Review Article

Endocrinological cancers and the Internet

Bid HK, Konwar R, Kumar S[1]
Endocrinology Division, Central Drug Research Institute, and [1]Department of Surgery, King George's Medical University (KGMU), Lucknow, India.

Correspondence to: Dr. Sandeep Kumar, E-mail: k_sandeep@hotmail.com

Abstract

Endocrine cancers are some of the commonest forms of cancer getting mention as early as in old papyruses of Egypt. Our current knowledge about this cluster of cancer has grown immensely with improved survival rates. In the era of specialization and super specialization, we started peeking into these conditions more elaborately and beyond microscopically. The growing awareness demanded categorization of information into disease basics like molecular pathology of initiation and progression; advanced diagnostics; new therapeutic options; patient awareness and involvement in clinical trials. Recent advances in genomics and hereditary counseling have delineated pre-disease forecasting possibilities. With advanced diagnostics and therapeutic modalities, we saw an increase in cancer survivors demanding extra care and moral support. Throughout these developments, we went through a boost in global information communications, the main thrust being the Internet. Networking of computers globally generated a platform that created a ripple of knowledge far and wide. The purpose of this review is to investigate how the Internet is supporting the growth and development of the field of endocrine cancer, and present and future scope of the Internet as a tool for professionals involved in this area. The information furnished here were collected from cited references as well as all websites mentioned in the tables.

Key words: Endocrine cancer, the internet, website

Introduction

The Internet is the most important communication innovation of the past few decades, providing access to large amounts of information relevant to health services and thus obviously also becoming an increasingly important source of information on cancer. In the past few years, numerous Internet resources on endocrine cancers have been published, including medical journal articles and clinical trial registries. These have already proven their significant role in dissemination of varied levels of information for all strata of people involved in the area of endocrinological cancers, from patients to expert specialist clinicians.

The Internet is inundated in our time with a huge array of information and inevitably set off a revolution in healthcare research and services. Medical practitioners and basic scientists today not only regularly review and evaluate relevant Internet sites, but also offer advice with accurate and up-to date information and share experiences with their colleagues. More importantly, cancer patients who seek information about their problems are the most important beneficiaries from the Internet. They use the Internet to enhance their medical care by using online information search and help the clinician in diagnosing their problem. Besides, the Internet has provided a more secure and private forum for information that they often found difficult to describe or discuss with clinicians for some reason. A recent survey found that 58% of people who accessed the Internet during a health crisis of a loved one, reported that they found important health related information from the Internet.[1] Another study reported that people who searched for information about a personal health problem were 60% more likely to contact a health professional compared to other people who had not searched for online information.[2]

Apart from the impact of online information on physician-patient communication, there is also evidence of the positive effects of the Internet and computer-based support on knowledge and overall satisfaction, health status, health care utilization, question asking, treatment compliance, and psychological benefits such as greater social support and less loneliness of patients.[3-8] However, the availability of an enormous amount of information may make it challenging for

people suffering with cancer to comprehend and to apply it to their own situation.

While there is consensus about the importance of web resources and their availability on the Internet, there is lack of comprehensive reviewing on available web resources relevant to endocrinological cancers including basic information, therapy advancement etc. This article highlights major sites of credible information on endocrinological cancer and describes the types of information available on these sites. This compendium on Internet sources for cancer information, especially endocrine cancer, is likely to provide a handbook for clinicians, cancer researchers, government regulators, public watchdogs and cancer patients, survivors and their caregivers. All information furnished in the article was collected from cited references and web addresses described in various tables of this review.

Internet Resources for Researchers of Endocrinological Cancers

Researchers involved in the area of endocrine cancers may be basic scientists who may include specialists in chemistry, pharmacology, cell biology, genetics, histopathology, bioinformatics, drug research and development etc. The Internet provides relevant information to all of these categories, which is summarized in Tables 1-3. Various organizations and societies serving in the area are listed in Table 4. Here we review a few of the important web resources in detail.

OncoLink

The first multimedia World Wide Web (WWW) and gopher server focusing on cancer information for both the health care professional and the patient. OncoLink provides an Internet-based hypertext and multimedia resource for linking people, computers and information together in an easy to use fashion.[9]

OncoLink has two major goals: a) To provide quality, original content for cancer patients and healthcare professionals and (b) to provide well-organized, consistent access to existing Internet cancer resources. OncoLink service is rich in multimedia content, containing text, pictures, illustrations, sound, and video. The information includes (i) original content written by authors at the institution, (ii) original content submitted by authors from other institutions and, (iii) publicly available information from other resources. Patient-oriented articles, physician-oriented review articles, and NIH, NCI, and FDA documents are also available through this link.

Oncomine 3.0

Oncomine combines a rapidly growing compendium of more than 20,000 cancer transcriptome profiles with a sophisticated analysis engine and a powerful web application for data mining and visualization. Oncomine facilitates rapid and reliable biomarker and therapeutic target discovery, validation and prioritization. It was developed by physicians, scientists, and software engineers at the University of

Table 1: General Information sites on Cancer

SL.	Resource	Web address
1.	A. P. John Institute for Cancer Research	http://www.apjohncancerinstitute.org/linksg.htm
2.	Association of Cancer Online Resource	http://www.acor.org/index.html
3.	Cancer Index	http://www.CancerIndex.org
4	Cancer Information Network	http://www.cancerlinksusa.com/
5	Cancer Links	http://www.cancerlinks.com/
6	Cancer News	http://www.cancernews.com/default2.asp
7	CANCERLIT NCI's	http://cancemet.nci.nih.gov/cancerlit.htm
8.	Cancer Net™	http://cancernet.nci.nih.gov/
9.	National Coalition for Cancer Survivorship	www.canceradvocacy.org
10.	OncoLink®	http://cancer.med.upenn.edu/
11.	Oncologic Pathology Internet Resources	http://members.tripod.com/~LouCaru/oncopathology.html
12.	PDQ®	http://cancernet.nci.nih.gov/pdq.html
13.	Resources for the Health Professionals	http://indmed.nic.in/imcwebir.html
14.	Virtual Library	http://www.epibiostat.ucsf.edu/epidem/epidem.html

Table 2: Epidemiology database of Endocrine Cancers

SL	Database	Web Address
1	Cancer Clusters	http://imsdd.meb.uni-bonn.de/cancernet/600358.html
2	International Agency for Research in Cancer	http://www-dep.iarc.fr/dephome.htm
3.	National Society of Genetic Counselors, Inc	National Society of Genetic Counselors, Inc
4.	National Cancer Data Base (NCDB)	http://www.facs.org/cancer/ncdb
5.	National Cancer Institute Surveillance, Epidemiology, and End Results	http://seer.cancer.gov/
6.	International Genetic Epidemiology Society	http://www.genepi.org/
7.	Canadian Society for Epidemiology and Biostatistics	http://www.cseb.ca/en/links.htm
8.	CMGCC Epidemiology Database	http://mrages.niehs.nih.gov/epidemiology/public/search/
9.	Cancer Research UK	http://info.cancerresearchuk.org/cancerstats/types/
10.	Texas Cancer Registry	http://www.dshs.state.tx.us/tcr/data.shtm

Michigan and is now fully supported for the academic and non-profit research community by Compendia Bioscience.[10]

Drug discovery tools

Fang *et al*. (2004) described the development of a set of integrated Web-based tools for mining the National Cancer Institute's (NCI) anticancer databases for anticancer drug discovery.[11] These Web-based data mining tools allow robust analysis of the correlation between the *in vitro* anticancer activity of the drugs in the NCI anticancer database, the protein levels and mRNA levels of molecular gene targets in the NCI 60 human cancer cell lines for identification of potential lead compounds for a specific molecular target and for study of the molecular mechanism action of a drug.

A comprehensive herbal medicine information system for cancer (CHMIS-C) has also been developed. The current version of the database integrates information on more than 200 anticancer herbal recipes that have been used for the treatment of different types of cancer in clinic, 900 individual ingredients, and 8500 small organic molecules isolated from herbal medicines. Fang *et al.* (2005) demonstrated that this comprehensive information system might be used as an effective informatics tool for anticancer drug discovery.[12]

Genomics web resources

The National Cancer Institute's Cancer Genome Anatomy Project (CGAP) is developing publicly accessible information, technology, and material resources that provide a platform for the interface of cancer research and genomics.[13] CGAP is a collaborative network of cancer researchers with a common goal: to decipher the genetic changes that occur during cancer formation and progression.[14]

CaCORE

caCORE is open source software and services developed by the NCICB Core Infrastructure Group. Providing a data management and application development framework caCORE-based systems include the semantic underpinning for interoperable data and analytical services.[15]

caBIG

The cancer Biomedical Informatics Grid, or caBIG (http://caBIG.nci.nih.gov), is an informatics infrastructure. It link teams of cancer and biomedical researchers together to enable them to better develop and share tools and data in an open environment with common standards. CaBIG is creating a voluntary virtual network also called 'grid' that links individuals and institutions nationally and internationally, effectively forming a World Wide Web of cancer research. CaBIG will allow researchers to answer research questions more rapidly and efficiently, thereby promising to accelerate progress in all aspects of cancer research - from etiologic research to prevention, early detection and treatment.[16]

BOADICEA

BRACA or Breast Cancer associated antigens are high penetrating genetic markers of breast and ovarian cancer. Their mutation for loss of function results in high risk of such cancer which can be screened by DNA testing. BOADICEA is a model under which susceptibility to breast and ovarian cancer is explained by mutations in BRCA1 and BRCA2, as well as multiplicative effects of many genes of polygenic component. A birth cohort effect on the cancer risks was implemented, whereby each individual

Table 3: List of general and specialized journals on endocrine cancer

Sl	Journals	Web links
General		
1.	A Cancer Journal of Clinicians	http://caonline.amcancersoc.org/
2.	Annals of Oncology	http://annonc.oxfordjournals.org/
3.	Annals of Surgical Oncology	http://www.annalssurgicaloncology.org/
4.	BMC Cancer	http://www.biomedcentral.com/bmccancer/
5.	Cancer	http://www3.interscience.wiley.com/journal/
6.	Cancer and Metastasis Reviews	http://www.springer.com/biomed/cancer/journal
7.	Cancer Cell	http://wwwcancercell.org
8.	Cancer Detection and Prevention	http://www.cancerprev.org/Journal/
9.	Cancer Epidemiology Biomarkers and Prevention	http://cebp.aacrjournals.org/
10.	Cancer Gene Therapy	http://www.nature.com/cgt/
11.	Cancer Genetics and Cytogenetics	www.elsevier.com/locate/cancergene
12.	Cancer Immunity	http://www.cancerimmunity.org/
13.	Cancer Informatics	http://la-press.com/
14.	Cancer Letters	www.elsevier.com/locate/canlet
15.	Cancer Research	http://cancerres.aacrjournals.org/
16.	Cancer Reviews Online	http://canreviews.aacrjournals.org/
17.	Cancer Therapy	http://www.cancer-therapy.org/
18.	Cancer Treatment Reviews	www.elsevier.com/locate/ctrv
19.	Carcinogenesis	http://carcin.oxfordjournals.org/
20.	Clinical Cancer Research	http://clincancerres.aacrjournals.org/
21.	Endocrine Related Cancer	http://erc.endocrinology-journals.org/
22.	Familial Cancer	http://www.springerlink.com/content/105711/
23.	Genes, Chromosomes and Cancer	http://as.wiley.com/
24.	International Journal of Gynecological Cancer	http://www.blackwellpublishing.com/
25.	International Journal of Oncology	http://www.spandidos-publications.com/ijo/
26.	Journal of Cancer Research and Therapeutics	http://www.cancerjournal.net/
27.	Journal of National Cancer Institute	http://jnci.oxfordjournals.org/
28.	Lancet Oncology	http://www.thelancetoncology.com/
29.	Molecular Cancer Research	http://mcr.aacrjournals.org/
30.	Molecular Cancer Therapeutics	http://mct.aacrjournals.org/
31.	Nature Reviews Cancer	http://www.nature.com/nrc/index.html
32.	Neoplasia	http://www.blackwellpublishing.com
33.	Nutrition and Cancer	http://www.nutritionj.com
34.	Oncogene	http://www.nature.com/onc/index.html
35.	Oncology	http://karger.com/
36.	Pediatric Hematology and Oncology	http://www.tandf.co.uk/
37.	Seminars in Cancer Biology	http://www.elsevier.com/wps/find/journaldescription.cws_home/622943/description?navopenmenu=-2
38.	World Journal of Surgical Oncology	http://www.wjso.com/

contd.....

contd.....

Sl	Journals	Web links
Region-wise		
1.	American Journal of Clinical Oncology	http://www.ovid.com/site/catalog/Journal/436.jsp
2.	Asian Pacific Journal of Cancer Prevention	http://www.apocp.org/index.php
3.	British Journal of Cancer	http://www.nature.com/bjc/index.html
4.	Chinese Journal of Cancer Research	http://www.springer.com/medicine/journal/11670
5.	European Journal of Cancer	http://www.journals.elsevierhealth.com/periodicals/ejc
6.	Indian Journal of Cancer	http://www.bioline.org.br/cn
7.	Indian Journal of Medical and Pediatric Oncology	http://medind.nic.in/ias/iasai.shtml
8.	Journal of the Egyptian National Cancer Institute	No website
9.	Turkish Journal of Cancer	http://www.turkjcancer.org/
Thyroid Cancer		
1.	Thyroid	http://www.thyroid.org/
Pancreas		
1.	Pancreas	http://www.pancreasjournal.com
2.	Journal of Pancreas	http://www.joplink.net/
Breast Cancer		
1	Breast Cancer	http://www.jstage.jst.go.jp/browse/jbcs
2	Breast Cancer Research	http://breast-cancer-research.com/
3	Breast Cancer Research and Treatment	http://www.springer.com/medicine/oncology/journal/10549
4	Clinical Breast Cancer	http://www.cigjournals.com/CIG/b/clinical-breast-cancer
Prostate cancer		
1	BJU International	http://www.bjui.org/
2	Canadian Journal of Urology	http://canjurol.com/
3	Clinical Genitourinary Cancer	http://www.cigjournals.com
4	Current Opinion in Urology	http://www.co-urology.com/
5	European Urology	http://www.europeanurology.com/
6	Indian Journal of Urology	http://www.indianjurol.com/
7	Journal of Urology	http://www.jurology.com/
8	Prostate Cancer and Prostatic Diseases	http://www.nature.com/pcan/index.html
9	The Prostate	http://www3.interscience.wiley.com
10	Urology	http://www.goldjournal.net/
11.	Uro-oncology	http://www.tandf.co.uk
Cervix		
1.	The Journal of Lower Genital Tract Diseases	http://www.jlgtd.com

was assumed to develop cancer according to calendar period-specific incidences. The fitted model predicts that the average breast cancer risks in carriers increase in more recent birth cohorts. The model was further extended to take into account the risks of male breast, prostate and pancreatic cancer, and to allow for the risk of multiple cancers. BOADICEA can be used to predict carrier probabilities and cancer risks to individuals with any family history, and has been implemented in a user-friendly Web-based program in web address http://www.srl.cam.ac.uk/genepi/boadicea/boadicea_home.html.[17]

Table 4: Professional and non-professional organizations and societies involved in serving for the victims of endocrine cancers

Sl	Organizations and societies	Web address
Prostate cancer		
1	American Prostate Society	http://www.ameripros.org/
2	American Urological Association (AUA)	www.auanet.org
3	British Columbia Foundation for Prostate Disease	www.bcprostatecancer.org
4	Canadian Prostate Cancer Network	http://www.cpcn.org/
5	Center for Prostate Disease Research	http://www.cpdr.org/patient/patient_main.html
6	Florida Prostate Cancer Network	http://www.florida-prostate-cancer.org/
7	National Prostate Cancer Coalition	http://www.fightprostatecancer.org/site/PageServer
8	Prostate Cancer Foundation	http://www.prostatecancerfoundation.org/
9	Prostate Cancer Mission	http://www.pcmission.org/
10	Prostate Cancer Research Foundation of Canada (Toronto)	www.prostatecancer.ca
11.	Prostate Cancer Support Association	www.prostatecancersupport.info
12.	Us Too! International, Inc.	www.ustoo.org
Breast Cancer		
1	Alamo Breast Cancer Foundation	http://www.alamobreastcancer.org/
2	Breast Cancer Research Foundation	http://www.bcrfcure.org/
3	California Breast Cancer Organizations	www.cabco-org.us/
4	Canadian Breast Cancer Foundation	http://www.cbcf.org/
5	Johns Hopkins Avon Foundation Breast Center	http://www.hopkinsbreastcenter.org/
6	National Breast and Ovarian Cancer Centre	http://www.nbcc.org.au/
7	National Breast Cancer Foundation	http://www.nationalbreastcancer.org/
8	National Breast Cancer Organization	www.y-me.org
9	SusanLoveMD.org	http://www.susanlovemd.com/
10	The American Societies of Breast Surgeons	http://www.breastsurgeons.org/
11	The Susan G. Komen Breast Cancer Foundation	http://www.komen.org
12	Ye-ME's National Breast Cancer Foundation	http://www.y-me.org/
Ovarian Cancer		
1	Canadian Ovarian Cancer Community	http://www.ovariancanada.org/
2.	National Ovarian Cancer Association	http://www.ovariancanada.org/
3.	National Ovarian Cancer Coalition	www.ovarian.org
4.	Ovarian Cancer Alliance of Nevada	http://www.ocan.org/
5.	Ovarian Cancer National Alliance	http://www.ovariancancer.org/
6.	Ovarian Cancer Research Foundation (OCRF),	http://www.ocrf.com.au/cpa/htm/
7.	Ovarian Cancer Support Network	http://www.ovacome.org.uk/Home
Thyroid Cancer		
1.	Asia and Oceania Thyroid Association (AOTA)	http://square.umin.ac.jp/aota/
2.	Australian Thyroid Foundation (ATF)	http://www.thyroidfoundation.com.au/
3.	British Thyroid Association	www.british-thyroid-association.org
4.	European Thyroid Association	http://www.eurothyroid.com/

Contd....

Contd....		
5.	The Japan Thyroid Association	http://square.umin.ac.jp/thyroid/en/frame.html
6.	Thyroid Cancer Survivors' Association	http://www.thyca.org/
7.	Thyroid Federation International (TFI) Kingston, ON, Canada	http://www.thyroid-fed.org/
8.	Thyroid Foundation of America	http://thyroid.about.com/library/weekly/aa010301a.htm
Pancreatic Cancer		
1.	Hirshberg Foundation for Pancreatic Cancer Research	http://www.pancreatic.org/
2.	Jefferson Center for Pancreatic, Biliary and Related Cancers	http://www.jeffersonhospital.org/pancreas/article 15687.html
3.	Johns Hopkins Pancreatic Cancer Home Page	http://www.path.jhu.edu/pancreas/
4.	Lustgarten Foundation for Pancreatic Cancer Research	http://www.lustgarten.org/LUS/CDA/HomePage.jsp
5.	Pancreatic Cancer Action Network	http://www.pancan.org/index.html
6.	Pancreatica	http://www.pancreatica.org/
7.	The National Pancreas Foundation	http://www.pancreasfoundation.org/
Parathyroid Adenoma		
1.	Brittingham Society	http://medicine.mc.vanderbilt.edu/brittingham/forum/

Table 5: Specialty centers involved in advanced research on endocrine cancers

Sl	Centers	Web address
1	CDC Funded Ovarian Cancer Research	http://www.cdc.gov/cancer/ovarian/research.htm
2.	Dane-Farber/Brigham and Women's Cancer Centre	http://www.dana-farber.org/pat/adult/endocrine-cancer/
3.	Jawaharlal Nehru Cancer Hospital and Research Centre	http://jnch.nic.in/infra.htm
4.	Johns Hopkins Endocrinology and Metabolism division	http://www.hopkinsmedicine.org/endocrinology/
5.	Marsha Rivkin Center for Ovarian Cancer Research	http://www.marsharivkin.org/
6.	Memorial Sloan-Kettering Cancer Center	http://www.mskcc.org/mskcc/html/447.cfm
7.	MUMS Endocrinology and Metabolism Research Center	http://www.mums.ac.ir/buali/en/endocrin
8.	Prostate Cancer Research Centre	http://www.prostate-cancer-research.org.uk/
9.	The British Columbia Cancer Research Centre	http://www.bccrc.ca/
10.	The Sol Goldman Pancreatic Cancer Research Centre	http://pathology.jhu.edu/pancreas/
11.	Thyroid and Endocrine Center of Florida	http://www.sarasotathyroid.com/
12.	University of Pennsylvania Health System	http://pennhealth.com/obgyn/news/07spr/center.html

Histology resources

Molecular pathways and mechanisms underlying endocrine cancers are being continuously investigated in different *in vivo* models. A critical part in such investigations is the evaluation of organ integrity and histology upon the alteration or inactivation of specific genes. The printed image does not permit an easy comparison of histological images published in different journals over the years. The Internet is now providing tools for the timely and inexpensive dissemination of scientific data to the research community. Web-based interactive histology atlases as available in http://histology.nih.gov and http://www.uwo.ca/pathol/resources.html making possible the retrieval of annotated question banks and high-resolution histology images are excellent resources on the Internet. These histology atlases also take advantage of the interactive nature of the Internet to support the communication between different research groups. They also provide the platform for professionals to evaluate and understand cancer pathology, and to develop a consensus between veterinary and human pathologists.[18] Killeen *et al*. published a review on Internet resources for molecular pathology that described several currently available resources.[19]

Cyclonet

Computational modeling of mammalian cell cycle regulation is a challenging task, which requires comprehensive knowledge of many interrelated processes in the cell. Cyclonet database is a web-based integrated database on cell cycle regulation in mammals in normal and pathological states. It integrates data obtained by all 'omics' sciences and chemoinformatics on the basis of systems biology approach. Cyclonet is a specialized resource, which enables researchers working in the field of anticancer drug discovery to analyze the wealth of currently available information in a systematic way. Cyclonet contains information on relevant genes and molecules; diagrams and models of cell cycle regulation and results of their simulation; microarray data on cell cycle and on various types of cancer, information on drug targets and their ligands, as well as extensive bibliography on modeling of cell cycle and cancer-related gene expression data. Cyclonet aims to predict promising anticancer targets and their agents by application of Prediction of Activity Spectra for Substances. The Cyclonet database is available at http://cyclonet.biouml.org.

Mouse tumor biology database (MTB)

MTB provides public access to information about endogenously arising tumors (both spontaneous and induced) in genetically defined mice (inbred, hybrid, mutant and genetically engineered mice). This includes information on the frequency and latency of mouse tumors, pathology images and reports, genomic changes occurring in the tumors, strain background and literature or contributor citations. This database is assembled from the primary literature or submitted directly from researchers. MTB can also be accessed via the Mouse Genome Informatics web site (http://www.informatics.jax.org). Integrated searches of MTB are enabled through use of multiple controlled vocabularies and by adherence to standardized nomenclature.[20]

pSTIING

Recently systems biology approach is being advocated by leading researchers particularly for multifactorial multigenic disorders to understand, manage for application of comprehensive data on a particular condition. A 'systems' approach towards integrating signaling pathways, interaction and transcriptional regulatory networks in inflammation and cancer (http://pstiing.licr.org) is a new publicly accessible web-based application and knowledgebase. It features 65,228 distinct molecular associations comprising protein-protein, protein-lipid, protein-small molecule interactions and transcriptional regulatory associations, ligand-receptor-cell type information and signal transduction modules for understanding and employing basic scientific information on cancer. It has particularly focused on regulatory networks relevant to chronic inflammation, cell migration and cancer.

Besides the above specific websites we have also listed the center/institutes involved with advanced research in cancer prevention, diagnosis, therapy development in Table 5.

Internet Resources for Endocrine Cancer Patients

Cancer patients are increasingly using the Internet as a source of medical information. This is a reflection of the overall availability of computers and access to the Internet. Forty to fifty percent of cancer patients use the Internet to search for information, and this number continues to rise.[21,22] There is a fairly large literature on Internet resources available to endocrine cancer patients. While the National Cancer Center website is taking the lead in providing general cancer information, the local cancer based hospital websites are expected to provide the individualized information that patients would require.[23] However, the utility of websites for cancer patients needs improvement. Specifically, it is important to better understand how patients access health information online and their associated preferences so that we can improve cancer patients' access to high quality health information on the Internet to facilitate decision-making and health outcomes. Recently, Huang *et al*. (2008) reviewed the current state of the Internet health resources available to the cancer patient and recommended several areas for future research.[24]

Internet-Based Clinical Trials of Cancer Drugs

Clinical trials are a cornerstone for deciding future cancer patient management. They provide patients with opportunity, good clinical practice and, for some, a sense of altruism. That information on cancer clinical trials is expected to be accurate and appropriate with a strong ethical basis. Increasingly, many patients and their families are looking for information from the Internet regarding cancer clinical trials.[25,26] The content and form of information available to patients is critical for decision making. Information must be readable, provide essential detail, and be understandable and easily accessed. A recent study has reviewed such available information on clinical trials by accessing seven cancer information sites.[27] Another study by Metz *et al*. (2005) describes one of the first Web-based cancer clinical trials matching resources and the demographics of users who were successfully matched.[28] Table 6 lists a few important cancer registries worldwide involved in clinical trials and also provides updated information on ongoing clinical trials of specific therapy regimes. Besides information

Table 6: Cancer registry and cancer clinical trials

Sl	Incidence and trial registry	Web address
1.	Arkansas Central Cancer Registry	http://www.healthyarkansas.com/arkcancer/law_regulations_fed.html
2.	Breastcancertrials.org	www.breastcancertrials.org
3.	Canadian Cancer Registry	http://www.statcan.ca/english/about/pia/cancerreg.htm
4.	Cancer Registry (ICMR), India	http://www.canceratlasindia.org/
5.	Cancer Watch	http://www.centerwatch.com/
6.	Cancer411	www.cancer411.org
7.	Clinical Trials Registries Database	http://ssrc.tums.ac.ir/SystematicReview/CTRDB.asp
8.	Clinical Trials Search.org	http://www.clinicaltrialssearch.org/index.html
9.	Current Controlled Trials	www.controlledtrials.com
10.	ClinicalTrials.com	www.clinicaltrials.com
11.	EmergingMed.com	www.emergingmed.com
12.	European Network of Cancer Registries	http://www.encr.com.fr/
13.	Gilda Radner Familial Ovarian Cancer Registry	http://www.ovariancancer.com/app/index.php
14.	International Association of Cancer Registry	http://www.iacr.com.fr/
15.	Medical Research Council Clinical Trials Unit	www.ctu.mrc.ac.uk
16.	National Cancer Institute	http://www.cancer.gov/clinicaltrials/
17.	National Cancer Registrars Association	http://www.ncra-usa.org/
18.	National Cancer Registry Ireland	http://www.ncri.ie/news/news-20050614.shtml
19.	National Comprehensive Cancer Network	http://www.nccn.org/professionals/reference_links.asp
20.	National Institutes of Health	www.clinicaltrials.gov
21.	National Program of Cancer Registries (NPCR)	http://www.cdc.gov/CANCER/npcr/
22.	New York State Cancer Registry	http://www.health.state.ny.us/statistics/cancer/registry/about.htm
23.	North Carolina Cancer Registry	http://www.schs.state.nc.us/SCHS/CCR/links.html
24.	OntarioCancerTrials.ca	www.ontariocancertrials.ca
25.	Pancreatic Cancer Collaborative Registry (PCCR)	http://pccr.unmc.edu/
26.	Pancreatic Cancer Registries	http://www.pancreatica.org/registries.html
27.	Thames Cancer Registry	http://www.thames-cancer-reg.org.uk/
28.	The Cancer Council Australia	www.cancer.org.au
29.	The North American Association of Central Cancer Registries	http://www.naaccr.org/
30.	Center Watch	www.centerwatch.com
31.	Thyroid Clinical Trial	http://www.thyca.org/clinical_trials.htm
32.	Trial Check	www.cancertrialshelp.org
33.	Trials Central	www.trialscentral.org
34.	Utah Cancer Registry	http://ucr.utah.edu/
35.	Veritas Medicine	www.veritasmedicine.com
36.	Western Australian Cancer Registry	http://www.health.wa.gov.au/wacr/rep2002summ.html

about clinical trials, a site like National Comprehensive Cancer Network provides "NCCN Clinical Practice Guidelines in Oncology™", a compilation of clinical guidelines for practice on endocrine and other cancers.

Recently, a number of services have been offered over the Web to facilitate enrollment in clinical trials. The increasingly widespread use of the Internet makes it a potential source by which patients can be made aware of and enrolled in clinical trials, thus improving the rate of clinical trial enrollment. However, there are concerns that rural and elderly patients are less familiar and/or have limited access to the Internet.[29,30]

The Internet as Resource for Cancer Survivors

Many endocrine cancer patients use the Internet to find reliable information about their disease and treatment. Patient information centers from hospitals should be strongly encouraged to improve disease and treatment information facilities on their hospital Web site, especially since most patients still view their oncologist as the most important source of information.[31]

Michael *et al*. (2006) investigated research-based strategies used in a web-based study to assess the impact of participation in cancer-related mailing lists on cancer survivors and caregivers. They also highlighted the alternative methods of measuring response rates in Internet surveys.[32]

Challenges and Limitations

Along with its enormous opportunities, the Internet also poses many daunting challenges and problems. With rise of numerous healthcare websites, clinicians and patients have more information than ever to wade through; even the volume of information it contains can be exhausting to search for specific needs. Unfortunately, many of these sites contain incomplete, misleading, or difficult to understand information, while others blur the distinction between advertising, medical advice and simple disclosure of fact. At present, spurious healthcare Web sites outnumber the trustworthy ones, commonly those of universities, medical centers, and government agencies. Some patients consider online consultations as substitutes for a physician's visit, ignoring the disclaimers that Internet information is no substitute for medical practice.

Conclusion

Finally, we conclude with that there is a significant potential for providing guidance to patients regarding accessing reliable and authenticated sources of Internet information on endocrine cancer related information. Thus, our review of Internet resources on endocrine cancer is intentionally general and all encompassing; no review can substitute for the user actually accessing a Web site and exploring its contents. Although many sites offer high quality information, the user should carefully assess each information site based on the authors' credentials, nature of editorial board, involvement of independent medical experts, frequency of information update, source of funding and potential conflicts of interest of the website etc. For example, Air *et al*. (2007) reported that thyroid cancer websites are out of date and incomplete, lacking important information sought by patients, particularly surgical information.[33] Finally, there is also a need to formulate universal guidelines and strict cyber law and sincere public effort to maintain genuine information on such a life-threatening condition as cancer.

References

1. Madden M, Fox S. Finding answers online in sickness and in health. In: Pew internet and American life project report 2006. Available from: http://www.pewinternet.org. [last accessed on 2008 Mar 24].
2. Ybarra ML, Suman M. Help seeking behavior and the Internet: A national survey. Int J Med Inform 2006;75:29-41.
3. Green MJ, Peterson SK, Baker MW, Harper GR, Friedman LC, Rubinstein WS, *et al*. Effect of a computer-based decision aid on knowledge, perceptions and intentions about genetic testing for breast cancer susceptibility: A randomized controlled trial. JAMA 2004;292:442-52.
4. Houston TK, Allison JJ. Users of internet health information: Differences by health status. J Med Internet Res 2002;4:E7.
5. Baker L, Wagner TH, Singer S, Bundorf MK. Use of the Internet and e-mail for healthcare information: Results from a National Survey. JAMA 2003;289:2400-6.
6. Bass SB, Ruzek SB, Gordon TF, Fleisher L, McKeown-Conn N, Moore D. Relationship of Internet health information use with patient behavior and self-efficacy: Experiences of newly diagnosed cancer patients who contact the National Cancer Institute's Cancer Information Service. J Health Commun 2006;11:219-36.
7. Gustafson DH, Hawkins R, Pingree S, McTavish F, Arora NK, Mendenhall J, *et al*. Effect of computer support on younger women with breast cancer. J Gen Intern Med 2001;16:435-45.
8. Fogel J, Albert SM, Schnabel F, Ditkoff BA, Neugut AI. Internet use and social support in women with breast cancer. Health Psychol 2002;21:398-404.
9. Benjamin I, Goldwein JW, Rubin SC, McKenna WG. OncoLink: A cancer information resource for gynecologic oncologists and the public on the Internet. Gynecol Oncol 1996;60:8-15.
10. Rhodes DR, Kalyana-Sundaram S, Mahavisno V, Varambally R, Yu J, Briggs BB, *et al*. Oncomine 3.0: genes, pathways, and networks in a collection of 18,000 cancer gene expression profiles. Neoplasia 2007;9:166-80.
11. Fang X, Shao L, Zhang H, Wang S. Web-based tools for mining the NCI databases for anticancer drug discovery. J Chem Inf Comput Sci 2004;44:249-57.
12. Fang X, Shao L, Zhang H, Wang S. CHMIS-C: A comprehensive herbal medicine information system for cancer. J Med Chem 2005;48:1481-8.
13. Schaefer C, Grouse L, Buetow K, Strausberg RL. A new cancer genome anatomy project web resource for the community. Cancer J 2001;7:52-60.
14. Riggins GJ, Strausberg RL. Genome and genetic resources from the Cancer Genome Anatomy Project. Hum Mol Genet

2001;10:663-7.
15. Covitz PA, Hartel F, Schaefer C, De Coronado S, Fragoso G, Sahni H, Gustafson S, Buetow KH. caCORE: A common infrastructure for cancer informatics. Bioinformatics 2003;19:2404-12.
16. caBIG Strategic Planning Workspace. The Cancer Biomedical Informatics Grid (caBIG): Infrastructure and applications for a worldwide research community. Medinfo 2007;12:330-4.
17. Antoniou AC, Cunningham AP, Peto J, Evans DG, Lalloo F, Narod SA, *et al*. The BOADICEA model of genetic susceptibility to breast and ovarian cancers: Updates and extensions. Br J Cancer 2008;98:1457-66.
18. Evans JA, Wagner U, Santos CM, Hennighausen L. The interactive Web-based histology atlas system. Oncogene 2000;19:989-91.
19. Killeen AA. Overview of current internet resources for molecular pathology. J Clin Lab Anal 1996;10:375-9.
20. Begley DA, Krupke DM, Vincent MJ, Sundberg JP, Bult CJ, Eppig JT. Mouse Tumor Biology Database (MTB): Status update and future directions. Nucleic Acids Res 2007;35:D638-42.
21. Kalichman SC, Benotsch E, Weinhardt L. Quality of health information on the Internet. JAMA 2001;286:2092-3.
22. Metz JM, Devine P, Denittis A, Jones H, Hampshire M, Goldwein J, *et al*. A multi-institutional study of Internet utilization by radiation oncology patients. Int J Radiat Oncol Bio Phys 2003;56:1201-5.
23. Morita T, Narimatsu H, Matsumura T, Kodama Y, Hori A, Kishi Y, *et al*. A study of cancer information for cancer patients on the Internet. Int J Clin Oncol 2007;12:440-7.
24. Huang GJ, Penson DF. Internet health resources and the cancer patient. Cancer Invest 2008;26:202-7.
25. James N, Daniels H, Rahman R, McConkey C, Derry J, Young A. A study of information seeking by cancer patients and their carers. Clin Oncol (R Coll Radiol) 2007;19:356-62.
26. Benson AB 3rd, Pregler JP, Bean JA, Rademaker AW, Eshler B, Anderson K. Oncologists' reluctance to accrue patients onto clinical trials: An Illinois Cancer Center study. J Clin Oncol 1991;9:2067-75.
27. Carden CP, Jefford M, Rosenthal MA. Information about cancer clinical trials: An analysis of Internet resources. Eur J Cancer 2007;43:1574-80.
28. Metz JM, Coyle C, Hudson C, Hampshire M. An Internet-based cancer clinical trials matching resource. J Med Internet Res 2005;7:e24.
29. Paskett ED, Cooper MR, Stark N, Ricketts TC, Tropman S, Hatzell T, *et al*. Clinical trial enrollment of rural patients with cancer. Cancer Pract 2002;10:28-35.
30. Martin RC 2nd, Polk HC Jr, Jaques DP. Does additional surgical training increase participation in randomized controlled trials? Am J Surg 2003;185:239-43.
31. van de Poll-Franse LV, van Eenbergen MC. Internet use by cancer survivors: current use and future wishes. Support Care Cancer 2008;16:1189-95.
32. Michael Bowling J, Rimer BK, Lyons EJ, Golin CE, Frydman G, Ribisl KM. Methodologic challenges of e-health research. Eval Program Plann 2006;29:390-6.
33. Air M, Roman SA, Yeo H, Maser C, Trapasso T, Kinder B, Sosa JA. Outdated and incomplete: A review of thyroid cancer on the World Wide Web. Thyroid 2007;17:259-65.

Source of Support: Nil, **Conflict of Interest:** None declared.