Accessibility Evaluation of the ClinicalTrials.gov Web Site

October 2008

prepared for

U.S. Department of Health and Human Services
National Library of Medicine

by

MACRO INTERNATIONAL INC. **7315 WISCONSIN AVENUE • SUITE 400W • BETHESDA, MD 20814**

CONTENTS

1. INTRODUCTION

1.1. OBJECTIVES OF THIS REVIEW

The goal of this review is to document accessibility concerns identified in compliance audits and usability testing of the ClinicalTrials.gov Web site. We hope to eliminate significant barriers for individuals with disabilities, particularly those with blindness and low vision, motor disabilities, and cognitive disabilities. Many of our comments focus specifically on issues that may affect use of the site with assistive technologies (hardware and software used by people with disabilities to access electronic and information technology).

1.2. ABOUT SECTION 508 COMPLIANCE

Because the U.S. Department of Health and Human Services (HHS) is a Federal agency, it must comply with the Federal accessibility standards established in Section 508 of the U.S. Rehabilitation Act.[1] In addition, the agency has established accessibility standards for its own Web publications,[2] which Macro incorporated into this review.

Section 508 compliance guarantees only a minimum level of accessibility, and a system may be compliant yet still be extremely difficult to use. Macro has, therefore, also documented some lower-priority issues that impact interface usability for assistive technology users. These are derived from guidelines set forth in the Web Content Accessibility Guidelines (WCAG 1.0),[3] developed and published by the World Wide Web Consortium.

Section 508 standards are currently under review, and new standards will go into effect in 2010. The draft for the 508 Refresh[4] includes a number of issues that are not included in the current standards. It may be worth addressing those issues as ClinicalTrials.gov is updated. Macro can provide guidance on the Refresh on request.

1.3. CURRENT SYSTEM STATUS

ClinicalTrials.Gov is not compliant with Section 508 of the U.S. Rehabilitation Act. The system will be compliant after the following issues have been addressed:

- Layout table construction must be improved because these tables create problems with tab and reading order and interfere with assistive technology.
- When tables are used to present data, column and row headers must be marked up with the header element TH.
- When more than one level of headers is present in a table, row and column headers must be programmatically associated with table cells.

[1] http://www.section508.gov
[2] http://www.hhs.gov/od/508policy/index.html
[3] http://www.w3.org/TR/WCAG10/
[4] http://webaim.org/teitac/wiki/EWG~Draft_Jan_7.php

- Form controls must be programmatically associated with labels using appropriate markup (LABEL or “title”).
- Skip links must be added to support jumping repetitive navigation links.

2. APPROACH

2.1. OUR METHODOLOGY

Compliance audits incorporate a combination of human and automated testing methods. For this evaluation, we performed the following analyses:

- Hypertext markup language (HTML) and Section 508 validation
- Keyboard testing
- Testing with scripting and style sheets disabled
- Testing in Mozilla Firefox and Microsoft (MS) Internet Explorer (IE) browsers
- Assistive technology testing with a screen reader (JAWS) and magnifier (Windows Magnifier), as appropriate
- Usability testing with users with vision, motor, and cognitive disabilities

Although automated evaluation tools are a useful part of an accessibility evaluation suite, they cannot be relied on as the sole testing method. Human judgment is required to meet many compliance requirements.

2.2. PARTICIPANT INFORMATION

During recent usability testing for the ClinicalTrials.gov Web site, Macro was able to speak with users with a number of disabilities, some of which were age related. One participant, for example, magnified screen text because of age-related low vision problems (cataracts). Another experienced physical disability as a result of long-term, degenerative illness (Parkinson's disease). Another used a screen reader because of vision loss due to retinitis pigmentosa. A final participant discussed how dyslexia and other learning disabilities affected her ability to process spoken and written information. All individuals whose results were included in this evaluation were over the age of 60.

Our findings from these interviews are not comprehensive. Because disabilities are unique, someone else with a cognitive, vision, or motor disability may have a different experience with the system. The screen reader user we interviewed had a great deal of difficulty with the search results interface but said that he was not a frequent user of the screen-reading software (JAWS 9) and that another user might have less difficulty. It should be noted, however, that frequent use of an assistive device or application should not be a requirement if the system is intended for use by the lay public. While the participant with Parkinson's disease experienced moderate physical slowness as a result of the disease, the facilitator did not believe that his disability affected his task completion rates.

2.3. ASSESSING PRIORITY

This report addresses a number of issues that are required for compliance with Federal legislation; these issues will be assigned a "Required" priority rating. If an item created problems during usability testing but is not required for compliance, it will be assigned a "Strongly

Recommended" rating. Any item that is not required for compliance and was not problematic for participants in usability testing but has been shown by research to improve usability for assistive technology users will receive a "Recommended" rating.

3. RESULTS BY PAGE

The ClinicalTrials.gov interface uses a fairly simple search engine design, with tabs across the top to select the type of search, a topical index, and a mapping interface. Most features can be operated by keyboard, although tab and reading order are sometimes problematic due to unusual layout table construction.

Many of our comments apply to more than one system screen. In order to avoid redundancies, we have not listed all items on every page. A number of these issues (e.g., problems with tables, forms, skip navigation) apply globally and should be addressed throughout the system.

3.1. BASIC SEARCH

3.1.1. Forms

Priority Rating: Required

The Basic Search form includes the “alt” attribute with form controls. “Alt” can be used with input elements that include an image but should not be used with other input elements. In order to explicitly associate a form control with its label, either the LABEL element or the “title” attribute should be used. The following is presented as an example of these issues:

```
<div class="indent1">
  <br/>
  <span class="header2">Enter a word or phrase, such as the name of a medical condition or
intervention.</span><br/>
  <br/>
</div>
<div class="indent2">
  <form name="search" method="get" action="/ct2/results">
    <table cellpadding="3" cellspacing="0" border="0">
     <tr>
       <td class="header3" nowrap>Example:   Heart Attack AND Los Angeles</td>
     </tr>
     <tr>
       <td class="header3" align="right" nowrap>
         <input class="header3" type="text" name="term" alt="Search Terms" id="first_focus"
value="" size="60" maxlength="250"/>  <br/>
       </td>
       <td class="header3" nowrap>
         <input class="header3" type="submit" alt="Search" value="Search"/>  <br/>
       </td>
     </tr>
     <tr>
       <td class="header3" align="right" nowrap>
```

```
        <a href="/ct2/search/advanced" title="Show Advanced Search page">Advanced
Search</a>  
       </td>
       <td class="header3" nowrap>
        <a href="/ct2/help/help" title="Show search help"
onclick="openPopupWindow('/ct2/help/help',true); return false;">Help</a>
       </td>
      </tr>
    </table>
  </form>
</div>
```

In order to explicitly associate a form control with its label using the LABEL element, LABEL must include the “for” attribute and INPUT (or SELECT or TEXTAREA) must include the “id” attribute. “Id” values must be unique to a document and must begin with an alphabetical character. The “id” value cannot contain a space, and “id” and “for” values must match exactly. The form control may be contained within LABEL or outside of it, so long as the programmatic association is present.

Explicit association of form controls with labels via LABEL or “title” is required because screen readers sometimes have difficulty associating labels with form controls when they are implicitly associated (e.g., when they are placed next to one another or when INPUT is placed within LABEL, but “for” and “id” are not present). In the example given above, the label (“Enter a word or phrase, such as the name of a medical condition or intervention”) and the form control are separated by a significant amount of markup, including table cells.

Once this association is created, it can be tested as follows: Click on the label for the form control. If focus moves into the element (INPUT, SELECT, or TEXTAREA), the association has been created and is operating correctly. If it does not do this, there is an error. Common errors include invalid or repeated “id” values and mismatched “for” and “id” values.

“Title” may be used with a form control to provide a label when LABEL cannot be used. LABEL cannot be used to associate a form control with multiple labels (e.g., in a form laid out as a data table) and may be difficult to use if no text label is present (although text labels may be hidden using cascading style sheets).

To fix this problem, we recommend that the National Library of Medicine (NLM):

- Use LABEL to associate the label and form control in the Basic Search screen:
    - <LABEL for="search_terms">Enter a word or phrase, such as the name of a medical condition or intervention.</LABEL>
    - <input class="header3" type="text" name="term" id="search_terms" value="" size="60" maxlength="250"/>

- Remove the “alt” attribute from INPUT

3.1.2. Skip Navigation Links

Priority Rating: Required

Users must be given a means of skipping repetitive navigation links via a skip link. On ClinicalTrials.gov, repetitive navigation links include the Home, Search, Study Topics, and Glossary links as well as the tabbed menu in the main search window. The skip link should jump users directly from the beginning of page content to the search feature or other page content.

A skip link may be accomplished in a number of ways. Two of the most common are the following:

- An invisible linked spacer image may be placed in the upper left corner of the page. The GIF image must include a text equivalent stating the target of the link (e.g., alt="skip to main content").
- A text link may be placed in the upper left corner of the page. This link may be hidden using a style sheet.[5]

The skip link must be the first link that users encounter on a page. In order to determine whether the link is operating correctly, tab to the link. Press **Enter** to activate it. Focus should move to the target of the link. Press the tab key again. If focus moves to the first link or form control in the page content, the link is functioning correctly. If focus returns to the top of the page, there is an error. Skip links must be tested in more than one browser. If the link does not pass this test in MS IE, try placing the named anchor in a SPAN element with a width of 100 percent:

3.1.3. Headings

Priority Rating: Strongly Recommended

The heading element (e.g., H1, H2, H3) is not present in ClinicalTrials.gov pages. The heading element is important for providing structural information on each page. Screen reader users can use the heading element to navigate the page, essentially moving through an outline. Although the heading element is not required for Section 508 compliance, it will be required in the 2010 508 Refresh.

In tests with a screen reader user, we found that one of the first things the participant looked for was page headings: “If I wasn’t sure how big this page was, I might check [headings] . . . Oh, [there are] no headings.” When he encountered a new page or site, he approached it by first looking for headings or tables. If he found neither, he would use the arrow key to attempt to move through the page content. Lack of headings was a significant barrier for him, since they would have allowed him to move through the page content and quickly identify the types of

[5] See the Skip Navigation page in the Policies and Standards section of the HHS Web site, http://www.hhs.gov/web/policies/skipnavigation.html.

information present. This was particularly important in text-heavy pages, such as many of those on the Clinical Trials Web site.

To improve accessibility and usability for screen reader users, we recommend that NLM:

- Use headings (H1, H2, H3) on all system pages
- Use headings appropriately, in ascending order
- Use headings to provide structure to the page and not for presentation alone (e.g., using H4 out of the correct order to get a certain font size)

3.1.4. Primary Language

Priority Rating: Recommended

The primary language of the ClinicalTrials.gov Web site is not specified in HTML. Screen readers are able to determine the primary language of a document and any changes in language that may occur if that information is provided in markup. It is especially important to provide this information when a system contains records from other countries, as this Web site does.

The following tag can be included, for example: <html lang="en">.

3.1.5. Plain Language

Priority Rating: Strongly Recommended

ClinicalTrials.gov uses a great deal of medical and research jargon. This creates difficulties for laypeople tasked with locating appropriate studies and places an even greater burden on nonmedical users with disabilities. Individuals with cognitive disabilities encounter difficulties when accessing text-heavy pages or pages that use excessive jargon and/or scientific language. Individuals who use screen readers to access system pages may be at a disadvantage if the reader mispronounces a lengthy scientific term.

During user testing, the blind participant attempted to locate stomach cancer in the by-topic list of diseases. After scrolling through a few cancers, he stated, “I wonder if I want to find stomach cancer, or some scientific word . . . I’m thinking that this might not be where I want to be, because these don’t make sense to me.” When the screen reader read “adenocarcinoma” aloud, he let out an intimidated “Wow.” The scientific language was clearly difficult for him to listen to and made browsing by topic significantly more difficult. Our low-vision participant, who was also a retired physician, spoke at some length about the difficulties health and research jargon would pose for laypeople.

When possible, language should be simplified to facilitate understanding. Plain language will be included as a requirement in the 2010 508 Refresh.

3.2. SEARCH RESULTS

3.2.1. Complex Layout Table Construction

Priority Rating: Required

The search interface, particularly on the Advanced Search and List Results pages, uses complex layout tables. Layout tables do not create accessibility problems unless they interfere with logical reading or tab orders. In the case of the List Results page, the table should be marked up as a data table and simplified.

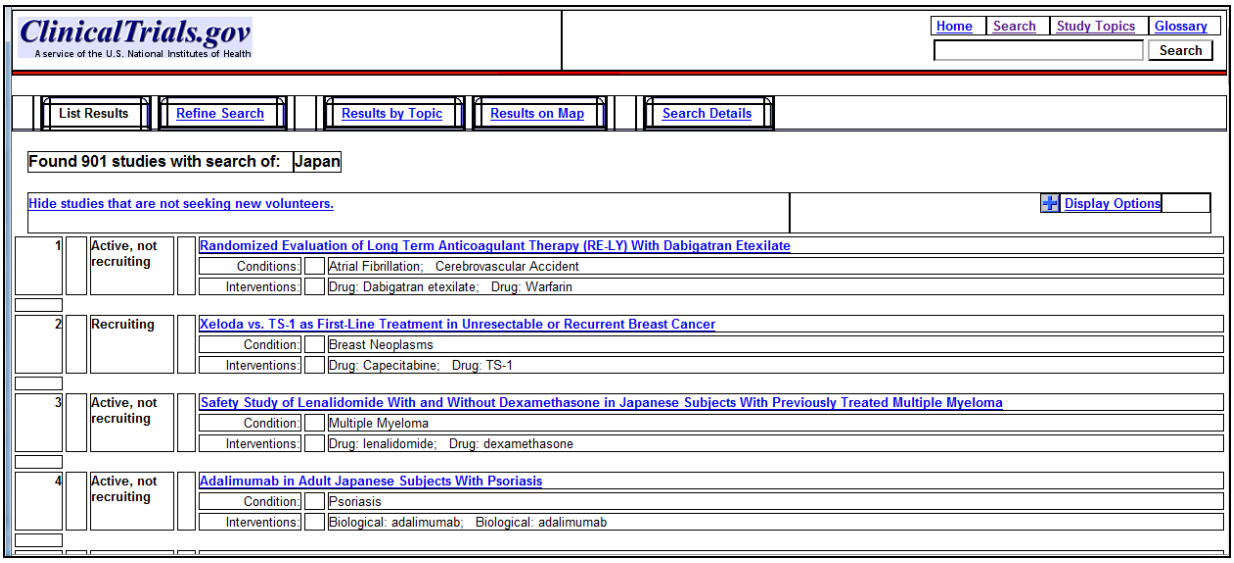


Figure 1. Grid view of List Results page

Although the screen reader can read the content in this table, use of table navigation features is complicated by the many blank and spanned cells that have been inserted and by the table's unorthodox structure.

For example, a single record in this table has been structured as follows:

```
 <tr valign="top">
     <td class="index" rowspan="3" align="left" nowrap>4</td>
  <td class="spacer" rowspan="3"/>
  <td class="header3" rowspan="3" align="left" style="width:10ex">
   <span style="color:  red ">Completed</span>
      </td>
  <td class="spacer" rowspan="3"/>
  <td class="header3" colspan="3" align="left" width="85%"><a title="Show study
NCT00035308: Safety and Efficacy Study of LJP 394 (Abetimus Sodium) to Treat Lupus
Kidney Disease" href="/ct2/show/NCT00035308?term=lupus&amp;rank=4">Safety and
Efficacy Study of LJP 394 (Abetimus Sodium) to Treat Lupus Kidney Disease</a></td>
 </tr>
```

```
<tr valign="top" class="body3">
      <td align="right">Conditions:</td>
      <td class="spacer"/>
   <td align="left" width="75%">Immunologic Diseases;  
Autoimmune Diseases;   Systemic Lupus Erythematosus;  
Lupus Nephritis;   Lupus Glomerulonephritis</td>
 </tr>

   <tr valign="top" class="body3">
      <td align="right">Intervention:</td>
      <td class="spacer"/>
   <td align="left"
width="75%">Drug: Abetimus sodium (LJP 394)</td>
 </tr>
```

When our screen reader user attempted to navigate a record using the arrow keys, he became confused because he could not make sense of the table structure. This was in large part due to the spanned cell in the third column. All the content in the following cells are contained within that spanned TD. Instead of moving across the row as he expected, he ended up in a series of spanned cells (containing title, condition, and intervention). The participant thought he was moving into new columns, when in reality the Conditions and Interventions content was located in the same cell (in terms of visual reading order) as the study title. All the records displayed in the Results List are coded in this way. The table structure is complex and lacks markup that would give users cues to orient themselves.

The table is essentially a data table, but it lacks column and row headers and appropriate associative markup. The user was unable to determine how content below the study title (e.g., Condition, Interventions) related to the study because the cells did not appear to be related in the markup. He could not determine that all the content was in one row because there were a number of spanned cells and no headers. The title itself was also confusing, he said, because the record number (“Show Study NC00519363”) was read before the title (JAWS can be set to prioritize “title” over link text or to prioritize whichever is longest). The titles used jargon he did not understand, which was made even more difficult to decipher by JAWS’s mechanized voice.

Even though all listed results are located in a single table, each result is separated from the others by an empty row that contains a single column, causing the screen reader to announce “end of column” at the end of each result. Instead of moving from cell to cell using table navigation keystrokes, the user must intuit that the table has not ended, move past the shortened empty row, and then move on to the next study row. The screen reader also announces the number of rows in the table. Because the results table is so complex, even when relatively few results are displayed, the screen reader announces a very long table (e.g., “stomach cancer” resulted in a table with more than 200 rows, in response to which our user commented, “Whoa”). This could give an erroneous impression of the number of records listed.

It is worth noting that our screen reading participant did not attempt to use JAWS table navigation keystrokes until the evaluator asked about them, and then he did not remember which keys to use. He instead attempted to move through the tables solely with the arrow keys on the

evaluator's laptop computer. This suggests that users who do not often browse online for tabular data are likely to be more familiar with layout table navigation than data table keystrokes. It is therefore important that these types of tables are constructed as simply as possible to ensure access for the broadest possible audience.

To simplify this table and add basic data table markup, the following modifications must be made:

- Remove empty cells.
- Eliminate spanned cells.
- Locate all record information in the same cell with the study title or move it to a fourth column (the table structure should mirror the reading order of the table).
- Top each column with a column header and scope="col."

If it is not possible to simplify the table structure, NLM must include column headers (i.e., TH) and programmatically associate each cell containing content with a header (using the "id" and "headers" attributes), which would be a Section 508-compliant solution but may not solve all the problems created by the table structure.

Table 1. Simplification of Table Structure To Improve Use with Assistive Technology

Result Number	Study Status	Study Name
1	Active, not recruiting	Randomized Evaluation of Long-Term Anticoagulants Condition: Atrial Fibrillation; cerebrovascular accident Interventions: Drug: Dabigatran etexilate, Warfarin

3.2.2. Scripting

Priority Rating: Strongly Recommended

Section 508 states that scripted page elements must be readable with assistive technology. The List Results page includes a Display Options feature. JAWS can read the form elements in this feature, and it can be operated by keyboard. Once a checkbox is selected, however, the form is automatically submitted. The page refreshes, and focus moves automatically to the top of the page. This is not an expected behavior: users expect to be able to select more than one checkbox before a form is automatically submitted.

For the screen reader user we interviewed, this was an unexpected event. He found it disconcerting to be abruptly brought back to the top of the screen. Due to the difficulties he was having with the results content, he was unable to determine whether the displayed options had actually changed. Because the refresh occurred immediately after he selected the checkbox, he

was unaware that he could make another selection. Because the content at the top of the page had changed, he was unsure that he was on the same page.

To eliminate this problem, we recommend that automatic submission be eliminated. A button should be provided so that users can submit multiple display options at once and so that the page refresh can be delayed until the user expects it.

3.2.3. Display Options Placement

Priority Rating: Strongly Recommended

Our low-vision participant completely ignored the Display Options feature. This was in large part because the link was located at the far right side of the page, where he could not see it without engaging in a significant amount of horizontal scrolling. It took him some time to realize that he was missing content because of the horizontal scrolling issue. Reference links such as "Study Topics" and "Glossary" are not directly related to the operation of the List Results screen and could therefore be placed in a less visible location. The Display Options feature, however, allows users to control the visibility of significant information, so it is important that users see it.

The low-vision users in this study were not using specialized magnification software because their sight was good enough that they were still able to use zoom features in commercial browsers. (It should be noted that this is far more common than use of specialized software,[6] and many low-vision users use a combination of the two.) The problems they experienced, however, would be even more significant for a user who commonly views content at a magnification of 2x or more.

We recommend that features that allow users to control current screen content be placed to the left side of the page so that they will not be missed.

3.2.4. Link Targets

Priority Rating: Strongly Recommended

On the List Results page, "title" attributes have been applied to study titles. Unfortunately, the "title" text for all of them reads the study number before the title (e.g., "Show study Show study NCT00582257: Early Onset and Familial Gastric Cancer Registry"). If the user has set his or her screen reader to read "title" text, the screen reader will read this extended title, which is confusing because many users will not understand what the number means.

[6] Theofanos, M.F. and Redish, J.C., 2005. **"**Helping Low-vision and Other Users with Web Sites That Meet Their Needs: Is One Site for All Feasible?" *Technical Communication*, 52 (1), February, 9–20.

The study title is a far better indication of the link target than the current “title” value. We recommend that NLM remove the “title” attributes or revise them so that the study title precedes the number. It is not necessary to instruct users to “show” the target of a link. The following is an example of our recommendations:

Early Onset and Familial Gastric Cancer Registry

3.3. REFINE SEARCH

3.3.1. Tab Order

Priority Rating: Recommended

In the Advanced Search screen, the tab order is problematic. In most forms, the user expects to tab through all form controls, at which point he or she will have access to buttons for submitting or cancelling data entry. In the Advanced Search screen, however, the **Search** button is placed after the first INPUT element in the page tab order. Because of the way the layout table is structured, users who want to conduct a more specialized search must tab through the **Search** button to enter their criteria and then back up to find it again in order to submit.

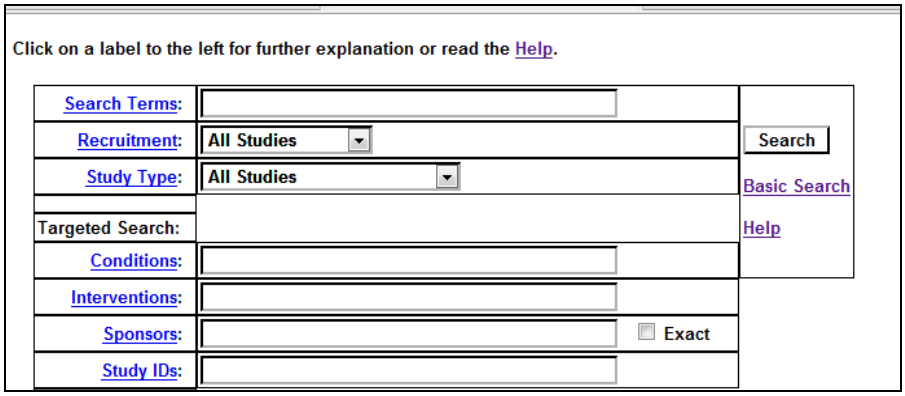


Figure 2. Grid view of Advanced Search page

As figure 2 shows, the **Search** button is located in a TD to the right of the Search Terms INPUT. Tab order follows table structure. If a layout table is present, the tab order will follow the order of table cells, from top to bottom and left to right. Tab order should follow visual reading order or the page’s intended task order.

The placement of the **Search** button appears to be designed so that users can submit their query without having to move through the entire form (a second **Submit** button is placed at the bottom of the page). Since the **Search** button is placed directly after the Search Terms control in terms of tab order, however, the user is encouraged to resubmit his or her original search without exploring the modification options elsewhere on the screen. This can seem counterintuitive because the user visits this page in order to refine his or her search. We recommend that if the

first **Search** button is employed, it should be placed after the top three fields in terms of tab order. The tab and reading order of a page should mirror reading order as it is experienced by sighted users.

3.3.1.1. Form Markup

Priority Rating: Required

As noted earlier in this report, form controls must be explicitly associated with labels in markup. This is particularly important with lengthy forms, such as the Advanced Search screen.

3.4. RESULTS ON MAP

3.4.1. Redundant Map Links

Priority Rating: Recommended

In the Results on Map section of the Web site, the map image at the top of each screen is clickable. Each country is linked to a list of that country's studies. These clickable areas cannot be activated by the keyboard. A table beneath the map provides redundant links to each country for which data exist, but the user must infer that the "Show map for Central America" link, for example, will lead to a page that includes a text list of studies in specific Central American countries. That is not immediately clear from the link text or "title" value, although the "title" does help to communicate the target of each link. Because of this lack of clarity, the user may not understand that by clicking on the "map" links they can drill down into text-based search results. This is particularly relevant because the map feature's instructions have been placed after the Region Name table in terms of page structure—a screen reader user would encounter the instructions after all the other page content.

Compliance requires that redundant text links be provided for map areas and that column headers be marked up with TH in the listings below the map (see the Data Table section for more information on accessible tables). While the design meets the compliance requirement (i.e., redundant text links are present) and usability testing did not produce results related to this feature, streamlining the design so that relationships between maps and text are clearer will improve accessibility and usability for this audience. NLM may also want to review whether the map image contributes to usability and consider switching to text-based geographical browsing.

If the Results on Map feature is maintained, NLM should:

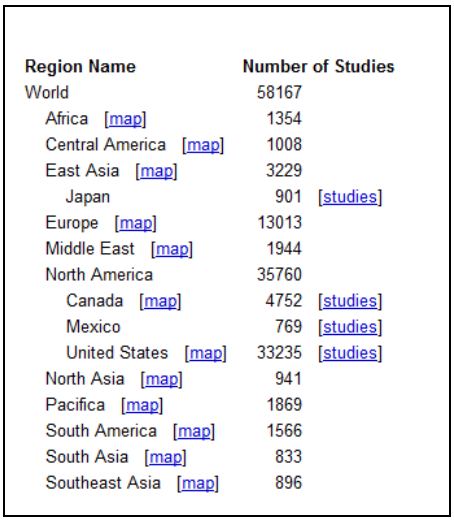
- Place instructions before the map in terms of reading order
- Provide a link to text-based results before the map image and enable users to choose between graphical or text-based geographical browsing, rather than displaying the map as the default

- Clarify link titles so that users understand that the links will result in a list of studies in that area rather than a "map," which implies a graphical result that some users may not think they can access (e.g., "Canadian map and studies list")
- Use data table structure to format text-based regional listings, rather than indicating relationships between regions by presentation (e.g., by indenting country names)

3.4.1.1. Data Table

Priority Rating: Required

In the Map feature, geographical areas are listed in table format. The table is essentially a data table, with column headers and data, yet it is currently marked up as a layout table.



Region Name	Number of Studies	
World	58167	
Africa [map]	1354	
Central America [map]	1008	
East Asia [map]	3229	
Japan	901	[studies]
Europe [map]	13013	
Middle East [map]	1944	
North America	35760	
Canada [map]	4752	[studies]
Mexico	769	[studies]
United States [map]	33235	[studies]
North Asia [map]	941	
Pacifica [map]	1869	
South America [map]	1566	
South Asia [map]	833	
Southeast Asia [map]	896	

Figure 3. Results on Map table

Column headers (i.e., Region Name, Number of Studies) should be marked up with TH.

Where "studies" links are present, a third column appears that does not include a header. Content within the Region Name column is often indented using nonbreaking spaces ( ). The indentation is intended to show relationships between regions and countries, but the relationships are only clear to sighted users. In order for this information to be communicated to all audiences, the data table structure must parallel its visual presentation.

To ensure that relationships between data are clear, we recommend that NLM:

- Include a column header for each column
- Use "id" and "headers" to programmatically associate headers with appropriate cell content

- Use table headers rather than indentation to create relationships between data (e.g., a screen reader would not currently recognize that Japan's studies fall under the East Asia regional header because that relationship is not established in the structural markup)
- Consider eliminating the maps because they do not contribute to the ease of the geographical search's use and they take up a large amount of screen space

The following example demonstrates one way in which this might be achieved:

Table 2: Changing the Table Structure to Reflect Data Relationships

Region	Country	Number of Studies	Lists of Studies	Map Search
World		58167		
Africa		1354		Africa Map
Central America		1008		Central America Map
East Asia		3229		East Asia Map
	Japan	901	Japanese Studies	
Europe		13013		Europe Map
Middle East		1944		Middle East Map
North America		35760		North America Map
	Canada	4752	Canadian Studies	Canada Map
	Mexico	769	Mexican Studies	
	United States	33235	U.S. Studies	U.S. Map

If NLM cannot change the structure of these tables, it must—at minimum—mark up column headers with TH and associate cell content with headers using the "id" and "headers" attributes.

4. NEXT STEPS

Because user testing with assistive technologies was performed before retrofitting occurred, we encountered a number of interface issues that prevented task completion. The screen reader user, for example, was unable to complete all tasks in the script because he had so much difficulty with the List Results screen. We recommend, therefore, that NLM conduct a second round of tests with at least one screen reader user in order to verify that problems with the interface have been corrected. Macro has recruited a second screen reader user who is interested in participating in a future evaluation of the site.

APPENDIX

ACCESSIBILITY CHECKLISTS

CHECKLIST FOR SECTION 508 COMPLIANCE

Guideline	Completion Status (Pass, Fail, NA)
(a) A text equivalent for every nontext element shall be provided (e.g., via “alt,” “longdesc,” or in element content).	Pass
(b) Equivalent alternatives for any multimedia presentation shall be synchronized with the presentation.	NA
(c) Web pages shall be designed so that all information conveyed with color is also available without color, for example from context or markup.	Pass
(d) Documents shall be organized so they are readable without requiring an associated style sheet.	Pass
(e) Redundant text links shall be provided for each active region of a server-side image map.	NA
(f) Client-side image maps shall be provided instead of server-side image maps except where the regions cannot be defined with an available geometric shape.	NA
(g) Row and column headers shall be identified for data tables.	Fail
(h) Markup shall be used to associate data cells and header cells for data tables that have two or more logical levels of row or column headers.	Fail
(i) Frames shall be titled with text that facilitates frame identification and navigation.	NA
(j) Pages shall be designed to avoid causing the screen to flicker with a frequency greater than 2 Hz and lower than 55 Hz.	NA
(k) A text-only page, with equivalent information or functionality, shall be provided to make a Web site comply with the provisions of this part, when compliance cannot be accomplished in any other way. The content of the text-only page shall be updated whenever the primary page changes.	NA
(l) When pages use scripting languages to display content or create interface elements, the information provided by the script shall be identified with functional text that can be read by assistive technology.	Pass
(m) When a Web page requires that an applet, plug-in, or other application be present on the client system to interpret page content, the page must provide a link to a plug-in or applet that complies with § 1194.21 (a)(1-11).	NA
(n) When electronic forms are designed to be completed online, the form shall allow people using assistive technology to access the information, field elements, and functionality required for completion and submission of the form, including all directions and cues.	Fail

Guideline	Completion Status (Pass, Fail, NA)
(o) A method shall be provided that permits users to skip repetitive navigation links.	Fail
(p) When a timed response is required, the user shall be alerted and given sufficient time to indicate that more time is required.	NA

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES (HHS) REQUIREMENTS

HHS guidelines incorporate Section 508 standards and the following additional requirements. This list is not comprehensive, as HHS guidelines also cover presentation issues that do not apply to this review.

Guideline	Completion Status (Pass, Fail, NA)
You must include a link named "Accessibility" from any Web page that may contain known accessibility barriers or that links to information inside your site that may present accessibility problems for users with disabilities (that is, any information that may not be 100-percent compliant with Section 508 standards).	Pass
Provide file types and sizes for downloadable files.	NA