

# The communications revolution and cancer control

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**Abstract** | Advances in communications technology, particularly with regards to computer-based media, have opened up exciting possibilities to intervene and influence the trajectory of cancer control, from disease prevention to survivorship, and to reduce the cancer burden. The resulting explosion in cancer information in the mass media and on the Internet, however, also offers challenges in terms of equality in access to information and the ability to act on it, as well as in making sure that it is accurate, readily available and easy to use.

The dazzling advances in new communication technologies (TIMELINE; BOX 1) such as the Internet, satellite television and telecommunications equally match the revolutionary developments in biomedical sciences in the form of the mapping of the human genome and molecular targeting of drugs, among others. These technological developments in communication offer the potential to transcend the conventional barriers of time and space that, at one time, constrained human communication. The combination of computers and telecommunications offers a potent vehicle to make significant inroads into our efforts to reduce the burden of cancer by intervening at different stages along the so-called 'cancer-control continuum'. Communication is now recognized as having a crucial role in the prevention,

detection and treatment of cancer, as well as in survivorship or end-of-life stages<sup>1</sup>.

Beyond active campaigns and public education interventions, there has been an explosion in the amount of information that is available on cancer. As an example, a recent search for cancer information using Google yielded more than 15 million 'hits' for cancer treatment alone. News media coverage of cancer is not far behind. Over the past four decades, cancer has been mentioned in tens of thousands of stories in the print media and in about 4,000 stories on television. The readily available and large amount of information on cancer prevention, treatment and scientific advances has enormous potential to influence not only what people know and do about cancer but also how they interact with their doctors, family members, other cancer patients, caregivers and friends. It also poses a direct challenge to the controlled exchange of medical information between doctors and patients.

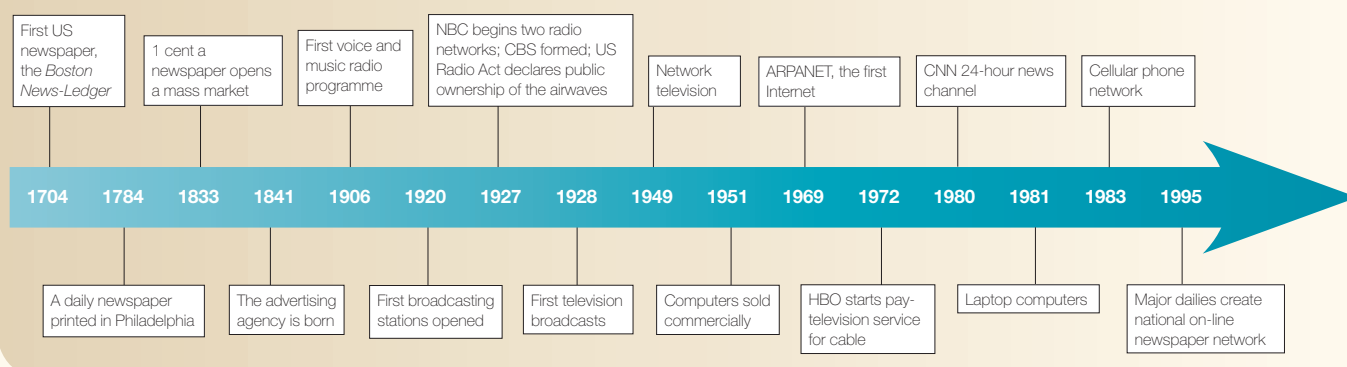
However, even while the role of communication in cancer control is expanding, there are two social trends that could potentially derail the ambitious goals of reducing suffering and death because of cancer. First, there are the continuing health disparities between social groups and, second, there is the unequal ability to access and/or deal with the available information that persists between higher and lower socio-economic classes.

It is time to examine the role of communication in cancer control within this broader perspective of seismic changes in the information environment and information-delivery technologies. What are the most important communication developments of our times and how do they influence the control of cancer? What do we know about the role of communication in cancer prevention, detection and treatment? What are the implications of inequalities in communication for cancer control and cancer-related health disparities? And what are the future trends and challenges in cancer communications that should be watched? This article, relying primarily on examples from the United States, will review the role that communication has in cancer control, from prevention to survivorship. Some of the important developments and barriers in communication that might impede the ambitious goal of transforming cancer into a chronic rather than an acute disease will be discussed. Particular attention will be paid to the roles of mass media and 'new media' such as the Internet in this communication, as well as to the issue of disparities between socio-economic classes.

## The burden of cancer

The global burden of cancer in terms of morbidity and mortality is profound. Cancer claimed more than 6 million lives in the year 2000 (REFS 2,3). In the United States alone, cancer is the second leading cause of death, claiming almost 580,000 lives a year. Major cancers include **lung**, **prostate** and **colorectal** cancer for men, and **lung**, **breast** and **colorectal** cancer for women. Almost 30% of cancer deaths are attributed to tobacco use and another 20% to obesity-related factors, making many of the deaths from cancer due to controllable factors<sup>3</sup>.

Timeline | **A timeline of important communication developments in the United States**



**Box 1 | The development of the mass communications industry**

Although the pursuit and study of communication can be traced back to the early ages of human civilization, including the interest of Ancient Greeks in rhetoric, the history of mass media is more recent (TIMELINE). The mass media in the United States are twentieth and twenty-first century phenomena that share some common characteristics. They are, with some exceptions, profit-making enterprises that rely on two main sources of financial subsidy: advertising and subscriptions or gate receipts, or a combination of both depending on the medium.

Another characteristic of mass media is that they are bureaucratic organizations with a hierarchy, organizational norms and occupational practices that are unique to each medium. In general, they are structured to produce content in a manner that is as efficient and reliable as possible.

Societal developments of the twentieth century have profoundly altered the landscape of the information environment. Advances in telecommunications have led to the development of cable and satellite television and technologies to produce multiple copies of media products simultaneously and cheaply for different audiences. Developments in social sciences made possible the conduct of sophisticated audience research and segmentation. These developments resulted in one singular characteristic of contemporary media: increasing specialization in its content and a fragmentation of its audience.

The most recent entrant to the media landscape is the Internet or its variant, the World Wide Web. From its humble beginnings in 1969, the 'Web' has emerged as a medium that offers the reach of a mass medium with the intimacy that is typical of one-to-one telephone communications. It is at once a repository of information and a medium of communication. Given the rapid developments in telecommunications and computing it is difficult to predict its evolution. It is one medium that has the potential to contest the gatekeeping power of a typical mass medium. For example, organized groups or advocacy groups can mobilize and offer alternative information contesting the ideas advocated in the mainstream media.

Overall, mass media penetrate the deepest corners of American society and the Internet is emerging as a medium of choice among many (TABLE 1; FIG. 2).

**The cancer information environment**

It is difficult to assess the entirety of the cancer information environment given the high number of newspapers, magazines, radio and television stations and websites that cover the topic. A rough idea of the extent of the information environment for cancer, primarily in the United States, can be gleaned from plotting the number of 'hits' obtained from a search engine on the World Wide Web (FIG. 1a,b) and the number of news stories published on cancer-related topics on television (FIG. 1c) and in newspapers (FIG. 1d) between 1965 and 2005. Our analyses show that most of the stories came from recent years.

News media coverage is often a product of interactions between journalists and the sources of news. Journalists depend on the 'beat system' — a method of routinely going to the same sources that are credible, reliable and steady suppliers of information. This reliance gives information sources some say over how issues are presented. Attractive sources are ones who offer jargon-free information and quotes. Sources might also be savvy in knowing how journalists work and will provide what they need, including drama and controversy. For example, one plausible reason that there are more stories on breast and lung cancer is that they cause the most deaths and also have strong advocacy communities.

This practice of gathering and packaging information gives journalists the discretionary power to decide the content that will end up as news or entertainment. So, in many ways, the mass media are the 'gatekeepers' for what audiences are likely to read, see or hear about topics that are beyond their immediate experience. The knowledge and beliefs that people hold about many topics are usually influenced by the nature of media attention. However, the audience have greater control over the type of cancer information they seek through the Internet.

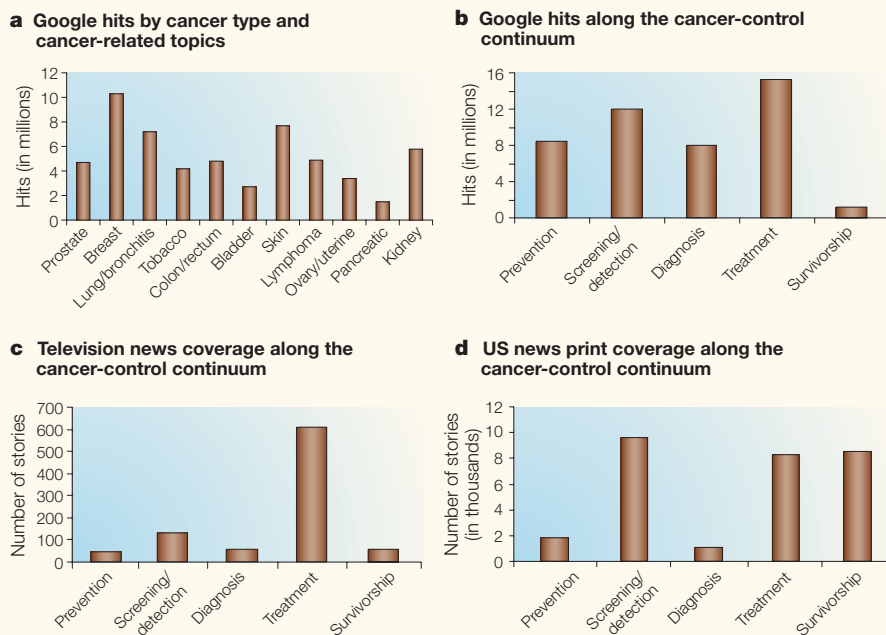
It must also be noted, however, that although there has been an 'explosion' in information on cancer or cancer-related topics, such as diet or tobacco, we know little about how people are using this information and which parts of the cancer-control continuum are influenced by this information. Much research has been focused on the strategic and deliberate use of communication to influence cancer knowledge, beliefs and behaviours — for example, focusing on the number of people using the Internet for cancer information or on the influence of targeted campaigns

In the United States, the estimated costs associated with cancer in 2004 were almost US\$190 billion, of which \$70 billion is due to direct medical costs. Almost \$17 billion arose from morbidity, and another \$103 billion was attributed to indirect costs such as loss of productivity and premature deaths<sup>4</sup>. Because of population-wide prevention strategies, better detection and diagnosis, and advances in treatment and disease management, the rates of death owing to cancer are steadily falling in the United States<sup>5</sup>.

Even though the burden of cancer is easing in the United States, the decline is unequal among different racial, ethnic and socio-economic groups. Blacks continue to bear a disproportionately heavier burden of cancer incidence and mortality compared with other groups. The incidence rate among black males for developing any type of cancer is 689.2 per 100,000 compared with a rate of 556.5 per 100,000 among white males<sup>6</sup>. Beyond a higher risk of developing cancer, the rates of death from cancer are higher for ethnic minorities and lower socio-economic groups. For example, white women have higher incidence rates of breast cancer than black women (141.7 per 100,000 compared with 119 per

100,000), but black women are more likely to die from it (35.4 per 100,000 compared with 26.4 per 100,000)<sup>6</sup>. Similar differences in cancer survival are found across many types of cancer. The 5-year survival for any cancer among blacks is 55.2% compared with 65.6% among whites<sup>6</sup>. Disparities in the cancer burden can be attributed to various causes including differences in diet, lifestyle factors, environment, access to preventive healthcare<sup>7</sup> and disparities in cancer treatment<sup>8</sup>.

The same disparities are evident on a global scale with notable differences between industrialized and developing nations. For example, 80% of cancer patients in developing countries have late-stage incurable tumours by the time they are diagnosed<sup>2</sup>. A shift in the cancer burden from industrialized to developing countries will occur in the future while developing countries undergo major lifestyle changes, including a continued increase in tobacco consumption. Furthermore, disparities in preventative care and treatment are more prevalent in the developing nations. The International Agency for Research on Cancer (IARC) estimates that two thirds of cancer incidence in the future will occur in the developing world<sup>2</sup>.



**Figure 1 | Analysis of cancer information on the Internet and in the media.** These figures must be interpreted with caution as they do not represent systematic content analyses. They are simply superficial searches done to mirror what a typical Internet or media user might experience by typing in casual keywords on a search engine or following exposure to news media. Parts **a** and **b** report the number of Google 'hits' on various types of cancer and along the cancer-control continuum, respectively. It is particularly difficult to estimate the number of unique sites about cancer on the Internet. This search was performed on 4 March 2005 and the numbers might have changed since then given the fluid and transient nature of the websites. In addition, it is not unusual for a number of sites to be duplicates or 'dead links' and searches might even generate misleading sites. For example, the term 'cancer' might also generate hits for the astrological sign of 'cancer.' Terms for different cancer-type searches included cancer 'AND' prostate, breast, lung, bronchus or bronchial, colon, rectum or rectal, colorectal, bladder, skin, lymphoma, ovary or ovarian, uterus or uterine, pancreas or pancreatic and kidney. Part **c** reports television news stories along the cancer-control continuum. The search for news media is more manageable than Internet searches, although it is also not without duplicate hits. To estimate television stories, we used the Television News Archives at the Vanderbilt University (see Online links box). Part **d** shows data on stories along the cancer-control continuum in the print media. For a search of print media, we used Lexis/Nexis (see Online links box), available through Harvard University. We used similar search terms for both the Internet and news-media searches. The terms for cancer-control continuum searches included: cancer 'AND' prevention, screening, detection, diagnosis, treatment and survivor.

on cancer-related topics such as the prevention of tobacco uptake or the promotion of cancer screening. On the other hand, much less attention has been paid to what people learn from and do with what will be referred to as 'incidental exposure' to cancer-related information; that is, the casual encounters with information on cancer that occur during the routine use of mass media for news or entertainment.

#### Communication in cancer control

Despite the rapid advances in molecular biology and genetics, it is now recognized that cancer treatment requires a multilevel strategy that intervenes at different stages of the disease<sup>1,3</sup>. The promise of communication in the cancer-control continuum stems from the fact that a substantial proportion of cancers (>50%) are reported to be caused by

'lifestyle' factors. These include risk behaviours that are modifiable by addressing factors such as tobacco use, alcohol abuse, diet, exercise, exposure to the sun, and reproductive and sexual activity<sup>1,3,9</sup>. This promise is further reinforced by the intense attention in the mass media to biomedical developments in cancer diagnosis and treatment, and the availability of such information on the World Wide Web. Communication could contribute to early detection, improving patient communication with healthcare providers in secondary prevention and, if necessary, in palliative care.

**Prevention.** Population-wide prevention strategies can influence the incidence of cancer and reduce its burden on society by targeting behaviour<sup>3</sup>. People are often unaware of connections between their lifestyle and behaviour

on the one hand and their risk of developing cancer on the other. Or, they might not have the skills or confidence to modify their behaviour. It is also possible that they might feel no social compulsion to change their behaviour or feel no need to be different from their peer groups. In such cases, communication has a significant role in providing the knowledge, skills and confidence to change social norms and facilitate a change in behaviour.

There are many examples of such contributions of communication to social behaviour. Media campaigns aimed at tobacco use, either on their own or in combination with other measures such as school or community-based efforts, have been successful in raising knowledge, building skills, changing norms, strengthening anti-smoking attitudes and reducing smoking in the United States and other countries<sup>10-14</sup>. Similar success has been seen with campaigns to reduce sun exposure<sup>15-18</sup>. Recent campaigns have been focused on the issue of obesity, particularly with respect to diet, but the evidence that this has been effective in changing social behaviour is more equivocal. Evidence indicates that efforts to modify diet and promote physical activity do succeed, albeit selectively among different target groups<sup>19-21</sup>.

In summary, it seems that prevention campaigns are successful in promoting healthy behaviour<sup>22</sup> and in redirecting personal priorities. The key to the success of media campaigns is that media publicity should be extensive, sustained, achieve enough exposure among the target audience and be coupled with local or national campaign events<sup>23-26</sup>. In addition, healthcare-provider recommendations on smoking or diet can reinforce media messages, amplifying the effect.

**Screening and detection.** A goal behind intervention efforts to promote cancer screening is two-fold: encourage screening in the first place, and urge people to remain on schedule for repeat screening or screening at regular intervals. The assumption behind screening, although it is not without controversy, is that early detection of cancer will allow for more effective treatment, leading to more positive prognoses and outcomes<sup>5</sup>. Communication to promote screening should address four potential problems: first, a lack of knowledge about cancer risks, and the potential for screening to detect and treat cancer; second, a lack of motivation to get screened because of personal beliefs, values, fear and importance given to personal health; third, a lack of access to screening services; and fourth, an inability to follow-up screening<sup>5</sup>.

There are many examples of successful interventions in screening. Well-designed communication campaigns at multiple levels have increased the rates of mammography among both whites and African-Americans, although differences in screening rates still persist<sup>27</sup>. In breast cancer screening, for example, there is evidence that simultaneous efforts by US federal agencies such as the National Cancer Institute (NCI) and the Centers for Disease Control and Prevention (CDC), as well as public-private partnerships, had a significant role in promoting awareness, changing attitudes, making environmental changes (such as access to screening services) feasible and, ultimately, changing behaviour<sup>28–30</sup>. Mass-media campaigns, in combination with other strategies, have also been successful in promoting cervical cancer screening, especially when they addressed the barriers to screening<sup>31</sup>.

Celebrities such as Katie Couric, a well-known television personality in the United States, have supposedly aided the promotion of screening for colorectal cancer. This has been dubbed ‘the Katie Couric effect’, where celebrities trade on their status to promote a cause<sup>32,33</sup>. Celebrity endorsements through media and advocacy also led to an increase in prostate-specific antigen (PSA) testing, a common screening mechanism for prostate cancer. This is not unheard of. The diagnosis of former American basketball player Earvin ‘Magic’ Johnson with HIV or the death of Hollywood film actor Rock Hudson from AIDS are further examples of celebrity health problems generating news coverage and thereby influencing public opinion.

Another potential determinant of the promotion of cancer-screening awareness is news media coverage. For example, the recent debate about mammography, when experts disagreed about its efficacy in saving lives, has kept the topic of breast cancer screening at the front of the public arena<sup>34,35</sup>. Evidence shows that media coverage of such conflicts often arouses public interest, increases the perceived importance of the issue and, ultimately, leads to greater knowledge that could influence social behaviour<sup>36–38</sup>.

The role of healthcare providers in screening remains crucial as they are the interpreters of the messages and are looked to for advice by the patients. One consequence of this is the emergence of the philosophy of shared and/or informed decision making. In this approach, patients who are armed with information weigh-up different options in terms of risks and benefits, as well as personal preferences

and values, before they actively engage in screening and treatment decisions<sup>5,37</sup>. Despite its democratic appeal, the extent to which patients want to be involved in such decisions is a question for empirical inquiry, and the answer might vary from patient to patient. This concept is also not aligned with the present culture of physicians who see their role as making such decisions based on their expertise. It will be interesting to see how this issue will evolve over the next few years.

**Diagnosis and treatment.** After being diagnosed with cancer, patients and family members are expected to make difficult treatment choices that might have serious, life-long consequences. Such decisions require some understanding of the complexity of the disease as well as the treatment. It is a situation fraught with stress and uncertainty, but a time when information might help.

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At the time of diagnosis and during the course of treatment and post-treatment, most patients and family members are eager to have information on the status or the stage of disease, different treatment options, clinical trials, and alternative and complementary therapies<sup>38,39</sup>. During treatment, they might seek information on coping with side effects and symptom management. The exchange of information between healthcare providers and patients, however, does not always lead to satisfaction; it could also lead to misunderstanding, and patients might even forget parts of the discussions<sup>40,41</sup>. The organization of care for cancer treatment involves patient interaction with various healthcare providers, including primary care physicians, specialists, nurses and pharmacists among others. This leaves room for the provision of sometimes confusing and even contradictory information. In addition, patients also obtain information from other sources including the Internet, mass media, direct-to-consumer advertising and third parties such as family members, colleagues and friends. It is little wonder that patients are often bewildered by the melange

of advice and instruction at a time when they are already under stress and their cognitive functions might be impaired<sup>42</sup>.

Communication facilitates the patients involvement in their own healthcare, reduces distress, improves adherence to, and compliance with, treatment regimens and increases the patient’s sense of control<sup>43</sup>. Carefully designed communication interventions have an impact on the patient’s knowledge and recall, patient satisfaction and their ability to manage the symptoms<sup>44–47</sup>. Some evidence indicates that preparing patients ahead of time for the clinical visit by providing practical information has a beneficial effect<sup>48,49</sup>.

What is clear is that communication complements social support in helping patients make informed decisions and cope with treatments. However, there are some gaps in the research. For example, in a national survey by the NCI, almost 30% of people with a history of cancer said that they never sought cancer information. We neither know the reasons for, nor the implications of, this phenomenon. We do not know the effects of confusing, contradictory advice and false information that patients might get from family and friends or other potentially unreliable sources. We also know little about the information needs of the caregivers and families of cancer patients. More research also needs to be done on the role of communication in disparities in cancer care. It is difficult to obtain hard data on the role of communication in cancer treatment given the wide-ranging searches that are indulged by patients and family members, and the potential role of the World Wide Web in making the search useful. Moreover, the impact of the World Wide Web on physicians remains to be investigated.

**Survivorship/end of life.** There are almost 10 million cancer survivors in the United States today, and their number is expected to increase with the growing success of treatment options, early disease detection and drug developments<sup>50</sup>. Survivors and people in the post-treatment phase need information on the probability of disease recurrence, tertiary prevention, long-term side effects of treatment, quality of life and personal finances among other topics. Studies show that interventions might reduce uncertainty about the future and the associated distress, and help develop a positive outlook and a problem-solving approach<sup>51</sup>. It is also documented that greater patient-physician communication is related to increased satisfaction with care and a sense of involvement with the treatment decisions<sup>52</sup>.



Table 1 | **Media and their audience demographics in the United States\***

	Total population in thousands	Television viewing (%)	Prime-time television viewing (%)	Cable television viewing (%)	Radio listening (%)	Newspaper reading (%)
<b>Total number of people aged 18 years and older</b>	206,900	94.3	83.3	76.6	84.2	79.8
<b>Ethnicity</b>						
White	173,897	94.1	83.2	77.6	84.6	79.8
Black	24,218	96.4	86.0	71.4	84.0	83.4
Asian	5,366	90.5	75.7	68.3	78.5	69.8
Other	3,419	92.4	78.8	72.3	78.3	75.0
Spanish speaking	25,792	94.4	81.4	69.9	85.9	64.7
<b>Education</b>						
Not high-school graduate	34,784	94.0	81.3	64.7	74.0	61.7
High-school graduate	66,320	95.4	85.4	78.3	83.0	79.8
Attended college	56,111	94.2	83.0	79.2	88.2	83.8
College graduate	49,685	92.9	82.0	79.5	88.7	88.1
<b>Employed</b>						
Full time	110,707	93.6	82.5	79.5	91.0	81.8
Part time	21,788	93.1	81.3	76.4	88.8	80.5
Not employed	74,405	95.6	84.9	72.3	72.9	75.7
<b>Household income (US\$)</b>						
Less than \$10,000	12,433	91.3	78.7	55.3	69.1	63.3
\$10,000 – \$19,999	21,824	95.8	84.4	63.5	73.4	69.4
\$20,000 – \$29,999	23,868	94.3	83.3	68.2	79.0	74.2
\$30,000 – \$34,999	11,797	94.4	83.6	70.4	79.8	75.5
\$35,000 – \$39,999	11,209	95.3	83.9	73.5	83.1	78.5
\$40,000 – \$49,999	20,895	94.6	83.4	76.6	87.6	81.0
More than \$50,000	104,874	94.1	83.4	84.7	89.4	85.7

\*Data taken from the United States Bureau of Census, Statistical Abstract of the United States, 2004–2005.

The arrival of the Internet has changed the way cancer survivors seek support and communicate with each other<sup>53</sup>. A number of online listservs (that is, electronic discussion forums) and support groups have started catering for an increasing number of patients and survivors. By one count, the term 'cancer survivorship' on Google generated almost 1.2 million hits (FIG. 1a,b).

The proliferation of cancer-related websites raises three important questions for which answers are not readily available. First, what is the long-term impact of information on quality of life, uncertainty reduction and health of long-term cancer survivors? Second, to what extent is the information available to cancer survivors scientifically accurate and reliable? Third, are survivors with access to information resources likely to do better than those without access to information resources?

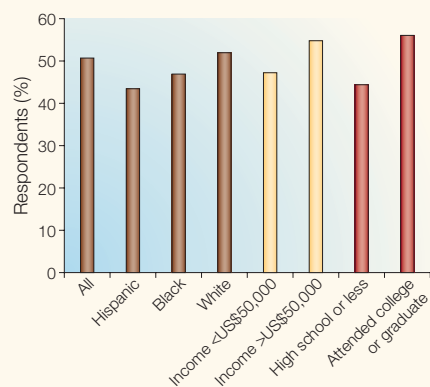
### Important issues and developments

The same advantages that are derived from technological advances in communication and the visibility of cancer in the mainstream and specialized media also pose two important challenges: unequal distribution of communication resources and the disadvantages that accrue from it, and the difficulty in separating quality from quantity of cancer information.

**Communication inequality and cancer.** An important threat to cancer communications in the information age is the inequality that characterizes the current distribution of communication resources and the advantages that accrue from these resources. Communication inequality could manifest at different levels: access to information sources, learning from media and campaigns, and/or the resources and capacity to act on that information.

Differences in access to and the use of mass media have steadily declined (TABLE 1). However, some differences still persist in the use of media such as cable or satellite television, Internet access, newspapers, and media that require recurring expenditures such as subscription fees. The more educated and higher-income groups have more access to these information resources compared with the lower socio-economic groups. Income, education and ethnicity are also associated with discrepancies in 'going online' for health information (FIG. 2) and are likely to influence the active seeking of cancer information (TABLE 2).

Even though differences in access to different media are narrowing, inequalities between different socio-economic, racial and ethnic groups do persist in other realms. When it comes to learning from



**Figure 2 | Percentage of respondents who went 'online' to look for health information in the United States.** Ethnicity (brown), income (yellow) and education level (red) was associated with discrepancies in 'going online' for health information. Ethnic minorities and people from lower socio-economic groups are least likely to search online. These data were taken from the National Cancer Institute Health Information National Trends Survey (see Online links box).

the media and benefiting from communication campaigns, people from higher socio-economic classes again take more advantage of information compared with those from lower socio-economic groups, thereby perpetuating the 'knowledge gap' between the classes<sup>36</sup>. Differences in class and race also influence the amount of information given in medical consultations, the emotional support given by the healthcare provider and question-asking by the patients. Ethnic minorities and people of poorer socio-economic groups, for different reasons, are likely to experience shorter visits, less involvement in decision making, lower satisfaction and lower recall of information, as well as providing lower compliance with advice, after a typical visit with their healthcare provider<sup>54</sup>.

In short, communication inequalities based on education, income, race and ethnicity are likely to influence what people know about health and their encounters with their healthcare providers, and prevent certain groups from fully benefiting from medical advances in cancer. Even though the disparities in access to information *per se* might be narrowing, the cumulative impact of associated disparities in communication along the continuum of attention, information processing and the ability to act on it, might be profound and is worthy of future empirical inquiry.

**Information and misinformation about cancer.** As discussed earlier, the amount of information on cancer is proliferating on the Internet (FIG. 1a,b) with millions of hits

generated by a single search. The amount of information is also increasing in the mass media, with thousands of stories now published or broadcast (FIG. 1c,d). However, there is little guarantee that this sheer quantity is equated with quality of information, or that proliferation might equal accuracy in knowledge and a reduction of confusion among the public.

The news media have the unenviable task of translating complex science into lay language for a diverse audience while under the constraints of deadline pressure. The definition of news as information that is new, and the self-imposed pressure to cover medical 'breakthroughs' under deadlines, means that the media are likely to cover cancer-related stories, or most health stories for that matter, in an episodic way; publishing the study *du jour* and relying on specialists who can summarize the study pithily and offer good quotes. In the process, it is hardly surprising that medical stories often contain inaccuracies, seem discontinuous and contradictory, or could sometimes be misleading<sup>55–57</sup>. In other cases, the journalistic ideal of objectivity, which is achieved by covering both sides of a story, might provide equal weight to both for and against views despite the weight of scientific evidence on each side. At the same time, some hope lies in the fact that the media lend greater credibility to the views of the biomedical establishment and therefore, in times of controversy, are likely to stay close to the advice given by the healthcare providers<sup>58</sup>.

The proliferation of sites on the Internet is no comfort either. Studies have repeatedly shown that many Internet sites contain inaccurate, misleading, incomplete and outdated information. There are, of course, exceptions such as sites by the NCI, the American Cancer Society, and the Harvard Center for Cancer Prevention, among others, which carry the credibility of the institutions that sponsor them. However, overall, the Internet is a medium that is like a wild bazaar with wares offered by both licensed vendors as well as fly-by-night operators.

Do the public have the capacity to sift the wheat from the chaff and not get confused by all the information? Evidence indicates that people often feel overwhelmed with the sheer amount of information — as reported in the Health Information National Trends Survey by the NCI. More than two thirds of the respondents agreed that there are so many recommendations on cancer prevention that it is hard to decide which ones to follow. Evidence also suggests that this, in turn, depends on the educational and economic

background of the audience or user. People who are well educated, of a higher income, and who have more interpersonal contacts with similarly educated people are more knowledgeable and have greater resources for acting on information. Other solutions, such as the promotion of health literacy and media literacy, have also been offered<sup>59</sup>. Health literacy is supposed to enable patients and non-patients to access and process cancer information in a manner that can minimize confusion and encourage appropriate actions. Media literacy, it is suggested, might teach a degree of sophistication in understanding and processing media content in a critical and informed way. However, there is no single definition of what health and media literacy are, nor is the evidence of their effect unequivocal. More empirical work remains to be done in these areas. There is also a need for community groups and medical establishments to build the capacity to communicate clearly and accurately in day-to-day language and to work with the media and the audience to promote accurate and complete cancer information.

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**"We must pay attention to closing the gaps between the information 'haves' and 'have-nots'."**

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#### Future directions

The communications revolution is just beginning. As technologies evolve and penetrate, and biomedical science advances, they can profoundly alter the cancer-care landscape. For example, in the future, interactive multimedia communication systems will probably allow the targeting of narrow groups of people with messages and information that are tailored to them — taking into consideration their interests, susceptibility to cancer, preferences, values and level of literacy<sup>60,61</sup>. In effect, the molecular targeting of cancer treatment might very well find its counterpart in tailored cancer communications.

A related development is the construction of easily accessible electronic medical record systems that incorporate the ability for patients to interact with their healthcare team. This represents a unique opportunity to provide useful cancer-related health information, prepare patients for their visits to make the medical encounters

Table 2 | **Cancer information seekers and non-seekers in the United States\***

	Seeker; n = 498	Non-seeker; n = 247
Income (% with annual income less than US\$35,000)	37.35	50.12
Education (% with high-school or less education)	47.09	68.20
% of minorities	11.18 non-white; 3.97 hispanic	17.91 non-white; 6.10 hispanic

\*Data taken from the National Cancer Institute Health Information National Trends Survey.

more efficient and effective and cut down not only on medical errors but also on 'information errors'.

The challenges, however, remain. We are still far from developing the science of research dissemination; that is, the transfer of knowledge from the laboratory to the clinic and to the community, which has been colourfully summarized as 'bench to bedside' and 'bench to trench'. Coupled with differential capacities among both people and systems to take advantage of new information, the lack of a systematic science of research dissemination is a major deterrent for cancer communication.

A number of efforts are being made to address some of these problems — such as those of low literacy, dissemination of evidence-based information and improving cancer communications. The NCI and the National Institutes of Health in the United States have initiated research programmes to study the challenges of cancer communications and research dissemination<sup>62</sup>. Efforts are also underway to examine the consequences of low levels of literacy to health and the measures required to address those consequences<sup>59</sup>. The next step, however, is in moving the research into the realms of practice and policy. The problems with research dissemination and communication have to be addressed in both public and private sectors as well as at local, national and international levels. Appropriate infrastructures that can help people tame the growing tide of information into packets of usable knowledge suited to their needs must be researched, established and evaluated. National and international communication policies that can provide access to information services such as the Internet at reasonable and even subsidized rates must be considered. In this regard, the recent discussion in the US cities of Philadelphia and Boston about providing free wireless Internet access to their citizens is an interesting experiment, although how it might work in practice remains to be seen. Equally crucial is an

investment in training people on information seeking and use through community centres, local hospitals and other community groups. Furthermore, reporters should be provided with the appropriate resources, training and toolkits to allow them to report on cancer in a timely and accurate way.

The developments in communication and informatics that we are witnessing are unlike anything we have seen in the past, and offer tremendous promise in delivering cancer information to people at their preferred time and place, and in their desired format. However, we must pay attention to closing the gaps between the information 'haves' and 'have-nots'.

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The author declares no competing financial interests.

#### Online links

##### DATABASES

The following terms in this article are linked online to:

**National Cancer Institute:** <http://www.cancer.gov>  
breast cancer | colorectal cancer | lung cancer | prostate cancer

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<http://www.ahrq.gov/clinic/epcsums/dietsumm.htm>.

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[http://www.cancer.org/docroot/STT/content/STT\\_1x\\_Cancer\\_Facts\\_Figures\\_2005.asp](http://www.cancer.org/docroot/STT/content/STT_1x_Cancer_Facts_Figures_2005.asp)

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<http://www.cdc.gov/cancer/index.htm>

**Entertainment Industry Foundation**

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**National Cancer Institute: 5 a Day for Better Health Programme Evaluation Report**

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