
<td>25</td>
<td>20</td>
</tr>
</tbody>
</table>

**Table 2. Variability of Search Engine Results**

<table>
<thead>
<tr>
<th>Engine</th>
<th>Commercial</th>
<th>Informational</th>
<th>Educational</th>
</tr>
</thead>
<tbody>
<tr>
<td>go.com</td>
<td>8 of 10, including top 6</td>
<td>2 of 10</td>
<td>0</td>
</tr>
<tr>
<td>msn.com</td>
<td>0</td>
<td>6 of 10</td>
<td>4 of 10</td>
</tr>
</tbody>
</table>
sored," whereas others do not (Figure). Most of the sponsored sites were related to vitamin supplements and alternative therapies.

We conducted this study hoping to better understand the information available on the Internet regarding age-related macular degeneration and the accessibility of such information to patients. Our results surprised us, especially the high variability with which different search engines handle commercial sites. Although commercial sites may provide valuable information, if given the option, most physicians would prefer to direct their patients to informational sites, which often have the assistance of advisory boards and harbor no ulterior motives in their presentations.

As medicine becomes more specialized and technologically savvy, so do our patients. The Internet can be a wonderful source of information, empowering patients to take control of and participate in their own care. The use of the Internet can be guided by physician input, especially when requested by patients. Periodic evaluation of search engines and Internet information can be invaluable to our understanding of "what’s out there" so that we can best assist our patients. Hence, we recommend that physicians conduct regular Internet searches on subjects important to their practice to remain abreast of the rapidly changing world of the Internet.

An important component of our relationship with our patients should also include the creation of an environment in which they feel comfortable sharing their information gathering with us. By asking our patients to bring to their clinic appointments materials that they may have obtained from the Internet, newspapers, magazines, and other sources, we can help educate them while increasing their involvement. By working with our patients, we can enable them to use the Internet as a valuable source of information and support.

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