Taiwan Bioinformatics Institute and the GMBD Bioinformatics Core

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Bioinformatics services are crucial to the growth and success of genomic medicine research in Taiwan. The Taiwan Bioinformatics Institute (TBI) is a virtual institute formed by bioinformatics research groups in Taiwan, with the purpose of combining the strengths and efforts of various researchers to establish a national infrastructure that provides state-of-the-art services and R&D in bioinformatics. At present, the members of TBI include the bioinformatics research groups at the National Health Research Institutes (NHRI), National Tsing Hua University (NTHU), National Chiao Tung University (NCTU), and National Cheng Kung University (NCKU). Other bioinformatics groups in Taiwan are welcome to take part in this joint effort.

\textbf{GMBD Bioinformatics Core}

The major operation of the TBI is running the Bioinformatics Core for Genomic Medicine and Biotechnology Development (GMBD Bioinformatics Core), which is a core facility of the National Research Program for Genomics Medicine (NRPGM) sponsored by the National Science Council (NSC), Taiwan. To achieve the goal of establishing an efficient infrastructure, the institute started out by organizing the manpower and expertise of the four bioinformatics research groups into five functional units and one coordination unit, all of which are integrated as a core facility devoted to the development of analytical tools and databases in order to provide services and collaborative research in specific areas in bioinformatics (Fig. 1). The theme of each unit is as listed below:

- Coordination unit: the administration, education and training, and service center of this core
- Unit 1: statistical genetics
- Unit 2: computational proteomics
- Unit 3: comparative genomics and interactomes
- Unit 4: structural bioinformatics
- Unit 5: applied medical genomics

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Besides R&D, the organizations activities can be divided into three groups: web/client server–based services, collaborative research, and training and education. They have established a portal web in which all the tools and databases from the four bioinformatics institutes are pooled together and accessible on one single page. Each unit in this core is very active in carrying out research (including collaborative research) and development as well as providing training and education courses in its specific focus area.

![Fig. 1. The organization of the GMBD Bioinformatics Core. Services are provided by joint efforts from different bioinformatics groups, and a wide spectrum of in-house developed tools and databases are provided to support genomics research.](image)


No less diversified than the field of bioinformatics itself, the web portal provide many in-house tools and databases with some others currently under development.

To name a few, the Genome Profile Database (GPDB) developed by Dr Ping Chiang Lyu's group compares the features of fully sequenced organisms in a graphical and easy-to-read way. The *Helicobacter pylori* protein–protein interaction database (*Lin et al.*, Bioinformatics, 2005) developed by Drs Chao Agnes Hsiung and Chung-Yen Lin's group has successfully predicted the interaction of HP1154 and HP1377 (*Uetz et al.*, *J Bacteriol*, 2006). (PS)2, an automated homology modeling server (*Chen et al.*, *Nucleic Acids Res*, 2006), and CELLO, a multiclass SVM classification system to predict protein subcellular localization (*Yu et al.*, *Protein Sci*, 2004; *Yu et al.*, *Proteins*, 2006) were developed by Dr Jenn Kang Hwang's group. The Tumor Associated Gene (TAG) database and the binding element search tools (BEST) were developed by Dr H. Sunny Sun's group (*Chen et al.*, *Nucleic Acids Res*, 2005). In addition, though not yet an online service, Drs I-Shou Chang and Chao Agnes Hsiung's group have developed a Bayesian approach to array-CGH data analysis (*Wen et al.*, *Stat Appl Genet Mol Biol*, 2006) that compares favorably with the circular binary segmentation (CBS) method of *Olshen et al.* (2004). Last but not least, the online sequence
analysis services provided by the coordination unit are by far the most popular one in Taiwan, and are used in the graduate program teaching laboratories at three local universities.

**Developments and Perspectives**

We believe that developments in both research and service aspects in bioinformatics are essential for the growth of genomic medicine. As the first of its kind in Taiwan, the TBI has formed a union of investigators to make further progress in research and then make these developments available to the research community. The operation of the GMBD Bioinformatics Core and the TBI model of collaboration will continue to meet the challenges in the evolving field of genomics research in order to benefit the research community. Any other bioinformatics research groups are welcome to participate in this TBI joint effort.

List of TBI Members and Research Group Principal Investigators

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