

## Development of Web-based Database Management System

Hang-Seok Chang, M.D.,<sup>1)</sup> Ki-Hyun Nam, M.D.,<sup>1)</sup> Jandee Lee, M.D.,<sup>1)</sup> Chi-Young Lim, M.D.,<sup>1)</sup>

Jong Ho Yoon, M.D.,<sup>2)</sup> Jang Hoon Lee, M.D.,<sup>3)</sup> Sung Soo Hwang, M.D.,<sup>3)</sup>

Eun Sung Lee, M.D.,<sup>3)</sup> Soo Nyung Kim, M.D.,<sup>4)</sup> Cheong Soo Park, M.D.<sup>1)</sup>

*Department of Surgery,<sup>1)</sup> Yonsei University College of Medicine, Seoul, Korea*

*Department of Surgery,<sup>2)</sup> Kangdong Sacred Heart Hospital,*

*Hallym University College of Medicine, Seoul, Korea*

*Pix Element Co. Ltd.,<sup>3)</sup> Seoul, Korea*

*Department of Obstetrics and Gynecology,<sup>4)</sup> KonKuk University, College of Medicine, Seoul, Korea*

**Introduction :** The needs of researchers collaborating on clinical studies have brought to the development of various medical database management systems for individual or single institute. However, the characteristic complexity of clinical database has been interfering with the comprehensive entity of data, and most of the database systems were limited to restricted fields for single project or to temporary use. The conventional database system, furthermore, could be provided only to the members of same institute or the users of specific software program in personal computers. The disease entry systems using world wide web (WWW) also have the limitation of fields of information, and the hazard of data spillage. In most of the multi-center projects using WWW entry system, the participants couldn't get or use the data for individual clinical activity. We developed Web-based Database management system for Endocrine Surgery (WeDBES) which can be available for individual clinicians, researchers and institutes, as well as for multi-center projects.

**Methods :** Thirty major diseases in the fields of endocrine surgery were classified as benign and malignant thyroid diseases ; primary, secondary, and tertiary hyperparathyroidism ; cortical and medullary adrenal diseases. The detail information and the risk factors of the diseases were analyzed and encoded. Tables, boxes and elements for all of 30 diseases were selected and encoded. For the project of WeDBES, we used Linux as operating system, My SQL program for relationship database management system, and PHP as tool. For the security of data from break-ins, we adopted password authentication protection, installing firewall, generating unique ID numbers for new data forms for prevention of transmis-

sion the patients' information after fusion of databases for multi-center projects. For tools of the statistical analysis, we adopted a data mining software program developed for medical statistics (dBstat 4.2) and connected to WeDBES by suitable interface program.

**Results :** WeDBES has several characteristics distinguishing from existing database systems ; first, concise and stable data entry system with easy operability, second, maximized accessibility by inviting WWW. Third, the data in WeDBES are mostly creative by the users, so called 'interactive database system', which enables to use the well-organized database as an electronic chart for the patients in clinical settings. Fourth, the individual databases can be combined with agreement of researchers or institutes for specific projects. During a project is proceeding, the data are available for joined users, but the identification or personal information of each patient will not be transmitted. After the project, the databases are separated clearly without any residual effect. Fifth, statistical analysis for any kind of scientific project is available in this system itself. The data can be sorted by required conditions and can be directly used for statistical analysis. With equipment of advanced data mining program conjoint together, even more high grade and sophisticated analysis of data for academic processes in medicine can be easily achieved. In WeDBES, the researchers can easily operate the data for almost all statistical analysis; not only for the ordinary descriptive statistics, but also for the higher statistical analysis such as hypothesis testing, uni- or multivariate analysis, regression analysis, correlation analysis, and survival analysis.

**Conclusion :** WeDBES is secure, stable database system

with easy accessibility and has advantages of user interactive concept. It is suitable for multi-center projects and can be also expandable for national or worldwide projects. The data sorting and the summary reports such as daily, monthly or annual reports can be basically accomplished in this system. Now, more advanced data mining tools for this system are

available, which can make the scientific projects in medicine more comfortable. We believe WeDBS will be one of the most helpful database systems for endocrine surgery, and it can be developed and progressed to the program for other medical fields.