StrokePortal: a Complete Stroke Information Resource Based on Oriental and Western Medicine

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**SYNOPSIS**

Stroke, also called an attack on the brain, is a complex disease that results from the interaction of many genetic and environmental factors. StrokePortal is a comprehensive resource for information on stroke that integrates and provides essential findings regarding stroke pathology, diagnostics, and treatments, based on Oriental and Western medicine. The stroke information was collected from various sources, such as journal articles, books, websites, and news stories, and it was refined, classified, and stored into a relational database system by automatic classification and manual curation. To provide the stored information effectively to users, a specialized retrieval system, based on web interfaces, was implemented. StrokePortal provides cutting-edge information to experts; interested people, including patients and their families; and investigators to broaden their knowledge of effective treatments for patients and offer many preventive measures. It provides a specialized feature with which users can upload their information and opinions to StrokePortal, which will enrich and mature the content even further. StrokePortal is freely accessible at http://genomics.kribb.re.kr/StrokePortal/.

Keywords: stroke, oriental medicine, information resource, treatment, diagnosis
Introduction

Stroke is a leading cause of death, behind cancer, in Korea. It is typically a complex disease that is caused by the interaction of many genetic and environmental factors (Hassan et al., 2005; Braunwald et al., 2001; Toole, 1999). Much research has been performed on the causes and mechanism of stroke (Dichgans, 2007; Carr et al., 2002), and many web resources are being developed to provide investigators with ample stroke-related information (Kim et al., 2010; http://www.strokecenter.org/).

Traditionally, in Korea, a substantial portion of stroke treatment is conducted based on Oriental medicine (Kim et al., 2008; WHO, 2007). Thus, general medicine and Oriental medicine coexist in Korea for stroke treatment and recovery. We introduce StrokePortal, a comprehensive resource of information, to provide essential stroke information, including stroke pathology, diagnostics, and treatments, based on Oriental and Western medicine to experts, patients, and interested people.

Table 1. Information stored and serviced (As of Jun., 2010).

<table>
<thead>
<tr>
<th>Information type</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treatment</td>
<td>142</td>
</tr>
<tr>
<td>Trend in stroke medicine</td>
<td>689</td>
</tr>
<tr>
<td>Cases</td>
<td>98</td>
</tr>
<tr>
<td>Terminologies</td>
<td></td>
</tr>
<tr>
<td>- Oriental Medicine: 350</td>
<td></td>
</tr>
<tr>
<td>- WHO international standard: 3130</td>
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</tbody>
</table>

Result

We developed StrokePortal interfaces using the principles of human–computer interactions, soliciting reactions from biologists in person and on-line. To construct StrokePortal, we collected and extracted over 1000 articles on raw stroke-related information from journals, books, websites, and news stories through pattern matching using regular expressions. The statistics of the information that was stored and serviced as of June 2010 are summarized in Table 1. Through manual curation by experts and a newly developed classification system, the raw information was refined, classified, and stored into the relational database system. The workflow for data processing and system implementation is shown in Figure 1. Not only was expert knowledge for medical investigators stored as information but general, in-common

Figure 2. The user interface of StrokePortal. StrokePortal is freely accessible at http://genomics.kribb.re.kr/StrokePortal/. information for patients and interested people was as well.

To provide the information effectively to users, a specialized retrieval system that was based on web interfaces was implemented (Figure 2) using Zeroboard in PHP; the relational database to store and manage the information was constructed using MySQL. The main windows of StrokePortal consist of menus, including Symptom, Medical News, Definition, and Case & Trend, as shown in Figure 3.


Discussion and Future Work

It is expected that StrokePortal will be a useful resource of information by providing expert information to investigators, releasing treatment information to patients, and supplying information on preventive measures to interested people. Methods that use artificial intelligence (AI), word context, or machine learning (ML) techniques might improve the current system of term identification in StrokePortal (Crass et al., 2007; Hearst et al., 2007). This site will evolve into a more comprehensive information system for stroke by collecting more data and developing in-depth content (Yamamoto et al., 2007). Efforts are underway to incorporate these improvements in future releases of StrokePortal.
Acknowledgments

This work was supported by a grant from the Korea Institute of Oriental Medicine (KIOM, K09200), in part by a grant (KGS2210911) from the KRIIB Research Initiative Program, and in part by a grant from the Korea Research Council of Fundamental Science & Technology (NTM1300711) of the Republic of Korea.

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