



## Oncosifter: A Customized Approach to Cancer Information

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### Oncosifter

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- ❖ Motivation
- ❖ Overview of Oncosifter
- ❖ Modules of Interaction
- ❖ Conclusion

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## Oncosifter: Motivation



- ❖ Volumes of medical data is available on lab research, latest news, treatment & diagnosis.
- ❖ In information age – data available in electronic format and accessible over internet.
- ❖ Various websites provide information only related to specific topics  
Eg: Oral Cancer, Breast Cancer



The Oral Cancer Foundation  
<http://www.oralcancer.org>

Thus a need to make all topics available at one location.



The Susan G. Komen Breast Cancer Foundation  
<http://www.komen.org/bci/>

## Oncosifter: Motivation



- ❖ Websites have data available at different levels/ locations
- ❖ Medical Jargon Usage

### Need to:

- Make data easily available
- Standardize data access procedures
- Focus on non-medical community

**Leukemia Home Page**

What You Need To Know About Leukemia  
Information about leukemia, symptoms, diagnosis, and treatment of leukemia. NCI Publication No. 10-2775

Adult Leukemia  
Adult Leukemia: Leukemia is a cancer of the white blood cells, the cells in the body that normally fight infections.

Childhood Leukemia  
Childhood Leukemia: Leukemia (LL) is a cancer of the white blood cells, the cells in the body that normally fight infections.

Living with Cancer: A Handbook for Parents  
Provides the most common types of childhood cancer, treatments and side effects, and issues that may arise when a child is diagnosed with cancer. Offers medical information and practical tips gathered from parents. Includes a section on talking to children about cancer.

NCI's NCI Comprehensive Cancer Database  
Full description of the NCI PDQ Database.

**Treatment**  
Information about treatment, including surgery, chemotherapy, radiation therapy, immunotherapy, and vaccine therapy.  
\* Adult Acute Lymphoblastic Leukemia Treatment  
[ PDF ] [ HTML ] [ PDF ] [ HTML ]  
\* Childhood Acute Lymphoblastic Leukemia Treatment  
[ PDF ] [ HTML ] [ PDF ] [ HTML ]  
\* Adult Acute Myeloid Leukemia Treatment  
[ PDF ] [ HTML ] [ PDF ] [ HTML ]  
\* Adult Chronic Lymphocytic Leukemia Treatment  
[ PDF ] [ HTML ] [ PDF ] [ HTML ]

**Prevention, Genetics, Causes**  
Information related to prevention, genetics, and risk factors.  
\* Understanding Gene Testing  
\* Search Cancer Genetics Services Directory  
\* Cancer Genetics Overview

**Clinical Trials**  
Information on clinical trials and current news on trials and trial-related data.  
\* Leukemia Clinical Trials  
\* Childhood Cancer Clinical Trials  
\* Childhood Cancer Clinical Trial Participation  
\* Search the Clinical Trials

**Cancer Literature**  
Resources available from the PubMed Database  
\* Cancer Trials Search: Leukemia/Lymphoma  
\* Cancer Statistics by Subtype

**Related Information**  
Other information, including reports about NCI priorities for cancer research and treatment.  
\* Leukemia/Lymphoma/Myeloma Progress Review Group  
\* State of the Science: Leukemia/Myeloma

**Statistics**  
Information related to cancer incidence, mortality, and survival.  
\* Leukemia, U.S. - Backgrounder: Cancer Patterns  
\* Cancer Incidence and Survival among Children, U.S.  
\* Data Sources

**Advanced** [ Search ]

Prostatectomy: A Cancer Diagnosis and Treatment  
Fact Highlights  
Press/NewsCenter  
[ Home ] [ About Us ] [ Contact Us ]  
[ Privacy Policy ] [ Terms of Use ]  
[ Site Map ]  
[ Feedback ]  
[ LiveHelp ]  
[ NCI Home ]  
[ NCI Publications ]  
[ NCI Clinical Trials ]  
[ NCI Cancer Statistics ]  
[ NCI Cancer Research ]  
[ NCI Cancer Treatment ]  
[ NCI Cancer Prevention ]  
[ NCI Cancer Control ]  
[ NCI Cancer Care ]  
[ NCI Cancer Education ]  
[ NCI Cancer Support ]  
[ NCI Cancer Advocacy ]  
[ NCI Cancer Policy ]  
[ NCI Cancer Research ]  
[ NCI Cancer Treatment ]  
[ NCI Cancer Prevention ]  
[ NCI Cancer Control ]  
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[ NCI Cancer Policy ]

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## Oncosifter: Overview



- ❖ "Onco" means Cancer
- ❖ Oncosifter is developed to filter cancer related news and medical information
- ❖ Limited medical jargon is used – with focus on non-medical user groups
- ❖ Latest News and Diagnosis & treatment information is provided at same location
- ❖ Information access procedures are standardized
- ❖ Personalization of news through customization



## Oncosifter: Overview



### ❖ System Design:

- ❖ System implemented in Perl-CGI

### ❖ Information Sources:

- ❖ *Medlineplus* - latest cancer news
- ❖ *Cancer.gov* - diagnosis and treatment information



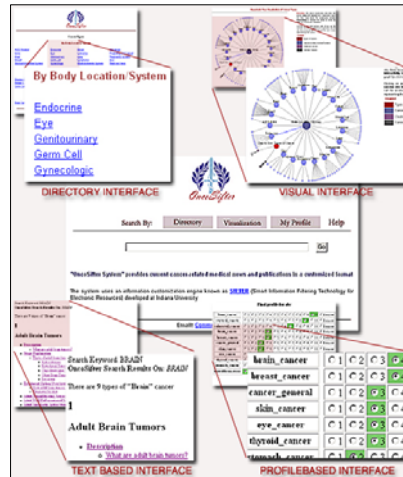
### ❖ Consistent interaction styles for data access

### ❖ Different modules of interfaces developed

- ❖ *Keyword Based Search Interface*
- ❖ *Directory Interface*
- ❖ *Hierarchical Visualization Interface*
- ❖ *Personalization Search Interface*



## Oncosifter: Overview



Different Modules of interaction in Oncosifter

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**Oncosifter: Modules of Interaction**



❖ Keyword Based Search

- ❖ Query submission is through a text-box
- ❖ Query - Controlled vocabulary match is performed to retrieve information
- ❖ In Oncosifter: Query – keyword match performed to acquire URL-addendum
- ❖ Data is dynamically accessed
- ❖ Information filters applied to parse relevant data for display



Keyword-Based Search Interface

**Oncosifter: Modules of Interaction**

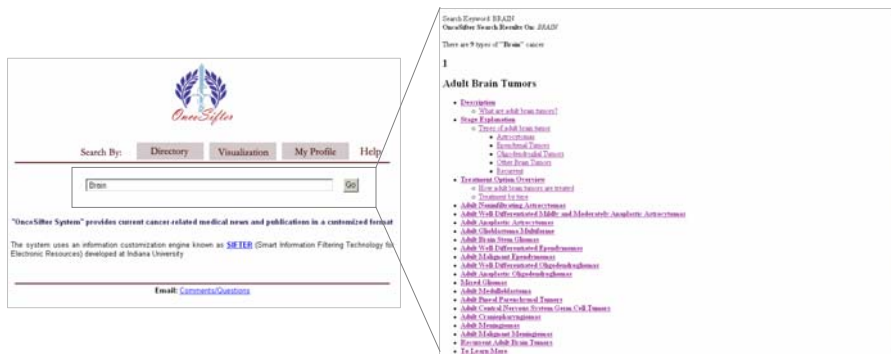


Figure: Keyword based search interface and corresponding results page

**Oncosifter: Modules of Interaction**



❖ **Directory Search**

- ❖ Provides overview of the different types of cancer
- ❖ Categorization of cancers – for simplified search
- ❖ Common terms used by non-medical community are used to identify cancers
- ❖ Multiple cancers in the same category name are concatenated in display

| Cancer Types                             |                                    |  |                                      |
|--|------------------------------------|--|--------------------------------------|
| By Body Location/System                  |                                    |  |                                      |
| <a href="#">AIDS-Related</a>             | <a href="#">Endocrine</a>          | <a href="#">Blood</a>                  | <a href="#">Neurologic</a>           |
| <a href="#">Bone</a>                     | <a href="#">Eye</a>                | <a href="#">Leukemia</a>               | <a href="#">Pregnancy and Cancer</a> |
| <a href="#">Brain</a>                    | <a href="#">Genitourinary</a>      | <a href="#">Lung</a>                   | <a href="#">Respiratory System</a>   |
| <a href="#">Breast</a>                   | <a href="#">Germ Cell</a>          | <a href="#">Lymphoma</a>               | <a href="#">Skin</a>                 |
| <a href="#">Stomach/Digestive System</a> | <a href="#">Gynecologic</a>        | <a href="#">Musculoskeletal System</a> | <a href="#">Head and Neck</a>        |
| By Common Cancer                         |                                    |  |                                      |
| <a href="#">Bladder Cancer</a>           | <a href="#">Endometrial Cancer</a> | <a href="#">Lung Cancer</a>            | <a href="#">Ovarian Cancer</a>       |
| <a href="#">Breast Cancer</a>            | <a href="#">Head/Neck Cancer</a>   | <a href="#">Melanoma</a>               | <a href="#">Prostate Cancer</a>      |
| <a href="#">Colon Cancer</a>             | <a href="#">Leukemia</a>           | <a href="#">Non-Hodgkins Lymphoma</a>  | <a href="#">Rectal Cancer</a>        |
| Childhood Cancer                         |                                    |  |                                      |
| <a href="#">Brain Tumor, Child</a>       | <a href="#">Leukemia, Child</a>    | <a href="#">Lymphoma, Child</a>        | <a href="#">Tumors, Child</a>        |

Directory Search Interface

**Oncosifter: Modules of Interaction**



1 AIDS-related lymphoma  
2 types

There are 2 types of "AIDS-related" cancer

**1**

**AIDS-Related Lymphoma**

- **Terminology**
  - [What is AIDS-related lymphoma?](#)
  - [Stages of lymphoma](#)
  - [Types of AIDS-related lymphoma](#)
    - [Chronic lymphocytic leukemia](#)
    - [Diffuse large B-cell lymphoma](#)
    - [Primary central nervous system lymphoma](#)
  - [Treatment Options Overview](#)
    - [How AIDS-related lymphoma is treated](#)
    - [AIDS-Related Prognosis of Lymphoma](#)
    - [AIDS-Related Prognosis: CNS Lymphoma](#)
    - [To Learn More](#)
    - [About EDC](#)

**Description**

**What is AIDS-related lymphoma?**

AIDS-related lymphoma is a disease in which cancer (malignant) cells are found in the lymph system in patients who have AIDS (acquired immunodeficiency syndrome). AIDS is caused by the human immunodeficiency virus (HIV) which attacks and weakens the immune system. Infections and other diseases can then spread to the lymph, and the immune system cannot fight against them.

The lymph system is made up of thin tubes that branch, like blood vessels, over all parts of the body. Lymph vessels carry lymph, a substance, where fluid that contains white blood cells called lymphocytes. Along the network of vessels are groups of small, bean-shaped organs called lymph nodes. Clusters of lymph nodes and other tissues holding cells. The organs are organs in the upper abdomen that make lymphocytes and B-cells, old blood cells from the blood, the former is small organ (called the tonsils), and the lymph can organ in the throat, are also part of the lymph system. Because there is lymph tissue in many parts of the body, the disease can spread to almost any of the body's organs or tissues including the liver, liver system (the lymph tissue inside the large veins of the body that makes blood cells), spleen, or bone.

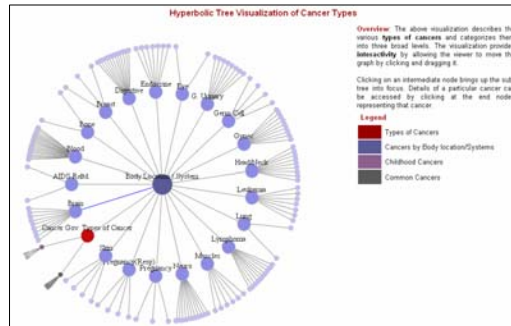
Figure: Directory search interface and corresponding results page

## Oncosifter: Modules of Interaction



### ❖ Hierarchical Visualization Interface

- ❖ Graphical visualization reveal structure in data
- ❖ Cancer categories represent hierarchical tree data structure
- ❖ Hyperbolic tree used in to display cancer categories
- ❖ Category classification of cancer is easily available
- ❖ Minimum interaction needed to get information



Hierarchical Visualization Interface: Body Locations/ Systems

## Oncosifter: Modules of Interaction

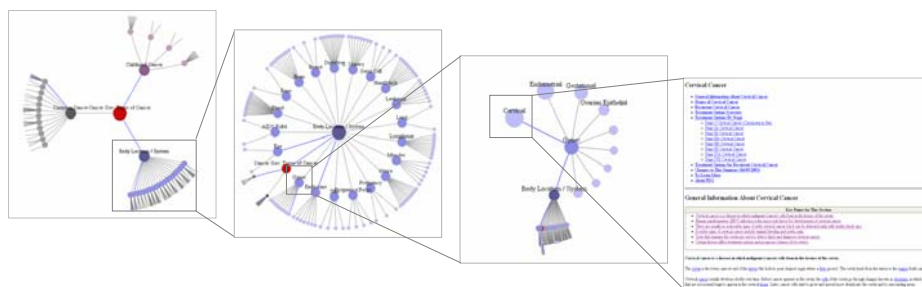


Figure: Hierarchical search interface and corresponding results page



## Oncosifter: Modules of Interaction



### ❖ Personalization Search Interface

- ❖ Feature to customize news retrieval topics
- ❖ Rating scale provided to set the users profile
- ❖ Highly rated cancer news are displayed at the top
- ❖ Users discretion to change the profile at any instance
- ❖ Article rating used to promote system learning and change users profile automatically

Have you already set up a profile

Yes No

User Name  New User Name

Password  Password

Confirm Password

Keyword-Based Search Interface

## Oncosifter: Modules of Interaction



The figure illustrates the personalization search interface and its corresponding results page. The top part shows the 'Personalization Search Interface' with a search bar and a 'Final profile for abc' table. The bottom part shows the 'Results for abc' page with a list of cancer-related articles.

**Final profile for abc**

|                       |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |
|-----------------------|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|
| breast_cancer         | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| colorectal_cancer     | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| endometrial_cancer    | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| lung_cancer           | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| prostate_cancer       | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| skin_cancer           | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| stomach_cancer        | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| testis_cancer         | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| uterine_cancer        | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| ovarian_cancer        | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| pancreatic_cancer     | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| bladder_cancer        | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| kidney_cancer         | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| thyroid_cancer        | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| esophageal_cancer     | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| nasopharyngeal_cancer | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| glioma                | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| meningioma            | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| pituitary_tumor       | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| acoustic_neuroma      | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| schwannoma            | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| craniopharyngioma     | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| chordoma              | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| osteosarcoma          | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| chondrosarcoma        | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| osteoid osteoma       | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| osteoblastoma         | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| osteosarcoma          | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| chondrosarcoma        | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| osteoid osteoma       | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| osteoblastoma         | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |

**Results for abc**

**BONE CANCER**  
Six Stories

**CERVICAL CANCER**  
Six Stories

**COLORECTAL CANCER**  
Six Stories

**BLADDER CANCER**  
Six Stories

**BREAST CANCER**  
Six Stories

**BRITISH CANCER**  
Six Stories

**ENDOMETRIAL CANCER**  
Six Stories

**ESOPHAGEAL CANCER**  
Six Stories

**GLIOMA**  
Six Stories

**HEALTH CANCER**  
Six Stories

**HEAD AND NECK CANCER**  
Six Stories

**HEMATOLOGICAL CANCER**  
Six Stories

**INTESTINAL CANCER**  
Six Stories

**LEUKEMIA**  
Six Stories

**LIVER CANCER**  
Six Stories

**MELANOMA**  
Six Stories

**MENINGIOMA**  
Six Stories

**MOUTH CANCER**  
Six Stories

**MUSCULOSKELETAL CANCER**  
Six Stories

**NEUROLOGICAL CANCER**  
Six Stories

**OBSTETRIC CANCER**  
Six Stories

**ORAL CANCER**  
Six Stories

**PANCREATIC CANCER**  
Six Stories

**PROSTATE CANCER**  
Six Stories

**SKIN CANCER**  
Six Stories

**STOMACH CANCER**  
Six Stories

**TESTIS CANCER**  
Six Stories

**UTERINE CANCER**  
Six Stories

**OVARIAN CANCER**  
Six Stories

**PANCREATIC CANCER**  
Six Stories

**BLADDER CANCER**  
Six Stories

**BREAST CANCER**  
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**TESTIS CANCER**  
Six Stories

**UTERINE CANCER**  
Six Stories

**OVARIAN CANCER**  
Six Stories

Figure: Personalization search interface and corresponding results page

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## Oncosifter: Conclusion

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- ❖ Oncosifter System:
    - ❖ Latest news and diagnosis & treatment information is obtained
    - ❖ Different user-friendly modules of interaction are available
    - ❖ Only relevant information is displayed
    - ❖ Multiple cancers of the same type are displayed together
    - ❖ Consistency in layout
    - ❖ Similar interaction styles
    - ❖ Ability to build personal profiles and customize it based on feedback
- } Reduces cognitive load on user



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### Oncosifter: References



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Thank You